Review article

Tooth wear and socioeconomic status in childhood and adulthood: findings from a systematic review and meta-analysis of observational studies

Short title: Socioeconomic status and tooth wear

Sheema Entezami[1], Karen Glazer Peres[2], Huihua Li[3], Zahra'a Albarki[4], Mariam Hijazi[5], Khaled E. Ahmed[6]

[1] School of Dentistry and Oral Health. Griffith University. Gold Coast. Australia. sheema.entezami@gmail.com

[2] National Dental Research Institute Singapore, National Dental Centre Singapore. Dentition Oral Health ACP, Health Services and Systems Research Programme, Duke-NUS Medical School, Email: karen.g.d.a.peres@ndcs.com.sg,

[3] National Dental Centre, ACP Research Office; Duke-NUS Medical School, Centre for Quantitative Medicine, li.hui.hua@ndcs.com.sg,

[4] School of Dentistry and Oral Health. Griffith University. Gold Coast. Australia. zahraa.albarki@gmail.com,

[5] School of Dentistry and Oral Health. Griffith University. Gold Coast. Australia mariam.hijazi1@outlook.com

[6] *Correspondence should be addressed to* Khaled E. Ahmed: Khaled.ahmed@griffith.edu.au. School of Dentistry and Oral Health. Griffith University. Gold Coast. Griffith Health Centre (G40). Room 7.59. QLD 4222. Australia. Telephone: +61 7 5678 0596. Email: khaled.ahmed@griffith.edu.au

ABSTRACT

Objectives: To evaluate the association and level of evidence between socioeconomic status (SES) and tooth wear (TW) in children, adolescents, and adults.

Data: Eligibility criteria comprised population-based observational studies assessing the association between SES and TW in permanent dentition of adolescents and adults. Interventional and descriptive studies or those without an internal comparison between exposed and nonexposed groups were excluded. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were applied where applicable. Risk of bias (RoB) was assessed using the Newcastle–Ottawa scale. Meta-analyses were conducted to estimate the pooled effect measures. Q-statistic, I^2 statistic, and subgroup and sensitivity analyses assessed study heterogeneity.

Sources: PubMed/Medline, Embase, Scopus, Web of Science, LILACS, SciELO, Cochrane Library, and Google Scholar databases were searched for articles published in English between 1st January 1980 and 31st March 2021.

Results: Sixty-five studies were included, involving 63893 participants in over 30 countries. A positive association was found between TW and education (OR=1.25 [0.96; 1.62]), family income (OR=1.18 [0.91; 1.53]), and private school (OR= 1.24 [0.90; 1.72]) among adolescents. Higher educated adults had a lower risk for TW (OR=0.70 [0.52; 0.93]). Most included studies had a moderate RoB. Limitations relating to population representation and assessment methodologies were identified in the included studies.

Conclusions: SES was associated with TW with its direction depending on the individuals' age. The overall quality of evidence was moderate. Clinical significance: SES should be included as part of the routine screening and risk assessment for tooth wear.

INTRODUCTION

In recent decades, greater attention has been paid to the increasingly complex condition of tooth wear (TW) [1], as it is a progressive process of multifactorial aetiology and may differ significantly in its presentation from one individual to the next. Tooth wear is described in terms of attrition, abrasion, and erosion [2] and their interrelationship. Contributing to the manifestation of this progressing condition is the interplay over time of lifestyle, diet, behaviours, health, and mental/medical state [3].

Tooth wear is a relatively common oral condition that impacts a significant cohort of the global population with increasing prevalence and pathological progression. Globally, a dental erosion prevalence of 30 – 50 % has been reported in deciduous dentition and 20 – 45% in permanent dentition, increasing linearly with age [4-6]. Furthermore, the National Health System Adult Dental Health Survey also reported a 10% increase in the prevalence of tooth wear in the dentate population of England, from 66% in 1998 to 76% in 2009 [7]. The tendency to develop more wear with age also pertains to adults, with up to 17% of 70 years old presenting with severe tooth wear [1].

Pathological tooth wear can indeed have an impact on patients' quality of life, presenting greater tooth sensitivity and pain due to dentine exposure and pulpal involvement as a sequela of progressive wear [8]. Tooth wear patients most commonly report aesthetic dissatisfaction [9] and a reduction in masticatory capacity affecting functional performance. More specifically, severe tooth wear affects daily living through psychological discomfort and disability, triggered by feelings of self – consciousness and embarrassment [10]. Further complicating the management of TW for dental care professionals is its possible association with complex medical and mental health conditions such as Gastroesophageal Reflux Disorder (GORD), diabetes, and sleep and eating disorders and even human immunodeficiency virus (HIV) in some patients [11-17]. Thus, there is a marked reduction in quality of life as TW pathologically progresses, which is comparable with that of edentulousness [18]. Nonetheless, there is a significant improvement in the quality of life and appearance in patients when restorative treatment is provided. [19, 20]. However, such full-mouth rehabilitations come at a high cost, involving complex and multi-disciplinary treatment, over multiple clinic visits extending for many months [21]. Thus, early identification of TW reduces the burden to both public and private health systems and patients.

Individuals are embedded within their societies and populations. From a young age, affluence and social determinants like family income, type of education, location of residence and occupation can have implications on individuals' lifestyle and behaviours that may affect oral health. Socioeconomic status (SES) is the overarching term used to describe these factors, and the aetiology of TW stems from such components [22, 23]. Access to routine dental care, dental awareness, oral hygiene practices, and a healthy diet and nutrition are well-known aspects involved in the tooth wear process that are likely to be modulated by the individuals' SES. For instance, social status, culture, and economic affluence can often dictate the dietary intake of individuals. [24]. Nonetheless, despite SES having a substantial impact on oral health - both at an individual and global level - in relation to tooth wear, the findings are yet inconclusive [25]. Moreover, the role of SES as a function of age also needs to be investigated since its impact on the prevalence and progression of tooth wear might very well vary between age groups, and subsequently, its management as a tooth wear risk factor. Accordingly, an understanding of the association of SES and TW at a population-based level can positively contribute to guiding clinical practise, policymaking, and healthcare initiatives [26]. Systematic reviews and meta-analyses, in this context, can play a critical role in identifying and assessing evidence from an expansive data pool and presenting evidence-based recommendations to researchers, clinicians, and policymakers [27].

The aim of this systematic review is to identify the association between SES and tooth wear in permanent dentition by systematically reviewing the existing literature.

MATERIALS AND METHODS

This study was registered at the International Prospective Register of Systematic Reviews - PROSPERO (CRD42020176919) and was reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. [27]

Review question

The review question was designed using the Population, Exposure, Control, and Outcome (PECO) criteria [28] as follows: “Is there an association between socioeconomic status and tooth wear in the permanent dentition?”

Inclusion and Exclusion Criteria

Original, population-based observational studies, including case-control, cohort, and cross-sectional studies, were included if they reported the association between any measure of socioeconomic indicator and tooth wear. The search was limited to studies involving humans of all ages with permanent dentition. Interventional and descriptive studies such as case reports and case series, studies on specific populations, as well as letters to the editor, abstracts from conferences, historical and forensic studies, were excluded. Studies without an internal comparison between exposed and nonexposed groups were excluded.

The exposure considered all levels of socioeconomic status, such as level of education, family income, socioeconomic status, and type of school. All tooth wear measures such as dental erosion indices and general tooth wear indices were analysed as an outcome.

