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Review Article

Oral Health Status and Communication-Based Oral Health Promotion Among Athletes with Intellectual Disabilities: A Narrative Review

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Abstract

Background: Athletes with intellectual disabilities experience disproportionately poor oral health despite increasing participation in organized sports and global health promotion initiatives. Untreated dental caries, periodontal diseases, inadequate oral hygiene, and limited access to preventive dental care remain common among this population. Conventional oral health promotion strategies frequently rely on verbal communication and written educational materials, which may not adequately address the cognitive and communication needs of individuals with intellectual disabilities. This review aims to synthesize current evidence regarding the oral health status of athletes with intellectual disabilities and to explore communication-based oral health promotion approaches that facilitate accessible and inclusive oral healthcare. **Methods:** A literature search was conducted using PubMed, Scopus, Web of Science, and Google Scholar, supplemented by publications from WHO, iADH, AAPD, and Special Olympics published between 2015-2025. **Results:** The literature consistently demonstrates that athletes with intellectual disabilities have a higher prevalence of untreated dental caries, gingivitis, periodontal disease, and unmet dental treatment needs than the general population. Communication barriers involving limited receptive and expressive language skills reduce oral health literacy and negatively influence preventive oral health behaviors. **Discussion:** Evidence indicates that communication-based interventions including visual education, Easy Read materials, caregiver-assisted education, Augmentative and Alternative Communication (AAC), and sign-supported communication improve understanding, cooperation, and oral hygiene practices. Signalong, a structured sign-supported communication system, has emerged as a promising approach to enhance oral health education through multimodal learning, although evidence in dentistry remains limited. Communication-centered oral health promotion should be incorporated into multidisciplinary healthcare programs involving dental professionals, caregivers, educators, coaches, and disability organizations. **Conclusion:** Future studies should evaluate the effectiveness of Signalong and other accessible communication strategies in improving oral health outcomes among athletes with intellectual disabilities.

Keywords: Intellectual disability; Oral health; Athletes; Oral health promotion; Signalong

INTRODUCTION

Oral health is an essential component of general health and well-being, influencing nutrition, communication, social interaction, self-esteem, and quality of life. According to the World Health Organization (WHO), oral diseases affect approximately 3.5 billion people worldwide, making them among the most prevalent non-communicable diseases globally. Despite being largely preventable, untreated dental caries, periodontal diseases, tooth loss, and other oral conditions continue to impose considerable health, social, and economic burdens across all age groups[1].

Individuals with disabilities experience disproportionately poorer oral health than the general population due to complex interactions among biological, behavioral, environmental, and healthcare-related factors. Among these populations, individuals with intellectual disabilities are recognized as one of the most vulnerable groups because cognitive impairment, adaptive functioning limitations, and communication difficulties often compromise their ability to maintain daily oral hygiene, understand preventive oral health information, and access appropriate dental services[2–4].

Athletes with intellectual disabilities represent a unique subgroup within this population. Participation in organized sports, particularly through programs such as the Special Olympics Healthy Athletes Initiative, provides opportunities to improve physical fitness, social participation, self-confidence, and overall health. Nevertheless, international oral health screening programs continue to report a high prevalence of untreated dental caries, gingivitis, periodontal disease, and unmet dental treatment needs among Special Olympics athletes. These findings suggest that participation in sports alone is insufficient to eliminate oral health disparities and that additional preventive strategies are required[5,6].

One of the most frequently overlooked determinants of oral health among athletes with intellectual disabilities is communication. Effective communication is fundamental to successful oral health promotion because preventive education relies on patients' ability to understand oral hygiene instructions, dietary counseling, fluoride use, and the importance of regular dental attendance. Conventional oral health education typically depends on spoken explanations and written materials, approaches that may not adequately meet the learning needs of individuals with intellectual disabilities. Limited receptive and expressive communication skills, reduced health literacy, and dependence on caregivers may therefore restrict the effectiveness of traditional oral health promotion programs[7,8].

