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Critically Appraisal of Tools to Measure Using the COSMIN Checklist

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Abstract

Purpose: Oral health literacy tools are important for assessing a population's oral health knowledge and awareness. The objective of this study was to critically appraise the methodology used for developing all the existing oral health literacy assessment tools, by systematically reviewing the available evidence.

Materials & Method: Databases used for the search were Wiley, BMJ open, Pub Med/Medline and Science Direct. We identified 10 studies, published in English during 2006 – 2016, that focused on the development and validation of oral health literacy tools. We then assessed these studies using the COSMIN checklist, which evaluates the methodological quality of studies on measurement properties**.**

Results: Most of the tools were adapted from the general health literacy tool. All the 10 tools had measured validity and reliability, but lacked cross-cultural validity.

Conclusion: Findings from this review confirm that majority of the tools focus towards assessment of word recognition, numeracy and reading skills, rather than indicative of aspects such as health behaviors and service utilization. Developing tools that are adapted for specific populations will require further work, such as incorporating tests to ensure their acceptability and cultural competence.

Key-words: *Oral, health literacy, COSMIN checklist, tools, review*

Introduction

Oral health literacy (OHL) is defined 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' [1] [2]. This ability to access and leverage oral health-related information and services serves as the most reliable indicator of oral health levels, since a high degree of OHL would correspond to a higher likelihood of good oral health being maintained. Being able to measure such an important indicator would prove to be extremely valuable in assessing overall oral health levels of a given population.

A number of tools have been developed to assess OHL levels of populations, of which the most widely used is the Rapid Estimate of Adult Literacy in Dentistry (REALD-99) [3], several variants of which were subsequently developed. Other popular tools, such as the Test of Functional Health Literacy in Dentistry (ToFHLiD)[4], the Comprehensive Measure of Oral Health Knowledge (CMOHK) [5] and the Health Literacy in Dentistry scale (HeLD) [6], have also been greatly successful.

A few reviews have been conducted for assessing OHL tools, including those by Dickson-Swift et al. (2014), and Navdeep Kaur and Daniel Kandelman (2015), which focus on what the different tools measure. However, no review has so far been conducted to evaluate the methodology used for developing these tools, which

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could help the researchers in understanding the critical points that are to be considered while planning the development of new tools.

This systematic review, hence, analyses, assesses and benchmarks all the currently available tools. The aim of this study is to critically appraise the methodology used for developing all the existing oral health literacy assessment tools, using the COSMIN checklist.

Materials and Method

This systematic review was conducted based on the five steps mentioned by [7]. The studies which emphasize on methodology of development and validation of different oral health literacy tools were included in the review. All other studies were excluded from the review during the step of screening. The final study selection was based on the inclusion and exclusion criteria mentioned in Table 1.

Table 1: Inclusion and exclusion criteria for the studies

Inclusion Criteria	Exclusion Criteria
1. Time period of studies from 2006- 2016. 2. The tools developed in different languages but published studies available in English language. 3. Studies based on development of Oral Health Literacy tools.	1. Tools adapted from an original tool. 2. Commentary articles/conference reports/theses/ workshop summaries

The research for the review was started with Google Scholar search and was completed with the help of Wiley, BMJ open and Pub Med/Medline databases. The key words used for the following search were 'health literacy', 'oral', 'development' and 'tool' with Boolean search strategy. MeSH term used was 'health literacy'. The time period selected for the review was 10 years. The search time frame was January 2006- April 2016.

Study selection

Using the search items selected for this review, 12585 turned up in the initial search. Then after applying various filters and removing duplicate studies, finally 10 studies were selected.

The quality of the studies selected were assessed based on the methodology used for the development of the oral health literacy tool in the particular study.

The Consensus-based Standards for the Selection of Health Measurement Instruments (COSMIN) checklist was used to evaluate the methodological quality of studies on measurement properties [8]. It is a valid and reliable tool for evaluating the methodological quality of health measurement instruments. The COSMIN uses a quality-rating system of nine domains including internal consistency, reliability, measurement error, content validity, structural validity, hypotheses testing, cross-cultural validity, criterion validity and responsiveness. Each domain is assessed with a series of questions that are scored on a 4-point scale from excellent to poor. For this review, studies that met the inclusion criteria were scored.

