

REVIEW

The influence of parental oral health literacy on children's oral health: a scoping review

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Abstract

The aim of this review was to evaluate the association between parental oral health literacy and children's oral health outcomes. A comprehensive search was conducted across four electronic databases to identify articles that were published up to October 2023. The articles that met our predetermined criteria were then screened and assessed for eligibility. Updated Arksey and O'Malley's scoping review framework was followed. After identifying 2964 references, duplicates were removed, leaving 1992 titles. Following the screening of article titles and abstracts, 19 full-text articles underwent a thorough examination. The scoping review included 19 relevant studies. In most of the studies included, the status of oral health of children is linked to the caregiver's oral health literacy. Children of caregivers with low oral health literacy were found to exhibit deleterious oral health habits, including inadequate teeth brushing and the use of bottles at night-time. Dental caries was found to be more common in children whose parents had low oral health literacy. Striving for optimal oral health literacy in the community is a valuable and worthwhile effort. Equipping parents with the skills and knowledge to make appropriate decisions about their children's oral health could positively prevent dental caries and promote better oral health outcomes.

Keywords

Literacy; Health; Oral health literacy; Parental oral health literacy

1. Introduction

The significance of health literacy (HL) as a vital factor affecting health in the 21st century has been acknowledged and given priority by the World Health Organization [1]. Enhancing the level of HL amongst individuals is widely regarded as one of the most fundamental, cost-efficient, and long-term strategies to promote a healthier population [2]. HL includes Oral Health Literacy (OHL) as a subcategory. OHL is defined according to the American Dental Association as "the degree to which individuals have the capacity to obtain, process and understand basic oral health information and services needed to make appropriate health decisions" [3, 4]. Individuals with poor HL are more likely to experience worse health outcomes [5–7], have difficulty managing chronic diseases [8], and experience more illness when seeking medical care [3, 7, 9]. Multiple tools have been developed for assessing oral HL in adults. Those tools appear to be a modified version of common tools used in medicine, which are based on word recognition [1]. A dental-specific version of the Rapid Estimate of Adult Literacy in Medicine test, namely the Rapid Estimate of Adult Literacy in Dentistry (REALD), has been developed to assess OHL. Additionally, the Test of Functional Health Literacy in Adults has been adapted to create a dental-specific version called the Test of Functional Health Literacy in Dentistry (ToFHLiD).

Moreover, a broad variety of instruments of a similar nature have been developed. But there isn't currently a resource that serves as the gold standard for measuring oral HL [1].

Parents play a significant role in shaping their children's oral health and hygiene habits [10]. Parents with low OHL may not prioritize oral hygiene or have the necessary knowledge to care for their children oral health properly. This cycle of poor oral health can inadvertently be perpetuated by parents to their children, resulting in short and long-term consequences [11–14]. To the best of our knowledge, the only comprehensive review evaluating the influence of parental oral health literacy on children's oral health was conducted by Firmino *et al.* [15] in 2018. This review analyzed 11 studies conducted up to 2017. Since then, numerous studies have been carried out to investigate the impact of parental oral health literacy, but none have synthesized the latest findings in this area. Hence, this review aims to comprehensively review and analyze previous studies on the relationship between varying levels of parental/caregivers' oral health literacy and the oral health outcomes of their children.

2. Materials and methods

2.1 Study design

The method created by Arksey and O'Malley [16] and updated by Levac *et al.* [17] was employed in this review. According to Arksey and O'Malley [16], conducting a scoping review involves five key phases: formulating the research questions, identifying related studies, selecting relevant research, organizing data and aggregating, summarizing and reporting outcomes. Furthermore, in this study, we followed the checklist items for systematic reviews and meta-analyses (PRISMA-ScR), extension for scoping reviews [18].

2.2 Objectives and research question

During the screening and selection process of studies, this study utilized PECO as an aid. PECO stands for Population, Exposure, Comparison and Outcome. PECO was used as a tool to assist in the screening and selection process of studies. For instance, when reviewing studies, we assessed if the population included parent and child dyads (P), if the exposure was related to OHL level (E), if an adequate OHL level was measured in the chosen sample (C), and if examinations of children and outcomes were reported (O). Therefore, this scoping review aims to answer the following PECO question: In pediatric patients, what is the impact of parental/caregivers' oral health literacy, on the oral health-related outcomes of their offspring.

2.3 Search and sources

A comprehensive search was performed on three electronic databases (PubMed, Science Direct and Cochrane) and one web-based academic search engine (Google Scholar). The search included English-language articles without any publication time constraints. Additionally, a manual search of reference lists from identified published works was conducted to identify potential studies eligible for inclusion. The last search was conducted on 10 October 2023. To ensure comprehensive search, we used specific keywords and subject headings as follows: ((parental) AND (oral health) AND (literacy) AND (children) AND (impact)).

2.4 Eligibility criteria

This review included publications that investigated the impact of parental oral health literacy on children's oral health outcomes. Any study assessed the influence of parental oral health literacy on the oral health of children from birth to 17 years was included. Moreover, the inclusion criteria specified that only observational studies (such as cross-sectional designs, case-control and cohort) and pilot studies would be considered. Additionally, these articles were required to be in English. Studies that focused solely on adult oral health literacy were excluded as they did not evaluate the oral health of children, which is the focus of this review. Additionally, non-original investigations, such as letters to the editor and narrative reviews have been excluded. Moreover, only studies that involved the measurement of caregivers' oral health literacy, along with correlating the scores with their children's oral health, were included. Any study that did not investigate this direct correlation was excluded from the study.

