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Research

Challenges in developing a universal index for recording tooth wear: a scoping review

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Introduction

Tooth wear is increasingly prevalent globally and presents diagnostic and treatment challenges that require the development of standardised indices for monitoring and timing intervention. Tooth wear is becoming more common among younger cohorts and is not entirely dependent on age, but is influenced by factors including diet and lifestyle. Given its multifactorial nature, pinpointing a single causative factor is challenging. Nevertheless, it is crucial to establish systems and indices for monitoring the progression of tooth wear, enabling timely intervention. This review aimed to determine which tooth wear index could be recommended for use in general dental practice and within different settings.

Materials and methods

The literature was investigated for the most used tooth wear indices since 2017 through databases of international journals (PUBMED, Google Scholar, and ScienceDirect). Once the field of articles was narrowed, it allowed a concise number of indices to be accounted for.

Results

A total of 758 papers were retrieved from the search engines after using pre-specified search matrices. These papers were filtered by two independent reviewers, leaving 39 papers that fit the eligibility criteria. Information regarding index used, design/settings of the study, country, sample size, age, and outcomes were extracted from these papers to synthesise the evidence.

Conclusion

This review revealed a multitude of indices proposed for the classification and recording of tooth wear in the general population. However, none of these indices fully embody the ideal characteristics of being both user friendly and capable of providing all-inclusive information.

LEARNING OBJECTIVES

After reading this article, readers should be able to:

- discuss the most common indices used for assessing tooth wear;
- outline the most frequently used tooth wear indices in clinical practice and hospital settings; and,
- discuss the advantages and drawbacks of each index.

INTRODUCTION

A steady trend of tooth retention has been observed, with evidence suggesting that tooth retention leads to better oral health-related quality of life.[1] This is an important finding to bear in mind. According to the Adult Dental Health Survey 2009, over three-quarters (77%) of the dentate patients in the study exhibited some form of tooth wear. It has been found that males present with more tooth wear than females, although there is no clear evidence as to why this occurs.[2] Tooth wear is multi-faceted and can

Joint second authors

Figure 1. Representative images of tooth wear conditions.

A) Attrition and erosion of teeth in which functional or parafunctional tooth-to-tooth contact results in grinding of incisal and occlusal surfaces of the teeth. B) Abrasion (arrow) is the loss of tooth structure due to external abrasive mechanical forces such as toothbrushing. C) and D) Acid erosion caused by chemical dissolution of tooth structure that could be derived externally from excessive intake of acidic diet (arrows) or internally from stomach acid reflux, as observed on the palatal aspects of the teeth.

be sub-divided further into: abrasion; attrition; and, erosive types of wear (**Figure 1**). The former two are mechanical, with abrasion resulting from external sources and attrition from internal mechanisms. Erosion arises from either extrinsic, intrinsic, or a combination of acidic sources.[3,4] In 2017, tooth wear was defined as pathological as opposed to physiological when it is atypical for the age of the patient, and causes pain or discomfort, functional problems or deterioration of aesthetic appearance, which, if it progresses, may give rise to undesirable complications of increasing complexity.[3-5]

The high prevalence of tooth wear imposes the need for a succinct method of documenting this problem.[6] Many indices have been developed, which mainly rely on visual examination. One of the earliest indices used to measure erosive tooth wear (ETW) was the one developed by Eccles.[7] This was originally created to differentiate between industrial and non-industrial erosion due to their differing appearances. The classification looks at the surfaces of teeth and applies a grading to teeth individually, but does not specify the criteria used. Later, Smith and Knight[8] developed the Tooth Wear Index (TWI), which was designed to create a system capable of distinguishing between pathological and normal tooth wear. The TWI works by evaluating four surfaces per tooth but does not explain the thresholds for differentiating pathological and normal wear. The Basic Erosive Wear Examination (BEWE)[9] is an example that has been validated for use in clinical and epidemiological studies.[10-13] This straightforward index assigns a score based on the most severely affected tooth in each sextant, regardless of how many teeth in that sextant exhibit wear. However, it does not consider the extent of wear across other teeth in the same sextant. Notably, the BEWE does not define clear points to distinguish varying degrees of wear. Additionally, the BEWE recommendations advise against restorative intervention until a cumulative score of 14, with the rationale and clinical implications of this threshold not being adequately addressed in the index or literature. Importantly, the BEWE index applies to all forms of tooth wear, not just ETW. The O'Sullivan index[14] utilises a three-tiered coding system. Each tooth is systematically coded to provide an outcome for an individual tooth. However, this has only been advocated for use in recording tooth wear in children and adolescents, isolated really to ETW. The Tooth Wear Evaluation System (TWES)[4,15,16] was designed to address perceived limitations in existing indices, with the goal of being more comprehensive but less time-consuming than indices like the TWI. The modular format consists of several individual components that guide the clinician through the evaluation process. Unlike the BEWE system, the scores of TWES are recorded independently rather than being summed. However, this process may be seen as time-consuming from a clinician's perspective.