Results

In this review we identified all the original oral health literacy tools and analyzed the methodologies adopted to develop and validate such tools. We observed that the first tool developed was the REALD- 30 in 2007 as shown in Table 2, which was adapted from Rapid Estimate of Adult Literacy in Medicine (REALM). REALM was the commonly used tool for assessing general health literacy. REALD- 30 was based on word recognition tests that helped in merely assessing the reading ability of the population.

Other recently developed tools such as the Adult Health Literacy Instrument for Dentistry (AHLID) [9], Oral Health Literacy Adults Questionnaire (OHL-AQ) [10]including new measures of literacy skills (OHL Adults Questionnaire: OHL-AQ, etc. were also based on parameters such as reading comprehension, numeracy, literacy and decision-making (factual, procedural, and conceptual). Apart from these, population-specific tools such as the Hong Kong Oral Health Literacy Assessment Task for Pediatric Dentistry (HKOHLAT-P) [11] and Oral Health Literacy Inventory for Parents (OH-LIP) [12] were also developed, which helped in assessing the oral health literacy of parents/ children with respect to word recognition, vocabulary knowledge and comprehension. It did not measure the comprehensive skills.

Table 2: Overview of oral health literacy tools

Name of tool	Year	Authors	Type of tool
Multi-site assessment of oral health literacy	2016	Macek et al.	Conceptual model with 3 domains
Health Literacy in Dentistry (HeLD)	2014	Jones et al.	29 item- Modelled on the HeLMS
Adult Health Literacy Instrument for Dentistry (AHLID)	2015	Stein et al.	Based on an OECD instrument
Oral Health Literacy Adults Questionnaire (OHL-AQ)	2014	Sistani et al.	17 items in 4 sections, reading comprehension, numeracy, literacy and decision making
Hong Kong Oral Health Literacy Assessment Task for Paediatric Dentistry (HKOHLAT-P)	2013	Wong et al.	Literacy and numeracy tasks across three kinds of knowledge (factual, procedural, and conceptual)
Oral Health Literacy Inventory for Parents (OH-LIP)	2011	Richman	3 parts- word recognition, vocabulary knowledge, and comprehension of 35 terms used in paediatric dentistry
Oral Health Literacy Assessment-Spanish (OHLA-S)	2012	Lee et al.	24 items- word recognition and a comprehension section
Oral Health Literacy Instrument (OHLI)	2009	Sabbahi et al.	38 item- reading comprehension and 19 item-numeracy sections
Test of Functional Health Literacy in Dentistry (ToFHLiD)	2007	Gong et al.	Reading comprehension and numeracy 68 item reading comprehension and 12 item numeracy
Rapid Estimate of Adult Literacy in Dentistry −30 (REALD-30)	2007	Lee et al.	30 item word recognition common dental words

Discussion

The present review focused on how over the years, various oral health literacy tools have been developed/adapted from original tools. For instance, the REALMD-20 [17] has been adapted from the REALD-30. But unlike such adapted tools, most of the original tools which were developed later included different domains for assessing oral health literacy such as comprehension, knowledge, numeracy and vocabulary. In 2007, another tool was developed, namely the Test of Functional Health Literacy in Dentistry (ToFHLiD), which assessed the comprehensive and numeric ability of a population. The tool showed satisfactory levels of reliability and convergent validity. However, the ToFHLiD lacked test-retest reliability.

Also, there were no proper measures followed for assessing the psychometric properties of the tool. As a consequence, the results obtained from the REALD-30 and the inferences drawn from them would include a significant level of inaccuracy, and would not be a reliable indicator of the true extent of oral health literacy in the given population.