Search Strategy

The search strategy was developed collaboratively by all members of the team and validated using the Peer Review of Electronic Search Strategies (PRESS) [29]. The electronic databases searched were PubMed/Medline, Embase, Scopus, Web of Science, LILACS, SciELO, and the Cochrane Library. The first search was handled on PubMed using the following strategy: (i) Outcome: ((((((((((‘tooth wear’[MeSH Terms]) OR ‘tooth abrasion’[MeSH Terms]) OR ‘tooth attrition’[MeSH Terms]) OR ‘tooth erosion’[MeSH Terms]))) OR (((tooth OR teeth OR dent*)) AND (wear OR attrition OR erosion OR abrasion)))) AND (ii) Exposure ((socioeconomic factors[MeSH Terms]) OR ((income* [ALL] OR occupation* [ALL] OR "socioeconomic" [ALL] OR “socio-economic” [ALL] OR "education" [ALL] OR “remuneration” [ALL] OR “earning*” [ALL] OR “salar*” [ALL] OR social class* [ALL] OR "education*status" OR "education* level*" OR "social determinant*" OR poverty OR economic OR "status quo" OR “public school*” OR “private school*” OR “urban region*” OR “urban area*” OR “rural area*” OR “rural region*” OR “metropolitan area*” OR “metropolitan region*” OR “regional area*”)))) AND (iii) Language: “English”[Language]) AND (iv) period: (“1980/01/01”[Date – Create] : “2021/03/31”[Date – Create]). A Google Scholar search was also performed and limited to the first ten pages, including any grey literature. The search was independently performed by two investigators (Z.A and M.H), with the last search carried out on 30/04/2021. The full search and

adaptations for each database can be found in the appendix (Appendix 1). Articles were considered if written in the English language.
The titles and abstracts of the retrieved records from the search were independently screened by two investigators (Z.A and M.H) as a first step. Agreement between the investigators was evaluated by Kappa statistics [30]. In cases of doubt, the articles were included for the full-text reading. Studies were filtered according to the eligibility criteria, and study inclusion was ascertained through discussion and agreement of the reviewers, with any disagreement resolved by the inclusion of mediators (K.A and K.P) [31]. A hand search and cross-referencing of the included studies were also performed to identify any further studies. Articles not found electronically were requested from the authors. The reference management tool utilised was EndNote X9.

Assessment of study characteristic and data extraction

A customised data extraction spreadsheet was developed to collect information from each included study. Two investigators (Z.A and M.H) independently extracted the data, and information was cross-checked with disagreements resolved through discussion and with a third investigator (K.A or K.P) when necessary. Data were retrieved from the main text, tables or figures of the articles. The data included information as follows: country and region of the study, study design, sample size, demographic characteristics (age and gender), main exposure (socioeconomic assessment of the study's participants) and tooth wear index applied. The prevalence and severity of tooth wear were recorded. Lastly, any SES associations with tooth wear and main conclusions were reported.

Risk of bias assessment

The risk of bias was assessed using the Newcastle – Ottawa scale at a study level [32, 33]. The domains assessed were selection, comparability, and outcome. A maximum of ten stars was awarded to each cross-sectional study and nine stars to case-control and cohort studies. If seven or more stars were awarded, then the studies were considered to have a low risk of bias and high quality.

Data analysis

For the meta-analysis, the outcome was defined as any tooth wear with any score larger than 0 considering the different scores applied in different studies. We reclassified the socioeconomic positions to make it consistent among all studies, or at least consistent among the same region when possible. We assessed the differences in tooth wear level concerning education, family income, SES, school type and location as independent groups. The lowest and the highest reported socioeconomic position were compared while maintaining the consistency of these socioeconomic positions when possible. Whenever possible, the following information was extracted from the publications: (1) the number of patients without tooth wear and the number of patients with tooth wear involved in the exposed and unexposed groups; (2) or the Odds ratio (OR) with 95% confidence interval (CI). The authors of the selected papers were contacted to provide further details when necessary [34]. Only studies reporting or allowing the calculation of odds ratios (OR) and error estimates (confidence intervals [CIs], standard error [SE]) were used for pooled analysis. If studies reported separate estimates for subgroups, we pooled data for meta-analysis to generate one effect estimate per study and comparison. When there was no response from the authors, the article was excluded from the meta-analysis. The meta-analysis was stratified according to different socioeconomic groups. Groups were defined based on classical theoretical frameworks [35] that distinguish the different approaches to evaluating socioeconomic conditions, like education, family income, SES, school type. Therefore, p-values were deemed unsuitable for the conducted meta-analyses.

Statistical analysis

The meta-analyses were conducted to estimate pooled effect measures on the relationship of socioeconomic status with tooth wear in adolescents and adults, respectively. We performed separate meta-analyses considering specific socioeconomic indicator for each whenever data were available. Effect measures were presented as pooled unadjusted odds ratios since socioeconomic indicators are considered a distal determinant for oral health [36]. In studies where the odds ratio was not available, the effect size was calculated or converted as necessary. Funnel plots, together with Begg's rank correlation test and Egger's regression asymmetry test for analysis, including at least ten studies, were used to assess publication bias [37]. In addition, the Duval and Tweedie nonparametric 'trim and fill' method of accounting for publication bias was performed to formalize the use of funnel plots and adjust the meta-analysis by incorporating the theoretically missing trials [38]. Q-statistic was used to investigate the degree of heterogeneity between studies. A P-value of <0.1 was interpreted as evidence by chance alone. I^2-statistical test [39] was carried out to describe the proportion of total variation caused by heterogeneity because the Q-statistic has low power in common situations of few studies and excessive power to detect clinically unimportant heterogeneity when there are many studies [40]. I^2 of less than 30% of the variability in point estimate was considered as mild heterogeneity, more than 50% was notable heterogeneity, whereas in between was considered as moderate heterogeneity [39]. In our study, the I^2-statistic found notable heterogeneity for most analysis; therefore, pooled estimates were derived using a random-effects model (DerSimonian-Laird) [41] to account for inter-study heterogeneity, especially when study populations were different. Subgroup and sensitivity analysis were performed to explore the reasons for heterogeneity. Sensitivity analysis were also carried out to evaluate the effect of each individual study considering the outcome of any tooth wear was not available or inconsistency of the socioeconomic positions for some studies after contacting authors. All analyses were done using R 4.0.1 (https://www.r-project.org).

RESULTS

Study selection

A total of 4305 studies were identified from the search strategy. After removing duplicates (n = 2131), 2174 articles were screened according to titles and abstracts, and after full-text reading of 143 articles, a total of 65 studies published between 1994 and 2020 were identified and included in the systematic review. A substantial level of agreement [30] between two investigators was identified in the titles and abstracts screening (Kappa=0.77) and in the full text screening phases (Kappa=0.78). Figure 1 displays the flowchart of study selection following PRISMA Statement. The reasons for article exclusion after full-text reading are shown in appendix 5. Of the total, three studies had a longitudinal study design [41-43], one was case-control, and the remaining were cross-sectional studies.

Study characteristics

Cumulatively, 63 893 individuals ranging from 6 to 79 years of age were examined in the included studies. Of those, 51% (n = 29 173) were female, with four studies not specifying the gender percentages of their sample and two only including male participants. A large proportion of the studies focused on adolescents between 10 and 19 years of age. In contrast, a minority of studies (n = 15) encompassed adults exclusively from 20 years of age. Individual sample size varied from n = 157 to n = 3 773. The most commonly utilised tooth wear instrument was the Basic Erosive Wear Examination (BEWE). The second most popular indices were Smith and Knight’s Tooth Wear Index (TWI), the O’Sullivan Index, and varying renditions of these tools, which were comparable in their frequency of use by studies (Appendix 1).

Results of individual studies

The prevalence of tooth wear ranged from 1.4% to 100%. Low SES and tooth wear were reported to have an association in 27 studies; the same number of studies found no relationship. Conversely, high SES was associated with a greater prevalence of tooth wear in 11 studies. The categorisation and definition of SES by the studies were highly varied. Education as a socioeconomic indicator was employed by 33 studies, with differences in analysing either the participant’s level of education, mother’s, father’s, or both parents. Type of school such as private/public was also a frequently used tool of classification as well as the income of the household or family. Other determinants included the occupation of the participants, or the parents of the children and adolescents examined, and place of residence, i.e., rural versus urban. Some studies utilised classification criteriums specific to their countries, such as the Standard Brazilian Economic Classification criteria or the 'A Classification of Residential Neighbourhoods in the UK' (ACORN), which categorises participants according to their postcode and housing areas. Other studies simply classed the participants into high, medium, and low SES and were unclear about their rationale (Appendix 2).

