

Impact of Digital Screen Time on Oral Health of children aged 12-15 years of age – Cross Sectional Study

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Abstract

Objectives: To evaluate the association between problematic media use (PMU), screen time, dietary habits, and oral health status among children aged 12–15 years.

Methods: A cross-sectional questionnaire-based study was conducted among 99 children aged 12–15 years. Participants were selected using convenience sampling from the Department of Pediatric Dentistry. Data on problematic media use (PMU), daily screen time, dietary habits, and oral hygiene practices were collected using a pre-validated questionnaire. Clinical oral examinations were performed to assess dental caries using the Decayed, Missing, and Filled Teeth (DMFT) index. Descriptive and inferential statistical analyses were carried out to evaluate associations between PMU, screen time, dietary habits, oral hygiene practices, and oral health outcomes, with statistical significance set at $p < 0.05$.

Results: Most participants (63.6%) had poor PMU. Children with poor PMU reported significantly greater use of electronic devices. Oral hygiene and DMFT scores were slightly poorer in this group, but no significant association was found between PMU and oral health outcomes. Brushing twice daily was the only variable significantly associated with PMU.

Conclusions: Problematic media use was associated with increased screen exposure but not with oral health status or dietary habits after adjustment for confounding factors. Promoting responsible screen use and healthy lifestyle behaviors remains important.

Keywords: Digital screen time, problematic media use, oral health, dental caries, oral hygiene, adolescents

Introduction

Screen time is defined as the amount of time spent using screen-based devices for passive entertainment, including televisions, computers, smartphones, and tablets. With the widespread availability of digital technology, children's exposure to screens has increased substantially, extending even to very young children and infants. This growing reliance on digital media has become a public health concern, as excessive screen use has been linked to a range of adverse psychological, physical, and social outcomes among children^[1, 2].

The widespread use of screen-based devices among children has made it increasingly difficult to ignore their potential impact on health and development. Rapid advances in digital technology over the past decade have significantly changed patterns of device use, with children spending increasing amounts of time on smartphones, tablets, computers, and other electronic devices for both educational and recreational purposes. Recent research indicates that current patterns of device use differ substantially from those observed in earlier studies, highlighting the need for updated evidence on the health implications of excessive screen exposure^[3, 4].

Problematic media use is characterized by persistent and compulsive media related behaviors that can lead to adverse physical, psychological, and social consequences. Increasing media accessibility among children has

contributed to concerns regarding excessive use, which may negatively affect sleep quality, emotional well-being, academic performance, and daily functioning^[5, 6].

Children with prolonged screen exposure frequently exhibit unhealthy dietary habits, including increased consumption of energy-dense, sugary, and fatty foods and inadequate intake of fruits and vegetables. Screen use during meals and frequent snacking while using digital devices may encourage poor nutritional choices and reduce awareness of healthy eating behaviors. Such dietary patterns, together with associated metabolic disturbances, may contribute to an increased risk of dental caries and greater dental plaque accumulation^[7, 8].

Dental caries is recognized by the World Health Organization as a major global public health concern and remains the most prevalent non-communicable disease worldwide. It shares several modifiable risk factors, particularly unhealthy dietary habits and poor oral hygiene practices, with other chronic conditions such as obesity. In children, increased intake of sugary snacks and beverages during screen time, combined with inadequate oral hygiene, may further increase the risk of developing dental caries and poor oral health outcomes^[9, 10].

The present study aims to evaluate the association between screen time, dietary habits, and oral health status among children aged 12–15 years. It also seeks to explore whether increased screen exposure and problematic patterns of

media use may indirectly influence oral health outcomes, particularly dental caries experience and oral hygiene status, through their effects on dietary and behavioural practices.

Methodology

The present study was designed as a cross-sectional, questionnaire-based survey conducted among children aged 12–15 years at the Department of Pediatric Dentistry, M.A. Rangoonwala College of Dental Sciences and Research Centre, Pune. A total of 99 participants were included in the study using a convenience sampling method. Children between 12 and 15 years of age who were present on the day of data collection, provided informed assent, and whose parents or guardians gave written informed consent were eligible for participation. Children with systemic diseases or medical conditions that could affect oral health, those undergoing orthodontic treatment or extensive dental treatment, and participants with incomplete questionnaires or those who refused to participate were excluded from the study.