Recent advances in disability-inclusive healthcare emphasize the importance of accessible communication strategies tailored to individual cognitive abilities. Visual aids, Easy Read materials, pictorial instructions, demonstration-based learning, caregiver-assisted education, and Augmentative and Alternative Communication (AAC) have shown promising results in improving health literacy and patient participation among individuals with intellectual disabilities[9]. However, evidence regarding their application in oral health promotion for athletes with intellectual disabilities remains limited.

Signalong is a sign-supported communication system that combines spoken language with standardized manual signs, facial expressions, gestures, and visual cues to facilitate understanding among individuals with learning and communication disabilities. Originally developed for educational and social communication, Signalong has the potential to support oral health education by delivering preventive messages through multimodal learning that is easier to understand and remember. Despite this potential, the role of Signalong in oral health promotion has received little attention in the dental literature, representing an important knowledge gap.

Therefore, this narrative review aims to synthesize current evidence on the oral health status of athletes with intellectual disabilities and to discuss the potential of communication-based oral health promotion, particularly accessible communication approaches such as Signalong, as an

innovative strategy to improve oral health literacy, preventive behaviors, and equitable access to oral healthcare.

METHODS

Study Design

This study was conducted as a narrative review to summarize and critically discuss current evidence regarding the oral health status of athletes with intellectual disabilities and the role of communication-based oral health promotion. A narrative review design was selected because the available literature includes heterogeneous study designs, such as cross-sectional studies, systematic reviews, qualitative research, clinical guidelines, and organizational reports, making quantitative synthesis inappropriate. The review was prepared following the Scale for the Assessment of Narrative Review Articles (SANRA) to improve methodological transparency and reporting quality[1].

Literature Search Strategy

A comprehensive literature search was conducted using PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar. Additional references were identified through manual searches of publications from the World Health Organization (WHO), International Association for Disability and Oral Health (iADH), American Academy of Pediatric Dentistry (AAPD), FDI World Dental Federation, and Special Olympics Healthy Athletes® Program.

The search included articles published between 2015 and 2025 using combinations of Medical Subject Headings (MeSH) and free-text terms, including: ("intellectual disability" OR "developmental disability") AND ("oral health" OR "dental health") AND ("athletes" OR "Special Olympics") AND ("communication" OR "oral health promotion" OR "augmentative and alternative communication" OR "Signalong"). Only English-language publications with accessible full texts were included.

Eligibility Criteria

Studies were eligible if they were involved individuals or athletes with intellectual disabilities; investigated oral health status, oral diseases, oral health promotion, communication strategies, or preventive dental care; were original research articles, systematic reviews, narrative reviews, clinical guidelines, or organizational reports.

Studies focusing exclusively on physical disabilities without intellectual disabilities, conference abstracts, editorials, and non-English publications were excluded.

Data Synthesis

Relevant information regarding study characteristics, participant populations, oral health outcomes, communication approaches, and principal findings was extracted and narratively synthesized. Because of substantial heterogeneity among study designs and outcome measures, findings were organized into thematic categories rather than quantitatively pooled.

RESULTS

Narrative Synthesis

1. Oral Health Status Among Athletes with Intellectual Disabilities

The reviewed literature consistently demonstrates that athletes with intellectual disabilities experience poorer oral health than the general population. International epidemiological studies and the Special Olympics Healthy Athletes® Special Smiles® program have reported high prevalences of untreated dental caries, gingivitis, periodontal disease, plaque accumulation, and unmet dental treatment needs despite increased participation in organized sports[2–4].

Dental caries remains the most frequently reported oral disease. Across Special Olympics screening programs, approximately one-third of participating athletes required restorative treatment because of untreated carious lesions. Poor oral hygiene practices, frequent consumption of cariogenic foods, inadequate fluoride exposure, and irregular preventive dental visits contribute substantially to disease development[2,5].

Gingivitis and periodontal diseases are also highly prevalent. Individuals with moderate or severe intellectual disabilities often require assistance with toothbrushing because of impaired cognitive and motor abilities, resulting in persistent plaque accumulation and gingival inflammation. Caregiver involvement therefore plays a crucial role in maintaining oral hygiene and preventing periodontal disease[6].

