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Edentulism Beyond The Mouth: Oral Microbes And Social Identity Crisis – A Narrative Review

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ABSTRACT

Background: Tooth loss (edentulism) affects millions of Nigerians, with consequences that extend beyond oral function to psychosocial well-being.[1] However, the link between oral microbes—the primary agents of tooth loss—and the social identity consequences of edentulism remains underexplored, particularly in African contexts.

Objective: This review synthesizes available evidence on oral microbiology, psychosocial impacts of tooth loss, and cultural dimensions of edentulism to examine whether edentulism can be understood as a social identity crisis mediated by oral microbes, and to identify implications for Nigerian dental practice.

Methods: This narrative review followed the SANRA (Scale for the Assessment of Narrative Review Articles) guidelines.[12] We systematically searched high-impact journals indexed in PubMed and Google Scholar for peer-reviewed publications published between 2000 and 2026. Articles that did not undergo peer review, articles published in languages other than English, or those that were not accessible because access was closed unless key information was available through abstracts or summaries were excluded.

Findings: Oral microbes including *Porphyromonas gingivalis* and *Streptococcus mutans* drive the caries and periodontitis that lead to tooth loss.[3,4] Synthesized evidence from quantitative studies shows that 45–49% of edentulous individuals report difficulty coming to terms with tooth loss, with documented emotional effects including sadness (12.9%), depression (6.4%), and feeling of lost body part (14%).[1] Visible caries operate as social stigma, with experimental studies showing lower ratings of intelligence, social skills, and happiness based solely on visible decay.[23] Halitosis from microbial metabolism causes documented social avoidance and workplace discrimination.[19,25] A Yoruba proverb captures this understanding: *"Bi eyin ba ti ka, ile erin a wo"* (when teeth are lost, the house of laughter collapses). Current evidence indicates that no published Nigerian studies have tested whether cultural frameworks interpret edentulism as self-mutilation or norm violation.[7]

Conclusion: Available evidence supports understanding edentulism as a social identity crisis mediated by oral microbes. Research gaps include the absence of qualitative Nigerian studies on patient experience and untested cultural hypotheses.[7]

Keywords: Edentulism, oral microbiota, social identity, psychosocial impact, Nigerian dentistry

INTRODUCTION

Tooth loss (edentulism) remains a significant burden in Nigeria.[1] It affects mastication, nutrition, and quality of life.[2] The microbiological mechanisms underlying tooth loss—dental caries and periodontitis driven by oral pathogens such as *Porphyromonas gingivalis* and *Streptococcus mutans*—are well established in the international literature.[3,4] Concurrently, a body of evidence from high-income countries has documented the psychosocial consequences of losing teeth, including diminished self-esteem, social withdrawal, avoidance of laughter in public, and reluctance to form close relationships.[5,6]

What is less clear from existing literature is how these two domains—microbial etiology and psychosocial outcome—intersect conceptually and empirically. Specifically, three questions remain unanswered by current evidence. First, to what extent do the documented psychosocial consequences of tooth loss derive directly from the microbial processes that cause tooth loss, rather than from tooth loss itself as a mechanical event? Second, how do cultural frameworks, particularly Nigerian and broader African contexts, shape the interpretation of tooth loss as a social phenomenon? Third, does current dental practice in Nigeria address both the biological and the psychosocial dimensions of edentulism, or does a gap exist between available evidence and clinical application?

This narrative review addresses these questions by synthesizing published evidence from oral microbiology, psychosocial dentistry, and cultural studies of health. The objective is to systematically map what is known about the relationship between oral microbes and social identity in edentulism, to identify specific evidence-based conclusions, and to highlight where evidence remains insufficient for Nigerian contexts.[7]

In Nigerian cultural contexts, teeth carry meaning beyond mastication. They enable the smile that signals warmth, the speech that articulates identity, and the facial structure that defines beauty. Studies from Nigerian teaching hospitals confirm these observations: tooth loss affects self-esteem, limits food choices in social settings, and in some cases leads to depression.[1] These consequences are not merely secondary effects; for many patients, they constitute the primary burden of edentulism. Furthermore, severe tooth loss is associated with cognitive dysfunction, including memory loss and dementia, which may be linked to bacteria traveling to the brain and causing inflammation.[8,9,10] Tooth loss serves as a critical indicator of overall oral health, reflecting the cumulative impact of dental diseases like caries and periodontitis as well as access to care.[11] A hypothesis meriting formal investigation is that some Nigerian cultural frameworks may interpret edentulism as self-mutilation or as consequences of violating traditional norms. No published Nigerian study has tested this hypothesis, which remains a research gap.[7]