Data Collection

Data for the present study were collected using a structured and pre-validated questionnaire administered to children aged 12–15 years. Before initiating data collection, the purpose and objectives of the study were explained to the participants and their parents/guardians.

The questionnaire was administered in a supervised setting, and each participant was provided with clear instructions on how to complete it.

We explained every section of the questionnaire in simple and age-appropriate language to ensure that the children clearly understood the meaning of each question before answering.

The questionnaire comprised sections on demographic details and Problematic Media Use (PMU)^[11], dietary habits during screen use, and oral hygiene practices. Information regarding average daily screen time was collected by asking participants about the amount of time spent using electronic devices such as smartphones, tablets, computers, laptops, and televisions for both educational and recreational purposes.

Dietary habits were evaluated by collecting information on the frequency of eating or drinking while using digital devices, and the intake of sugary or sticky foods. Oral hygiene practices, including the frequency of tooth brushing, use of fluoridated toothpaste, and other oral hygiene measures, were also recorded.

Statistical Analysis

The data was obtained and entered in Microsoft excel version 13 Statistical analysis was performed using IBM SPSS version 26.

For continuous variables Mean and SD was obtained and for categorical variables Frequency and percentage. For comparison between PMU category and Device usage and Dietary habits mann whitney u test was applied. For association between variable Binomial Regression analysis was performed.

All the statistical tests were applied keeping confidence interval at 95% and $p < 0.05$ was

Considered to be statistically significant

Categorization of Problematic Media Use (PMU): The total PMU score for each participant was calculated by summing the responses to all items in the questionnaire. The mean PMU score of the study population was used as the reference value for categorization. Participants with PMU scores below the mean were classified as having Good PMU, whereas those with scores equal to or above the mean were classified as having Poor PMU, indicating relatively higher levels of problematic media use behaviour

Result

A total of 99 children participated in the study. Most participants (63.6%) were classified as having poor problematic media use (PMU). Participants with poor PMU generally spent more time using electronic devices, especially mobile phones, televisions, computers, and video games, compared with those with good PMU. Although oral hygiene and DMFT scores were slightly poorer among the poor PMU group, these differences were not statistically significant. Device usage variables such as TV time, computer time, video game time, and phone time showed statistically significant associations with PMU ($p < 0.05$), whereas dietary habits and most oral health parameters did not. Among the variables included in the regression analysis, only brushing twice daily showed a statistically significant association with PMU.

Table1: Descriptive Response of study participants

		PMU Category				P value
		Good		Poor		
Age		Mean	SD	Mean	SD	
		13.69	1.17	13.92	1.07	
		n	%	n	%	
Gender	Male	16	44.4%	25	39.7%	0.645
	Female	20	55.6%	38	60.3%	
Medical condition	No	36	100.0%	63	100.0%	1.000
	Yes	0	0.0%	0	0.0%	
Medications	No	36	100.0%	63	100.0%	1.000
	Yes	0	0.0%	0	0.0%	
Allergies	No	33	91.7%	61	96.8%	0.262
	Yes	3	8.3%	2	3.2%	
Previous Dental Treatment	No	13	36.1%	21	33.3%	0.781
	Yes	23	63.9%	42	66.7%	
Brushing Frequency	Once	26	72.2%	33	52.4%	0.054

	Twice	10	27.8%	30	47.6%	
Fluoridated Toothpaste	No	8	22.2%	14	22.2%	1.000
	Yes	28	77.8%	49	77.8%	
Oral Habits	No Habits	26	72.2%	49	77.8%	0.590
	Tongue Thrusting	0	0.0%	1	1.6%	
	Mouth Breathing	5	13.9%	4	6.3%	
	Nail Biting	5	13.9%	9	14.3%	

P value obtained using Chi-square test. P < 0.05 considered statistically significant.

Table 1 shows

The descriptive characteristics of the study participants were compared between the Good PMU category and Poor PMU category groups.

The study included a total of 99 participants, with 36 participants (36.4%) classified under the Good PMU category and 63 participants (63.6%) under the Poor PMU category.