Limited access to preventive dental services remains another major concern. Communication difficulties, behavioral management challenges, lack of disability-friendly dental services, financial barriers, and insufficient numbers of dental professionals trained in special care dentistry collectively contribute to delayed diagnosis and treatment[4,7].

2. Communication Barriers

Communication difficulties are increasingly recognized as a major determinant of oral health inequalities among individuals with intellectual disabilities. Conventional oral health education typically relies on spoken language and written educational materials, which may exceed patients' cognitive and linguistic abilities. Consequently, many individuals experience difficulty understanding toothbrushing instructions, dietary counseling, fluoride recommendations, and the importance of regular dental attendance[7,8].

Communication barriers also influence clinical care. Patients may be unable to accurately describe oral pain, discomfort, or treatment concerns, resulting in delayed diagnosis and increased dental anxiety. Studies have shown that communication difficulties negatively affect patient cooperation, treatment acceptance, and continuity of preventive care[7].

3. Communication-Based Oral Health Promotion

Recent evidence supports communication-based oral health promotion as an effective strategy to improve oral health literacy among individuals with intellectual disabilities. Visual educational materials, pictorial toothbrushing instructions, Easy Read resources, demonstration-based learning, caregiver-assisted education, and Augmentative and Alternative Communication (AAC) have all demonstrated positive effects on patient understanding and oral hygiene behaviors[6,8,9].

Among these approaches, Signalong represents an emerging communication method with potential application in oral healthcare. Signalong combines spoken language with standardized manual signs, facial expressions, gestures, and visual cues to facilitate understanding among individuals with learning disabilities. Unlike conventional sign languages, Signalong is specifically designed to support spoken communication and everyday functional learning.

Although direct evidence regarding Signalong in dentistry remains limited, its multisensory learning approach aligns with contemporary health education principles. Incorporating Signalong into oral health promotion may enhance patient comprehension, improve communication between dental professionals and athletes, and facilitate consistent reinforcement of preventive behaviors by caregivers, teachers, and coaches.

Overall, the reviewed literature suggests that communication-centered oral health promotion should become an integral component of multidisciplinary healthcare programs for athletes with intellectual disabilities, complementing conventional preventive dentistry and contributing to more equitable oral healthcare.

DISCUSSION

This narrative review highlights that athletes with intellectual disabilities continue to experience considerable oral health disparities despite increased participation in organized sports and international health promotion initiatives. The available evidence consistently indicates that untreated dental caries, gingivitis, periodontal disease, and poor oral hygiene remain highly prevalent among this population. These findings suggest that participation in sports alone does not guarantee better oral health outcomes, emphasizing the need for preventive strategies that address the biological, behavioral, environmental, and communication-related determinants of oral health[1–3].

The oral health inequalities identified in this review are multifactorial. Individuals with intellectual disabilities frequently encounter cognitive limitations that affect their understanding of oral hygiene practices, recognition of oral disease symptoms, and ability to perform effective self-care independently. Reduced manual dexterity, impaired adaptive functioning, and dependence on caregivers further increase the risk of inadequate plaque control and oral disease[4]. Consequently, oral health should not be viewed solely as an individual responsibility but rather as a shared responsibility involving caregivers, healthcare professionals, educators, and community organizations.

One of the most significant findings of this review is the important role of communication in oral health promotion. Effective communication is essential for improving oral health literacy, encouraging preventive behaviors, and facilitating access to dental services. However, conventional oral health education commonly relies on spoken language and written educational materials that may exceed the cognitive and communication abilities of individuals with intellectual disabilities. Communication barriers therefore contribute not only to poor understanding of oral hygiene instructions but also to delayed treatment seeking, increased dental anxiety, and reduced patient participation during dental care[5].