Risk of bias assessment

The majority of studies demonstrated to be of moderate quality (n=51) and the remainder of high quality (n=14), indicating a low to moderate risk of bias (Appendix 3). Most studies were found to be lacking in their comparability of outcome groups by not controlling for confounding factors.

Synthesis of results

Adolescents

The meta-analysis for the exposure level of education comprised 13 studies. We found a positive association between education and tooth wear with OR of 1.25 [0.96; 1.62] (Figure 2A). Results of sensitivity analysis by omitting one study each time produced a low effect on I^2 (Appendix 6A). Subgroup analysis including cross-sectional studies only (I^2=75.4% [56.9%; 86.0%], OR=1.23 [0.93; 1.63]), including tooth erosion only (I^2=76.0% [56.9%; 86.6%], OR=1.19 [0.89; 1.59]), or participants with mothers' education only (I^2=73.8% [52.3%; 85.6%], OR=1.16 [0.88; 1.52]), still detected notable heterogeneity (Appendix 7A). However, subgroup analysis of 4 Brazilian studies only detected a mild heterogeneity (I^2=5.5% [0%; 8.6%]) and showed no effect of education (OR=0.98 [0.80; 1.20]), while the analysis of the rest 9 studies showed that higher level of education tended to increase the risk of tooth wear development (OR=1.38 [0.93; 2.05]) with notable heterogeneity (I^2=79.3% [61.2; 88.9%]); subgroup analysis of 8 studies comparing University to Primary only (I^2=70.7% [39.3%; 85.8%], OR=1.03 [0.75; 1.41) or 10 studies from middle-income countries only (I^2=67.5% [36.9%; 83.3%], OR=1.07 [0.81; 1.40]) didn't reduce the heterogeneity) and also didn't find any effect of education (Appendix 7A).

Family income was the second analysed exposure. The meta-analysis included nine studies. We found a tendency of increased risk among adolescents from high-income families with an OR of 1.18 [0.91; 1.53]. The *Q*-statistic showed the presence of heterogeneity among different studies included in our meta-analysis (*P*=0.037). I^2-statistics also found notable heterogeneity (I^2 = 51.1% [0%; 77.1%]) (Figure 2B). Sensitivity analysis by excluding one study each time still detected moderate to notable heterogeneity with I^2 ranging from 38.7% to 57.0% (Appendix 6B). Among these nine studies, eight studies were of cross-sectional design reporting tooth erosion. Subgroup analysis, including cross-sectional studies reporting tooth erosion, only confirmed that adolescents from high-income families tended to develop tooth erosion at a higher risk (OR=1.23 [0.99, 1.54]) (Appendix 7B).

The meta-analysis of SES included 17 studies. Our pooled analysis did not detect any significant effect of SES on tooth wear with an OR of 1.09 [0.77; 1.55] (Figure 2C). The *Q*-statistic showed the presence of heterogeneity among different studies included in our meta-analysis. I^2-statistics also found notable heterogeneity (I^2 = 88.1% [82.5%; 91.9%]) (Figure 2C). Sensitivity analysis by excluding one study each time still detected moderate to notable heterogeneity with I^2 ranging from 36.5% to 87.7% (Appendix 6C). Subgroup analysis including studies from 8 middle-income countries only (I^2=90.6% [83.9%; 94.5%]) or eight high-income countries only (I^2=85.0% [72.4%; 91.9%]) did not affect I^2; however, the subgroup analysis showed that those with high SES tended to have a high risk of developing tooth wear compared to those with low SES from middle-income countries (OR=1.42 [0.75; 2.66]), while a low risk for those from high-income countries (OR=0.77 [0.51; 1.15]), (Appendix 7C). Subgroup analysis of the 4 Brazilian studies reduced the I^2 to 0% and detected the increased risk of developing tooth wear among participants with high SES (OR=1.41 [1.09; 1.81]) (Appendix 7C).

Finally, we analysed the school type as exposure. Fifteen studies were included in the meta-analysis comprising 3819 participants from private and 9842 from public school. Adolescents from private school tended to have a higher risk with OR of 1.24 [0.90; 1.72] (Figure 2D). The Q-statistic showed the presence of heterogeneity among different studies included in our meta-analysis. I^2-statistics also found notable heterogeneity (I^2 = 91.2% [87.2%; 94.0%]) (Figure 2D). Sensitivity analysis by excluding one study each time still detected notable heterogeneity with I^2 ranging from 82.3% to 91.9% (Appendix 6D). Subgroup analysis including cross-sectional studies only (I^2=91.9% (88.1%; 94.5%); OR=1.26 [0.90; 1.76]), including the studies reporting tooth erosion only (I^2= 91.6% [87.4%; 94.4%]; OR=1.22 [0.84; 1.77]), including non-Brazilian studies only (I^2=77.2% [52.4%; 89.1%]; OR=1.42 [0.82; 2.47]), including studies from low income countries (I^2=96.0% [93.5%; 97.6%]; OR=1.48 [0.67; 3.27]) still detected notable heterogeneity and suggested adolescents from private school tended to have a higher risk (Appendix 7D).

Adults

Six studies, including 4024 individuals with high education and 3033 with low education, were included in the meta-analysis of tooth wear in adults. The *Q*-statistic detected the presence of heterogeneity, I^2-statistics also found notable heterogeneity (I^2 = 84.4% [69.6%; 92.0%]) (Figure 3). Our pooled analysis showed that participants with high education had a lower risk of developing tooth wear with an OR of 0.70 [0.52; 0.93] (Figure 3). Subgroup analysis including four high-income country studies didn't change the conclusion (OR=0.82 [0.69; 0.99]) with reduced heterogeneity (I^2=33.3% [0%; 76.5%]).

Publication Bias

We did not find any significant publication bias in our meta-analysis; however, funnel plots suggest otherwise regarding education, family income, and school type among adolescents' studies (Appendix 8) and in terms of education among adult studies (Appendix 9). When employing Duval and Tweedie nonparametric Trim and Fill method, we could not detect high tooth wear risk among those with high mothers' education level (OR=1.03 [0.78; 1.36]) or from private schools (OR=1.00 [0.72; 1.37]) as we did without 'trim and fill' method.

DISCUSSION

This is the first systematic review with meta-analysis investigating worldwide population-based evidence of the association between socioeconomic status and tooth wear, to the authors' knowledge. The findings of this sequence of meta-analyses involving 63893 individuals ranging from 6 to 79 years of age identified that there was an association between SES and TW. Indeed, the review identified that a greater prevalence of tooth wear was positively associated with adolescents whose parents had higher levels of education and family income and with those who attended private schools. Conversely, higher educated adults were less likely to develop pathological tooth wear. These findings shed light as to how SES and affluence can present a diametric risk of developing tooth wear depending on the age of the individual.

The main cause for tooth wear in children and adolescents was the consumption of acidic drinks, mainly juices and soft drinks[107]. Indeed, several studies did report an association between tooth wear, diet, caries, and oral hygiene practices. The erosive potential of a drink is related to its pH and presence of calcium, fluoride and phosphates[108]. Such dietary habits may predispose children of all socioeconomic levels to erosive risk; however, those from 'high' SES may be more frequently exposed than their counterparts due to increased access as a result of affluence in low- and middle-income countries. Nonetheless, the consumption of traditional acidic foods like tamarind, baobab, hibiscus, and citrus teas was also seen in certain countries and positively correlated with tooth wear due to their strong erosive potential [60, 92, 93]. In older individuals, the combination of consumption of acidic foods and other acidic components, such as gastric symptoms, can lead to erosive wear [109]. Several studies found caries experience to be positively associated with tooth wear [49, 59, 65, 99]. The association may be explained by their common aetiologies, such as the failure to maintain a low cariogenic diet, potentially resulting in the failure to maintain a non-erosive diet [59]. Moreover, the salivary characteristics of those with tooth wear closely matched those who were caries-active, with features such as low saliva quantity and buffering capacity [110], as well as a higher *Streptococci mutans* count [65].