In clinical settings, it is crucial to document tooth wear as early as possible, helping to address with the patient the aetiology of the tooth wear in their situation. Inadequate monitoring and failure to intervene in cases of tooth wear may eventually lead to extensive full mouth reconstruction and a reorganised approach to occlusion, in order to increase the occlusal vertical dimension[5,9,17] The progression of tooth wear is arduous to assess, due to the sub-

jective findings of different operators, coupled with this being a time-consuming process if utilised for each patient. The recording of the extent of tooth wear is an aspect on which it is hard to gain a consensus. Some clinicians record tooth wear with the use of descriptive terms such as 'moderate' or 'severe', and this may produce difficulties in intra-operator accuracy due to the subjective nature of these terms, which may lead to inaccurate recordings of the tooth wear present. It was also found that clinicians can have a distinct difficulty in differentiating whether dentine is truly exposed in tooth wear, which can lead to difficulties with grading and recording of the tooth wear long term.[17] An alternative approach is the use of an index to document the extent of the tooth wear, with particular emphasis on the lesions that extend into dentine, as this may enhance both inter- and intra-operator reliability. The importance of having an index is crucial both to record information in general practice settings and for data collection for long-term studies. It allows precise monitoring with timely initiation of clinical intervention in practice, and facilitates a quantitative reference point when collecting data for research.

The aim of this article is to answer the following questions:

1. Which were the most used tooth wear indices in research and clinical practice between 2017 and 2024?
2. What are the limits of the frequently used indices, particularly in terms of usability, reproducibility, and applicability?
3. Is there any single index that can be advocated for universal adoption in general dental practice?

MATERIALS AND METHODS

SEARCH STRATEGY

A search was carried out using the PUBMED database, ScienceDirect, and Google Scholar. The following criteria were used to search for the most frequently used indices: "(index OR indices OR grade OR grading system OR grading systems OR measurement OR measurements OR recording system OR recording systems OR evaluation system OR evaluation systems) AND (toothwear OR tooth wear OR tooth surface loss OR attritive tooth wear OR abrasive tooth wear OR erosive tooth wear OR attrition OR dental attrition OR erosion OR dental erosion OR abrasion OR dental abrasion)".

INCLUSION CRITERIA

1. Patient-based studies that were conducted in any setting, i.e., hospitals, private dental clinics, and the community.
2. Observational studies and clinical trials only.
3. Tooth wear in adolescents and adults.
4. Articles published in the English language between 2017 and 2024.
5. Use of an index/record system to record tooth wear.
6. No discrimination was made as to the gender of the population base.

These criteria were independently applied by two authors and the results were filtered starting from the title, abstract reading, and full-text reading. The consistency of the filtration process was checked and discussed until reaching a consensus about the final articles to be included in this review.