2.5 Selection of sources of evidence

The article selection process for this scoping review consisted of three stages. Firstly, one reviewer (AZ) removed citations that were obviously irrelevant based on the title. After that, the remaining titles and abstracts were independently assessed against predefined eligibility criteria by two reviewers (AZ and OM), and any discrepancies were resolved through discussions. During this stage, the reviewer was calibrated to ensure consistent application of the eligibility criteria. Finally, a single "calibrated" reviewer (AZ) examined the remaining titles and abstracts to identify potential full-text records. Full-text screening was carried out independently by two reviewers (AZ and OM), and any discrepancies were resolved through discussions.

2.6 Quality assessment and bias risk assessment

Two authors (AZ and OM) used the modified Newcastle Ottawa Scale [19] to assess the methodological quality of the included studies. In case of any discrepancy between the two authors, a discussion of the value was carried out until they reach an agreement. In the Selection and Exposure categories, a study can receive a maximum of one star for each numbered item. For Comparability, a maximum of two stars can be awarded.

2.7 Data charting and result synthesis

The information extracted and documented from each article includes the publication details, such as the year, author's name, the country of investigation, the study design, the tool used to evaluate oral health literacy, outcomes related to oral health literacy, and the primary findings.

3. Result

3.1 Charting the data

A total of 2964 references were found during the search, but after excluding duplicates, 1992 titles remained. Out of these titles, 19 full-text articles were thoroughly examined after screening their titles and abstracts for relevance to the research question and inclusion and exclusion criteria. These 19 articles were considered relevant and included in the scoping review. Additionally, the reference lists of the reviewed publications were manually searched to identify any other relevant research that might have been overlooked during the original search. The selection procedure followed the flowchart for the PRISMA-ScR, as shown in Fig. 1. Regarding the study methodology, all the studies were cross-sectional studies. Regarding the authors' country, the majority of articles were conducted in the United States of America (USA). The articles were published between 2010 to 2023. The key characteristics and measured outcomes of the included studies are summarized in Table 1.

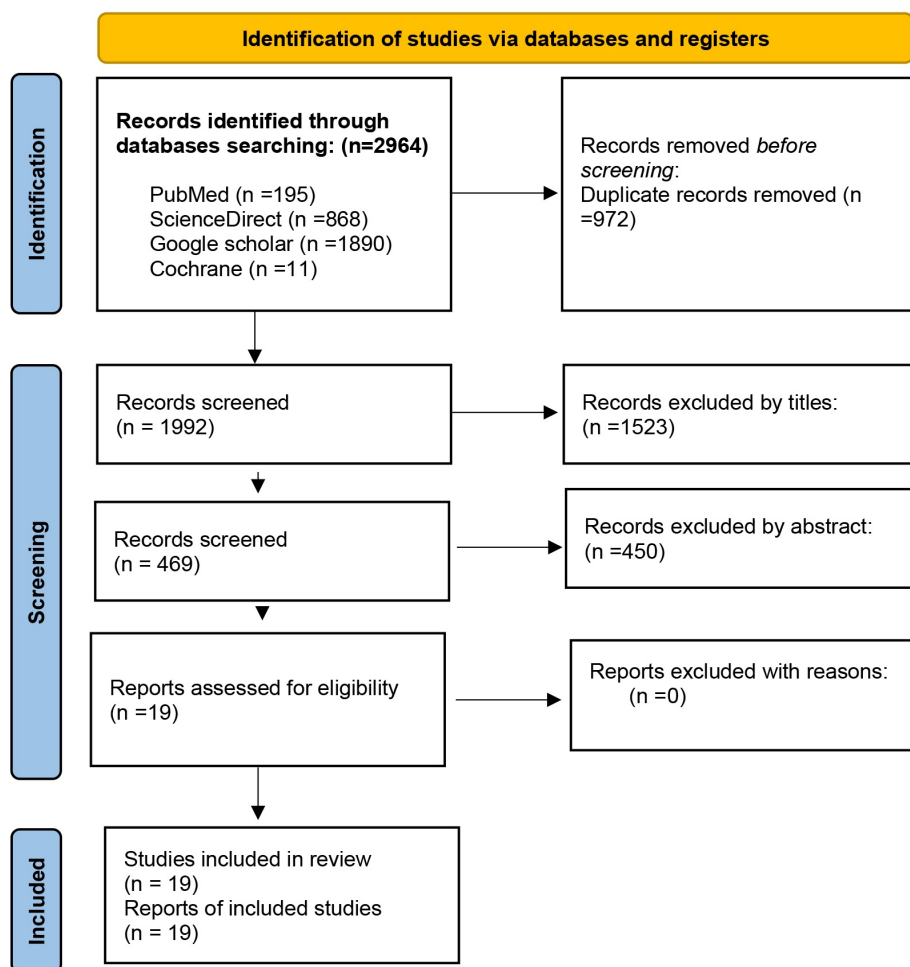


FIGURE 1. PRISMA-ScR statement flowchart.

3.2 Assessment of the quality of the included studies

The studies' quality has been assessed using the modified Newcastle-Ottawa Scale [19] and the results are presented in Table 2. The score on the modified Newcastle-Ottawa Scale ranged from four to eight points, with eight being the highest achievable score. The main shortcomings identified in the included studies were the absence of nonresponse rate reporting, sample size calculation and the use of non-representative samples.

3.3 Gathering and reporting the results

In Table 1, the main characteristics and the outcomes of the included studies and the tools used to assess caregiver oral health literacy are presented. In Table 3, the instrument that used to assess the OHL is described. Moreover, a significant amount of relevant information from the included publications was gathered. The following summarizes the main findings:

1. In most of the studies reviewed, the oral health of children was found to be associated with the OHL levels of their caregivers [11, 12, 20, 22, 23, 25, 27, 28, 30, 31, 33, 34, 36]. The significant association found in most studies indicated that poor OHL of parents was associated with unfavorable oral health outcomes in children and *vice versa*. Various unfavor-

able oral health outcomes were found in the studies, including dental caries, inadequate teeth brushing, bottle feeding at night, less restorations and infrequent dental visits.

