

Excessive Digital Screen Exposure in Early Childhood: Three Cases of Autism-like Presentation and Implications for Pediatric Dental Care

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Abstract

Background

Excessive digital screen exposure during early childhood has been associated with delayed language acquisition, autism-like behavioural characteristics with developmental and behavioural contributes to communication difficulties and challenges effective dental care.

Case Presentation

This case series describes three young boys aged 2.5–7 years presented with dental pain or caries, with a history of prolonged digital screen exposure (>7-8 hours) beginning within the first year of life. All 3 presented with autism-like developmental features, challenges in communication and required special behavioural modelling in pediatric dental facility. All had delayed speech, poor eye contact and impaired social interaction. Two had previously been diagnosed with ASD and one was referred for developmental assessment. Dental treatment was performed under conscious sedation for the first patient and using behavioural modelling techniques for the third patient, while the second patient underwent oral hygiene training. Counselling regarding appropriate screen-use practices and referred for multidisciplinary management, including developmental evaluation, speech therapy, and occupational therapy were given to the caregiver. At the 6-month follow-up, two children showed improvements in communication and behavioural cooperation during dental care after implementation of screen withdrawal and multidisciplinary intervention.

Conclusion

These cases underscore the important role of pediatric dentists in recognizing early developmental or behavioural changes, educating parents and timely referral for multidisciplinary assessment and intervention along with behavioural management strategies supported comprehensive preventive and curative dental care.

Keywords: Autism spectrum disorder; Screen time; Pediatric dentistry; Behaviour guidance; Early childhood; Case series

1. Introduction

Emerging evidence indicates that excessive screen exposure in the first few years of life may be associated with adverse neurodevelopmental outcomes, including delayed cognitive and language development, impaired social communication, and autism-like behavioural features such as hyperactivity, shortened attention span, irritability, and poor eye contact.¹ Studies found that early exposure of screen leads to neurochemical and anatomical brain changes like reduced melatonin, neurotransmitters deficiency and abnormal changes in grey and white matter. These physiological changes may be correlated with verbal incompetence, aggression, and lack of cognition in such children.¹ In 2018, a Romanian psychologist, Marius Zamfir coined the term ‘virtual autism’ to describe behavioural abnormalities and autism-like symptoms developing from socio affective and sensorimotor deprivation due to excessive screen exposure of 4 hours or more in a day.²

World Health Organization guidelines says that child under 1 year should not be exposed to screen. And there should not be sedentary screen time for 1-2 years and for 2-4years, it should be limited to less than 1 hour per day.³ American academy of paediatrics society guidelines says that no screentime should be allowed to children aged 0-2 years other than video chatting and for 2-5 it should be limited to less than 1 hr per day.⁴

Evidence from a previous systematic review shows that excessive passive screen time, such as TV, mobile phone impacts on cognitive and social skills especially on attention, memory, and emotional regulation.⁵ The most

important factors associated with child's screen exposure were parental screen use, lack of screen limit rules by parents, low parental education and early unsupervised access to screen.^{6,7}

Despite growing evidence linking excessive digital screen exposure with developmental and behavioural difficulties in young children, there is limited literature describing its implications for pediatric dental practice. This case series highlights an emerging intersection between excessive early digital screen exposure, autism-like developmental presentations, and pediatric dental practice. As digital media use among young children continues to increase globally, pediatric dentists are increasingly likely to encounter children with developmental and behavioural concerns during routine dental care. These underscore the importance of obtaining real world evidence on recognizing early developmental red flags in dental setup, and on facilitating timely multidisciplinary referral as well as on the effective behavioural management techniques in such patient.

This study aims to describe the parental factors, behavioural presentation, screen exposure history, dental management challenges and effective behavioural approaches in children with excessive early screen exposure presenting with autism-like developmental features presenting for dental treatment and to report their behavioural outcomes following multidisciplinary intervention.