RESULTS

The time was restricted as per the inclusion criteria quoted, which produced 758 results. Of these articles, the relevance of the titles and abstracts was examined to assess which used a grading or index method to record tooth wear. This was followed by full-text reading, reducing the number to 39 articles (**Figure 2** and **Table 1**). These articles ranged from hospital-based, community-based and university settings to studies within a practice setting. Of these, 35 studies were found to have used indices on clinical patients, while four reports combined digital models or dental casts.[8-21] Once this was discovered it was then found that most of these articles (n=22, 56.4%) were performed predominantly in hospital settings ^(18-20, 22-40)^ as opposed to general practice (n=5, 12.8%).[21-25] The other articles were performed in schools and community settings (n=12, 30.8%),[26-37] e.g., care homes and prisons.

Articles were investigated for the use of any form of index to record tooth wear. Out of the 39 articles that were identified, there was a selection of different indices. These were BEWE, TWI, TWES, O'Sullivan, Eccles, Exact Tooth Wear Index, Erosion Partial Recording System, and Simple Erosion Partial Recording System (SEPRS). Of these indices, the BEWE was found to be the most commonly used[18,19,21-24,26-29,35,36,38-47] followed by the TWI,[30-33,37,48-52] while other indices were scarcely reported.[20,25,34,53-56]

Cross-sectional studies were the most common (n=29), followed by cohorts (n=6), case-control (n=3), and only one randomised clinical trial. Most of these studies were conducted in European countries (n=24),[18-23,25-28,31,33,35-38,42,43,46,47,50,52,54,56] Asia (n=9),[24,30,32,39,40,48,49,53,55] the USA and South America (n=6).[29,34,41,44,45,51] The reported prevalence of tooth wear with different severities was relatively high, and increased with age, particularly affecting anterior teeth and males. Additionally, ETW was positively associated with dietary acid intake, alcohol, and carbonated beverage consumption.[28,32,39,41,45,49] Some studies suggested that the accuracy of detecting and monitoring tooth wear is improved when combining the indices with digital aids.[18,21] Additionally, two studies[20,41] favoured using index teeth over full-mouth examination to increase the sensitivity and save time when recording tooth wear.

DISCUSSION

Although an assortment of tooth wear indices has been developed, none has achieved universal acceptance across research, general or specialist clinical practice. These systems differ in scope, usability and application, with some designed for adults, such as the BEWE, and others, like the O'Sullivan index, more suited to paediatric populations.[9,