METHODS

Study design

This narrative review followed the SANRA (Scale for the Assessment of Narrative Review Articles) guidelines.[12]

Search strategy

We searched PubMed, Google Scholar, African Journals Online (AJOL), and the Nigerian Journal of Dental Research for literature published between January 2000 and April 2026. Search terms included: ("edentulism" OR "tooth loss" OR "partially edentulous") AND ("psychosocial" OR "social identity" OR "self-esteem" OR "quality of life") AND ("Nigeria" OR "West Africa" OR "African"). For microbiology, we used ("oral microbiota" OR "*Porphyromonas gingivalis*" OR "*Streptococcus mutans*") AND ("tooth loss" OR "edentulism").[13]

Inclusion and exclusion criteria

Inclusion criteria: original research, reviews, and clinical studies on humans; English language; Nigerian or comparable low/middle-income country contexts. Exclusion criteria: animal studies; non-English; conference abstracts without full text. Reference lists of included articles were hand-searched.[13]

Data synthesis

Because this is a narrative review, we did not perform meta-analysis. Instead, we synthesized findings thematically under three pre-specified subheadings derived from the review question: (a) the oral microbiota in edentulism, (b) social identity crisis in edentulism, and (c) intersections of both domains.[12]

a. Oral Microbiota in Edentulism

The oral cavity provides a warm, moist, nutrient-rich environment that supports over 700 bacterial species.[3,4] The oral cavity has been described as an ideal incubator for microbial growth based on temperature, pH, nutrient, and moisture preferences.[14] In a state of eubiosis, commensal microbes coexist with the host without causing disease. However, dietary carbohydrates, poor oral hygiene, and reduced salivary flow can drive dysbiosis—an imbalance characterized by overgrowth of acidogenic and proteolytic pathogens.[15,4]

Microbial mechanisms of caries and periodontitis

Streptococcus mutans ferments dietary sugars to produce lactic acid, demineralizing enamel and initiating dental caries.[4] The majority of initial colonizers of teeth are Gram-positive facultative anaerobic cocci and rods, including *Streptococcus* and *Actinomyces* species.[16] These initial colonizers provide a foundation for further development of dental decay. In periodontitis, anaerobic Gram-negative bacteria—including *Porphyromonas gingivalis*, *Treponema denticola*, and *Tannerella forsythia*—colonize subgingival pockets. These pathogens release lipopolysaccharides and proteases that trigger host inflammatory responses, leading to periodontal ligament destruction and alveolar bone resorption.[3] Left untreated, these microbial processes culminate in tooth loss.[1] Emerging evidence also indicates that oral microbial shifts following tooth loss may affect systemic health, including gut health.[17]

Post-extraction microbial colonization

Even after tooth extraction, denture-borne biofilms colonize prosthetic surfaces. Denture microbiota includes *Candida albicans*, *Streptococcus* spp., and *Staphylococcus* spp., which can cause denture stomatitis and contribute to halitosis.[18,19] The composition of denture microbial community is influenced by patient hygiene and prosthetic material.[19]

Summary of microbiological evidence

The available evidence establishes that specific oral pathogens are necessary causes of dental caries and periodontitis, and that these diseases are the primary reasons for tooth extraction in adult populations.[2,1] Rehabilitative management of periodontitis requires attention to both biological and prosthetic considerations.[20] This microbiological foundation is relevant to understanding edentulism as a biosocial phenomenon because the microbial processes that destroy teeth also produce secondary effects (halitosis, visible decay, gingival bleeding) that precede complete tooth loss and may themselves carry social consequences.

b. Social Identity Crisis in Edentulism

Defining social identity crisis

In the context of oral health, teeth carry social meanings related to attractiveness, health status, age, and self-care capacity.[21] Loss of teeth can therefore disrupt social identity by altering how individuals present themselves to others and how others perceive them.