Table 2: Distribution of oral health indices and comparison with PMU category

	PMU Category				P value
	Good		Poor		
	Mean	SD	Mean	SD	
DI-S	1.49	.82	1.26	.74	0.163
CI-S	1.06	.77	1.08	.82	0.907
OHI-S	2.55	1.13	2.35	1.12	0.392

Table 2 shows

The mean Debris Index-Simplified (DI-S) score was higher in the Good PMU group (1.49 ± 0.82) compared with the Poor PMU group (1.26 ± 0.74). Conversely, the mean Calculus Index-Simplified (CI-S) score was almost identical

between groups, with values of 1.06 ± 0.77 in Good PMU and 1.08 ± 0.82 in Poor PMU groups. The overall Oral Hygiene Index-Simplified (OHI-S) score was slightly higher in the Good PMU category (2.55 ± 1.13) compared with the Poor PMU category (2.35 ± 1.12).

Table 3: Mean Distribution of the DT, MT and DMFT score

	PMU Category	N	Minimum	Maximum	Mean	Std.Deviation	P value
DT	Good	36	.00	4.00	1.97	1.05	0.744
	Poor	63	.00	4.00	2.04	1.12	
MT	Good	36	.00	1.00	.19	.40	0.429
	Poor	63	.00	2.00	.26	.48	
FT	Good	36	.00	4.00	.77	.98	0.244
	Poor	63	.00	4.00	1.06	1.25	
DMFT Total	Good	36	.00	6.00	2.75	1.55	0.225
	Poor	63	.00	6.00	3.15	1.62	

Table 3 shows

When considering the overall DMFT (Decayed, Missing, and Filled Teeth) score, the Good PUM group recorded a mean DMFT score of 2.75 ± 1.56 , with scores ranging from 0 to 6. In contrast, the Poor PUM group demonstrated a higher mean DMFT score of 3.16 ± 1.63 , with the same observed range of 0 to 6.

Table 4: Distribution of Gingival Malocclusion status

		Good PMU		Poor PMU		P value
		n	%	n	%	
Gingival status	Normal	14	38.9%	22	34.9%	0.769
	Mild	12	33.3%	23	36.5%	
	Moderate	10	27.8%	18	28.6%	
Malocclusion	Absent	27	75.0%	40	63.5%	0.241
	Present	9	25.0%	23	36.5%	

P value obtained using Chi-square test. P < 0.05 considered statistically significant.

Table 4 shows: Gingival status evaluation revealed that normal gingival status was observed in 14 participants (38.9%) in the Good PMU category and 22 participants (34.9%) in the Poor PMU category. Mild gingivitis was observed in 33.3% and 36.5% of participants, respectively, whereas moderate gingivitis was present in 27.8% and 28.6%, respectively. The findings demonstrate a similar gingival health pattern across both PMU categories. Regarding malocclusion, absence of malocclusion was more frequent in both groups. Among Good PMU participants, 27 participants (75%) had no malocclusion, whereas 9 participants (25%) had malocclusion. In the Poor PMU category, 40 participants (63.5%) had no malocclusion, while 23 participants (36.5%) had malocclusion, indicating a slightly greater proportion of malocclusion among participants with Poor PMU.

Table 5: Comparison of PMU between Device Usage and Sweet Consumption

		PMU Category				
		Good		Poor		p Value
		n	%	n	%	
TV_Time	No Usage	8	22.2%	3	4.8%	<0.001*
	Less than 1 Hour	18	50.0%	13	20.6%	