Case Presentation

A prospective observational case series was undertaken to describe the clinical presentation, dental management, and six-month outcomes of three children with excessive early digital screen exposure and autism-like developmental features. This case series has been prepared in accordance with the CARE (CAse REport) reporting guideline (CARE Checklist (<https://www.care-statement.org/> ; used with minor modification).⁸ The completed CARE checklist is provided as Supplementary File 1.

Three male children aged 2.5, 3 and 7 years presented to the Department of Pediatric Dentistry of KMCT Dental College in Kerala with dental pain or untreated dental caries requiring comprehensive dental care.

Demographic and clinical characteristics are summarized in Table. 1

Case 1

A 7-year-old boy presented with dental pain. The primary caregiver was the mother, family interaction was poor, and sleep routine was reported as normal. His mother was 37 years old, employed in healthcare, and the child was the only offspring. Dental examination revealed symptomatic dental caries (dmft = 5; plaque score = 0), and the child demonstrated positive behaviour on the Frankl Behaviour Rating Scale. (See Table 1 for patient information)

He had been exposed to smartphone-based entertainment from 1 year of age, averaging 8 hours/day, with screen use during feeding and before sleep. Withdrawal symptoms were reported when screen access was restricted. (See table 1 for screen exposure history) The child demonstrated delayed speech, poor eye contact, absent response to name, poor social interaction, and absence of pretend play without repetitive behaviours. He had previously undergone psychiatric assessment and had been diagnosed with ASD at the age of four years. (See Table 2 for behavioural characteristics) Images of treatment attached as Figure 2 and 3

Conventional behaviour guidance techniques, including Tell–Show–Do, desensitization, and positive reinforcement, were unsuccessful. Pulpotomy of tooth 74 was therefore completed under conscious sedation, while play-based strategies facilitated rapport during subsequent visits. Caregivers received counselling on oral hygiene, dietary modification, caries prevention, screen withdrawal, and continuation of speech and occupational therapy. At the 6-month follow-up, improvements in eye contact, expressive language, and cooperation during dental visits were observed. (See Table 3 for Management and follow up information)

Case 2

A 2.5-year-old boy presented with dental caries. The child was primarily cared for by his grandmother, family interaction was poor, and the family belonged to an average socioeconomic background. Dental examination showed early childhood caries (dmft = 3; plaque score = 0), and the child demonstrated definitely negative behaviour on the Frankl scale.

Smartphone exposure had begun at 6 months of age, averaging 7 hours/day, primarily for entertainment during feeding and before bedtime. Withdrawal symptoms were present. Developmentally, the child exhibited delayed speech, poor eye contact, absent response to name, limited social interaction, and no pretend play. Formal developmental assessment had not previously been performed, although the behavioural profile raised concerns for an underlying neurodevelopmental disorder.

Preventive dental counselling was provided. No dental treatment was required in this visit. Desensitization was effective and improved attention for teaching brushing techniques. Following dental evaluation, the family was counselled regarding oral hygiene, dietary practices, caries prevention, reduction of screen exposure, and the need for comprehensive developmental assessment together with speech and occupational therapy. At the 6-month follow-up, improvements in eye contact and language were noted, although cooperation during dental visits remained limited.

Case 3

A 3-year-old boy presented with dental pain requiring comprehensive dental rehabilitation. The child was primarily cared for by his grandparents, with poor family interaction despite a normal sleep routine. Dental examination demonstrated symptomatic dental caries (dmft = 4; plaque score = 1), and the child exhibited positive behaviour on the Frankl scale.

Screen exposure had commenced at 8 months of age, with combined smartphone and television use averaging 8 hours/day. Screen viewing routinely occurred during meals and before sleep, and withdrawal symptoms were reported. Developmental assessment revealed delayed speech, poor eye contact, absent response to name, poor social interaction, and absence of pretend play without repetitive behaviours. The child had previously been diagnosed with ASD at the age of three years.