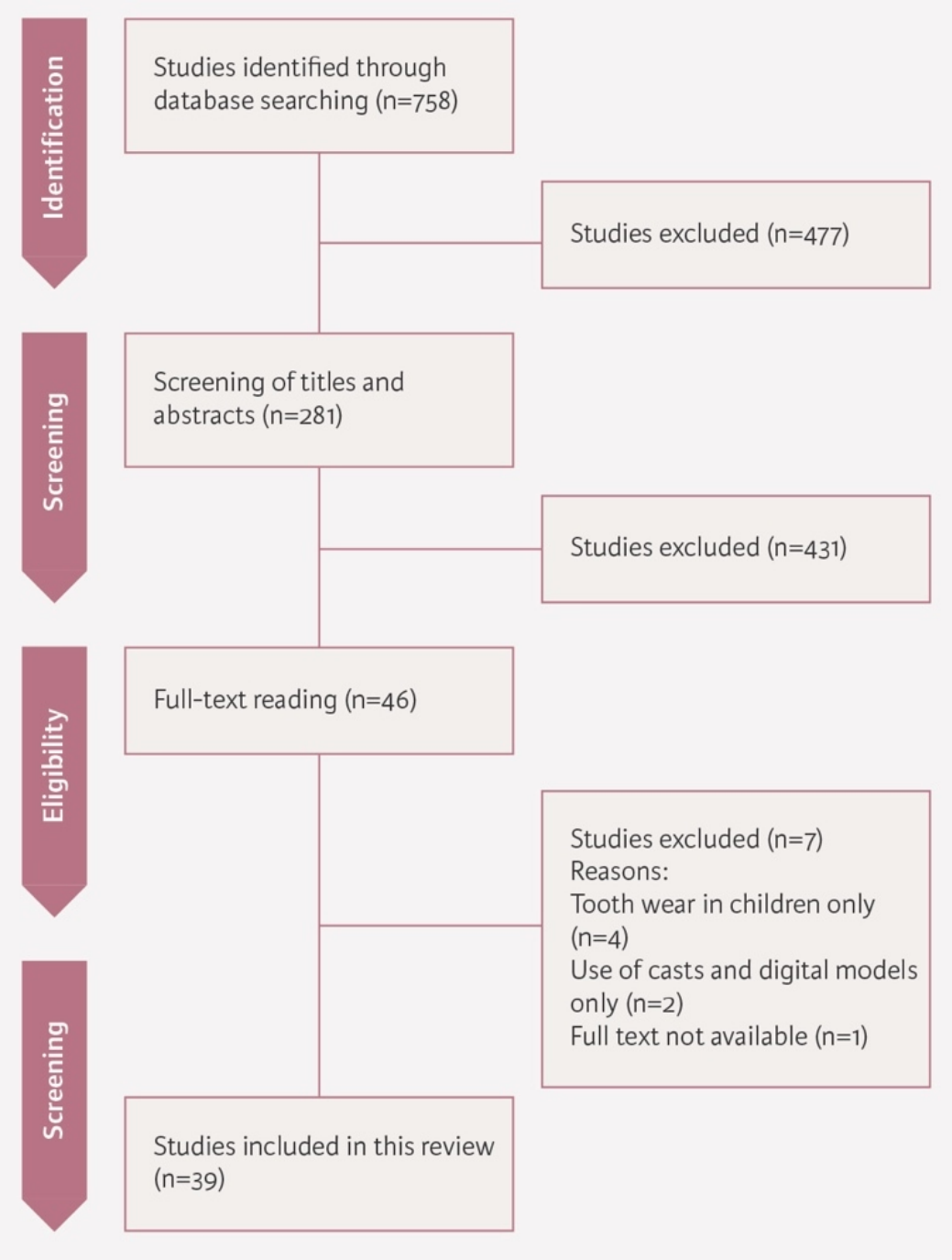

Figure 2. Flowchart of the study.

[57] Studies on tooth wear would aim to provide insights to drive prevention and treatment. Unfortunately, the intervention seen is often largely dependent on a wider range of systemic factors, including treatment philosophies and policy frameworks.

The universal adoption of a standardised, accepted index remains integral to the global standardisation of data collection, facilitating analysis across varying populations and tailoring treatment in a timely, effective manner.

COMPARISONS OF THE TOOTH WEAR INDICES

One challenge in comparing the prevalence data from different studies is the variability in the indices used. To better illustrate a comparison between these indices, **Table 2** provides a relative overview of their key features, clinical applications and limitations. For instance, one study using the BEWE index alongside the O'Sullivan index highlighted inconsistencies in prevalence reporting, demonstrating how different indices can yield varying results and make inter-study comparisons difficult.[34] For the Eccles index, care should be taken as it was created in a hospital setting,[7] which meant that the population it was based upon already

Table 1: Summary of studies involving the use of tooth wear indices (n=39).			
Index Author, year	Design, settings, country	Populations (n), age	Outcomes
BEWE index			
Alaraudanjoki *et al.*, 2016[41]	Cross-sectional, practice based, Finland	1,962 patients (all born in 1966)	ETW was a common finding and almost one in ten suffered from severe ETW.
Alaraudanjoki *et al.*, 2017[21]	Cross-sectional, practice and digital model based, Finland	1,964 patients (all born in 1966)	It is reliable to monitor ETW on 3D digital models. 3D digital models and clinical findings may not be as comparable.
Strużycka *et al.*, 2017[42]	Cross-sectional, practice based, Poland	1,869 patients (18y)	DE is a common oral disease in the 18y old population with prevalence of frequency and intensity in males.
Gallagher *et al.*, 2018[22]	Cross-sectional, hospital based, UK	352 elite athletes (18-39y)	49% of athletes had a BEWE score of above 7.
Marro *et al.*, 2018[18]	Retrospective cohort, university hospital based, Belgium	Orthodontic adolescent patients (n=120) Baseline: orthodontic cast model (n=480); endpoint (2y): (n=240 cast models and n=240 3D image replicas)	Combining digital scans with index may provide more accurate ETW records.
Marro *et al.*, 2018[45]	Cross-sectional, community based, Belgium	613 adolescents (mean age: 15.1±0.8y)	ETW is a common finding in Belgian adolescents, but is of low severity.

