

CAREGIVER ORAL HEALTH LITERACY, PEDIATRIC ORAL HEALTH: A SYSTEMATIC REVIEW

by

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by

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Abstract

Objectives

The primary aim is to determine whether there is an association between caregiver oral health literacy and the oral health status of children.

Methods

All bibliographic databases with salient information on the proposed question were evaluated and included biomedical research literature (MEDLINE via PubMed and Embase), allied health, nursing and dental literature (CINAHL Complete), and social sciences/scientific literature (SCOPUS). We have also undertaken a grey literature search to be screened for additional articles or abstracts. The subject terms and keywords assessed for the main concept domains included: oral health literacy, oral health, parents or caregivers, and children. A comprehensive list of search terms was iteratively developed by the team, and peer reviewed by a second librarian. After removing duplicate works, 4,705 studies were screened at the title and abstract level by at least two independent reviewers. Five hundred twenty-six studies were identified for the full text screening. Preliminarily, at least two independent team members completed 40 full text reviews, with 15 articles meeting the specified inclusion criteria.

Preliminary Results

For articles that were excluded within the full text review, the most common reason articles were excluded is that they did not specifically address both caregiver oral health literacy and children oral health status together. Of the full text articles meeting the established inclusion criteria (37.5%), the majority indicate a connection between caregiver oral health literacy and the oral health status of children.

Preliminary Conclusions

Based on the articles reviewed thus far, there appears to be a positive association between caregiver oral health literacy and children oral health status across diverse countries and cultures.

Introduction

In order to understand the scope of the research investigation, defining the measures that quantify our data is crucial for analysis. Oral health literacy, referred to as OHL, is defined as how individuals obtain and understand “basic oral health information and services needed to make appropriate health decisions and act on them”. Oral health status (OHS) is the measure of one’s current state of oral health, based upon clinical examination, and evaluation of dental, medical and social histories, while including results from and stability of previous treatment. Measures for oral health status include metrics such as decayed teeth, missing teeth due to dental caries, filled tooth surfaces, periodontal status, and others. Decayed, missing, or filled, tooth surfaces, is commonly referred to as DMFT and this is one of the most frequently used metrics for oral health status measurement amongst the screened articles discovered by the team. Dental caries can lead to harmful consequences such as pain, loss of productivity and possibly severe limitations in those affected individuals. Without proper dental care throughout one’s childhood, it paves the way for a lifetime of poor oral health and diverse consequences such as affecting systemic body functions. Understanding if an association between caregiver oral health literacy and their child’s oral health status exists, creates the chance for improved preventive measures in this vulnerable population.

Dr. McCarlie told me a personal story about one reason this research has become a passion of his. He was treating a young child whose family explained that she was no longer eating for unknown reasons. Upon doing an oral examination, he noticed a monumental amount of tooth decay which was resulting in extreme pain during eating and was the reason

the child was refusing to eat. What stuck out to me about this is that the parents had no idea the child was even in pain because they did not know where the root of the problem was. Dr. McCarlie addressed the child's oral health status and importantly, helped improve the parents' oral health literacy. This led to them scheduling checkups for the rest of their children to avoid similar pain their daughter was experiencing. This anecdote led us to want to explore if there is a correlation that can be drawn from existing research between a caregiver's oral health literacy and their child's oral health status so that this problem Dr. McCarlie treated, becomes a story of the past and not a further limitation to overall health of children around the world.