2. Several studies have found a significant moderate negative correlation between the OHL scores of parents and the dmft scores of their children [22, 23, 25, 28, 30, 33]. This means that children of parents with high scores of OHL are likely to have lower dmft scores.

3. Some studies have shown that caregivers with low OHL had their infants and children suffering from deleterious oral health habits including lack of teeth brushing and use of bottles at night time. Thus, OHL for caregivers can have multidimensional effect on oral health of infants and young children [11–14].

4. Based on two studies, lower parental OHL does not appear to affect the existence of dental decay, but instead is associated with the severity of untreated dental decay in children [32], or reduced dental service utilization in children [35].

5. Two studies found no correlation between the oral health status of children and the oral health literacy of caregivers [21, 29].

6. One study found that oral health literacy and dental anxiety are correlated [24].

TABLE 1. The main characteristics and findings of the included studies.

Study ID	Location	OHL instrument	Sample size	Outcomes measured	Study findings
Miller <i>et al.</i> [20], 2010	USA	REALD-30	106	The need for dental care, frequency of brushing teeth	Children oral health status is linked to oral health literacy of parents.
Vann Jr <i>et al.</i> [11], 2010	USA	REALD-30	1158	Parents' perception of their child's dental health, their oral hygiene habits, sugar intake and nighttime bottle-feeding.	Infants and young children of caregivers with low health literacy are suffering from deleterious oral health habits including lack of teeth brushing and use of bottles at night time.
Divaris <i>et al.</i> [21], 2012	USA	REALD-30	203	Oral health, and overall health-related quality of life. Parental perceptions of sugar intake and overnight bottle feeding.	No correlation between C-OHRQoL and OHL was found, but a negative relationship was found C-OHRQoL and children's oral health status.
Garrett <i>et al.</i> [22], 2012	USA	REALD-30	101	Child's OHRQoL, dmfs, DMFT	Improved functional OHL leads to reduced child caries, but does not affect subjective oral health.
Sanzone <i>et al.</i> [12], 2013	USA	REALD-30	102	The history of tooth brushing, fluoride toothpastes, and bottle-feeding practices.	An association was found between the examined OHBs (4 of 8) and OHL. High OHL reduces children's frustration with tooth brushing.
Bridges <i>et al.</i> [23], 2014	China	HKREALD-30	301	Dental plaque (visual plaque index) and dmft	The oral health of the child is associated with caregivers' oral health literacy.
Shin <i>et al.</i> [24], 2014	USA	REALD-30	187	History of endodontic treatment, fillings history, extractions history, recent dental visits history.	The anxiety and literacy of oral health are connected.
Khodadadi <i>et al.</i> [25], 2016	Iran	OHL-AQ	384	dmft	Children who had poor parental OHL had more dental caries and less restorations.
Hiu Fong Lai <i>et al.</i> [26], 2017	Hong Kong	HKOHLAT-P	315	dmft	Parents who have lower economic status and had less education had considerably lower HKOHLAT-P scores. Lower dmft scores seem to be associated with higher HKOHLAT-P Part II scores.
Yazdani <i>et al.</i> [27], 2018	Iran	OHL questionnaire	258	Brushing teeth, dental visits, eating sugary snacks, smoking cigarettes, and DMFT	The mean DMFT of parents and their children appear to be highly correlated, and parents' higher OHL appears to improve their oral health behavior.
Montes <i>et al.</i> [28], 2019	Brazil	BREALD-30	415	dmft	Dental caries was more prevalent among preschoolers whose caregivers had a low level of OHL.
Firmino <i>et al.</i> [29], 2020	Brazil	BOHLAT-P	200	dmft	BOHLAT-P scores have not been linked to dental caries or the quantity of cavitated teeth.
Adil <i>et al.</i> [30], 2020	Malaysia	Self-administered oral health literacy questionnaire	230	dmft	It was found that parents OHL and dmft score of their preschoolers are significantly correlated to each other.

TABLE 1. Continued.

Study ID	Location	OHL instrument	Sample size	Outcomes measured	Study findings
Dieng <i>et al.</i> [31], 2020	Senegal	Oral Health Literacy-Adult Questionnaire	315	Prevalence of caries	Senegalese mothers' OHL levels were strongly correlated with the dental caries of their offspring.
Martins <i>et al.</i> [32], 2021	Brazil	BOHLAT-P	449	ICDAS, pufa	Low parental OHL doesn't affect the existence of dental decay, but leaves at least one consequence (pufa) of childhood dental caries untreated.
Sowmya <i>et al.</i> [33], 2021	India	REALD-30 Parent Mealtime Action Scale-(PMAS).	100	dmft	Children's experiences with caries were influenced by the behaviors of their mothers and level of oral health literacy.
Moriyama <i>et al.</i> [14], 2022	Brazil	BREALD-30	630	dmft	Low-income families' children have more caries, and rewards in the PMAS are correlated with caries severity. Parents' mealtime eating habits are linked to dental caries, but OHL is not.
Buldur and Oguz [34], 2023	Turkey	TOHLAT-P	315	Dental caries, OHRQoL, children dental anxiety, and the oral health behaviors of children and parents.	Parents' oral health literacy impacts their own oral health habits and indirectly affects their children's oral health behaviors.
Menoncin <i>et al.</i> [35], 2023	Brazil	OHL-AQ	419	Dental services utilization.	Parents with higher OHL took their children to the dentist more often than those with lower OHL.