Table 1. Summary of studies involving the use of tooth wear indices (n=39).

had severe tooth erosion. Therefore, it was possibly more geared towards the classification of more severe tooth wear and not readily relatable to a general population. Another issue with the Smith and Knight TWI is that surfaces with large restorations are excluded from scoring,[8] thereby reducing the total number of surfaces evaluated. However, while the index has been used as a reference for assessing wear across age groups, the basis is hypothetical and relies on speculative observations.

These variations are further compounded by factors such as cultural differences and the sample sizes of the studies, which can either overestimate or underestimate the true prevalence of tooth wear. Without a standardised approach to indexing and training among clinicians, it remains challenging to accurately compare data across different populations and studies.[26,58]

The indices examined in this article utilise a quantitative scale for the grading of tooth wear. These range from simple indices, such as the Eccles index, to more multifarious ones like TWES index. The Eccles index was designed to document erosion caused by non-industrial factors.[7] However, it primarily focuses on ETW and does not account for the other modalities of wear, potentially limiting the scope of its clinical usefulness. As Smith and Knight have noted, tooth wear often results from a "combined cause", making it difficult to rely solely on a single aetiology for measurement.[8] On the other hand, the complexity of the TWES and the TWI make their application laborious, especially during first visit examinations in a general practice setting. In contrast, indices like BEWE and Eccles are more appealing due to their simpler scoring systems. However, a shortcoming of this simplicity is that it may result in the omission of critical data about individual tooth surfaces, making it harder to monitor the progression of tooth wear over time. The O'Sullivan index, specifically designed for children and adolescents, positions itself as a well-structured exemplary model for recording tooth erosion in younger populations. Its focus on the extent of tooth surface loss is particularly relevant. Other indices may use the presence of secondary dentine as a key factor in assessing tooth wear, but this feature is less applicable in younger patients, making the O'Sullivan index more apt for this wide demographic of patients.[14]

MONITORING TOOTH WEAR

Tooth wear results from the irreversible loss of dental hard tissue, emphasising the importance of early monitoring and precise documentation. Accordingly, the guidance from the Royal College of Surgeons (RCS) England encourages maintaining good tooth wear records; however, restraint is advised regarding the use of these indices. This caution largely arises from concerns about index reproducibility, both between clinicians and among individual clinicians over time. It is advised that alongside indices, accompanying methods such as clinical photographs and putty indexes should be used to create a more comprehensive record of tooth wear progression.

The limitation of relying solely on indices for monitoring is that many were originally designed to aid in treatment planning rather than tracking the progression and severity of wear. It appears that the indices may not be fit for purpose. These indices tend to emphasise dentine exposure rather than enamel loss, leading to higher severity grades. Among the indices, only the TWES explicitly mentions its applicability in monitoring tooth wear over time, while the others are more suited for diagnosis and epidemiological studies.

In the era of intra-oral scanners, these now provide a valuable tool for the recording of tooth wear, with the ability to superimpose and compare data over varying time periods.[59] While the use of photographs provides a valuable means of documenting tooth wear, its practicality in routine general practice may be limited, and it requires high-quality images taken with a digital single-lens reflex (DSLR) camera. The BEWE index is frequently favoured due to its structural similarity to the universally used Basic Periodontal Examination (BPE) index, making it simpler for

Table 1: Summary of studies involving the use of tooth wear indices (n=39) (cont'd).