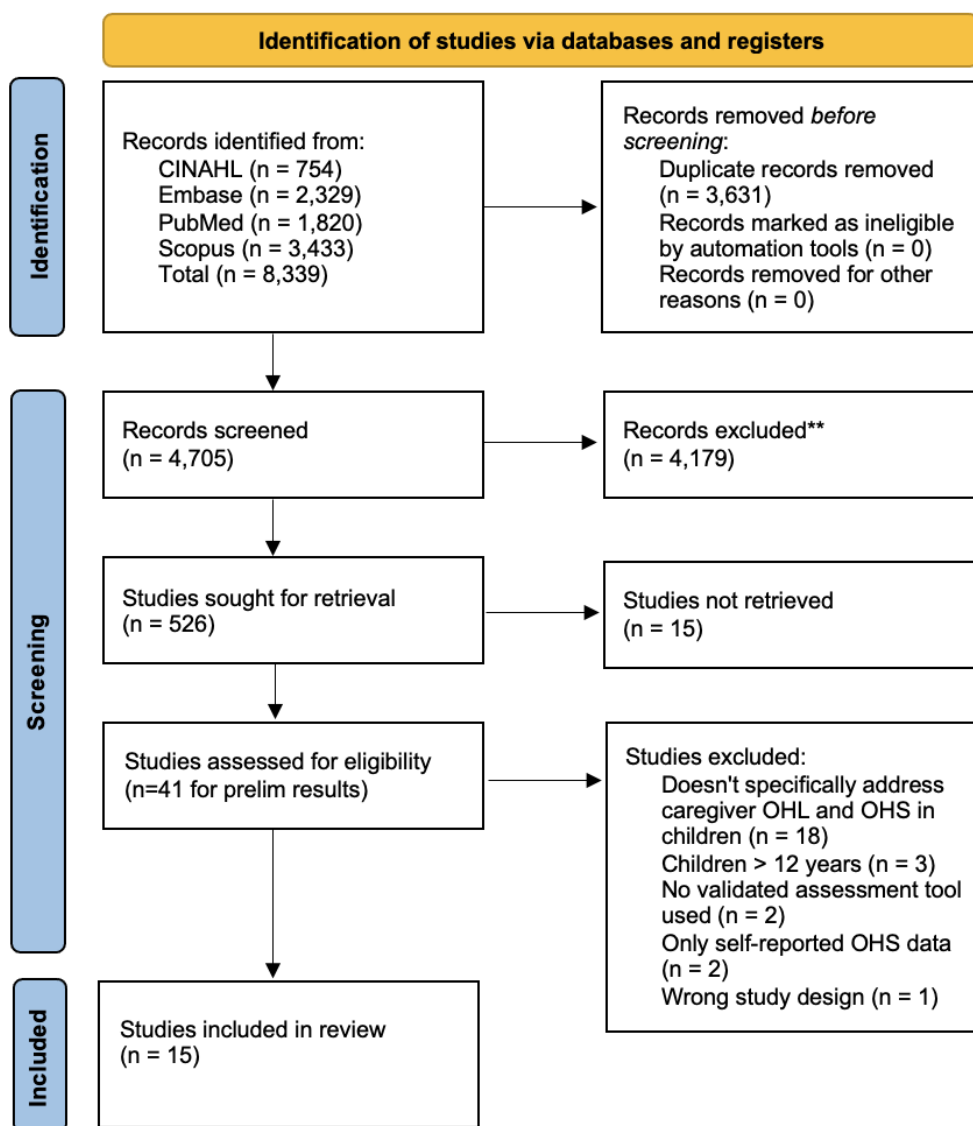
Methods

Our methods are based upon a systematic search process. This is a developed strategy to review literature regarding correlation between caregiver OHL and children OHS, adhering to Preferred Reporting Items for Systematic Reviews and Meta-Analyses. Jamie Bloss, our team search specialist and librarian, created a comprehensive list of established search terms in PubMed, which were peer reviewed by a second research librarian using Peer Review of Electronic Search Strategies. The databases that were searched for relevant studies were PubMed, the Cumulative Index to Nursing and Allied Health, Scopus, and EMBASE.

Selection Criteria included both inclusion and exclusion criteria through the systematic review management system, Covidence. Inclusion criteria included the following: Children through 11 years of age, peer-reviewed scientific studies, and inclusion of studies that specifically address caregiver OHL and OHS in children. Our exclusion criteria involved excluding

any articles with duplicates, those not utilizing appropriate statistical analysis, and those studies with only self-reported oral health status data.

Using the inclusion and exclusion criteria mentioned, each member of the team was able to screen articles for validity and eligibility. Using EndNote Citation Manager and Covidence Systematic Review software, duplicates were removed. Study titles and abstracts were screened and voted on by at least two team members.



With each of the 4,705 research articles being reviewed twice, that meant the team would screen 9,410 articles collectively using Covidence Software. This screening process was independently performed by the five reviewers following calibration of the reviewers. Any articles that received a vote of yes and no by two reviewers were resolved by a third reviewer. Qualified studies were screened for full-text review, recording reasons for which studies were subsequently excluded.

Of the 4,705 articles screened, 526 were selected for full text review, thus excluding 4,179 articles. Currently, 41 of these 526 have been through full text review by at least two reviewers and 15 studies have been deemed eligible for inclusion in our systematic review.