Abbreviation: OHL, Oral Health Literacy; OHBs, Oral Health Behaviors; C-OHRQoL, Children's Oral Health-Related Quality of life; OHRQoL, Oral Health-related Quality of Life; dmft, Decayed, missing due to caries, and Filled Teeth; ICDAS, international caries detection and assessment system; pufa, presence of either a visible pulp, ulceration of the oral mucosa due to root fragments, a fistula or an abscess; PMAS, Parents Mealtime Action Scale; REALD-30, Rapid Estimation of Adult Literacy in Dentistry; HKRELD-30, Hong Kong Rapid Estimate of Adult Literacy in Dentistry; OHL-AQ, OHL-Adults Questionnaire; BOHLAT-P, Brazilian Oral Health Literacy Assessment Task for Paediatric Dentistry.

4. Discussion

As a result of the varied outcomes and complexity of addressing specific research questions, this review design was thought appropriate. According to Arksey and Malley [16], a scoping review is a type of literature review that used to assess the main concepts found in relevant literature in a specific health science research area. In this study, only observational studies were included. During the selection phase of the studies, prospective intervention studies were found that aimed to improve parents' oral health literacy. However, we had to exclude these studies since they don't examine the children's oral health rather than targeting improving the oral health literacy of caregivers.

A decision was made to assess the quality of the included studies for two reasons. First, it was important to consider the quality of the evidence being summarized to help the scholars understand the research findings and the reliability of the studies upon which these conclusions are based. Second, to assist researchers in conducting future studies based on the limitations of the studies included. For example, most of the studies used non-representative samples, which is a

critical issue requiring consideration in future research. Moreover, most of the studies displayed a notable risk of bias (Table 2) since they relied on nonrepresentative and non-calculated samples. Furthermore, most of the studies didn't report the response rate. The absence of randomization could have affected the findings in the included studies, as it could introduce a systematic discrepancy between the chosen study subjects and those excluded.

Despite frequent updates to the definitions of OHL, these changes have not been adequately reflected in the developed tool. As a result, the full spectrum of the conceptual dimensions of OHL is not properly addressed in these tools, hindering the accuracy and effectiveness of the outcomes they produce. When reviewing the tools used to assess parental oral health literacy, several issues became apparent. Firstly, most of the tools only included a single domain of oral health literacy, focusing primarily on pronunciation. This is a concerning issue as OHL includes more than just the ability to pronounce dental words. Secondly, the tools did not include the other domains of oral health literacy previously described in studies [1]. The missing domains include critical thinking, informa-

TABLE 2. The quality of cross-sectional studies in the review, using the modified Newcastle-Ottawa Scale.

Author	Selection			Comparability	confounders adjustment	Outcome			Score out of (8)
	A	B	C			D	E	F	
Vann Jr <i>et al.</i> [11], 2010	*				**		*		4
Miller <i>et al.</i> [20], 2010	*				**		*	*	5
Divaris <i>et al.</i> [21], 2012	*				**		*	*	5
Garrett <i>et al.</i> [22], 2012	*	*					*	*	4
Sanzone <i>et al.</i> [12], 2013	*				**		*	*	5
Bridges <i>et al.</i> [23], 2014	*	*	*		**		*	*	8
Shin <i>et al.</i> [24], 2014	*	*			**		*	*	6
Khodadadi <i>et al.</i> [25], 2016	*				**		*	*	5
Hiu Fong Lai <i>et al.</i> [26], 2017	*	*			**		*	*	7
Yazdani <i>et al.</i> [27], 2018	*				**		*		4
Montes <i>et al.</i> [28], 2019	*	*	*		**		*	*	8
Firmino <i>et al.</i> [29], 2020	*	*			**		*	*	7
Adil <i>et al.</i> [30], 2020	*	*			**		*	*	7
Dieng <i>et al.</i> [31], 2020	*				**		*	*	5
Martins <i>et al.</i> [32], 2021	*	*	*		**		*	*	8
Sowmya <i>et al.</i> [33], 2021	*		*		**		*		5
Moriyama <i>et al.</i> [14], 2022	*	*	*		**		*	*	8
Buldur and Oguz [34], 2023	*	*			**		*		5
Menoncin <i>et al.</i> [35] 2023	*	*	*		**		*	*	8

Abbreviation: *Yes (Performed); **Study adjusted the confounding factors; A, Validity of instrument; B, Sample size calculation; C, Representativeness sample; D, Ascertainment of the outcome; E, Training and validity of the tool; F, Nonresponse rate.

TABLE 3. Summary of OHL assessment tools used in the included studies.

Instrument	Year of development	Domain assessed	Remarks
Rapid estimate of adult literacy in dentistry	2007	Pronunciation	Word pronunciation only, no measurement of understanding. Developed and shortened from REALD-99.
Hong Kong rapid estimate of adult literacy in dentistry	2012	Pronunciation	Word pronunciation only, no measurement of understanding.
Oral health literacy adults questionnaire	2013	Reading comprehension, numeracy, literacy and decision making.	Questionnaire with a short interview consisted of four sections including reading comprehension, numeracy, listening and decision-making.
Hong Kong oral health literacy assessment task for pediatric dentistry	2013	Pronunciation	The purpose of the assessment was to evaluate the level of oral health knowledge of caregivers in the field of pediatric dentistry. The test was developed based on TOFHLiD and OHLI models, but it also included dental vocabulary from different Hong Kong media channels, including videos, brochures and advertisements.
Oral health literacy adults questionnaire	2013	Reading comprehension, numeracy, literacy and decision making.	The questionnaire had five sections, which assessed general knowledge about oral and dental health, understanding of dental instructions, personal decisions when dealing with oral and dental problems, oral health behaviors and demographic information.
Malaysia version of the oral health literacy instrument	2015	Reading comprehension and numeracy sections.	It is the Malaysia version of the Oral Health Literacy Instrument.