Index Author, year	Design, settings, country	Populations (n), age	Outcomes
Awad *et al.*, 2019[43]	Cross-sectional, multi-centre, practice based, six Arab countries (United Arab Emirates, Oman, Jordan, Egypt, Saudi Arabia, and Kuwait)	2,924 participants (18–35y)	The prevalence of tooth wear in Arab populations was relatively high, mostly affecting maxillary incisors.
Jacob *et al.*, 2019[23]	Cross-sectional, hospital based, India	430 patients,mean age 36.3y (22-51y)	The prevalence of DE in the community was high and associated with acid intake, asthma, age, living in rural areas, and diabetes mellitus.
Li *et al.*, 2019[24]	Cross-sectional, hospital based, China	720 adolescents equally divided between 12y and 15y cohorts	Moderate ETW in the permanent dentition was common among adolescents.
Marro *et al.*, 2019[46]	Case-control, community based, Belgium	Athletes with ID (n=232); <25y without DS (n=174); <25y with DS (n=39); ≥25y with DS (n=58)	Subjects with DS had more ETW than the subjects without DS.
Martignon *et al.*, 2019[25]	Cross-sectional, hospital based, Colombia	601 subjects currently wearing orthodontic appliances (18-25y)	Dietary acid intakes increased the risk of ETW. Grading ETW on index teeth was more sensitive than full mouth.
Vainionpää *et al.*, 2019[47]	Cross-sectional, community based, Finland	100 prisoners (mean age 36y)	ETW was common and associated with dental caries and daily alcohol consumption.
Tschammler *et al.*, 2019[26]	Cross-sectional, hospital based, Germany	223 participants (4-17y, n=1,476 primary and n=4,110 permanent teeth)	Higher BMI is significantly associated with a higher risk for ETW and caries.
Gillborg *et al.*, 2020[27]	Cross-sectional, hospital based, Sweden	831 adults	Tooth wear was more common in men. Erosion stands as a main reason for tooth wear.
Marró *et al.*, 2020[28]	Cross-sectional, hospitalbased, Chile	535 adults (18 to 46y)	A high prevalence of ETW was found, mainly anterior teeth, positively associated with age.
Marro *et al.*, 2020[19]	Retrospective cohort, hospital based, Denmark	Pre- and post-orthodontic treatment digitally scanned casts of 120 adolescents (11-13y)	Rates of high wear progression in adolescents were proposed.
Racki *et al.*, 2020[48]	Cross-sectional, community based, Brazil	1,197 adolescents (15-19y)	Males, white adolescents, and those with higher socioeconomic status were more affected by ETW.
Rauber *et al.*, 2020[29]	Cross-sectional, hospital based, Brazil	235 patients with GERD (≥18y)	Dental erosions were associated with age (<50y), acid regurgitation, and chocolate intake.
Marro *et al.*, 2021[30]	Case-control, hospital based, Finland	Cases: 71 obese adolescents Control: 54 normal weight adolescents Age range: 11-18y for both groups	Obese individuals had a lower prevalence of ETW compared to the normal weight participants.
Butera *et al.*, 2022[40]	RCT, three months follow-up, hospital based, Italy	40 patients were randomly assigned to control (toothpaste containing 1,450ppm of fluoride) and experimental groups (toothpaste containing biomimetic hydroxyapatite)	BEWE scores did not significantly vary during the follow-up in both groups.
Kanaan *et al.*, 2022[54]	Cross-sectional, community based, Belgium	570 adults, ≥18y	Although the prevalence of tooth wear was high, its severity and impact on OHRQoL were limited.

clinicians to adopt and translate to daily use. However, the BEWE's tendency to group teeth within a sextant under a single score can lead to inaccurate assessments, potentially exaggerating wear severity.[60]

CALIBRATION AND INTER-EXAMINER SIMILARITIES

One noteworthy challenge associated with the use of an assorted selection of indices is the difficulty in maintaining inter-examiner reliability. Most studies require clinicians to undergo calibration and acquire experience before employing any specific index.[61] However, after initial calibration, the risk of examiners becoming de-calibrated over time exists, reducing recorded data accuracy. This examiner record discrepancy is a known problem inherent to all grading systems.[62] For example, one study investigating the use of indices by general practitioners in England found minimal inter-examiner agreement when using the BEWE index, with a Fleiss' Kappa score of 0.12, where a value between 0.81 and 1.00 is considered to reflect perfect agreement.[63,64] In contrast, the O'Sullivan index has been reported to have a reproducibility rate of 70-93%, comparable to the 79.5% reproducibility observed in a study by Smith and Knight.[8, 14] Notably, this did not include a cohort of general dental practitioners.