Tell–Show–Do and desensitization were ineffective. The child underwent full-mouth rehabilitation using individualized behaviour management strategies, together with preventive dental counselling. Positive reinforcement strategies using phone and games were found effective. (See Figure 4) Caregivers received education regarding oral hygiene, dietary counselling, caries prevention, screen withdrawal, and continuation of multidisciplinary developmental therapy, including speech and occupational therapy. At the 6-month follow-up, minimal improvement in eye contact, language, or cooperation during dental visits was observed despite ongoing therapy.

Table 1: Patient characteristics

	Case 1	Case 2	Case 3
Patient profile			
Age	7	2.5	3
Sex	M	M	M
Chief complaint	Pain	Decay	Pain
Maternal factors			
Maternal age	37	20	35
Education	Degree	Tenth	Plus two
Working status	Employed	Unemployed	Unemployed
Occupation	Healthcare	Housewife	Housewife
Pregnancy history	Single child	Single child	4 th child
Screen use during feeding	Yes	Yes	Yes
Primary caregiver	Mother	Grandmother	Grandparents
Family interaction	Poor	Poor	Poor
Sleep routine	Normal	Normal	Normal
Socioeconomic status	Good	Average	Average
Dental findings			
Dmft score	5	3	4
Plaque score	0	0	1
Diet	Less sugar intake	Sugary diet	Sugary diet
Oral habits	No	No	No
Screen Exposure history			
Age of first exposure	1 year	6 months	8 months

Hours/day	8 hr/day	7hr/day	8hr/day
Television	No	No	Yes
Smartphone	Yes	Yes	Yes
Meals with screen	Yes	Yes	Yes
Sleep with screen	Yes	Yes	Yes
Educational vs entertainment	Entertainment	Entertainment	Entertainment
Withdrawal symptoms	Present	Present	Present

Table 2: Developmental and behavioural characteristics

Behavioural history			
Frankl scale	Positive	Negative	Positive
Speech	Delayed	Delayed	Delayed
Eye contact	Poor	Poor	Poor
Pretend play	No	No	No
Response to name	No	No	No
Social interaction	Poor	Poor	Poor
Repetitive behaviour	No	No	No

Table 3: Patient management and follow up

Behavioural assessment			
Psychiatric assessment for ASD done previously	Yes	No	Yes
Diagnosed with ASD	Yes	Not assessed	Yes
Age of diagnosis	4	2.5	3
Dental management			
Dental treatment undergone, if any	Pulpectomy of 74	Preventive counselling	Full mouth rehabilitation
Dental Preventive counselling	Done	Done	Done
Tell-Show-Do	Not effective	NA	Not Effective
Desensitization	Not effective		Not Effective
Positive reinforcement	Not effective		Effective (Phone)
Conscious sedation	Effective		-
Games	Effective		Effective (Phone)
Intervention			
Advised Developmental assessment	Already assessed and diagnosed	Yes	Already assessed and diagnosed
Advised Screen withdrawal	Already undergoing therapy	Yes	Yes
Advised Speech therapy	Already undergoing therapy	Yes	Yes
Advised Occupational therapy	Already undergoing therapy	Yes	Yes
Outcome			
Follow-up Time	6 months	6 months	6 months
Improved eye contact	Yes	Yes	No
Improved language	Yes	Yes	No