Abbreviations: REALD-99, Rapid Estimation of Adult Literacy in Dentistry; TOFHLiD, Test of Functional Health Literacy in Dentistry.

tion seeking, decision-making, responsibility and evaluation. Furthermore, the tools did not fully reflect parental oral health literacy, with the exception of one tool. Parental OHL can be defined as the caregiver's ability to access, understand, and use healthcare information to make appropriate decisions about their children's oral health. Parental oral health literacy also involves their ability to recognize and understand their child's oral health needs, follow preventive oral health practices, seek appropriate oral health care when necessary, and have an advanced knowledge of diet and feeding practices [35, 37]. Up to now, there is no gold standard tool for measuring OHL [38]. Limited health literacy has been shown to have a negative impact on health outcomes, and this is not only true for individuals themselves, but also for their children. Therefore, it is important to have a reliable tool to assess the OHL of parents in order to identify those who may need additional support and education. Developing such a tool, however, is not a simple task. It is crucial to find a gold standard or at least a consensus model for assessing parental OHL that can be used as a guide for researchers. This standard should take into account cultural and linguistic differences, as well as the influence of systems factors on OHL. By finding consensus models and domains of parental OHL, researchers can then develop and validate tools that are tailored to their specific language, culture and healthcare system, ensuring that they are accurate and effective.

The role of parents in shaping their children's health and behavior is significant [10, 39], which has resulted in an increasing number of studies examining the impact of parental and caregiver literacy on children's oral health. The results of this review highlight the substantial influence of parents' oral health literacy on the oral health of their children through various ways. Firstly, multiple studies have consistently shown a clear relationship between the level of oral health literacy among parents and the dmft scores of their children [22, 23, 25, 28, 30, 33]. The findings of three studies indicate that the results remained significant even after controlling for confounding factors. Two of the studies involved the recruitment of subjects from schools [23, 28], while the remaining investigations involved children undergoing treatment at university clinics [20, 22, 25]. Secondly, the oral health literacy of parents influences their children's negative oral habits, such as irregular brushing and the use of bottles at night. Four studies were conducted to investigate the effects of night bottle feeding. One of the studies found no statistically significant results [20], while the other three reported an association between this habit and lower literacy in parents/caregivers [11, 12, 21]. There were five studies conducted to evaluate how parents perceive their children's oral health. Out of those studies, three found that parents with low OHL were more likely to have a negative perception of their child's oral health [11]. Parents with higher OHL tend to take their children to the dentist more frequently than those with lower OHL [35], and having higher OHL appears to encourage better oral health behavior [27]. On the other hand, the two other investigations failed to find significant results [20, 22]. Lastly, children of parents with poor oral health literacy are more likely to suffer from severe dental caries [32] and exhibit anxiety towards dental treatment [24]. However, it is important to note that

this does not necessarily indicate a causal relationship. While parental OHL may seem to influence children's oral health, caries in children is multifactorial and not solely caused by OHL [40].

In most of the studies reviewed, the oral health of children was found to be associated with the OHL levels of their caregivers [11, 12, 20, 22, 23, 25, 27, 28, 30, 31, 33, 34, 36]. Based on this finding that parents with poor OHL are likely to have children with poor oral health, it can be concluded that the saying "the apple does not fall far from the tree" holds true in this context. Parents play a crucial role in shaping their children's health behaviors, including oral hygiene practices. Children often learn by observing their parents' habits and behaviors, and this can have a significant impact on their own oral health. Studies have shown that a significant number of parents do not prioritize their children's oral health, with only a small percentage ensuring their children visit the dentist regularly and follow proper oral hygiene routines [41–43]. On the other hand, pediatricians play a vital role in conducting regular health checkups and vaccinations for infants and young children, serving as a crucial bridge between families and dentists. They have the opportunity to advocate for and support children's first dental visits starting from the age of 12 months. However, a survey in the United States revealed that 63% of pediatricians only recommended the first dental visit after the child turned 3 years old [44]. Despite their belief in actively promoting children's oral health, various quantitative studies have demonstrated that pediatricians often lack sufficient knowledge and awareness about early childhood caries, children's oral health, treatment requirements, and appropriate referrals in this context [44, 45]. The goal is to discover effective methods to enhance the OHL of low-income families from diverse backgrounds, with the ultimate objective of reducing dental caries in children. One potential approach is to incorporate oral health education for parents into early childhood programs. These programs are well-suited to engage parents from disadvantaged communities who may not have access to dental care and to provide culturally sensitive education [37, 46–50]. Research has shown that parents who took part in this intervention experienced improved access to oral health information, enhanced oral health knowledge, more frequent positive oral health behaviors in their children, and increased use of preventive dental services [37, 46–50].

The health and well-being of individuals, especially those from different social classes and racial/ethnic backgrounds, are not only shaped by their personal choices and access to healthcare but also by the social determinants of health (SDH). These factors refer to the contexts in which people are "born, grow, live, work and age." [51, 52]. Numerous SDH have been discovered to have a high correlation with health literacy, which eventually causes health disparities. For instance, poorer income, educational attainment and minority racial and ethnic groups have all been linked to lower HL levels [53, 54]. According to other study, HL can predict health status more accurately than socioeconomic level, age or ethnic background [55–57]. Moreover, it is essential to address the structural issues that confound the ability of parents to access dental education and services. A recent systematic review that assessed the potential facilitators and barriers to the utiliza-

tion of dental services found evidence of interrelated factors that hinder or facilitate dental utilization [5]. At the system level, the primary challenge to accessing services was found to be a lack of affordability. This financial barrier prevents individuals and families from seeking the care they need. At the provider level, negative experiences and difficulties with language and communication were identified as additional obstacles to accessing care. Moreover, individual and family-level factors such as cultural beliefs, knowledge, attitudes, and values can also have an impact on the ability to access quality care, and should be taken into account when developing effective support strategies [5].