Multiple studies found certain brushing habits such as the use of an electric toothbrush [54], horizontal pulling movements [97, 104], hard bristle brushes [102], and changing of brushes every month were associated with greater tooth wear [56, 66, 69, 86]. One study found that individuals who brush their teeth with a traditional chewing stick had more tooth wear lesions than others [56]. The relationship between tooth wear, SES, and fluoridation – both professionally applied and community exposure – was not a commonly explored factor.

More educated adults tend to consume a healthier diet and maintain better oral hygiene practices, potentially explaining the greater association of TW in adults with lower education [48, 56]. Furthermore, adults might present with a more complex presentation of tooth wear attributed to attrition or wear of multifactorial origin involving bruxism or other parafunctional habits [103, 111]. There is some evidence that bruxism is associated with mental health disorders and neuroticism such as stress, anxiety, sleep disorders, and depression, which in turn are associated with low SES in adults and a high-acidic diet [112-116]. Furthermore, these factors have a cumulative effect during the life course of an individual, increasing tooth wear progression with age, especially in those of lower SES.

The findings of the review did identify several limitations with the existing body of evidence investigating the association between SES and tooth wear relating to population representation and assessment methodologies. Among the 36 studies included in meta-analyses, nine were from high-income countries, 20 from upper-middle-income countries, and only seven from lower-middle and low-income countries [117]. Furthermore, the majority of included studies involved adolescents rather than adults. This might be attributed to adolescents being more accessible, an emphasis on screening and prevention programs organised through school programs, and the feasibility of their recruitment for longitudinal studies due to their presence in educational institutions [59]. However, the assessment of adult populations is equally if not more important since tooth wear is a progressing condition increasing in severity over time [2].

When it came to assessment approaches, a plethora of tooth wear indices was employed by the researchers to investigate and diagnose tooth wear. Given the inconsistency of outcome, sensitivity analysis by omitting one study each time showed that our analyses were robust as pooled results didn't reduce heterogeneity or lead to different conclusions. The presence of diverse indices offers a variety of choice to investigate tooth wear that may be dependent on the research needs, yet the use of different scales and measures and different cut-offs generates high heterogeneity between studies, making difficult to compare results. Nonetheless, the Basic Erosive Wear Examination (BEWE) was the most used index, demonstrating a potential for standardisation. However, despite clear recommendations [118], the index was mainly used to investigate erosive tooth wear [103], as opposed to all forms of wear which also include attrition, abrasion, and tooth wear with multifactorial aetiology. This could possibly be attributed to the confusion arising from the name of the index as well as the index's tendency to overestimate the severity of wear when incisal wear is scored. This overestimation can become problematic when the most affected teeth by tooth wear in the current review's included studies were the anterior teeth. Moreover, the reported moderate levels of examiner reliability warrant caution went interpreting BEWE scores [119]. Henceforth, for meta-analyses in this review, only the presence of tooth wear was assessed, irrespective of its severity. The majority of studies also performed a full mouth examination rather than partial screening. Standardised full mouth assessments can reduce the incongruency of results pertaining to surfaces or teeth most commonly and severely affected by wear. Nonetheless, full mouth assessment with or without third molars remains time-consuming and may decrease examiner accuracy due to an increased rate of fatigue and patient discomfort [62]. On the other hand, the use of index teeth is a resource-saving method, as wear on index teeth is statistically similar to wear on the full arch, provided the surface area is standardised [120]. However, using certain teeth such as first molars as index teeth, which generally show extensive cavities, fissure sealants, or restorations, can also prevent proper examination [45].

A final identified limitation of the included studies is the great variation in SES indicators employed in the included studies, even between studies from the same country. We attempted to reclassify SES indicators to make them consistent, however, it was not possible for all studies even after contacting the relevant study authors. Indeed, affluence was determined through the education levels of the participants and their guardians, type of school, postcode, income, employment status, and deprivation index, amongst others. This creates challenges in comparing research evidence and analysing results which might go to explain the conflicting results noted in the included studies and the low odds ratio detected. Nonetheless, pooled results of sensitivity analysis by omitting one study each time didn't reduce heterogeneity or lead to different conclusions, which showed that our analyses were robust. However, Duval and Tweedie nonparametric Trim and Fill method didn't detect high tooth wear risk among those with high mothers' education level (OR=1.03 [0.78; 1.36]) or from private schools (OR=1.00 [0.72; 1.37]) among adolescents' studies as we did without 'trim and fill' method, suggesting the impact of publication bias.

The WHO recommended the introduction of taxes on sugar-sweetened beverages in an attempt to deter people from its consumption and improve overall health [121]. This could prove consequently beneficial in reducing erosive tooth wear. Isaksson [65] found that obese individuals were more likely to have dental erosion than normal-weight individuals due to soft drink consumption. In France, acidic beverages were seen to be the sole risk factor for dental erosion in school children, despite soft drinks and food dispensers having been prohibited in schools since 2005 [82] and a soda tax introduced in 2012 [122]. It is difficult to say whether such large–scale actions can have direct outcomes when an individual's life is filled with a myriad of complex and intertwined factors. Moreover, behavioural change is difficult, particularly when interventions are not tailored to the individual, and no alternatives are provided to improve the chances of success and reduce the relapse of negative habits [24].

It is essential for dental practitioners to understand the underlying aetiology of tooth wear for proper definitive diagnosis and management. Moreover, early screening of individuals at risk, as part of routine risk assessment [123] that considers SES as a risk factor based on the patient's age, will enhance the cost-effectiveness and success of dental treatment [93]. Furthermore, the relationship between caries and tooth wear shows the potentiality of restorative treatment needs status being indicative of tooth wear status [49]. Early clinical screening, risk assessment and diagnosis become even more critical given the limitations of the current methods of assessing and monitoring tooth wear, lacking accuracy and sensitivity [124]. Nonetheless, advances in digital dentistry using CAD/CAM technology, digital scanning and purpose-built, surface-matching software are likely to be highly applicable in the quantification and monitoring of worn dentition in the future, overcoming the barriers of currently available methods and indices [125-127].

CONCLUSION

Socioeconomic status can be considered a risk factor for tooth wear with its risk dependant on the age of the individual. Well-conducted epidemiological studies employing appropriate causal modelling approaches are necessary to understand the relationship between SES and TW. Due to the complex nature of the tooth wear process, a more comprehensive, preventive population – approach is recommended to identify people at risk of developing such a condition. At an individual/patient-based level, routine screening, risk assessment, monitoring of identified tooth wear lesions, and implementing educational and preventive measures are suggested for those at risk, in addition to restorative interventions, when needed.

Conflict of interest

No conflict of interest was present at the time of conducting this study. The study did not receive any internal or external funding to report.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