Better cooperation during dental visits	Yes	No	No
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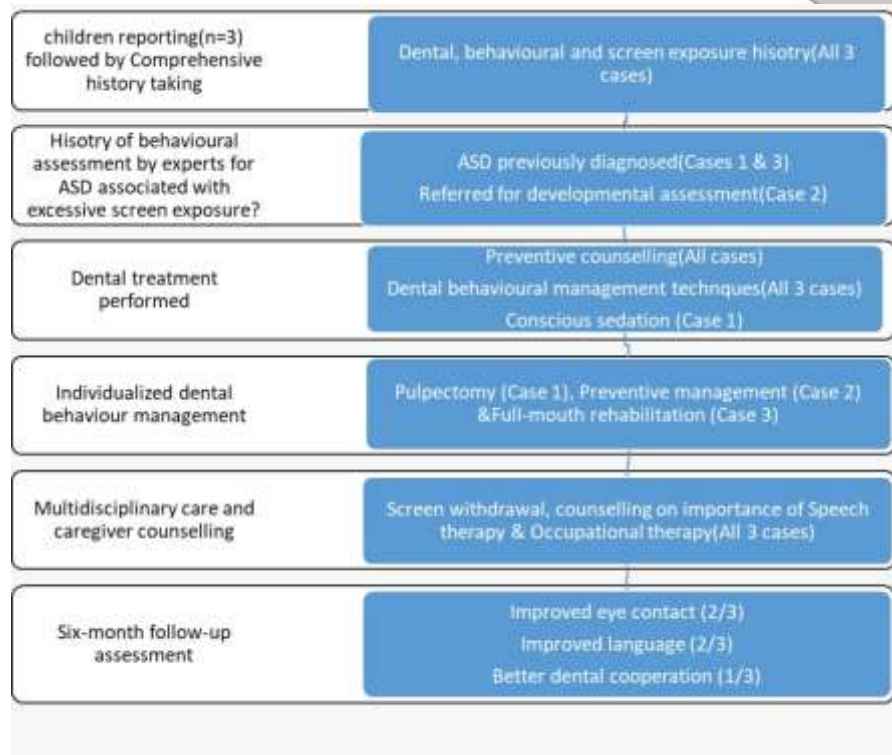


Figure 1 Clinical timeline and management pathway of three children with excessive early digital screen exposure and autism-like developmental presentation



Figure 2. Attempting treatment for case 1 using conventional behavioural management



Figure 3 Treatment under conscious sedation for case 1



Figure 2 Behavioural modelling of case 3 for dental treatment

DISCUSSION

This prospective case series highlights the challenges of providing dental care for children presenting with prolonged early digital screen exposure and autism-like developmental features, while demonstrating the value of individualized behaviour guidance integrated with multidisciplinary.

The first five years of life constitute a critical period of neurodevelopment, during which language acquisition, executive functioning, emotional regulation, and social communication are highly dependent on responsive caregiver–child interactions and environmental stimulation. Screen exposure may displace opportunities for reciprocal communication and social engagement that are critical for language acquisition and socio-emotional development.^{2,9} Consequently, international organizations, including the World Health Organization and the American Academy of Pediatrics (AAP), recommend minimizing sedentary screen exposure during infancy and limiting recreational screen use during the preschool years while promoting active play, adequate sleep, and reciprocal social interaction.^{3,4,10} Despite these recommendations, screen exposure during early childhood has increased substantially worldwide, making it an emerging public health concern.

Although two children had established ASD diagnoses before presentation, one child had not undergone developmental evaluation despite demonstrating similar behavioural characteristics. The dental visit therefore was an important opportunity for recognition of developmental abnormalities and referral for multidisciplinary assessment. A cross sectional study conducted among 95 5-8 year children had shown that electronic screen exposure time may be associated with dental anxiety and behavioural management problem in dental setting.⁷ These cases also highlight the increasing role of pediatric dentists in identifying children with developmental concerns. During routine dental visits, clinicians frequently observe behaviours such as poor eye contact, delayed communication, limited social engagement, and difficulty following instructions. Recognition of these findings, together with careful developmental history including digital media exposure, may facilitate earlier referral for developmental assessment.¹¹