Computer Time	1 - 2 Hours	10	27.8%	30	47.6%	<0.001*
	More than 2 Hours	0	0.0%	17	27.0%	
	No Usage	30	83.3%	28	44.4%	
	Less than 1 Hour	2	5.6%	5	7.9%	
	1 - 2 Hours	4	11.1%	29	46.0%	
Tablet Time	More than 2 Hours	0	0.0%	1	1.6%	0.311
	No Usage	28	77.8%	43	68.3%	
	Less than 1 Hour	5	13.9%	12	19.0%	
	1 - 2 Hours	3	8.3%	8	12.7%	
	More than 2 Hours	0	0.0%	0	0.0%	
Video_Game_Time	No Usage	32	88.9%	36	57.1%	<0.001*
	Less than 1 Hour	1	2.8%	1	1.6%	
	1 - 2 Hours	3	8.3%	21	33.3%	
	More than 2 Hours	0	0.0%	5	7.9%	
	No Usage	3	8.3%	0	0.0%	
Phone_Time	Less than 1 Hour	5	13.9%	0	0.0%	<0.001*
	1 - 2 Hours	7	19.4%	9	14.3%	
	More than 2 Hours	21	58.3%	54	85.7%	
	No	16	44.4%	18	28.5%	
	1 - 2 Times/Week	4	11.1%	12	19.0%	
Sugary_Foods_Frequency	3-4 Times/ Week	4	11.1%	9	14.3%	0.187
	Daily	12	33.3%	24	38.1%	
	No	13	36.1%	16	25.4%	
	1 - 2 Times/Week	5	13.9%	10	15.9%	
	3-4 Times/ Week	3	8.3%	15	23.8%	
Sugary_Beverages_Frequency	Daily	15	41.7%	22	34.9%	0.735
	No	14	38.9%	32	50.8%	
	Yes	22	61.1%	31	49.2%	
	No	8	22.2%	24	38.1%	
	Yes	16	44.4%	25	39.7%	
Eat_During_Screen_Use	3.00	6	16.7%	7	11.1%	0.093
	4.00	6	16.7%	7	11.1%	
	No	12	33.3%	31	49.2%	
	Yes	24	66.7%	32	50.8%	
	No	12	33.3%	31	49.2%	
Snack_Between_Meals	Yes	24	66.7%	32	50.8%	0.127
	No	12	33.3%	31	49.2%	
	Yes	24	66.7%	32	50.8%	
	No	12	33.3%	31	49.2%	
	Yes	24	66.7%	32	50.8%	
Eat_After_Night_Brushing	No	12	33.3%	31	49.2%	0.127
	Yes	24	66.7%	32	50.8%	
	No	12	33.3%	31	49.2%	
	Yes	24	66.7%	32	50.8%	
	No	12	33.3%	31	49.2%	

P value obtained using Chi-square test. P < 0.05 considered statistically significant.

Table 5 shows

The association between PMU categorization and electronic device usage patterns was evaluated. Participants with Poor PMU demonstrated greater exposure to screen-based devices compared with those with Good PMU. The details are mentioned in table 5. The overall device usage score was higher in the Poor PMU group (12.24 ± 1.35) compared with the Good PMU group (9.11 ± 0.95),

indicating greater cumulative digital device exposure among participants with Poor PMU. Sugary food consumption patterns showed that daily consumption was common in both groups. Daily sugary food intake was reported among 12 participants (33.3%) in Good PMU and 24 participants (38.1%) in Poor PMU. A higher proportion of participants in the Poor PMU group consumed sugary foods more frequently.

Table 6: Binomial Regression Analysis

						95% Confidence Interval	
Predictor	Estimate	SE	Z	p	Odds ratio	Lower	Upper
Intercept	-2.3389	3.7686	-0.6206	.5348	0.0964	0.0001	155.6112
Age	0.0446	0.2632	0.1696	.8653	1.0457	0.6242	1.7517
Gender	0.0258	0.6421	0.0401	.9680	1.0261	0.2915	3.6123
Previous_Dental_Treatment:							
Yes – No	-0.3464	0.6845	-0.5060	.6128	0.7072	0.1849	2.7054
Brushing_Frequency:							
Twice – Once	1.8021	0.6950	2.5930	.0095*	6.0625	1.5527	23.6713
Fluoridated_Toothpaste:							
Yes – No	0.0184	0.7518	0.0245	.9804	1.0186	0.2334	4.4456
Oral_Habits:							
Tongue Thrusting – No Habits	14.1397	1455.3983	0.0097	.9922	1382972.6249	0.0000	Inf
Mouth Breathing – No Habits	-1.8539	1.1734	-1.5799	.1141	0.1566	0.0157	1.5619
Nail Biting – No Habits	-0.5071	0.9118	-0.5561	.5781	0.6022	0.1008	3.5969
OHI_Interpretation:							
Fair – Poor	0.7464	0.8230	0.9069	.3645	2.1093	0.4203	10.5854
Good – Poor	1.0369	1.1222	0.9239	.3555	2.8204	0.3127	25.4420
DMFT_Total:							