This review has limitations. Initially, at the review level, despite conducting an extensive search across various databases such as PubMed, ScienceDirect and Cochrane, it is advised that future researchers include additional relevant databases to enhance the reliability of scientific evidence. Moreover, failing to report data quantitatively or *via* meta-analysis is another limitation of this review. However, such analysis was not feasible. As a result of the diverse assessment tools and outcomes used in the studies, we have determined that reporting the outcomes qualitatively is the most appropriate approach. An additional constraint of the current study is the absence of protocol registration for this scoping review. As a result, we advocate for future studies to undergo registration before initiation. Second, at study-level, seven studies out of nineteen were considered as high quality, the remaining studies were ranged from low to moderate. Studies that utilize non-calculated samples may lack sufficient study power, thereby raising doubts about the reliability of their outcomes. In addition, most of the studies involved subjects who visited dental hospitals, leading to a potential bias in the selection process of these subjects due to the indication that they were already suffering from dental diseases. Therefore, it is advisable to consider these limitations when interpreting the results.

When conducting this review, our secondary objective was to focus on parental oral health literacy and identify any gaps or deficiencies that may exist in parental knowledge or oral health literacy. However, we encountered some challenges as the tools used in the included studies were not based on specific domains but instead aimed to address the broad concept of oral health literacy. As a result, it became difficult to pinpoint any specific intervention points. Therefore, it is crucial to conduct future studies with specific goals in mind to identify potential intervention points for improving the oral health literacy of parents. This identification of intervention points is critical for developing targeted strategies that are likely to have the greatest impact [58, 59]. Furthermore, there is a clear and pressing need for further research on correlation between parental oral health literacy level and oral health outcomes of children. However, researchers need to acknowledge the importance of conducting comprehensive investigations, for example, clinical trials and cohort studies, to better understand the influence of oral health literacy on children's oral health outcomes. Additionally, the outcome of the present review highlights the importance of pediatric dentists being knowledgeable about the level of oral health literacy among parents, as it could have an influence on a child's likelihood of developing dental caries. Taking steps such as increasing

the frequency of dental visits and fluoride application can help ensure proper oral health for children whose parents have low oral health literacy. Professionals must take into account parental oral health literacy to effectively communicate oral health instructions [15].

5. Conclusions

In most of the studies included, the oral health of children is associated with the caregiver's oral health literacy. Children of caregivers with low oral health literacy were found to exhibit deleterious oral health habits, including inadequate teeth brushing and the use of bottles at night-time. Dental caries was found to be more common in children whose parents had low oral health literacy.

ABBREVIATIONS

OHBs, Oral Health Behaviors; REALD-30, Rapid Estimation of Adult Literacy in Dentistry; HKRELD-30, Hong Kong Rapid Estimate of Adult Literacy in Dentistry; OHL-AQ, OHL-Adults Questionnaire; OHLAT-P, Brazilian Oral Health Literacy Assessment Task for Paediatric Dentistry; C-OHRQoL, Children's Oral Health-Related Quality of life; OHRQoL, Oral Health-related Quality of Life; dmft, Decayed, Missing due to caries, and Filled Teeth; ICDAS, international caries detection and assessment system; pufa, presence of either a visible pulp, ulceration of the oral mucosa due to root fragments, a fistula or an abscess.

AVAILABILITY OF DATA AND MATERIALS

The datasets and complete search terms for the current study can be obtained from the corresponding author upon a reasonable request.

AUTHOR CONTRIBUTIONS

AYA and OEM—contributed to selecting articles and synthesizing information. AYA, AA, NOB, RA and DB—contributed to drafting and editing the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

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CONFLICT OF INTEREST

The authors declare no conflict of interest. Omar El Meligy is serving as one of the Editorial Board members of this journal. We declare that Omar El Meligy had no involvement in the peer review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to AS.