Quantitative evidence of psychosocial impact

Studies on the emotional effects of tooth loss have documented substantial psychosocial burden. Davis et al. reported that 45% of edentulous subjects studied had difficulty coming to terms with total tooth loss.[5] Fiske et al. found that 49% of partially dentate subjects reported similar difficulties with partial tooth loss.[6] Specific consequences included limitation of food choice, reduction in enjoyment of food, avoidance of laughing in public, inability to accept change in facial shape, and reluctance to form close relationships.[5,6]

A Nigerian study by Oginni found that only 40.9% of edentulous patients were prepared for the emotional effects of losing their teeth.[1] Immediate post-extraction relief was expressed by 43.9% of cases, but emotional effects persisted in others: sadness (12.9% of cases), depression (6.4%), feeling of lost body part (14%), feeling of ageing (2.3%), while 7.6% felt unconcerned.[1] These proportions indicate that a substantial minority of patients experience significant psychological distress following tooth loss. Edentulism has been described as an irreversible disability with profound psychological impact.[6,22]

Visible caries as social stigma

Carious lesions, particularly on anterior teeth, function as visible markers. Experimental evidence from the United Kingdom showed that when decayed teeth were visible in photographs, participants rated the same individual lower in intelligence, social skills, confidence, self-esteem, and perceived happiness compared to images without visible decay.[23] These stigmatizing responses lead to feelings of shame, embarrassment, and low self-esteem, and in some cases reduce likelihood of seeking dental care due to fear of further humiliation.[24]

Halitosis and social interaction

Halitosis (bad breath) associated with edentulism is commonly caused by accumulation of bacteria on removable dentures, poor oral hygiene of remaining tissues, or dry mouth.[19] Volatile sulfur compounds produced by *P. gingivalis* and *T. denticola* are documented causes of halitosis.[25] Halitosis produces documented social consequences including social avoidance, reduced intimacy, and workplace discrimination.[19,25]

Cultural dimensions in Nigerian and African contexts

In Nigerian cultural contexts, teeth enable the smile that signals warmth, the speech that articulates identity, and the facial structure that defines beauty. A Yoruba proverb encodes this understanding: *"Bi eyin ba ti ka, ile erin a wo"* (when teeth are lost, the house of laughter collapses). Laughter in this context stands for social connection, confidence, and full participation in community life. Studies from Nigerian teaching hospitals confirm that tooth loss affects self-esteem, limits food choices in social settings, and in some cases leads to depression.[1]

However, it is important to recognize that the psychosocial meaning of tooth loss is not uniform across all African cultures. A comprehensive scoping review of intentional dental modifications across Africa found that such practices are prevalent for reasons linked to traditional medicine (53%), ethnic affiliation markers (38%), and individualism (6%).[31] The most common form was infant oral mutilation involving extraction of deciduous canine tooth buds, followed by tooth filing, dental avulsion, and diastema piercing.[31]

Among the Dinka and Nuer of Sudan, both boys and girls undergo removal of four to six lower front teeth during childhood as a mark of initiation and beauty.[32,33] These communities have practiced ritual dental extraction for centuries. In a study examining 36 Sudanese refugees, a total of 238 individual extractions had been performed, indicating the persistence of this practice even among displaced populations.[32] The Dinka and Nuer view the resulting dental gap as an aesthetic enhancement rather than a disfigurement, and the ability to endure the procedure without showing pain is considered a demonstration of bravery and maturity.

The Makonde of Tanzania practice chipping of teeth into pointed shapes, a procedure that signifies that a person has completed initiation rituals (known as *jando* or *unyago*) and attained full adult status within their community.[33] This modification is typically performed during adolescence and serves as a permanent marker of social maturity.

Among the Dogon of Mali, teeth are filed into sharp points resembling the teeth of a comb. For the Dogon, this shape holds cosmological significance: it evokes the loom, with speech issuing from between the teeth understood as the source of action that "weaves" the world.[33] This practice is thus embedded in a complex system of religious and philosophical beliefs about creation and language.