1 – 0	1.7601	1.5217	1.1567	.2474	5.8128	0.2945	114.7214
2 – 0	1.2664	1.2300	1.0296	.3032	3.5480	0.3184	39.5338
3 – 0	0.3253	1.1769	0.2764	.7822	1.3844	0.1379	13.9005
4 – 0	2.1570	1.2974	1.6626	.0964	8.6448	0.6799	109.9174
5 – 0	2.3229	1.3763	1.6878	.0914	10.2052	0.6876	151.4567
6 – 0	1.8458	1.6381	1.1268	.2598	6.3334	0.2554	157.0326
Gingival_Status:							
Mild – Normal	-0.1431	0.7217	-0.1982	.8429	0.8667	0.2106	3.5663
Moderate – Normal	0.5773	0.7625	0.7570	.4490	1.7812	0.3996	7.9395
Malocclusion:							
Present – Absent	1.1252	0.7296	1.5421	.1230	3.0807	0.7372	12.8736
Sugary_Foods_Frequency:							
1 - 2 Times/ Week – Never	1.5009	0.8289	1.8107	.0702	4.4857	0.8836	22.7720
3 - 4 Times/ Week – Never	0.6992	1.0541	0.6633	.5071	2.0121	0.2549	15.8805
Daily – Never	1.0172	0.7501	1.3561	.1751	2.7655	0.6358	12.0296
Sugary_Beverages_Frequency:							
1 - 2 Times/ Week – Never	0.6819	1.0003	0.6817	.4954	1.9777	0.2784	14.0473
3 - 4 Times/ Week – Never	1.4688	1.0840	1.3549	.1754	4.3439	0.5190	36.3595
Daily – Never	0.3350	0.8692	0.3854	.7000	1.3979	0.2545	7.6794
Eat_During_Screen_Use:							
Yes – No	-1.0136	0.6656	-1.5229	.1278	0.3629	0.0985	1.3376
Snack_Between_Meals:							
Once a Day – Never	-0.4817	0.7277	-0.6620	.5080	0.6177	0.1484	2.5716
2 - 3 Times a Day – Never	-0.9019	0.9388	-0.9607	.3367	0.4058	0.0644	2.5551
More than 3 times a Day – Never	-1.0975	0.9906	-1.1079	.2679	0.3337	0.0479	2.3256
Eat_After_Night_Brushing:							
Yes – No	-0.6919	0.6701	-1.0324	.3019	0.5006	0.1346	1.8619

Note. Estimates represent the log odds of "PMU Categorization = Poor" vs. "PMU Categorization = Good"

Table 6 shows: Binary logistic regression analysis was performed to identify factors associated with Poor PMU categorization. The dependent variable was PMU status, with Poor PMU compared against Good PMU as the reference outcome. Among demographic variables, age was not significantly associated with Poor PMU status (OR=1.0457, $p=0.865$). This indicates that increasing age within the studied age range did not significantly alter the likelihood of belonging to the Poor PMU category. Gender also showed no significant association (OR=1.026, $p=0.968$), suggesting that PMU status was independent of gender. Previous dental treatment was not significantly associated with PMU status (OR=0.707, $p=0.613$), indicating that previous dental care experience did not significantly influence PMU categorization. Brushing frequency demonstrated a statistically significant association with PMU category. Participants brushing twice daily had approximately 6 times higher odds of being classified under Poor PMU compared with those brushing once daily (OR=6.06, $p=0.0095$).

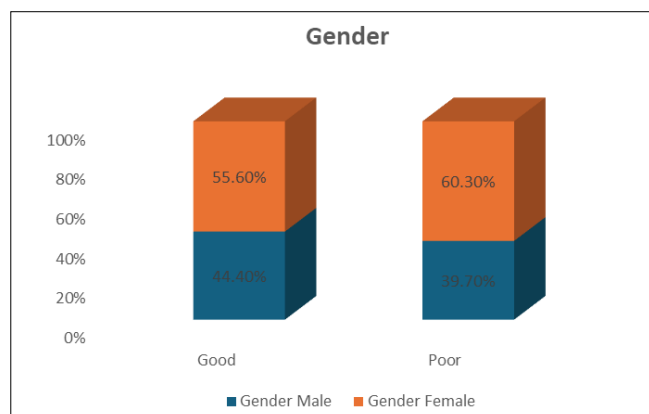
Although this finding appears counterintuitive, it may reflect compensatory brushing behaviour among individuals with existing oral problems or higher oral health awareness. Fluoridated toothpaste use was not associated with PMU categorization (OR=1.018, $p=0.980$), indicating that fluoride toothpaste usage alone did not significantly influence PMU classification. Oral habits including tongue thrusting, mouth breathing, and nail biting were not significant predictors. Mouth breathing showed a tendency toward reduced odds of Poor PMU (OR=0.157, $p=0.114$), although this did not reach statistical significance. OHI-S interpretation was not significantly associated with PMU status. Compared with

poor oral hygiene, fair hygiene showed OR=2.109 ($p=0.365$), and good hygiene showed OR=2.820 ($p=0.356$), suggesting no statistically significant relationship.