Results

Our results table provides insight into the location of where various studies took place, the oral health literacy and oral health status tools that were used, and the appropriate scores regarding association between OHL and OHS amongst the studies. Studies meeting our inclusion and exclusion criteria, which is about 38% of those so far screened in the full text review, derive from countries such as Saudi Arabia, Australia, India, Brazil, Kosovo, and even the United States. Oral Health literacy provided a proportion of adequate versus inadequate oral health knowledge amongst surveys, questionnaires, and the REALD-99 test, which is the Rapid Estimate of Adult Literacy in Dentistry Measurement Instrument.

| Year Published | First Author | Country | Participant Dyads | OHL Instrument | Mean OHL Score (SD) | OHS Instrument | Mean OHS Score (SD) |
|----------------|--------------|---|-------------------|--|--|---|--|
| 2014 | Bridges | Hong Kong Special Administrative Region of the People's Republic of China (HKSAR) | 301 | HKREALD-30 & HKOHLAT-P | HKREALD-30: 23.0 (3.97) HKOHLAT-P: 43.6 (5.59) | dmft & VPI | dmft: 75.4% VPI: 99.3% |
| 2016 | Khodadadi | Iran | 384 | OHL-AQ | Inadequate: 47.1% Adequate: 52.9% Mean Score: 11.5 | dmft | dmft- 8.2 |
| 2018 | Ismail | Malaysia | 478 | Dental Health Literacy Assessment Instrument | Intervention: 46.74 (3.4) Control: 39.05 (5.7) | dmft | (2-3 v.o.)- Intervention: 12% Control: 25% |
| 2019 | Baskaradoss | Saudi Arabia | 300 | COMHK-A | Poor: 53% Adequate: 47% | dmft | 87% had dental caries or treatment |
| 2020 | Adil | Malaysia | 230 | OHLI- M | Inadequate: 44.0 % Marginal: 24.7% Adequate: 31.3% | dmft | dmft score- Inadequate OHL: 7.49 ± 4.1 Marginal OHL: 3.28 ± 2.67 Adequate OHL: 0.55 ± 1.55 |
| 2020 | Barasuol | Brazil | 205 | BREALD-30 | Low: 21% High: 79% | dmft | DMFT- 0: 62.4% ≥1: 86.3% dmft- 0: 13.7% ≥1: 86.3 |
| 2020 | BaniHani | Jordan | 600 | AAPD Diagnostic Criteria | Poor: 82% Adequate: 18% | dmft | DMFT- 99.2% poor OHS 6.04 ± 1.2 |
| 2018 | Batra | India | 60 | Close ended child's OHS questionnaire | 53% unsure of methods to prevent ECC | Clinical diagnosis of ECC risk markers: | Dental caries presence: 19.17% present 80.83% absent |

There were numerous measures of oral health literacy used but as can be seen for oral health status, DMFT (decayed, missing, or filled tooth surfaces) was the most commonly used metric for calculating a mean score of OHS. And in regard to participant dyads, they ranged from 60 to 885 caregiver child pairs throughout the studies.





| Year Published | First Author | Country | Participant Dyads | OHL Instrument | Mean OHL Score (SD) | OHS Instrument | Mean OHS Score (SD) |
|----------------|--------------|-------------------------|-------------------|--|---|-------------------------------------|---|
| 2014 | Begzati | Kosovo | 664 | Pediatric Oral Health Literacy Questionnaire | Knowledge of proper oral hygiene techniques: Proper: 11% Inadequate: 89% | dmft | DMFT: 6.30 ± 3.23 |
| 1997 | Febres | Texas, United States | 100 | BBTD and demographic questionnaire | Adequate knowledge results for BBTD and brushing: Adequate: 54% Inadequate: 46% | BBTD classification examination | BBTD presence: Present: 19% Absent: 81% |
| 2020 | Firmino | Brazil | 200 | BREALD-30 | Mean: 23.3 SD: 5.5 | B-ECOHis | Mean: 3.5 SD: 5.8 |
| 2018 | Ismail | Malaysia | 200 | REALD-99 | REALD-99: mean – 62.96 | Dmft & VPI | Dmft: 6.24 VPI: 70.39% |
| 2018 | Ivana | Indonesia | 162 | (KAP) Questionnaire | Strong negative correlation between mother's OHL and ECC: r = 0.453 p = 0.002 | Clinical assessment of first molars | 42 pairs met criteria: Caries present: 69.6% Caries absent: 30.4% |
| 2020 | Soares | Australia | 223 | HeLD-14 | Mother's OHL deemed important to child OHS | Dmft, ECOHis | Inverse dmft and node strength relationship |
| 2008 | Sohn | Michigan, United States | 885 | Caregiver OHS perception questionnaire | Caregiver perception of OHS, not attitude, is associated with child OHS | ICDAS | ICDAS (dmf): 25.1 ± 2.4 for 56 children with caregiver OHL rated poor |