All children in this series had prolonged daily screen exposure beginning during infancy, substantially exceeding current recommendations. They also demonstrated delayed language development, poor eye contact, reduced social engagement, behavioural dysregulation, and difficulties cooperating during dental treatment. These observations are consistent with an expanding body of epidemiological evidence demonstrating associations between excessive early screen exposure and adverse developmental outcomes, including delayed expressive language, impaired executive functioning, poorer social communication, attention difficulties, behavioural problems, and autism-like developmental presentations, sometimes described in the literature as "virtual autism".² Recent systematic reviews and meta-analyses have concluded that although these associations are consistent, the evidence remains predominantly observational and is limited by residual confounding, reverse causation, and heterogeneity in the

measurement of both screen exposure and developmental outcomes. Accordingly, excessive screen exposure should not be interpreted as a causal factor for autism spectrum disorder but rather as a potentially modifiable environmental exposure that may coexist with or exacerbate developmental vulnerabilities.^{1,9} Rather than adopting the term "virtual autism," which may inadvertently imply a causal role for excessive screen exposure in the development of autism spectrum disorder, we recommend using terminology such as screen-related developmental delay or screen-associated autism-like features. These terms better acknowledge the observed association while recognizing that ASD is a multifactorial neurodevelopmental disorder.¹²

The individualized management approaches adopted in the present cases including behaviour shaping, modelling, repeated desensitization, caregiver participation, structured oral hygiene education, and conscious sedation when clinically indicated enabled successful completion of dental treatment. Furthermore, improved cooperation during subsequent dental visits following multidisciplinary developmental intervention suggests that behavioural management in pediatric dentistry should extend beyond procedural techniques to include recognition and management of underlying developmental conditions. This approach aligns with current recommendations from the American Academy of Pediatric Dentistry and the International Association of Paediatric Dentistry, both of which advocate individualized, patient-centred behaviour guidance integrated with comprehensive assessment of developmental and psychosocial needs.¹³ An important finding of the present study is the impact of developmental and behavioural characteristics on the provision of dental care.

Notably, all three children demonstrated improvements in language, adaptive behaviour, eye contact, and cooperation during dental treatment after six months of multidisciplinary intervention. The improvements observed during follow-up are likely to reflect the combined effects of multidisciplinary developmental intervention, caregiver engagement, environmental modification, individualized behaviour guidance, and ongoing dental care rather than any single intervention. This interpretation is consistent with current evidence demonstrating that individualized behavioural strategies, caregiver participation, environmental adaptations, and interdisciplinary approaches improve cooperation, reduce anxiety, and facilitate successful dental care for children with autism spectrum disorder. Therefore, the findings of this case series should be interpreted as illustrating the potential benefits of coordinated multidisciplinary management rather than the independent effect of screen withdrawal alone.^{14,15}

Pediatric dentists are among the first healthcare professionals to have repeated contact with young children through routine preventive visits and early childhood oral health programs. Consequently, they may encounter children with previously unrecognized developmental or behavioural concerns before a formal diagnosis is established. Children with autism-like developmental presentations often exhibit behavioural characteristics such as poor eye contact, delayed speech, sensory sensitivities, repetitive behaviours, hyperactivity, and difficulty following instructions, all of which can complicate dental examination and treatment. Therefore, pediatric dentists should maintain a high index of suspicion when these developmental and behavioural features coexist, particularly in children with a history of prolonged screen exposure.¹⁶ Early recognition, parental counselling regarding healthy media habits, and timely referral for comprehensive developmental assessment and multidisciplinary intervention, together with individualized behaviour guidance and preventive oral healthcare, may contribute to improved developmental and oral health outcomes.⁹

The strengths of this case series include the detailed characterization of parental factors, early-life screen exposure patterns, developmental and behavioural characteristics, individualized dental behaviour management strategies, and six-month clinical follow-up. The inclusion of children at different stages of developmental assessment, including one identified during dental evaluation, further highlights the potential role of pediatric dentists in facilitating early multidisciplinary referral. Unlike previous observational studies that primarily evaluated developmental outcomes associated with screen exposure, this case series provides a detailed description of screen exposure history, parental factors, behavioural characteristics, challenges encountered during pediatric dental care, individualized behaviour management strategies, and short-term outcomes following multidisciplinary intervention, thereby highlighting the potential role of pediatric dentists in early recognition of developmental and behavioural concerns and facilitating timely multidisciplinary referral.¹³