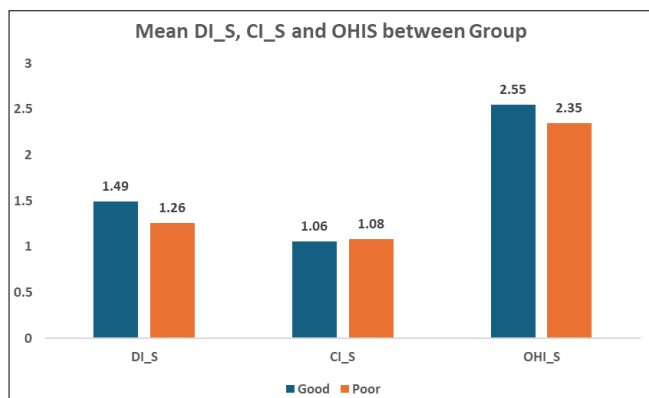
DMFT categories did not demonstrate significant associations with Poor PMU. Although higher DMFT categories showed increased odds, wide confidence intervals and non-significant p -values indicate insufficient evidence of an independent association.

Gingival status was not significantly associated with PMU status. Participants with mild gingivitis had similar odds compared with normal gingival status (OR=0.867, $p=0.843$), while moderate gingivitis showed increased but non-significant odds (OR=1.781, $p=0.449$). Malocclusion showed increased odds of Poor PMU among participants with malocclusion (OR=3.081), but this association was statistically non-significant ($p=0.123$). Dietary variables were not significant predictors. Sugary food consumption showed increased odds among participants consuming sweets 1–2 times/week (OR=4.486, $p=0.070$), indicating a possible trend; however, statistical significance was not achieved. Sugary beverage consumption was also not significantly associated with PMU status. Eating during screen use, snack frequency, and eating after night brushing were not significant predictors of Poor PMU. Eating during screen use demonstrated reduced odds of Poor PMU (OR=0.363, $p=0.128$), while eating after night brushing also showed reduced odds (OR=0.501, $p=0.302$), although neither association was statistically significant. Overall, the regression model indicates that among all evaluated behavioural, clinical, and demographic factors, only brushing frequency showed a statistically significant association with PMU categorization, whereas other

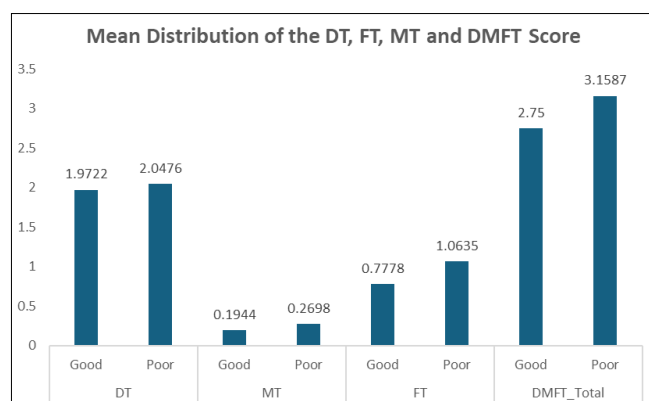
variables including age, gender, oral hygiene, caries experience, gingival status, malocclusion, dietary habits, and screen exposure did not independently predict Poor PMU status.



Graph 1: Gender Distribution According to PMU Status



Graph 2: Mean DI-S, CI-S and OHI-S Scores in Good and Poor PMU Groups



Graph 3: Comparison of Mean DT, MT, FT and DMFT Scores According to PMU Category

Discussion

The present study evaluated the association between problematic media use (PMU), screen time, dietary habits, and oral health status among children. The findings showed that a greater proportion of participants belonged to the Poor PMU category (63.6%) compared with the Good PMU category (36.4%), indicating a high prevalence of problematic media use in the study population. Similar trends have been reported in previous studies, where increasing smartphone dependence among adolescents has

been linked to adverse health and behavioural outcomes [3, 12].

