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Review Article

Screen-based media and verbal communication in toddlers with autism: a narrative review of content specific impacts

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ABSTRACT

Autism spectrum disorder (ASD) is a neurodevelopmental disorder increasingly diagnosed in early childhood. Concurrently, screen time exposure among young children has risen, prompting global concern. Understanding the potential association between early screen exposure and ASD risk is vital for informing parental guidance and policy. A narrative review was conducted using electronic databases including PubMed, Scopus, and Google Scholar. Studies published between 2010 and 2024 that assessed screen time exposure in children under five and its association with ASD or ASD-like symptoms were included. The review considered observational studies, meta-analyses, and systematic reviews. Socio-economic status, parental education, and urban-rural differences were evaluated as confounding factors where data allowed. Most studies indicated a potential association between excessive screen time (particularly passive screen use beyond 2 hours per day) and ASD-like symptoms or delayed verbal communication in children under five. However, the evidence remains inconclusive due to variability in study designs and measurement tools. Socio-economic background emerged as a significant moderator, with children from lower-income families showing higher screen exposure and reduced interactive parenting. While excessive screen time may be associated with ASD-related developmental concerns, causality cannot be established due to potential confounders. Public health interventions should focus on promoting balanced screen use and parent-child interaction, especially in socio-economically disadvantaged settings. Further longitudinal research is needed to clarify causation and guide early intervention strategies.

Keywords: Autism, Screen time, Verbal communication, Toddlers, Digital media, Content analysis

INTRODUCTION

Autism spectrum disorders (ASD) are a broad set of conditions which are distinguished by some level of difficulties in social engagement and communication. Other features include aberrant patterns of activities and behaviors, such as difficulty transitioning from one activity to another, a preoccupation with minutiae, and unexpected reactions to sensations.[1] ASD affects around one out of every 100 children worldwide. Prevalence estimates increasing trends of ASD over time and significant variation inside and across sociodemographic groups.[2] There is more than one etiology of ASD. A variety of factors, including environmental, biologic, and genetic, have been identified as potentially increasing a child's risk of developing ASD. Although research has been limited about what causes ASD, the existing studies suggest that having a sibling with autism, Having certain genetic or chromosomal abnormalities, such as fragile X syndrome or tuberous sclerosis, having health issues during pregnancy and birth, and being born to older parents are more likely to suffer from this condition.[3] Autism prevalence in India has been gradually increasing.

According to a 2021 study published in the Indian journal of pediatrics, autism is predicted to affect approximately one out of every 68 children in India. With boys being affected more than females, with a male-to-female ratio of around 3:1.[4]

ONSET

ASD begins at the age of three and may continue a person's entire life, however symptoms may vary over time. Some children exhibit ASD symptoms within their first 12 months of life. In others, symptoms may not appear until 24 months of age or later. Some children with ASD learn new skills and reach developmental milestones until they are about 18 to 24 months old, at which point they cease learning new skills or lose those they already have.[3]

VERBAL COMMUNICATION CHALLENGES IN TODDLERS

Speech and language development have been the most frequently reported early concerns among parents of children with ASD, and, in addition to other behavioral indications such as restricted/repetitive activities and socio-emotional responses, can be identified in the second year of life.[5]

Some children with ASD may be unable to communicate through speech or language, while others may have poor speaking skills. Others may have extensive vocabulary and be able to discuss specific topics in great detail. Many struggles with the meaning and rhythm of words and sentences. Children might exhibit rigid or repetitive language, narrow interest, uneven language development or poor non-verbal communication skills.[6]

The DSM-5 diagnostic criteria for ASD include three specific problems in social communication and interactions. To be diagnosed with autism, an individual must meet all three of the following criteria: Difficulties with social emotional reciprocity, such as difficulty approaching others, conversing back and forth, sharing interests, and expressing/understanding feelings. Difficulties with nonverbal communication utilized for social interaction, such as aberrant eye contact and body language, as well as difficulty knowing how to use nonverbal communication, such as facial expressions or gestures. Difficulties in nonverbal communication used for social interaction, such as abnormal eye contact and body language, as well as confusion about how to use nonverbal communication, such as facial expressions or gestures.[7]

These verbal communication problems pose significant hurdles to social development and learning, necessitating effective early treatments. Understanding how various types of screen-based information can help or impede verbal development is critical for making evidence-based recommendations to families and clinicians.