In South Africa, particularly among coloured communities in the Cape Flats area, intentional removal of upper front teeth creates a visible space known colloquially as the "passion gap."[34,35,36] This practice is considered attractive, fashionable, and a marker of social identity. Unlike the Dinka and Nuer practices, which are tied to initiation and ethnicity, the passion gap is primarily an aesthetic choice linked to contemporary urban identity and subcultural belonging.[34]

In Northwest Africa, archaeological evidence reveals that tooth evulsion was practiced by Iberomaurusian populations over 20,000 years ago, with over 94% of individuals showing removal of upper central incisors.[37] This practice was age-transgressive (performed on both adolescents and adults) and is interpreted as a marker of group identity rather than individual aesthetic preference.

These diverse African practices demonstrate that intentional tooth removal cannot be reduced to a single cultural meaning. The same biological event—tooth loss—can signify initiation into adulthood (Makonde), ethnic identity (Dogon, Iberomaurusian), beauty and attractiveness (Dinka, Nuer, South African coloured communities), religious cosmology (Dogon), or traditional medicine (infant oral mutilation across multiple African societies).[31,32,33,34,35,36,37] This diversity underscores the critical role of cultural framing in shaping the psychosocial experience of tooth loss.

Intentional tooth removal in global cultural contexts

Beyond Africa, intentional tooth ablation has been documented across Asia, Oceania, and the Pacific, with distinct cultural meanings attached to the practice in each region.

In Taiwan, ritual tooth ablation has been practiced by Austronesian communities for nearly 5,000 years, with ethnographic records documenting its persistence among indigenous groups such as the Atayal, Bunun, and Tsou into the mid-20th century.[38] Among these groups, tooth removal was typically performed during adolescence and served as a marker of readiness for marriage and adult responsibilities. Strontium isotope analysis has revealed that non-local individuals buried in Taiwan more frequently exhibited tooth ablation than local individuals, suggesting the practice also served as a marker of immigrant identity.[38]

In Australia, Aboriginal peoples practiced tooth avulsion using a stick without anesthetic as an initiation ritual marking a boy's transition to maturity.[33] The pain experienced during the procedure was purposefully incorporated as an element of the ritual, adding to the sense of bravery and achievement required for adult status.

In Hawaii, incisors were knocked out using a stick and rock as a mourning ritual marking the death of a tribal leader.[33] Archaeological examination of skeletal remains has revealed that 67% of individuals in some populations show residual roots from this practice, indicating its widespread observance.

These global practices, like their African counterparts, demonstrate that intentional tooth removal cannot be reduced to a single cultural meaning. The same biological event—tooth loss—can signify initiation into adulthood (Taiwan, Australia), mourning (Hawaii), or group identity (Taiwan), depending on the cultural context.

Summary of psychosocial evidence

The available evidence establishes that tooth loss produces measurable psychosocial consequences including difficulty adapting to tooth loss, sadness, depression, stigma from visible decay, and social avoidance from halitosis. These consequences affect a substantial minority (approximately 45–49%) of edentulous individuals.[5,6] However, the cross-cultural evidence demonstrates that these outcomes are not universal. In numerous African and global societies, intentional tooth removal is practiced as a valued cultural practice associated with beauty, initiation, identity, mourning, or spiritual belief.[31,32,33,34,35,36,37,38] This paradox—that tooth loss can be either stigmatizing or valorized depending on cultural context—highlights the need for culturally grounded dental research and practice that avoids universalizing assumptions about the psychosocial consequences of edentulism.

c. Intersections of Both in Edentulism

Having separately reviewed the oral microbiota (Section a) and social identity crisis (Section b), this section synthesizes evidence on how these domains intersect in edentulism.

The causal chain from microbes to identity disruption

The available evidence supports a causal chain with four steps.[26] First, oral pathogens (*S. mutans*, *P. gingivalis*, *T. denticola*) drive caries and periodontitis through acid production and inflammatory host responses.[3,4] Second, these microbial processes produce clinical phenotypes including visible carious lesions, tooth mobility, gingival bleeding, alveolar bone loss, and ultimately tooth loss itself.[1] Third, these clinical phenotypes trigger documented psychosocial responses: stigma from visible decay,[23] social avoidance from halitosis,[19,25] sadness and depression post-extraction,[5,6,1] and difficulty accepting altered facial appearance.[5,6] Fourth, these psychosocial responses constitute disruption of social identity—altered self-concept, withdrawal from social participation, and reduced quality of life.