The mean age and gender distribution were comparable between the Good and Poor PMU groups, suggesting that demographic characteristics were not major determinants of PMU in the present study. Logistic regression analysis further confirmed that neither age nor gender was significantly associated with PMU status. Similar observations have been reported by previous investigations conducted by Demirci et al [12], and Sohn et al [6], which found that excessive smartphone use affects children across different age groups and both sexes [12, 6].

No participant reported systemic diseases or medication use, thereby minimizing the influence of medical confounding factors on oral health outcomes. Likewise, allergy history was uncommon and showed no meaningful variation between groups. These findings suggest that behavioural factors rather than systemic health conditions may have contributed more substantially to the observed oral health patterns.

The study demonstrated that fluoridated toothpaste use was almost identical in both PMU groups and was not significantly associated with PMU status. Fluoride toothpaste remains one of the most effective preventive measures against dental caries; however, its benefits depend on regular and appropriate oral hygiene practices rather than usage alone [13].

Interestingly, participants who reported brushing twice daily had significantly greater odds of belonging to the Poor PMU category. Although this finding appears counterintuitive, it may reflect reverse causation, where adolescents with existing oral health concerns become more conscious of oral hygiene and increase their brushing frequency. Similar unexpected associations have been discussed in behavioural health research, emphasizing that self-reported oral hygiene practices do not always correspond to actual oral health outcomes [14].

Assessment of oral hygiene using the Simplified Oral Hygiene Index (OHI-S) revealed predominantly fair oral hygiene status in both groups, with no statistically significant differences between Good and Poor PMU participants. The OHI-S is a well-established epidemiological tool for evaluating oral cleanliness and has been widely applied in population-based studies [15].

The mean DMFT score was slightly higher among participants with Poor PMU, indicating a tendency toward greater caries experience. However, regression analysis did not identify DMFT as an independent predictor of PMU status. Previous studies have suggested that prolonged screen exposure may indirectly increase caries risk through unhealthy dietary habits, reduced physical activity, and irregular oral hygiene practices rather than through direct biological mechanisms [7, 8].

Gingival status and malocclusion also did not show statistically significant associations with PMU status in the present investigation. Although a greater proportion of malocclusion was observed among participants in the Poor PMU group, the relationship was not statistically significant after adjustment for other variables. These findings indicate that PMU alone may not independently influence these clinical parameters.

One of the most notable findings was the significantly greater exposure to digital devices among participants with Poor PMU. Television viewing, computer use, video

gaming, and especially mobile phone use were consistently higher in this group. The cumulative device usage score was also substantially elevated among participants with Poor PMU, supporting previous reports that excessive screen exposure is strongly associated with problematic smartphone behaviour among children^[3, 2]

Dietary assessment showed that sugary food consumption, sugary beverage intake, eating during screen use, snacking between meals, and eating after nighttime brushing were common behaviours in both groups. Although these habits tended to occur more frequently among participants with Poor PMU, none emerged as statistically significant independent predictors in multivariable analysis. Similar observations have been reported by studies indicating that screen time may encourage unhealthy eating behaviours but that multiple environmental and behavioural factors interact to influence oral health outcomes^[8, 7].

Overall, the findings suggest that problematic media use is associated with greater digital device exposure but may not independently predict oral hygiene status, dental caries, gingival health, or dietary practices after adjustment for confounding variables. The significant association observed with brushing frequency should be interpreted cautiously and warrants further investigation through longitudinal studies to clarify causal relationships. Future research involving larger and more diverse populations may provide additional insight into the complex interaction between smartphone use, lifestyle behaviours, and oral health.

Conclusion

Overall, the findings suggest that excessive screen exposure alone may not independently determine oral health outcomes but may contribute indirectly through associated behavioural and lifestyle factors. The increasing use of smartphones and digital devices among adolescents emphasizes the need for integrated health education programs promoting responsible screen use, healthy dietary practices, and optimal oral hygiene behaviours. Future prospective studies with larger and more diverse populations are recommended to establish causal relationships and further clarify the impact of problematic media use on oral health.

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