GROWING USE OF DIGITAL MEDIA AMONG YOUNG CHILDREN, INCLUDING THOSE WITH AUTISM

A substantial number (68%) of children under the age of three watch television, DVDs, and play video games on a daily basis.[8] Indian research reveal that screen-based media exposure begins as early as 2 months of age, with a median age of 10 months. By 18 months of age, most children are exposed to screen-based media, with smartphones accounting for 96% of screen time and television for 89%. Nearly 65% of families watch television during supper.[9] The world health organisation and Indian academy of paediatrics recommends that children under 2 years old should not be exposed to any screen. For children aged 24-59 months, limit screen usage to 1 hour per day, with each session lasting no more than 20-30 minutes.[10,11] A study discovered that the longer the child was exposed to screens, the greater the risk of developing ASD. Furthermore, children who are exposed to screens sooner are more likely to acquire ASD than children who are exposed later.[12] Research on the association between screen time and behavior in ASD children suggests that children who are exposed to electronic displays for more than three hours per day have language delay, attention deficit, and hyperactivity difficulties.[13]

Given the prevalence of screen-based media and rising evidence of its possible developmental effects, knowing the complex consequences of different types of digital information becomes critical, particularly for children with ASD, who may perceive and engage with media differently.

RATIONALE FOR EXAMINING CONTENT TYPES BEYOND SCREEN TIME DURATION

Limitations of screen time metrics

Traditional approaches to understanding digital media's impact have predominantly focused on quantitative screen time measurements. However, this approach fails to capture the nuanced developmental implications of different content types. Children with ASD interact with digital media in uniquely complex ways that cannot be adequately understood through simple duration metrics.

Content-specific developmental mechanisms

Different screen content types potentially activate distinct cognitive and linguistic processing pathways: Educational programs may provide structured language models. Interactive applications offer contingent, personalized learning experiences. Passive viewing might have fundamentally different neurological engagement patterns

Developmental theories, particularly social learning and information processing frameworks, suggest that content characteristics-not just exposure time-critically influence

cognitive and communication skill acquisition in neurodevelopmental contexts.[14]

This narrative review aims to systematically analyze how varied screen-based content types differentially impact verbal communication skills in toddlers with ASD.

Broader significance

Address critical gaps in understanding digital media's developmental role. Provide evidence-based guidance for clinicians, educators, and families. Develop nuanced recommendations beyond generic screen time guidelines. Contribute to emerging interdisciplinary research connecting technology, developmental psychology, and autism interventions.

RESEARCH QUESTIONS AND SPECIFIC AIMS

Central research question

How do different types of screen-based content (educational programs, interactive applications, passive viewing) differentially impact verbal communication skills in toddlers with ASD?

Specific research aims

Critically examine existing literature on screen content types and their linguistic developmental outcomes. Identify specific content features that potentially support or hinder verbal communication in toddlers with ASD.

Synthesize evidence regarding the differential impacts of various digital media content types. Develop a conceptual framework for understanding content-specific developmental mechanisms. Highlight methodological limitations in current research and propose future investigation strategies

METHODOLOGICAL APPROACH

The literature search was conducted across multiple electronic databases to ensure comprehensive coverage of relevant research. Primary databases included-PubMed/MEDLINE, PsycINFO, SCOPUS, Web of Science, CINAHL (Cumulative index to nursing and allied health literature) and ERIC (Education resources information center). Multiple combinations of medical subject headings (MeSH) and keywords were employed to search relevant articles-ASD, toddlers/early childhood, screen time, digital media, verbal communication, language development, interactive applications, educational programs and passive viewing.

Comprehensive search was conducted covering literature from January 2010 to December 2024 and focused on recent research to capture evolving digital media landscape.

Inclusion criteria

The following criteria were systematically applied to select studies: Peer-reviewed empirical research, studies focusing on children aged 18-36 months, diagnosed ASD, English-language publications, quantitative studies examining screen content impacts, empirical research with clear methodological descriptions and studies addressing verbal communication outcomes.

Exclusion criteria

Studies were excluded if they: Lacked formal autism diagnosis, were not in English, did not provide specific verbal communication outcomes, were case studies or purely theoretical papers, focused exclusively on screen time without content analysis and had methodological limitations compromising data reliability.

FRAMEWORK FOR CATEGORIZING SCREEN CONTENT TYPES

A three-dimensional classification framework was created to analyze the impact of screen-based information on verbal communication abilities in toddlers with autism. This paradigm categorizes information according to kind, interaction modality, and developmental design in order to reflect the intricacies of digital media consumption. The first component, content type, distinguishes between structured learning events and unstructured or solely observational content. The second component, interaction modality, categorizes engagement patterns such as touch-based interactions, voice-responsive content, passive observation, and guided learning experiences to assess how different forms of interaction affect language development. The final dimension, developmental design, distinguishes between autism-specific content, generic child-focused content, and unspecified digital material, allowing for a more focused examination of whether media designed specifically for neurodivergent children provides distinct advantages over general programming.