Recent disability-inclusive healthcare approaches emphasize adapting communication methods according to patients' individual needs. Visual aids, pictorial toothbrushing guides, Easy Read materials, demonstration-based learning, caregiver-assisted education, and Augmentative and Alternative Communication (AAC) have demonstrated positive effects on patient comprehension and preventive oral health behaviors[6]. These approaches are consistent with person-centered healthcare principles, which recommend tailoring health information to individual cognitive abilities rather than expecting patients to adapt to conventional communication methods.

Among the communication approaches discussed in this review, Signalong represents a promising innovation for oral health promotion. Signalong is a sign-supported communication system that combines spoken language with standardized manual signs, gestures, facial expressions, and visual reinforcement to facilitate understanding among individuals with learning disabilities.

Unlike formal sign languages primarily developed for Deaf communities, Signalong is specifically intended to support spoken communication and everyday learning. This characteristic makes it particularly suitable for delivering oral health education to individuals with intellectual disabilities.

The educational principles underlying Signalong are supported by the Cognitive Theory of Multimedia Learning, which proposes that information is retained more effectively when verbal and visual inputs are presented simultaneously[7]. Applying Signalong during oral health education may therefore enhance comprehension of toothbrushing techniques, fluoride use, healthy dietary practices, routine dental attendance, and mouthguard use during sports activities. Furthermore, because Signalong can be consistently used by dentists, caregivers, teachers, and coaches, it facilitates repeated reinforcement of oral health messages across different settings.

Despite its potential, evidence regarding the application of Signalong within dentistry remains limited. Most available publications describe its use in educational and communication settings rather than oral healthcare. Consequently, further clinical research is needed to evaluate its effectiveness in improving oral health literacy, patient cooperation, oral hygiene behaviors, and long-term oral health outcomes among athletes with intellectual disabilities.

From a clinical perspective, dental professionals should receive additional training in disability-inclusive communication techniques. Communication assessments should become part of routine dental examinations to identify each patient's preferred communication methods and support needs. Preventive education should extend beyond patients themselves to include caregivers, teachers, and sports coaches, who play essential roles in reinforcing daily oral hygiene behaviors. Integrating communication-based oral health promotion into Special Olympics health programs and community disability services may represent an effective strategy for reducing oral health inequalities.

This review has several strengths. It integrates evidence from dentistry, disability studies, communication sciences, sports medicine, and public health to provide a comprehensive overview of oral health promotion among athletes with intellectual disabilities. In addition, the review introduces Signalong as a potential communication strategy within oral healthcare, offering a novel perspective for future research and clinical practice.

Nevertheless, several limitations should be acknowledged. As a narrative review, this study does not include a formal risk-of-bias assessment or quantitative meta-analysis. Furthermore, published studies specifically involving athletes with intellectual disabilities remain relatively limited, and evidence regarding Signalong in dentistry is still emerging. Therefore, recommendations concerning Signalong should be interpreted as conceptually supported rather than definitively evidence-based.

Future studies should evaluate communication-based oral health promotion programs through well-designed randomized controlled trials and longitudinal studies. Comparative research examining Signalong, AAC, visual communication, and digital educational interventions would further strengthen the evidence base. In addition, multidisciplinary collaborations among dentists, speech and language therapists, educators, caregivers, and sports organizations are needed to develop standardized communication frameworks that promote equitable oral healthcare for individuals with intellectual disabilities.

CONCLUSIONS

Athletes with intellectual disabilities continue to experience poorer oral health than the general population, with high levels of untreated dental caries, periodontal disease, and unmet preventive dental needs. Communication barriers substantially contribute to these disparities by limiting oral health literacy, preventive behaviors, and access to appropriate dental care.

Communication-based oral health promotion offers a practical and inclusive approach to addressing these challenges. Visual learning, Easy Read materials, caregiver-assisted education, AAC, and sign-supported communication may improve understanding and facilitate sustainable oral hygiene behaviors. Among these approaches, Signalong demonstrates considerable potential as an accessible communication tool that supports multisensory learning and reinforces preventive oral health messages across clinical, educational, and community settings.

Although further empirical research is required, integrating communication-centered strategies into routine dental practice and community oral health programs may contribute to reducing oral health inequalities and improving the quality of life of athletes with intellectual disabilities.

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