1. Van't Spijker, A., et al., *Prevalence of tooth wear in adults.* International Journal of Prosthodontics, 2009. **22**(1): p. 35-42.
2. Bartlett, D. and C.J.C.o.i. Dugmore, *Pathological or physiological erosion—is there a relationship to age?* Clinical oral investigations, 2008. **12**(1): p. 27-31.
3. Young, W. and F.J.J.o.o.r. Khan, *Sites of dental erosion are saliva-dependent.* Journal of Oral Rehabilitation, 2002. **29**(1): p. 35-43.
4. Kreulen, C., et al., *Systematic review of the prevalence of tooth wear in children and adolescents.* Caries Research, 2010. **44**(2): p. 151-159.
5. Schlueter, N. and B. Luka, *Erosive tooth wear – a review on global prevalence and on its prevalence in risk groups.* British Dental Journal, 2018. **224**(5): p. 364-370.
6. Salas, M., et al., *Estimated prevalence of erosive tooth wear in permanent teeth of children and adolescents: an epidemiological systematic review and meta-regression analysis.* Journal of Dentistry, 2015. **43**(1): p. 42-50.
7. Care, I.C.f.H.a.S., *Adult Dental Health Survey, 2009*, S.S.D. Office for National Statistics, Editor. 2012, UK Data Service.
8. Al-Omiri, M.K., P.-J. Lamey, and T. Clifford, *Impact of tooth wear on daily living.* International Journal of Prosthodontics, 2006. **19**(6).
9. Wazani, B.E., M.N. Dodd, and A. Milosevic, *The signs and symptoms of tooth wear in a referred group of patients.* British Dental Journal, 2012. **213**(6): p. E10-E10.
10. Li, M.H. and E.J.J.o.D. Bernabé, *Tooth wear and quality of life among adults in the United Kingdom.* Journal of Dentistry 2016. **55**: p. 48.
11. Ahmed, K.E.J.S.C.i.D., *The psychology of tooth wear.* Special Care in Dentistry, 2013. **33**(1): p. 28-34.
12. Ahmed, K.E.J.P.d.j., *Management of tooth wear: a holistic, dental, medical, and mental healthcare approach.* Primary dental journal, 2016. **5**(3): p. 35-37.
13. Wetselaar, P., et al., *Associations between tooth wear and dental sleep disorders: A narrative overview.* Journal of Oral Rehabilitation, 2019. **46**(8): p. 765-775.
14. Jordão, H.W., et al., *The association between erosive toothwear and gastro-oesophageal reflux-related symptoms and disease: A systematic review and meta-analysis.* Journal of Dentistry, 2020: p. 103284.
15. Sehgal, H.S., et al., *Tooth wear in patients treated with HIV anti-retroviral therapy.* BMC Oral Health, 2019. **19**(1): p. 129.
16. Srisilapanan, P., M. Jindarat, and J.J.I.j.o.d. Roseman, *The prevalence and severity of tooth wear in type 2 diabetic patients.* International Journal of Dentistry, 2018. **2018**.
17. Pallier, A., et al., *Dental and periodontal health in adults with eating disorders: A case-control study.* Journal of Dentistry, 2019. **84**: p. 55-59.
18. Papagianni, C., et al., *Oral health-related quality of life in patients with tooth wear.* Journal of Oral Rehabilitation, 2013. **40**(3): p. 185-190.
19. Al-Omiri, M.K., P.-J. Lamey, and T.J.I.J.o.P. Clifford, *Impact of tooth wear on daily living.* International Journal of Prosthodontics, 2006. **19**(6).
20. Sterenborg, B.A.M.M., et al., *The influence of management of tooth wear on oral health-related quality of life.* Clinical oral investigations, 2018. **22**(7): p. 2567-2573.

21. O'Toole, S., et al., *The treatment need and associated cost of erosive tooth wear rehabilitation–a service evaluation within an NHS dental hospital.* British Dental Journal, 2018. **224**(12): p. 957.
22. Berkman, L.F., I. Kawachi, and M.M. Glymour, *Social epidemiology*. 2014: Oxford University Press.
23. Borrell, L.N. and N.D.J.P. Crawford, *Socioeconomic position indicators and periodontitis: examining the evidence.* Periodontology, 2012. **58**(1): p. 69-83.
24. O'Toole, S. and F. Mullan, *The role of the diet in tooth wear.* British Dental Journal, 2018. **224**(5): p. 379-383.
25. Peres KG, V.-F.F.D.e.I.P.M.e.a., *Oral Epidemiology. A textbook on oral health conditions, research topics and methods.* . 2013, Sao Paulo: Santos.
26. Ganss, C., A. Young, and A.J.C.d.h. Lussi, *Tooth wear and erosion: methodological issues in epidemiological and public health research and the future research agenda.* Community dental health, 2011. **28**(3): p. 191-195.
27. Liberati, A., et al., *The PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses of Studies That Evaluate Health Care Interventions: Explanation and Elaboration.* PLOS Medicine, 2009. **6**(7): p. e1000100.
28. Morgan, R.L., et al., *Identifying the PECO: A framework for formulating good questions to explore the association of environmental and other exposures with health outcomes.* Environment international, 2018. **121**(Pt 1): p. 1027-1031.
29. McGowan, J., et al., *PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Statement.* Journal of Clinical Epidemiology, 2016. **75**: p. 40-46.
30. Landis, J.R.; Koch, G.G. *The measurement of observer agreement for categorical data*. *Biometrics*. 1997. **33** (1): p. 159–174
31. Edwards, P., et al., *Identification of randomized controlled trials in systematic reviews: accuracy and reliability of screening records.* 2002. **21**(11): p. 1635-1640.
32. Stang, A., *Critical evaluation of the Newcastle-Ottawa scale for the assessment of the quality of nonrandomized studies in meta-analyses.* European Journal of Epidemiology, 2010. **25**(9): p. 603-605.
33. Modesti, P., et al., *S1 Text: NEWCASTLE-OTTAWA QUALITY ASSESSMENT SCALE (adapted for cross sectional studies). Panethnic differences in blood pressure in europe: a systematic review and meta-analysis.* PLoS One, 2016. **11**(1): p. e0147601.
34. Forero, D.A., et al., *Ten simple rules for carrying out and writing meta-analyses*. 2019, Public Library of Science San Francisco, CA USA.
35. Galobardes B, Lynch J, Smith GD. *Measuring socioeconomic position in health research.* Br Med Bull, 2007. 81-82:21-37. doi: 10.1093/bmb/ldm001. Epub 2007 Feb 6. PMID: 17284541.
36. Watt, R.G., *Social determinants of oral health inequalities: implications for action.* Community dentistry and oral epidemiology, 2012. **40**: p. 44-48.
37. Sutton, A.J., et al., *Methods for meta-analysis in medical research*. Vol. 348. 2000: Wiley Chichester.
38. Duval, S. and R. Tweedie, *Trim and fill: a simple funnel-plot–based method of testing and adjusting for publication bias in meta-analysis.* Biometrics, 2000. **56**(2): p. 455-463.
39. Higgins, J.P. and S.G. Thompson, *Quantifying heterogeneity in a meta-analysis.* Statistics in medicine, 2002. **21**(11): p. 1539-1558.
40. Hardy, R.J. and S.G. Thompson, *Detecting and describing heterogeneity in meta-analysis.* Statistics in medicine, 1998. **17**(8): p. 841-856.
41. DerSimonian, R. and N. Laird, *Meta-analysis in clinical trials.* Controlled clinical trials, 1986. **7**(3): p. 177-188.
42. Brusius, C.D., et al., *Dental erosion among South Brazilian adolescents: A 2.5-year longitudinal study.* Community dentistry and oral epidemiology, 2016. **46**(1): p. 17-23.