Literature analysis approach

A systematic narrative review process was used to provide a thorough and critical evaluation of current research. The first phase included a preliminary screening in which titles and abstracts were examined, duplicates were deleted, and primary relevance was determined using preset inclusion criteria. During full-text evaluation phase, selected studies were analyzed in depth, with an emphasis on technique quality, assessment instruments for verbal communication outcomes, and research design strength. In addition, a critical analysis of findings was performed to synthesize patterns across research, detect inconsistencies, and investigate potential moderating factors. This methodology provided for a more in-depth knowledge of how different screen material types affect language development in autistic children while also resolving methodological limitations in previous research.

DATA EXTRACTION AND RESULTS

Along with the type of content, mediating factors influence the association between screen-based material kinds and verbal communication results in toddlers with ASD. One important component is caregiver co-viewing and mediation, which can improve the learning experience by offering contextual explanations, reinforcing verbal expressions, and encouraging interactive participation. According to studies, children who view educational information alongside an involved caregiver perform better on language acquisition than those who are passively exposed to screens.[24] Individual differences in response to screen content also influence outcomes, since toddlers with differing cognitive capacities, attention spans, and sensory sensitivities may react differently to the same piece of digital content.[25] Autism symptom severity also effects content efficacy; children with more severe communication deficiencies may require highly structured and interactive content to make linguistic gains, whilst those with milder symptoms may benefit from a broader range of digital media options.[26] Environmental circumstances, such as socioeconomic position, parental screen usage habits, and access to alternative learning materials, all influence screen-based learning experiences.[27] Timing and developmental preparedness are also important, since toddlers in the early phases of language acquisition may be more susceptible to the good and negative impacts of screen exposure.[28]

Table 1: Effects of different screen-based content types on verbal communication outcomes in children with ASD.

Content type	Key findings
Educational programs-autism-specific design	Statistically significant beneficial relationship between the extent to which autistic children do verbal expression.[15]
Passive observation impact	Longer video and television viewing was associated with improved expressive language development but significantly hampered the development of complicated language understanding. Simultaneously, high TV users improved their expressive language 1.3 times more quickly than low TV users. The difference was not statistically significant.[16]
Interaction modality	
Touch-based interactions	Digital interventions have a statistically significant larger influence on improving social-emotional skills than language and communication abilities, cognitive skills, daily living skills, and physical skills.[17]
Voice-responsive content	Significant improvement was observed in the rate of reaction to the voice responsive content.[18]
Guided learning experiences	Showed significant improvement in communication skills through structured interventions and effectively promote communication in minimally verbal children.[19]
Development design	
Autism specific content	Helps enhance elements that are not just related to linguistic skills but also to emotions, cognitive ability, and game perception.[20]
Generic child focused content	Can help improve language, particularlyexpressive and composite language.[21]
Unspecified digital material	Positive impact on language development- including vocabulary and word development among children, but does require parental regulation.[22,23]

The therapeutic implications of these findings highlight the significance of turning research into practical family suggestions. To optimize the benefits of verbal communication, parents and caregivers should be led to choose high-quality educational content and use interactive co-viewing practices. Clinicians have an important role in advising families about content selection, promoting interactive and developmentally appropriate materials while avoiding excessive passive viewing. Integrating digital media into existing intervention strategies can improve therapeutic outcomes, especially when digital tools are used with speech therapy procedures and structured communication activities. Creating optimal viewing circumstances, such as reducing background distractions and ensuring a balanced media diet, also aids language development. Regular monitoring and evaluation of a child's response to digital media can assist caregivers and physicians in adjusting tactics based on observed language improvement and engagement levels.

Despite expanding studies on screen-based media and ASD, there are still numerous gaps in the literature. Methodological constraints, including as small sample numbers, conflicting outcome measures, and reliance on parental reporting, restrict the generalizability of the findings. There is an urgent need for standardized content assessment systems that classify digital media based on linguistic complexity, interactivity, and cognitive load in order to make more precise suggestions. Future research should look into long-term effects, potential causal links, and differential effects among ASD subgroups. Research approaches that use randomized controlled trials, neuroimaging techniques, and real-world longitudinal tracking can provide more information about how diverse

screen-based material kinds influence verbal communication development. Furthermore, emerging technologies such as artificial intelligence-driven language learning apps and adaptive screen-based interventions require further investigation to establish their efficiency in promoting language progress in infants with ASD.

CONCLUSION

To Conclude, this narrative review summarizes known information on the varied effects of screen-based media on verbal communication abilities in children with ASD. While digital media exposure is almost universal in early life, its impact on language development is mostly determined by content type, caregiver participation, and individual child features. A refined approach to material selection that emphasizes interactivity and structured language exposure is critical for improving communication results. From a public health and clinical standpoint, suggestions should prioritize balancing screen time with conventional face-to-face contacts, advising families on evidence-based media choices, and incorporating digital tools into early intervention frameworks. Future study should deepen our understanding of content-specific impacts, eventually affecting policy and clinical guidelines that assist the language development of children with ASD.

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