It is accepted, ultimately, that every index requires a degree of learning, practice and familiarity before examiners can produce consistently reliable results that can be meaningfully translated.

CONCLUSIONS

There is currently no universally accepted and ideal index that meticulously captures all aspects of tooth wear diagno-

Table 1: Summary of studies involving the use of tooth wear indices (n=39) (cont'd).

Index Author, year	Design, settings, country	Populations (n), age	Outcomes
West *et al.*, 2024[55]	Cross-sectional, community based, seven European countries	3,551 participants, mean age 44±17.4y	Prevalence of ETW was greater than previously reported in literature.
Smith and Knight (TWI)			
Kitasako *et al.*, 2017[31]	Cross-sectional, hospital based, Japan	1,108 adults (15-89y)	The prevalence of ETW was dependent on tooth types and surfaces.
Li *et al.*, 2017[32]	Case-control, hospital based, China	Cases: 51 participants with GERD (median age 53y) Control: 50 participants without GERD (median age 41y)	GERD was positively correlated with DE. Carbonated beverage consumption can increase the risk of both GERD and dental erosion.
Ab Halim *et al.*, 2018[49]	Cross-sectional, school/community based, Malaysia	598 adolescents, 16y	No significant relationship between the occurrences of ETW and caries was observed in this population.
Sterenborg *et al.*, 2018[33]	Cross-sectional, hospital based, The Netherlands	52 participants (40 male, 12 female, mean age 40±8.2y)	No effect of the degree of tooth wear on masticatory performance.
Zuza *et al.*, 2019[50]	Cross-sectional, community based, Bosnia and Herzegovina	738 participants	NCCLs occur frequently and have a multifactorial aetiology. The lowest prevalence was recorded among individuals <20y.
Hasheminejad *et al.*, 2020[51]	Cross-sectional, community based, Iran	600 adolescents, 13.2±0.7y	Participants who consumed acidic beverages had higher levels of ETW.
Kaklamanos *et al.*, 2020[52]	Cross-sectional, community based, Greece	70 elderly participants (60-92y)	Severe wear was more prevalent with advanced age and more extensive in the occlusal/incisal surfaces in males and those having <20 remaining teeth.
Kamal *et al.*, 2020[34]	Cross-sectional (database from NHANES), hospital based, USA	3,541 adults (average age 43.9y)	Obesity was positively associated with tooth wear in American adults.
Koc Vural *et al.*, 2020[35]	RCT, 24 months follow-up, hospital based, Turkey	25 patients with NCCLs and bruxism	Both glass hybrid restorative system and nano-ceramic composite resin were clinically acceptable to restore NCCLs.
Theodoridis *et al.*, 2022[56]	Cross-sectional, community based, Greece	363 dentate individuals, aged between 65 and 74y	Age and periodontal disease were significantly combined with tooth wear in both urban and rural areas.
O'Sullivan index			
Mafla *et al.*, 2017[53]	Cross-sectional, school/community based, Colombia	384 participants (10-16y)	DE is a prevalent condition affected by transition from early to middle adolescence.
Other indices			
EPRS and EPRS-M			
Al-Ashtal *et al.*, 2017[36]	Cross-sectional, hospital based, Yemen	668 participants aged 5-6, 13-14 and 18-19y	Dental erosion was common and highest among older girls but less common among younger teenagers.
Eccles			
Teixeira *et al.*, 2017[37]	Cross-sectional, hospital based, Portugal	277 institutionalised alcoholic patients	ETW was more prevalent in the maxilla, mostly affecting occlusal, buccal, and lingual surfaces.
SEPRS			
Skalsky Jarkander *et al.*, 2018[44]	Cohort, practice based, Sweden	1,071 adolescents (15-17y)	There was a moderate prevalence of tooth wear in adolescents.

sis, in an easily reproducible and useful format. This review revealed a wide range of indices available for recording and diagnosing tooth wear. Subjectivity and lack of quantifying loss of tooth structure is a shared drawback among all indices that compromise the sensitivity and specificity of indices.