43. Dugmore, C.R. and W.P. Rock, *The progression of tooth erosion in a cohort of adolescents of mixed ethnicity.* International journal of paediatric dentistry, 2003. **13**(5): p. 295-303.
44. El Aidi, H., et al., *Dynamics of tooth erosion in adolescents: A 3-year longitudinal study.* Journal of Dentistry, 2010. **38**(2): p. 131-137.
45. Aguiar, Y.P.C., et al., *Association between dental erosion and diet in Brazilian adolescents aged from 15 to 19: a population-based study.* TheScientificWorldJournal, 2014. **2014**: p. 818167.
46. Al-Dlaigan, Y.H., L. Shaw, and A. Smith, *Dental erosion in a group of British 14-year-old, school children. Part I: Prevalence and influence of differing socioeconomic backgrounds.* British dental journal, 2001. **190**(3): p. 145-149.
47. Al-Hammadi, S., M. Dubais, and A. Madfa, *The prevalence of tooth wear among a group of yemeni adults.* Journal of Oral Research, 2019. **8**(6): p. 478-487.
48. Al-Khalifa, K.S., *The Prevalence of Tooth Wear in an Adult Population from the Eastern Province of Saudi Arabia.* Clinical, Cosmetic and Investigational Dentistry, 2020. **12**: p. 525.
49. Alaraudanjoki, V., et al., *Association of erosive tooth wear and dental caries in Northern Finland Birth Cohort 1966 - an epidemiological cross-sectional study.* BMC Oral Health, 2017. **17**(1).
50. Alves, L.S., et al., *Dental erosion among 12-year-old schoolchildren: a population-based cross-sectional study in South Brazil.* Int Dent J, 2015. **65**(6): p. 322-30.
51. Auad, S.M., et al., *Dental erosion amongst 13- and 14-year-old Brazilian schoolchildren.* International dental journal, 2007. **57**(3): p. 161-167.
52. Awad, M.A., et al., *Prevalence, severity and explanatory factors of tooth wear in Arab populations.* J Dent, 2019. **80**: p. 69-74.
53. Bachanek, T., et al., *Prevalence of dental erosion among 18-year-old adolescents in the borderland districts of LVIV (Ukraine) and Lublin (Poland).* Annals of Agricultural and Environmental Medicine, 2018. **25**(1): p. 66-70.
54. Bartlett, D.W., et al., *Prevalence of tooth wear on buccal and lingual surfaces and possible risk factors in young European adults.* Journal of dentistry, 2013. **41**(11): p. 1007-1013.
55. Bernhardt, O., et al., *Risk factors for high occlusal wear scores in a population-based sample: results of the Study of Health in Pomerania (SHIP).* The International journal of prosthodontics, 2004. **17**(3): p. 333-339.
56. Braimoh, O.B. and G.O. Alade, *Oral habits and sociodemographic factors as determinants of tooth wear lesions among the elderly population in Port Harcourt, Nigeria.* International Journal of Community Dentistry, 2018. **6**(2): p. 30.
57. Chrysanthakopoulos, N.A., *Prevalence of tooth erosion and associated factors in 13-16-year old adolescents in greece.* Journal of Clinical and Experimental Dentistry, 2012. **4**(3): p. e160-e166.
58. Donachie, M.A. and A.W. Walls, *Assessment of tooth wear in an ageing population.* Journal of dentistry, 1995. **23**(3): p. 157-164.
59. Dugmore, C.R. and W.P. Rock, *The prevalence of tooth erosion in 12-year-old children.* British dental journal, 2004. **196**(5): p. 279-282.
60. El Karim, I.A., et al., *Dental erosion among 12-14 year old school children in Khartoum: A pilot study.* Community Dental Health, 2007. **24**(3): p. 176-180.
61. Gurgel, C.V., et al., *Dental erosion in a group of 12- and 16-year-old Brazilian schoolchildren.* Pediatr Dent, 2011. **33**(1): p. 23-8.
62. Ab Halim, N., R. Esa, and H.P. Chew, *General and erosive tooth wear of 16-year-old adolescents in Kuantan, Malaysia: prevalence and association with dental caries.* BMC oral health, 2018. **18**(1): p. 11.
63. Huew, R., et al., *Dental erosion among 12 year-old Libyan schoolchildren.* Community dental health, 2012. **29**(4): p. 279-283.

64. Ibiyemi, O. and J.O. Taiwo, *Some socio-demographic attributes as covariates in tooth wear among males in a rural community in Nigeria.* Ethiop J Health Sci, 2012. **22**(3): p. 189-95.
65. Isaksson, H., et al., *Prevalence of dental erosion and association with lifestyle factors in Swedish 20-year olds.* Acta Odontol Scand, 2013. **72**(6): p. 448-57.
66. Jiang, H., et al., *The prevalence of and risk factors for non-carious cervical lesions in adults in Hubei Province, China.* Community dental health, 2011. **28**(1): p. 22.
67. Kirthiga, M., et al., *Dental Erosion and its Associated Factors In 11-16-Year Old School Children.* The Journal of clinical pediatric dentistry, 2015. **39**(4): p. 336-342.
68. Korkmaz, E. and A. Kaptan, *Cross-Sectional Analysis of Prevalence and Aetiological Factors of Dental Erosion in Turkish Children Aged 7–14 Years.* Oral Health Prev Dent, 2020. **18**: p. 959-972.
69. Kumar, S., et al., *Prevalence and risk factors for dental erosion among 11- to 14-year-old school children in South India.* Journal of Oral Science, 2013. **55**(4): p. 329-336.
70. Lai, Z.Y., et al., *Prevalence of Non-carious Cervical Lesions and Associated Risk Indicators in Middle-aged and Elderly Populations in Southern China.* Chinese Journal of Dental Research, 2015. **18**(1): p. 41-50.
71. Li, J., et al., *A survey on the prevalence and risk indicators of erosive tooth wear among adolescents in Guangzhou, South China.* J Oral Rehabil, 2018. **46**(6): p. 493-502.
72. Loureiro, L.A., et al., *Erosive Tooth Wear among 12-Year-Old Schoolchildren: A Population-Based Cross-Sectional Study in Montevideo, Uruguay.* Caries Research, 2015. **49**(3): p. 216-225.
73. Luciano, L.C.O., M.C. Ferreira, and M.A. Paschoal, *Prevalence and factors associated with dental erosion in individuals aged 12-30 years in a northeastern Brazilian city.* Clinical, Cosmetic and Investigational Dentistry, 2017. **9**: p. 85-91.
74. Mafla, A.C., et al., *Prevalence and Extrinsic Risk Factors for Dental Erosion in Adolescents.* The Journal of clinical pediatric dentistry, 2017. **41**(2): p. 102-111.
75. Maharani, D.A., et al., *Dental Caries and the Erosive Tooth Wear Status of 12-Year-Old Children in Jakarta, Indonesia.* Int J Environ Res Public Health, 2019. **16**(16).
76. Margaritis, V., et al., *Evaluation of three different scoring systems for dental erosion: a comparative study in adolescents.* Journal of dentistry, 2011. **39**(1): p. 88-93.
77. Marro, F., et al., *The Influence of Behavioural and Sociodemographic Risk Indicators on Erosive Tooth Wear in Flemish Adolescents, Belgium.* Caries research, 2018. **52**(1-2): p. 119-128.
78. Martinez, L.M., et al., *Dental erosion. Etiologic factors in a sample of Valencian children and adolescents. Cross-sectional study.* European Journal of Paediatric Dentistry, 2019. **20**(3): p. 189-193.
79. McGuire, J., et al., *Erosive tooth wear among children in the United States: relationship to race/ethnicity and obesity.* International Journal of Paediatric Dentistry, 2009. **19**(2): p. 91-98.
80. Milosevic, A., P.J. Young, and M.A. Lennon, *The prevalence of tooth wear in 14-year-old school children in Liverpool.* Community dental health, 1994. **11**(2): p. 83-86.
81. Mulic, A., A.B. Tveit, and A.B. Skaare, *Prevalence and severity of dental erosive wear among a group of Norwegian 18-year-olds.* Acta odontologica Scandinavica, 2013. **71**(3-4): p. 475-481.
82. Muller-Bolla, M., et al., *Dental erosion in French adolescents.* BMC oral health, 2015. **15**: p. 147.
83. Nasir, E. and A. Altayeb, *Dental Erosion Among Secondary Schoolchildren: Sudan.* Basic and Applied Sciences - Scientific Journal of King Faisal University, 2021. **22**.
84. Okunseri, C., et al., *The relationship between consumption of beverages and tooth wear among adults in the U nited S tates.* Journal of public health dentistry, 2015. **75**(4): p. 274-281.