REFERENCES

- [1] Ghaffari M, Rakhshanderou S, Ramezankhani A, Mehrabi Y, Safari-Moradabadi A. Systematic review of the tools of oral and dental health literacy: assessment of conceptual dimensions and psychometric properties. *BMC Oral Health*. 2020; 20: 186.
- [2] Santana S, Brach C, Harris L, Ochiai E, Blakey C, Bevington F, *et al*. Updating health literacy for healthy people 2030: defining its importance for a new decade in public health. *Journal of Public Health Management and Practice*. 2021; 27: S258–S262.
- [3] Sullivan ML, Claiborne DM, Shuman D. Oral health literacy inventories for caregivers of preschool-aged children: a systematic review. *Journal of Dental Hygiene*. 2022; 96: 34–42.
- [4] Safari-Moradabadi A, Rakhshanderou S, Ramezankhani A, Ghaffari M. Explaining the concept of oral health literacy: findings from an exploratory study. *Community Dentistry and Oral Epidemiology*. 2022; 50: 106–114.
- [5] Marcus K, Balasubramanian M, Short S, Sohn W. Barriers and facilitators to dental care among culturally and linguistically diverse carers: a mixed-methods systematic review. *Community Dentistry and Oral Epidemiology*. 2023; 51: 327–344.
- [6] Zaidman EA, Scott KM, Hahn D, Bennett P, Caldwell PH. Impact of parental health literacy on the health outcomes of children with chronic disease globally: a systematic review. *Journal of Paediatrics and Child Health*. 2023; 59: 12–31.
- [7] Kim M, Kwasny MJ, Bailey SC, Benavente JY, Zheng P, Bonham M, *et al*. MidCog study: a prospective, observational cohort study investigating health literacy, self-management skills and cognitive function in middle-aged adults. *BMJ Open*. 2023; 13: e071899.
- [8] van der Gaag M, Heijmans M, Spoiala C, Rademakers J. The importance of health literacy for self-management: a scoping review of reviews. *Chronic Illness*. 2022; 18: 234–254.
- [9] Schillinger D. Social determinants, health literacy, and disparities: intersections and controversies. *Health Literacy Research and Practice*. 2021; 5: e234–e243.
- [10] Dean JA. McDonald and Avery's dentistry for the child and adolescent. 11th edn. Elsevier Health Sciences: Missouri. 2021.
- [11] Vann WF, Lee JY, Baker AD, Divaris K. Oral health literacy among female caregivers. *Journal of Dental Research*. 2010; 89: 1395–1400.
- [12] Sanzone LA, Lee JY, Divaris K, DeWalt DA, Baker AD, Vann Jr WF. A cross sectional study examining social desirability bias in caregiver reporting of children's oral health behaviors. *BMC Oral Health*. 2013; 13: 24.
- [13] Chawłowska E, Karasiewicz M, Lipiak A, Cofta M, Fechner B, Lewicka-Rabska A, *et al*. Exploring the relationships between children's oral health and parents' oral health knowledge, literacy, behaviours and adherence to recommendations: a cross-sectional survey. *International Journal of Environmental Research and Public Health*. 2022; 19: 11288.
- [14] Moriyama CM, Velasco SRM, Butini L, Abanto J, Antunes JLF, Bönecker M. How oral health literacy and parental behavior during the meals relate to dental caries in children. *Brazilian Oral Research*. 2022; 36: e131.
- [15] Firmino RT, Ferreira FM, Martins CC, Granville-Garcia AF, Fraiz FC, Paiva SM. Is parental oral health literacy a predictor of children's oral health outcomes? Systematic review of the literature. *International Journal of Paediatric Dentistry*. 2018; 28: 459–471.
- [16] Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology*. 2005; 8: 19–32.
- [17] Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implementation Science*. 2010; 5: 69.
- [18] Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, *et al*. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Annals of Internal Medicine*. 2018; 169: 467–473.
- [19] Peterson J, Welch V, Losos M, Tugwell P. The Newcastle-Ottawa scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses. Ottawa: Ottawa Hospital Research Institute. 2011; 2: 1–12.
- [20] Miller E, Lee JY, DeWalt DA, Vann WF. Impact of caregiver literacy on children's oral health outcomes. *Pediatrics*. 2010; 126: 107–114.
- [21] Divaris K, Lee JY, Baker AD, Vann Jr WF. Caregivers' oral health literacy and their young children's oral health-related quality-of-life. *Acta Odontologica Scandinavica*. 2012; 70: 390–397.
- [22] Garrett GM, Citi AM, Gansky SA. Parental functional health literacy relates to skip pattern questionnaire error and to child oral health. *Journal of the California Dental Association*. 2012; 40: 423–430.
- [23] Bridges SM, Parthasarathy DS, Wong HM, Yiu CKY, Au TK, McGrath CPJ. The relationship between caregiver functional oral health literacy and child oral health status. *Patient Education and Counseling*. 2014; 94: 411–416.
- [24] Shin WK, Braun TM, Inglehart MR. Parents' dental anxiety and oral health literacy: effects on parents' and children's oral health-related experiences. *Journal of Public Health Dentistry*. 2014; 74: 195–201.
- [25] Khodadadi E, Niknahad A, Sistani MMN, Motallebnejad M. Parents' oral health literacy and its impact on their children's dental health status. *Electronic physician*. 2016; 8: 3421.
- [26] Hiu Fong Lai S, Kok Wun Wong M, Ming Wong H, Kar Yung Yiu C. Parental oral health literacy of children with severe early childhood caries in Hong Kong. *European Journal of Paediatric Dentistry*. 2017; 18: 326–331.
- [27] Yazdani R, Esfahani EN, Kharazifard MJ. Relationship of oral health literacy with dental caries and oral health behavior of children and their parents. *Journal of Dentistry*. 2018; 15: 275–282.
- [28] Montes GR, Bonotto DV, Ferreira FM, Menezes JVN, Fraiz FC. Caregiver's oral health literacy is associated with prevalence of untreated dental caries in preschool children. *Ciencia & Saude Coletiva*. 2019; 24: 2737–2744.
- [29] Firmino RT, Granville-Garcia AF, McGrath CP, Bendo CB, Ferreira FM, Paiva SM. Validation for Brazilian Portuguese language of the Hong Kong oral health literacy assessment task for paediatric dentistry (BOHLAT-P). *International Journal of Paediatric Dentistry*. 2020; 30: 234–243.
- [30] Adil AH, Eusufzai SZ, Kamruddin A, Wan Ahmad WMA, Jamayet NB, Karobari MI, *et al*. Assessment of parents' oral health literacy and its association with caries experience of their preschool children. *Children*. 2020; 7: 101.
- [31] Dieng S, Cisse D, Lombrail P, Azogui-Lévy S. Mothers' oral health literacy and children's oral health status in Pikine, Senegal: a pilot study. *PLOS ONE*. 2020; 15: e0226876.
- [32] Martins LP, Bittencourt JM, Bendo CB, Pordeus IA, Martins-Júnior PA, Paiva SM. Impact of oral health literacy on the clinical consequences of untreated dental caries in preschool children. *Pediatric Dentistry*. 2021; 43: 116–122.
- [33] Aparna K, Sowmya K, Puranik M. Association between mother's behaviour, oral health literacy and children's oral health outcomes: a cross-sectional study. *Indian Journal of Dental Research*. 2021; 32: 147.
- [34] Buldur B, Oguz E. Reliability and validity of the Turkish version of the oral health literacy assessment task: pathways between parental oral health literacy and oral health consequences in children. *International Journal of Paediatric Dentistry*. 2023; 33: 101–112.
- [35] Menoncin BLV, Crema AFA, Ferreira FM, Zandoná AF, Menezes J, Fraiz FC. Parental oral health literacy influences preschool children's utilization of dental services. *Brazilian Oral Research*. 2023; 37: e090.
- [36] Shahravan A, Haghdoost A, Hessari H, Baneshi M, Rad M. The impact of mother's literacy on child dental caries: individual data or aggregate data analysis? *Journal of Education and Health Promotion*. 2017; 6: 5.
- [37] Li Y, Xiao Q-L, Li M, Zhang Y, Chen M, Jiang C-H, *et al*. Community-based intervention via WeChat official account to improve parental health literacy among primary caregivers of children aged 0 to 3 years: protocol for a cluster randomized controlled trial. *Frontiers in Public Health*. 2023; 10: 1039394.