This chain means that oral microbes function as indirect agents of identity crisis;[26] without the microbial etiology of caries and periodontitis, the cascade of psychosocial consequences would not occur for most cases of adult tooth loss. However, as noted in Section b, this chain is culturally mediated; in communities where tooth loss is intentionally pursued as an aesthetic practice, the psychosocial outcomes may differ substantially.

The smile-microbe cycle as intersection

The human mouth contains over 700 species of bacteria that must stay balanced to prevent gum disease.[3,4] The "smile-microbe cycle" describes a bidirectional relationship not fully captured in the linear causal chain. Microbial colonization leading to gingival inflammation and bleeding causes individuals to avoid smiling before tooth loss occurs.[27] This anticipatory identity damage begins at early disease stages. Conversely, avoidance of dental care due to fear of humiliation[24] permits continued microbial proliferation, accelerating disease progression.

Denture microbiota as persistent intersection

Even after extraction, denture microbial communities perpetuate the identity crisis.[28] Malodorous or ill-fitting dentures—resulting from microbial biofilms on prosthetic surfaces[18,19]—produce continued halitosis and discomfort. This extends rather than resolves the identity crisis, as patients continue to experience social avoidance and embarrassment despite prosthetic rehabilitation.[19,25]

Cultural intersections: untested hypotheses

The reviewed evidence identifies one specific cultural intersection that remains untested. A hypothesis meriting formal investigation is that some Nigerian cultural frameworks may interpret edentulism as self-mutilation or as consequences of violating traditional norms. No published Nigerian study has tested this hypothesis. This gap is not an a priori assumption but rather a finding of this review: the available literature contains no empirical test of this cultural hypothesis.[7] Furthermore, the paradoxical relationship between tooth loss and social identity across African cultures (e.g., Nigeria versus South Africa) and across global cultures (e.g., Nigeria versus Taiwan, Australia, or Hawaii) raises important unanswered questions about how microbial etiology interacts with cultural meaning-making. Future research should explore whether communities that value intentional tooth loss also experience differential microbial outcomes, and whether the absence of stigma affects health-seeking behaviors.

Summary of intersections

The synthesized evidence supports understanding edentulism as a biosocial phenomenon in which oral microbes initiate a causal chain culminating in social identity disruption.[26] The smile-microbe cycle and denture microbial communities represent specific intersection points where microbial processes and psychosocial outcomes interact bidirectionally.[18,19,25,27] Cultural intersections remain understudied, with one specific hypothesis untested in the published Nigerian literature.[7] Cross-cultural comparisons, particularly between Nigerian and other African (e.g., South African, Sudanese, Tanzanian, Malian) and global (e.g., Taiwanese, Australian, Hawaiian) contexts, offer a productive avenue for future research to disentangle the biological from the cultural determinants of edentulism-related psychosocial outcomes.[31,32,33,34,35,36,37,38]

IMPLICATIONS FOR NIGERIAN DENTAL PRACTICE

The following implications are derived directly from the specific findings of this narrative review.

Clinical practice implications

Dental clinicians should routinely inquire about emotional adjustment to tooth loss using open-ended questions such as "How has losing this tooth affected your daily life or confidence?" Additionally, based on evidence that denture microbial communities produce halitosis through volatile sulfur compounds when hygiene is inadequate,[18,19,25] clinicians should provide written, specific instructions for daily denture cleaning. Furthermore, practitioners should adopt non-judgmental communication that avoids reinforcing shame, as visible caries and halitosis are documented causes of stigma and reduced healthcare-seeking behavior.[23,24,19,25]

Health system implications

Poor dental attendance, lack of insurance, and high cost of restorative services drive patients toward extraction rather than repair.[29] Lower education, lower income, and older age are strongly linked with increased rates of edentulism.[7] There is a significant reliance on tertiary hospitals for care, while rural areas face acute shortages of dental professionals, making services inaccessible to many.[29] Given that edentulism increases with age, there is growing demand for geriatric prosthodontic services.[28]

Public communication implications

Recently, the Nigerian Dental Association addressed a social media hoax spreading misleading counsel on checking marks on toothpaste tubes as a parameter for efficacy.[30] Mechanisms to tackle misleading information in all areas of dentistry should be put in place.

CONCLUSION

This narrative review synthesized available evidence from oral microbiology, psychosocial dentistry, and cultural studies to examine whether edentulism can be understood as a social identity crisis mediated by oral microbes. The following conclusions are supported by the evidence reviewed.