85. Peres, K.G., et al., *Dental erosion in 12-year-old schoolchildren: a cross-sectional study in Southern Brazil.* Int J Paediatr Dent, 2005. **15**(4): p. 249-55.
86. Que, K., et al., *A cross-sectional study: non-carious cervical lesions, cervical dentine hypersensitivity and related risk factors.* J Oral Rehabil, 2012. **40**(1): p. 24-32.
87. Racki, D.N.O., et al., *Erosive tooth wear among South Brazilian adolescents, and its association with sociodemographic variables.* Brazilian Oral Research, 2019. **33**.
88. Ratnayake, N. and L. Ekanayake, *Prevalence and distribution of tooth wear among Sri Lankan adolescents.* Oral health & preventive dentistry, 2010. **8**(4): p. 331-337.
89. van Rijkom, H.M., et al., *Prevalence, distribution and background variables of smooth-bordered tooth wear in teenagers in the hague, the Netherlands.* Caries Res, 2002. **36**(2): p. 147-54.
90. Saerah, N.B., et al., *Associated factors of tooth wear among Malaysian 16-year-olds: a case-control study in Kota Bharu, Kelantan.* Community dental health, 2012. **29**(1): p. 33-38.
91. Salas, M.M.S., et al., *Prevalence and Associated Factors of Tooth Erosion in 8 -12-Year-Old Brazilian Schoolchildren.* The Journal of clinical pediatric dentistry, 2017. **41**(5): p. 343-350.
92. Sanhouri, N.M., et al., *Tooth surface loss, prevalence and associated risk factors among 12-14 years school children in Khartoum State, Sudan.* Community dental health, 2010. **27**(4): p. 206-212.
93. Septalita, A., et al., *Dental erosion in 12-year-old school children living in Jakarta*, in *1st Physics and Technologies in Medicine and Dentistry Symposium*. 2017.
94. Simangwa, L.D., et al., *Oral diseases and socio-demographic factors in adolescents living in Maasai population areas of Tanzania: a cross-sectional study.* BMC Oral Health, 2018. **18**(1): p. 200.
95. Søvik, J.B., et al., *Dental erosion: a widespread condition nowadays? A cross-sectional study among a group of adolescents in Norway.* Acta odontologica Scandinavica, 2014. **72**(7): p. 523-529.
96. Stangvaltaite-Mouhat, L., et al., *Erosive Tooth Wear among Adults in Lithuania: A Cross-Sectional National Oral Health Study.* Caries Research, 2020. **54**(3): p. 283-291.
97. Sun, K., et al., *Tooth wear: a cross-sectional investigation of the prevalence and risk factors in Beijing, China.* BDJ open, 2017. **3**(1): p. 1-7.
98. Truin, G.J., et al., *Caries trends 1996-2002 among 6- and 12-year-old children and erosive wear prevalence among 12-year-old children in The Hague.* Caries research, 2005. **39**(1): p. 2-8.
99. Vargas-Ferreira, F., J.R. Praetzel, and T.M. Ardenghi, *Prevalence of tooth erosion and associated factors in 11-14-year-old Brazilian schoolchildren.* Journal of Public Health Dentistry, 2011. **71**(1): p. 6-12.
100. Vered, Y., et al., *Dental erosive wear assessment among adolescents and adults utilizing the basic erosive wear examination (BEWE) scoring system.* Clin Oral Investig, 2014. **18**(8): p. 1985-90.
101. Wang, P., et al., *The prevalence of dental erosion and associated risk factors in 12-13-year-old school children in Southern China.* BMC public health, 2010. **10**: p. 478.
102. Wei, Z., et al., *Prevalence and Indicators of Tooth Wear among Chinese Adults.* PloS one, 2016. **11**(9): p. e0162181.
103. Wetselaar, P., et al., *The Prevalence of Tooth Wear in the Dutch Adult Population.* Caries research, 2016. **50**(6): p. 543-550.
104. Yadav, N.S., et al., *Alliance of oral hygiene practices and abrasion among urban and rural residents of Central India.* The journal of contemporary dental practice, 2012. **13**(1): p. 55-60.
105. Syed Mohammed, Y., et al., *Dental erosion among 12-15-year-old school boys in southern Saudi Arabia.* Archives of Orofacial Sciences, 2013. **8**(1): p. 14-19.

106. Zhang, J., et al., *The prevalence and risk indicators of tooth wear in 12- and 15-year-old adolescents in Central China.* BMC Oral Health, 2015. **15**(1).
107. El Aidi, H., et al., *Multifactorial analysis of factors associated with the incidence and progression of erosive tooth wear.* Caries research, 2011. **45**(3): p. 303-312.
108. Al-Dlaigan, Y., L. Shaw, and A. Smith, *Dental erosion in a group of British 14-year-old school children Part II: Influence of dietary intake.* British Dental Journal, 2001. **190**(5): p. 258-261.
109. Jarvinen, V.K., I.I. Rytomaa, and O.P. Heinonen, *Risk Factors in Dental Erosion.* Journal of Dental Research, 1991. **70**(6): p. 942-947.
110. O'Sullivan, E. and M. Curzon, *Salivary factors affecting dental erosion in children.* Caries research, 2000. **34**(1): p. 82-87.
111. Ahmed, K.E., C.A. Murray, and C.J. Whitters, *A prospective survey of secondary care tooth wear referrals: demographics, reasons for concern and referral outcomes.* British dental journal, 2014. **216**(5): p. E9-E9.
112. Polmann, H., et al., *Association between sleep bruxism and stress symptoms in adults: A systematic review and meta-analysis.* Journal of Oral Rehabilitation, 2021. **48**(5): p. 621-631.
113. Polmann, H., et al., *Association between sleep bruxism and anxiety symptoms in adults: A systematic review.* Journal of Oral Rehabilitation, 2019. **46**(5): p. 482-491.
114. Chemelo, V.D.S., et al., *Is There Association Between Stress and Bruxism? A Systematic Review and Meta-Analysis.* Frontiers in neurology, 2020. **11**: p. 590779-590779.
115. Arenas, D.J., et al., *A Systematic Review and Meta-analysis of Depression, Anxiety, and Sleep Disorders in US Adults with Food Insecurity.* Journal of General Internal Medicine, 2019. **34**(12): p. 2874-2882.
116. Pourmotabbed, A., et al., *Food insecurity and mental health: a systematic review and meta-analysis.* Public Health Nutrition, 2020. **23**(10): p. 1778-1790.
117. *World Bank Country and Lending Groups*. 2021 [cited 2021 15/05/2021]; Available from: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups.
118. Aránguiz, V., et al., *Recommendations and guidelines for dentists using the basic erosive wear examination index (BEWE).* British dental journal, 2020. **228**(3): p. 153-157.
119. Dixon, B., et al., *Evaluation of the basic erosive wear examination (BEWE) for use in general dental practice.* British Dental Journal, 2012. **213**(3): p. E4-E4.
120. O'Toole, S., et al., *Quantitative tooth wear analysis of index teeth compared to complete dentition.* Journal of Dentistry, 2020. **97**: p. 103342.
121. Escobar, M.A.C., et al., *Evidence that a tax on sugar sweetened beverages reduces the obesity rate: a meta-analysis.* BMC public health, 2013. **13**(1): p. 1072.
122. Capacci, S., et al., *The impact of the French soda tax on prices and purchases. An ex post evaluation.* PloS one, 2019. **14**(10): p. e0223196-e0223196.
123. Kontaxopoulou, I. and S. Alam, *Risk assessment for tooth wear.* Primary dental journal, 2015. **4**(3): p. 25-29.
124. O'Hara, M. and B.J. Millar, *Evaluation of the assessment of tooth wear by general dental practitioners.* British Dental Journal, 2020. **228**(6): p. 423-428.
125. Ahmed, K.E., et al., *Clinical monitoring of tooth wear progression in patients over a period of one year using CAD/CAM.* International Journal of Prosthodontics, 2017. **30**(2): p. 153-155.
126. O'Toole, S., et al., *Investigation into the validity of WearCompare, a purpose-built software to quantify erosive tooth wear progression.* Dental Materials, 2019. **35**(10): p. 1408-1414.
127. Michou, S., et al., *Detecting early erosive tooth wear using an intraoral scanner system.* Journal of Dentistry, 2020. **100**: p. 103445.