- [38] Dickson-Swift V, Kenny A, Farmer J, Gussy M, Larkins S. Measuring oral health literacy: a scoping review of existing tools. *BMC Oral Health*. 2014; 14: 148.
- [39] Li D, Guo X. The effect of the time parents spend with children on children's well-being. *Frontiers in Psychology*. 2023; 14: 1096128.
- [40] Ali M. Risk factors for dental caries in school children: a systemic study. *Jurnal Syntax Admiration*. 2023; 4: 1342–1356.
- [41] Mohammed Al-Dahan H, Ali Ismael S. Early childhood caries: parents' knowledge, attitude and practice towards its prevention in refugee camps in Erbil, Iraq. *BMC Oral Health*. 2023; 23: 792.
- [42] Aiuto R, Dioguardi M, Caruso S, Lipani E, Re D, Gatto R, Garcovich D. What do mothers (or Caregivers) know about their children's oral hygiene? An update of the current evidence. *Children*. 2022; 9: 1215.
- [43] Kumar N, Nabi AT, Kavita K, Choudhary P, Huda I, Dubey SK. Familial oral hygiene practices and its influence among rural youths-exploring primary preventive measures. *Journal of family medicine and primary care*. 2020; 9: 4353–4357.
- [44] Geetha Priya P, Asokan S, Balaraman C, Viswanath S, Yogesh Kumar TD. Pediatrician's perception of oral health in children—a qualitative study. *Journal of Indian Society of Pedodontics and Preventive Dentistry*. 2023; 41: 239–245.
- [45] Dickson-Swift V, Kenny A, Gussy M, McCarthy C, Bracksley-O'Grady S. The knowledge and practice of pediatricians in children's oral health: a scoping review. *BMC Oral Health*. 2020; 20: 211.
- [46] Borrelli B, Henshaw M, Endrighi R, Adams W, Heeren T, Rosen R, *et al*. An interactive parent-targeted text messaging intervention to improve oral health in children attending urban pediatric clinics: feasibility randomized controlled trial. *JMIR Mhealth Uhealth*. 2019; 7: e14247.
- [47] Dudovitz R, Teutsch C, Holt K, Herman A. Improving parent oral health literacy in head start programs. *Journal of Public Health Dentistry*. 2020; 80: 150–158.
- [48] Nye R, Robinia K. The effect of a community based educational intervention on oral health knowledge levels of adult caregivers of young children in the rural upper peninsula of Michigan. *Journal of Community Health Nursing*. 2019; 36: 188–198.
- [49] Shan Z, Liao C, Lu J, Yeung CPW, Li KY, Gu M, *et al*. Improvement of parents' oral health knowledge by a school-based oral health promotion for parents of preschool children: a prospective observational study. *BMC Oral Health*. 2023; 23: 890.
- [50] Verlinden DA, Schuller AA, Verrips GHW, Reijneveld SA. Effectiveness of a short web-based film targeting parental oral health knowledge in a well-child care setting. *European Journal of Oral Sciences*. 2020; 128: 226–232.
- [51] Lundell H, Niederdeppe J, Clarke C. Public views about health causation, attributions of responsibility, and inequality. *Journal of Health Communication*. 2013; 18: 1116–1130.
- [52] Willis E. The Australian health care system. *Understanding the Australian Health Care System*. 2009; 18: 3–13.
- [53] Okan O. From Saranac Lake to Shanghai: a brief history of health literacy. *International Handbook of Health Literacy*. 2019; 21–38.
- [54] Sullivan SS, Ledwin KM, Hewner S. A clinical classification framework for identifying persons with high social and medical needs: the COMPLEXedex-social determinants of health (SDH). *Nursing Outlook*. 2023; 71: 102044.
- [55] Sudore RL, Yaffe K, Satterfield S, Harris TB, Mehta KM, Simonsick EM, *et al*. Limited literacy and mortality in the elderly: the health, aging, and body composition study. *Journal of General Internal Medicine*. 2006; 21: 806–812.
- [56] Zanobini P, Lorini C, Lastrucci V, Minardi V, Possenti V, Masocco M, *et al*. Health literacy, socio-economic determinants, and healthy behaviours: results from a large representative sample of Tuscany region, Italy. *International Journal of Environmental Research and Public Health*. 2021; 18: 12432.
- [57] Tamayo-Fonseca N, Pereyra-Zamora P, Barona C, Mas R, Irlés MÁ, Nolasco A. Health literacy: association with socioeconomic determinants and the use of health services in Spain. *Frontiers in Public Health*. 2023; 11: 1226420.
- [58] Rudd RE, Anderson JE, Oppenheimer S, Nath C. Health literacy: an update of medical and public health literature. *Review of Adult Learning and Literacy*. 2023; 175–204.
- [59] Draper CE, Klingberg S, Wrottesley SV, Milner K, Fisher J, Lakes KD, *et al*. Interventions to promote development in the next 1000 days: a mapping review. *Child: Care, Health and Development*. 2023; 49: 617–629.

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