**HKREALD-30: Hong Kong Rapid Estimate of Adult Literacy in Dentistry-30, HKOHLAT-P: Hong Kong Oral Health Literacy Assessment Task for Pediatric Dentistry, dmft: number of decayed, missing and filled teeth (primary teeth), VPI: visible plaque index, OHL-AQ: Oral Health Literacy- Adults Questionnaire, CMOHK-A: Comprehensive Measure of Oral Health*

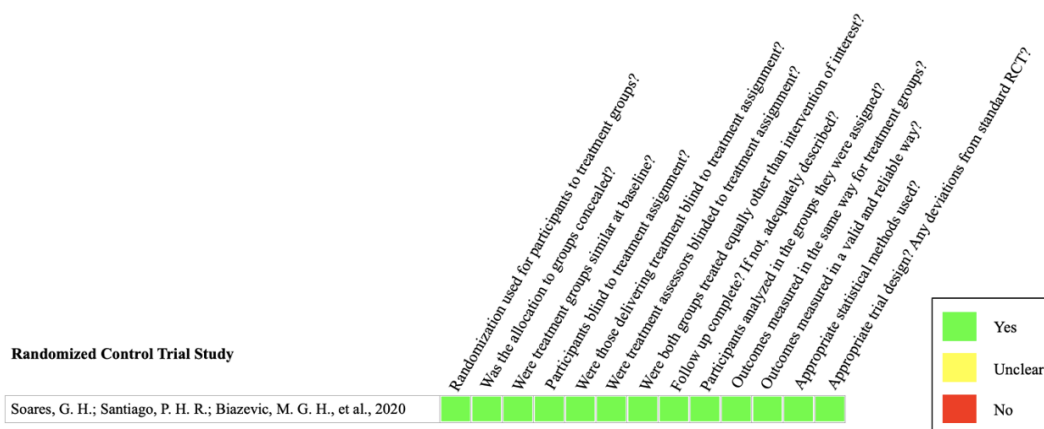
Of the 15 studies extracted from the full text review, 13 were cross-sectional research studies, which correlates well to our methods. The Joanna Briggs Institute checklist for cross-sectional studies was utilized to evaluate the quality of the 13 cross sectional studies.

Cross-Sectional Studies

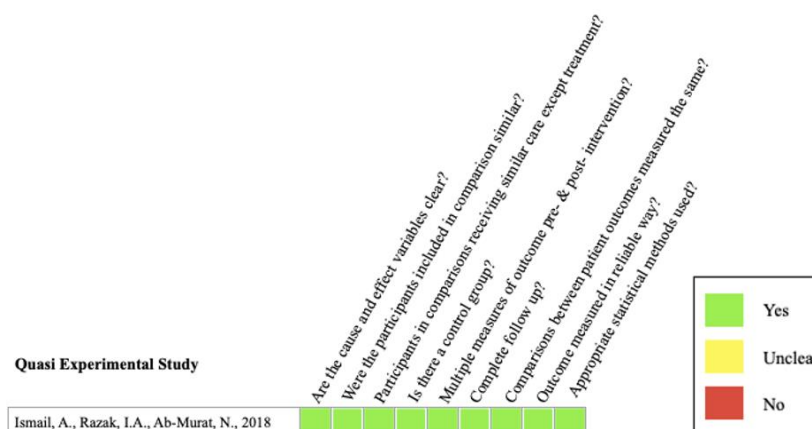
| | Criteria clearly defined? | Study subjects & setting clear? | Exposure measure valid & reliable? | Objective criteria for condition? | Confounding variables identified? | Strategy for confounding variable? | Outcomes measured with validity/reliability? | Appropriate statistical analysis? |
|---|---------------------------|---------------------------------|------------------------------------|-----------------------------------|-----------------------------------|------------------------------------|--|-----------------------------------|
| Febres, C.; Echeverri, E. A.; Keene, H. J., et al., 1997 | Yes | Yes | N/A | Yes | Yes | Yes | Yes | Yes |
| Sohn, W.; Taichman, L. S.; Ismail, A. I., et al., 2008 | Yes | Yes | N/A | Yes | Yes | Yes | Yes | Yes |
| Bridges, S.M.; Parthasarathy, D.S.; Wong, H.M., et al., 2014 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Begzati, A.; Bytyci, A.; Meqa, K., et al., 2014 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Khodadadi, E.; Niknahad, A.; Sistani, M.M.N., et al., 2016 | N/A | Yes | N/A | Yes | Yes | Yes | Yes | Unclear |
| Batra, M.; Shah, A. F.; Virtanen, J. I., et al., 2018 | N/A | Yes | N/A | Yes | Yes | Yes | Yes | Yes |
| Ismail, A. F.; Ardini, Y. D.; Mohamad, N., et al., 2018 | Yes | Yes | N/A | Yes | Yes | Yes | Yes | Yes |
| Ivana; Indarti, I. S.; Budiardjo, S. B., et al., 2018 | Yes | Yes | N/A | Yes | Yes | Yes | Yes | Unclear |
| Baskaradoss, J.K., AlThunayan, M.F., Alessa, J.A., et al., 2019 | Yes | Yes | N/A | Yes | Yes | Yes | Yes | Yes |
| Adil, A.H., Eusufzai, S.Z., Kamruddin, A., et al., 2020 | Yes | Yes | N/A | Yes | Yes | Yes | Yes | Yes |
| Barasuol, J.C., Daros, B.C.I., Fraiz, F.C., et al., 2020 | Yes | Yes | N/A | Yes | Yes | Yes | Yes | Yes |
| BaniHani, A.; Tahmassebi, J.; Zawaideh, F., et al., 2020 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firmino, R. T.; Granville-Garcia, A. F.; McGrath, C. P., et al., 2020 | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