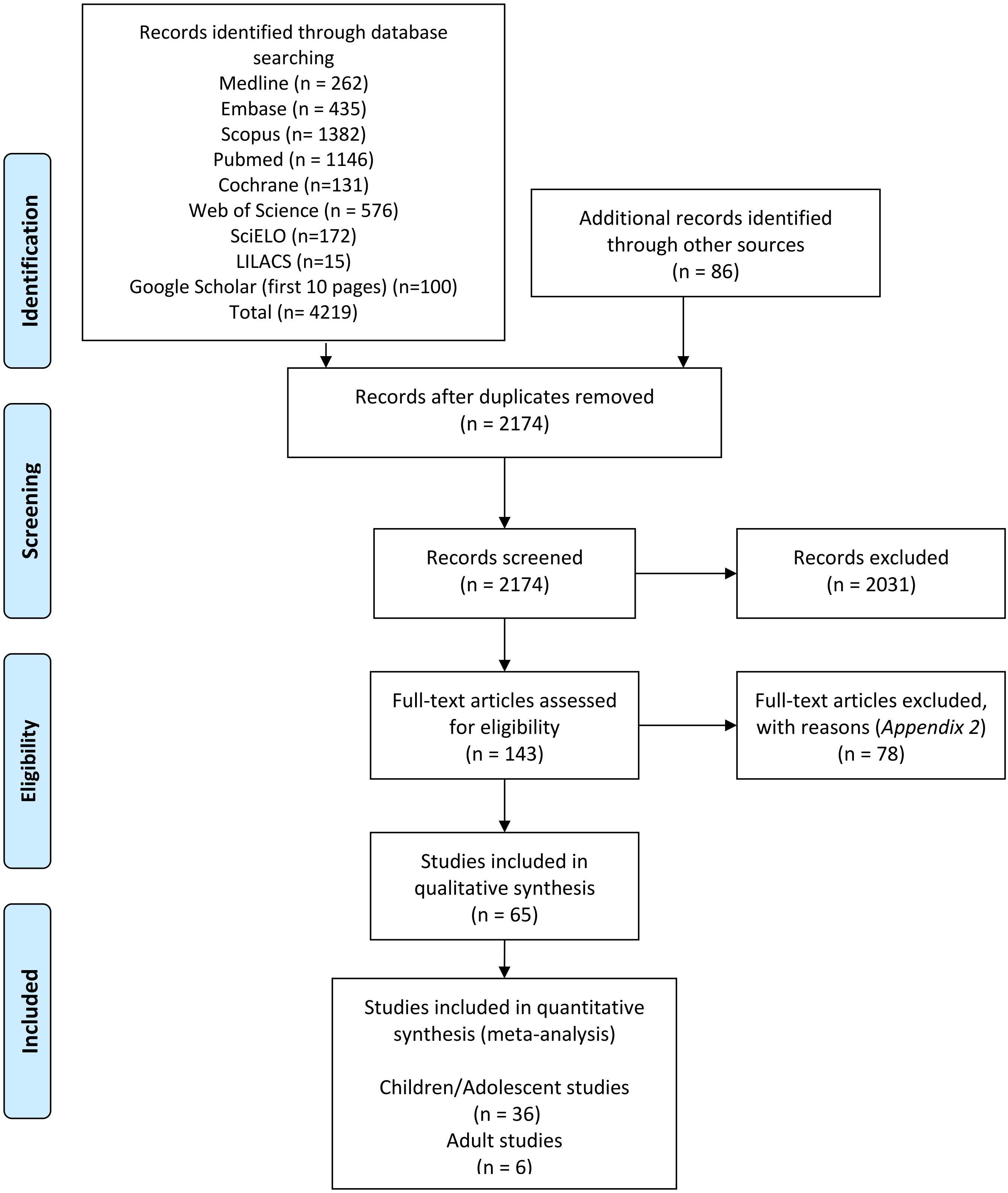

Figure 1: Prisma flow diagram

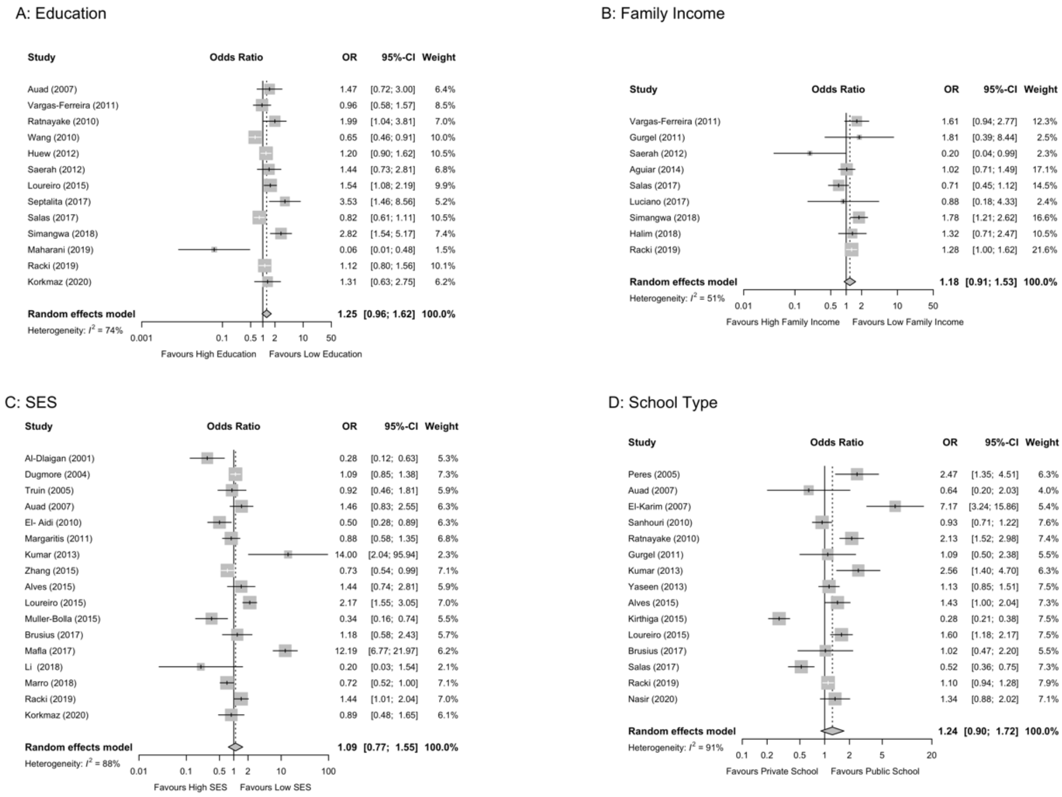

Figure 2: Pooled effect estimates from random effects models. Adolescents

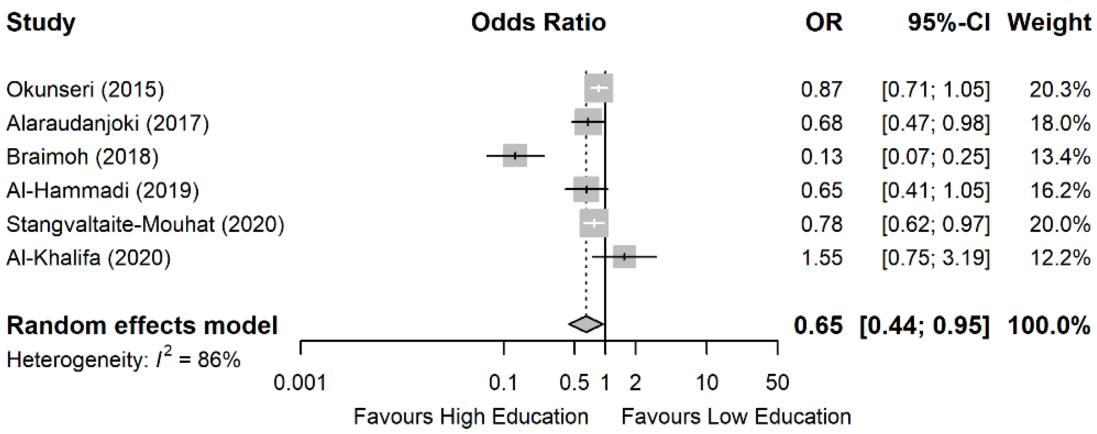

Figure 3: Pooled effect estimates from random-effects models. Adults