First, oral pathogens (*S. mutans*, *P. gingivalis*, *T. denticola*) are established necessary causes of dental caries and periodontitis, which are the primary reasons for adult tooth loss.[3,4]

Second, tooth loss produces measurable psychosocial consequences documented in both Nigerian and international studies: difficulty coming to terms with tooth loss (45–49%), sadness (12.9%), depression (6.4%), feeling of lost body part (14%), stigma from visible decay, and social avoidance from halitosis.[5,6,1,23,19] These proportions indicate that a substantial minority of edentulous individuals experience significant psychological distress. Tooth loss has been described as an irreversible

disability with profound psychological impact.[6,22] Furthermore, severe tooth loss is associated with cognitive dysfunction, including memory loss and dementia.[8,9,10]

Third, the causal chain from microbial etiology to identity disruption supports understanding oral microbes as indirect agents of identity crisis.[26] The smile-microbe cycle and denture microbial communities represent specific points where microbial processes and psychosocial outcomes intersect bidirectionally.[18,19,25,27]

Fourth, cultural intersections remain understudied and culturally variable. A Yoruba proverb encodes an indigenous understanding of teeth as integral to social presence, and the specific hypothesis that some Nigerian cultural frameworks interpret edentulism as self-mutilation or norm violation has not been tested empirically.[7] However, across Africa, many communities practice intentional tooth removal as a marker of beauty, initiation, or social identity—from the Dinka and Nuer of Sudan, the Makonde of Tanzania, and the Dogon of Mali, to the "passion gap" in South Africa, as well as prehistoric Northwest Africa.[31,32,33,34,35,36,37] Globally, similar practices exist in Taiwan (initiation and immigrant identity), Australia (initiation), and Hawaii (mourning).[33,38] This demonstrates that the psychosocial meaning of tooth loss is not universal but deeply culturally contingent.

Fifth, a specific research gap exists: no published Nigerian qualitative studies document how patients experience edentulism as an identity phenomenon, and no studies have evaluated whether dental curricula address psychosocial dimensions of tooth loss.[7] Cross-cultural comparative research between Nigerian and other African and global contexts could help disentangle biological from cultural determinants of edentulism-related outcomes.

These conclusions are limited by the scarcity of Nigerian qualitative research on edentulism and identity and by the absence of meta-analyses on this topic.[7]

LIMITATIONS OF THIS REVIEW

This narrative review has several limitations. First, the scarcity of Nigerian qualitative research on edentulism and identity limits the strength of conclusions about cultural dimensions.[7] Second, poor archival keeping in some Nigerian settings may have resulted in relevant studies being unavailable for inclusion. Third, the review did not include meta-analysis because the heterogeneity of outcome measures across studies precluded statistical synthesis. Fourth, the review's reliance on English-language publications may have excluded relevant studies published in French or other languages spoken in African contexts. Fifth, while we have included literature on intentional tooth removal practices across multiple African and global cultures, the depth of cross-cultural comparison is limited by the available published evidence.

RECOMMENDATIONS

Based on the findings of this review:

1. Dental clinicians should routinely inquire about emotional adjustment to tooth loss using open-ended questions such as "How has losing this tooth affected your daily life or confidence?"
2. Clinicians should provide written, specific instructions for daily denture cleaning to prevent biofilm accumulation and halitosis.
3. Researchers should test the hypothesis that some Nigerian cultural frameworks interpret edentulism as self-mutilation or as consequences of violating traditional norms, using qualitative methods.
4. Researchers should conduct qualitative studies documenting how Nigerian patients experience edentulism as an identity phenomenon.
5. Researchers should replicate studies on the smile-microbe cycle in Nigerian populations.
6. Researchers should evaluate whether Nigerian dental curricula currently address psychosocial dimensions of edentulism.

7. Cross-cultural comparative research should be conducted between Nigerian and other African (e.g., South African, Sudanese, Tanzanian, Malian) and global (e.g., Taiwanese, Australian, Hawaiian) contexts to explore how different cultural framings of tooth loss (stigma vs. beauty vs. initiation vs. mourning) affect psychosocial outcomes, health-seeking behaviors, and microbial management practices.[31,32,33,34,35,36,37,38]

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