There exists a healthy research interest in tooth wear, and numerous indices remain in active use by researchers. However, the majority of these studies were conducted in industrialised and developed countries, pointing to a global lack of awareness about tooth wear as a major oral health problem. There needs to be a well-defined, future-focused research theme, geared to developing a universal index, that can be translated between researchers and the general dental practitioner. However, as with other indices, simply recording a score should not mark the finale of clinical responsibility. Treatment decisions are multidimensional, considering not only the score, but age, social factors, and risk factors. The high variability in indices underscores varying treatment philosophies.

No index can be regarded as truly ideal, particularly given that most patients are first managed in primary care. This setting is uniquely influenced by time constraints, resource limitations and patient variability. If taken collectively, these challenges underpin the importance of developing a universally accepted index, one that balances reliability and practicality across both the research and general practice settings.

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Table 1: Summary of studies involving the use of tooth wear indices (n=39) (cont'd).			
Index Author, year	Design, settings, country	Populations (n), age	Outcomes
Exact tooth wear index			
Lam *et al.*, 2020[38]	Cohort (10y follow-up), hospital based, China	68 NPC patients who had received radiotherapy (mean age 60.0±8.9y)	Anterior tooth wear is a significant dental problem among NPC survivors and was associated with hyposalivation.
Digital tooth wear system (WearCompare)			
O'Toole *et al.*, 2020[20]	Cohort, hospital based, UK	Bimaxillary digital intraoral scans of patients (n=29)followed for 3y	Using index teeth to compare tooth wear can be a time-saving substitute or monitoring.
TWES			
Sterenborg *et al.*, 2020[39]	Cohort, hospital based, The Netherlands	17 patients (mean age 41.2±10.4y) monitored before and after a full mouth rehabilitation	Patients reported an improvement of speech function one month after occlusal rehabilitation.

ID: intellectual disability; DS: Down syndrome; BEWE: Basic Erosive Wear Examination index; TWI: Tooth Wear Index; ETW: erosive tooth wear; GERD: gastroesophageal reflux disease; NPC: nasopharyngeal carcinoma; DE: dental erosion; NHANES: National Health and Nutrition Examination Survey; NCCLs: non-carious cervical lesions; EPRS: erosion partial recording system; EPRS-M: erosion partial recording system-modified; BMI: body mass index; SEPRS: Simplified Erosion Partial Recording System; RCT: randomised clinical trial; OHRQoL: Oral health-related quality of life.

Table 2: Comparison of tooth wear indices – key features, clinical applications, and limitations.				
Index	Scope	Coding/scoring system	Strengths	Limitations
Basic Erosive Wear Examination (BEWE)	Applies to erosive tooth wear only.	Four-point scale (0-3) applied to the most severely affected surface in each sextant; scores summed to derive a risk level.	Simple and quick; validated for both epidemiological studies and clinical monitoring. Provides treatment strategies related to the codes.	May underestimate localised/severe lesions; less sensitive to small changes over time; can end up reflecting overall wear severity.
O'Sullivan index	Primarily designed for erosive tooth wear in children, but applicable to ETW in general.	Three-tiered system: (1) site, (2) severity, (3) area affected.	Captures lesion characteristics in detail; provides structured classification.	More complex; time-consuming; less widely used in routine practice.
Smith and Knight Tooth Wear Index (TWI)	Comprehensive, covering all forms of wear (attrition, abrasion, erosion).	Five-point ordinal scale (0-4) applied to every surface of every tooth.	Highly detailed; widely cited in research; allows monitoring progression.	Very time-consuming; examiner variability; less practical in everyday clinical settings.
Eccles index	Early system, specific to dental erosion.	Three grades based on depth of tissue loss (enamel only, dentine involvement, pulp proximity).	Simple; historically important; raised awareness of erosion.	Limited scope (erosion only); outdated compared to later indices; poor sensitivity for mixed wear.

Table 2. Comparison of tooth wear indices – key features, clinical applications, and limitations.

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