| | |
|---|---------|
|  | Yes |
|  | Unclear |
|  | No |
|  | N/A |

The questions above investigate whether criteria were clearly defined, the subjects and setting were clear, exposure measure was valid and reliable, if there were objective criteria for condition, if confounding variables were identified, if they had a strategy for these confounding variables, and lastly, if outcomes were valid with support from appropriate statistical analysis. As can be seen, most studies had few marks that were not applicable and mostly met all criteria under the Joanna Briggs Checklist. However, 2 studies were not able to be evaluated using the JBI checklist and it was further determined by the team that they were not cross-sectional studies so additional JBI checklists for alternative research study formats were used.



One study, stemming from Australia, met the criteria of being a randomized controlled study. The Joanna Briggs checklist for randomized control trials was used for this study and included many similar questions as the previous, but additions included “were participants blind to treatment assignment”, “were both groups treated equally other than intervention of interest”, and “were treatment assessors blinded to treatment assignment?”. This study successfully met all criteria as determined by the team. Below, we had a similar process for a Quasi-Experimental Study design coming out of Malaysia.



We once again found the applicable Joanna Briggs checklist which this time included questions regarding cause-and-effect variables, various measures of outcome before and after

intervention, and comparisons between patient outcomes. Multiple reviewers confirmed that the article checked all boxes for a Quasi-Experimental Study under the JBI checklist. From this point, the team was able to discuss our outcomes and begin to identify our preliminary conclusions.

Discussion

The average number of participant dyads was 332.8 for the 15 selected studies. Approximately 86.7% of these indicated an association between caregiver OHL and children OHS. Among those studies affirming correlation, 92% measured OHL beyond solely word recognition. Thus, instruments capturing greater OHL complexity tended to show an association, whereas the opposite was true for studies utilizing less complex instruments. The quality of these studies is generally good, especially considering that study criteria were clearly defined, objective criteria for analyses were used, and variables were measured in a valid and reliable way. Our team was calibrated to screen titles and abstracts in a manner that ensured eligible studies, meeting the inclusion criteria, were not overlooked. Before we began screening, each team member completed a calibration process that included the independent review of pre-selected articles. When a member incorrectly decided to include or exclude a study, the team discussed it and that member reviewed additional studies until they were able to demonstrate sufficient understanding and application of the criteria. Once the screening process began, studies were only excluded if there was agreement by two independent reviewers. If there was discordance, a third reviewer assessed the study and a final decision rendered. This process provides a thorough mechanism that helps to limit the exclusion of

important studies in this review process. One limitation of our review is that we lacked the resources and ability to translate studies only available in a language other than English. However, we have found that these are relatively few in number and should not bias the review findings.

Conclusion

Overall, based on the team's research conducted over the past year, there appears to be a positive association between caregiver oral health literacy and children oral health status across diverse countries and cultures. The team is excited to hopefully further conclude this study and have our work published over the next year. Fortunately, I will be able to continue with my role as a member of the research team during dental school as I will have much closer proximity to Dr. McCarlie and the patient populations the research addresses.

The hope is that once our research is published, the American Dental Association for example can use our systematic review as evidence for implementing an oral health literacy program used to educate those seeing obstetricians for pre-natal care. It is imperative for caregivers to gain strong oral health literacy prior to giving birth so the child's oral health status is prioritized from the start.

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