This study has several limitations. First, the small sample size limits the generalizability of the findings. Second, the observational design precludes any inference of causality between excessive early screen exposure and autism-like developmental presentations. ASD is a multifactorial neurodevelopmental disorder, and prolonged screen exposure should be regarded as a potentially modifiable environmental exposure that may coexist with or exacerbate

developmental vulnerabilities rather than an established causal factor. Finally, the relatively short follow-up period did not allow assessment of long-term developmental or oral health outcomes. Future prospective longitudinal studies using standardized developmental assessments, objective measures of screen exposure, and robust epidemiological methods are needed to clarify these associations.⁹

In summary, this case series illustrates the challenges of managing children with ASD in dental clinic as well as the effective behavioural modelling strategies for effective management of the patients. This case series underscores the importance of integrating developmental surveillance into routine pediatric dental practice and strengthening interdisciplinary collaboration with paediatricians, developmental specialists, speech therapists, and occupational therapists. Familiarity with the common developmental and behavioural presentations of early childhood is essential for pediatric dentists, enabling the recognition of behavioural features that are disproportionate to the child's developmental age and warrant further developmental evaluation. Identification of such warning signs should prompt appropriate parental counselling and timely referral for comprehensive developmental evaluation and multidisciplinary management. This may facilitate improved developmental outcomes while enabling the delivery of individualized, behaviour-guided dental care and optimizing oral health outcomes.

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Disclosures

Human subjects: Informed consent for treatment, taking images and open access publication was obtained or waived by all participants in this study.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work.

Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

Author Contributions

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All authors read and approved the final manuscript.

ANNEXURES: SUPPLEMENTARY TABLES

Supplementary table S1. CARE Checklist for "Excessive Digital Screen Exposure in Early Childhood: Three Cases of Autism-like Presentation and Implications for Pediatric Dental Care"(https://www.care-statement.org/; used with minor modification))

No.	CARE Item	Question	Reported (Yes/No)	Manuscript Section
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1	Title	Does the title identify the manuscript as a case series and describe the condition/intervention of interest?	✓	Title
2	Keywords	Are 3–6 relevant keywords provided?	✓	Keywords
3	Abstract	Does the abstract summarize the background, cases, intervention, outcomes, and clinical relevance?	✓	Abstract
4	Introduction	Is the rationale for reporting these cases clearly described with relevant literature?	✓	Introduction
5	Patient Information	Are demographic details, presenting complaints, developmental history, and relevant parental/screen exposure history reported for each case?	✓	Case Series
6	Clinical Findings	Are the important developmental, behavioural, and dental findings described?	✓	Case Series
7	Timeline	Is a timeline summarizing the clinical course of the cases provided?	✓	Figure 1
8	Diagnostic Assessment	Are diagnostic methods, assessments, referrals, and diagnostic challenges described?	✓	Case Series
9	Therapeutic Intervention	Are dental procedures, behaviour management strategies, caregiver counselling, and multidisciplinary interventions described?	✓	Case Series
10	Follow-up and Outcomes	Are follow-up findings and clinical outcomes reported for each case?	✓	Follow-up
11	Discussion	Are the principal findings interpreted in the context of existing evidence?	✓	Discussion
12	Strengths and Limitations	Are the strengths and limitations of the case series discussed?	✓	Discussion
13	Clinical Implications	Are the implications for clinical practice and future research described?	✓	Discussion
14	Patient Perspective	Has the patient/caregiver perspective been included, or has its absence been stated?	Absence stated	Not applicable
15	Informed Consent	Has written informed consent for publication been obtained?	✓	Ethics Statement

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