A study done by Mark D. Macek and his colleagues in 2016 was based on a multi-site investigation which included a conceptual model with three domains: Health Literacy (Domain #1), Behaviors/decisions (Domain #2), and Health Outcomes (Domain #3), influenced by selected oral health-related and socioeconomic status

(SES) covariates.

Most of these tools were adapted from existing tools which were originally developed for measuring general health literacy. For instance, the Health Literacy in Dentistry (HeLD) [6] was adapted from a general health literacy measure, the Health Literacy Management (HeLM) scale. Similarly, REALD was based on the Rapid Estimate of Adult Literacy in Medicine (REALM).

Despite successful adaptions of these original tools, however, it was observed in the review that all of the tools that were reviewed lacked cross-cultural adaptation. But there were a few tools which considered the importance of language in assessing the literacy of a population. The tools that were developed by [11] and [14], for instance, were translated into Mandarin and Spanish languages respectively.

In the past, there have not been many reviews for assessing oral health literacy tools. The results we obtained by means of this study were similar to those obtained from reviews done by [18] and [19], the latter of which states that none of the current tools offer an accurate assessment of oral health literacy level of a given population.

With this review we observed that there is a need of oral health literacy tools which are not only disease specific but consider all the domains of health literacy such as word recognition, comprehension, decision making etc. the tools should also be cross-culturally adapted for specific population.

One of the limitations of this review was that only original studies were considered for the purpose of the review. The various tools adapted from original tools were not considered.

Conclusion

Findings from this review confirm that majority of the tools focus towards assessment of word recognition, numeracy and reading skills, rather than indicative of aspects such as health behaviors and service utilization. Of late, attempts have also been made to incorporate other parameters into the development phase of the tool, which include parameters that are considered important, including decision making and possibly service navigation. The incorporation of these parameters should increase the validity of these tools as a measure of oral health literacy on a larger scale, as they are more capable of incorporating communicative/ interactional and critical nuances of oral health awareness. Efforts in the area of formal validation, however, are still required. In addition, further work would be required to develop tools that are adapted for specific populations, by incorporating tests to ensure their acceptability and cultural competence.

Ethical Clearance- Taken from M.S Ramaiah University of Applied Sciences Ethics committee

Source of Funding- Self

Conflict of Interest - Nil

References

1. Wehmeyer MM, Corwin CL, Guthmiller JM, Lee JY. The impact of oral health literacy on periodontal health status. J Public Health Dent 2012;74(1):80–7.
2. Raynor DKT. Health literacy. BMJ [Internet] 2012;344(march):1–2. Available from: http://www.bmj.com/cgi/doi/10.1136/bmj.e2188
3. Richman JA, Lee JY, Rozier RG, Gong DA, Pahel BT, Vann WF. Evaluation of a Word Recognition Instrument to Test Health Literacy in Dentistry: The REALD-99. J Public Health Dent 2007;67(2):99–104.
4. Gong DA, Lee JY, Rozier RG, Pahel BT, Richman JA, Jr WFV. Development and Testing of the Test of Functional Health Literacy in Dentistry (TOFHLiD). J Public Health Dent 2007;67(2):105–12.
5. Macek MD, Haynes D, Wells W, Bauer-Leffler S, Cotten PA, Parker RM. Measuring conceptual health knowledge in the context of oral health literacy: Preliminary results. J Public Health Dent 2010;70(3):197–204.
6. Jones K, Parker E, Mills H, Brennan D, Jamieson LM. Development and psychometric validation of a Health Literacy in Dentistry scale (HeLD). J Health Commun [Internet] 2014;31:37–43. Available from: http://www.ncbi.nlm.nih.gov/pubmed/25315594
7. Khan KS, Kunz R, Kleijnen J, Antes G. Five steps to conducting a systematic review. J R Soc Med 2003;96(3):118–21.
8. Mokkink LB, Terwee CB, Patrick DL, Alonso J, Stratford PW, Knol DL, et al. The

COSMIN checklist manual [Internet]. VU Univ. Med.2012;56. Available from: http://www.cosmin.nl/images/upload/File/COSMIN checklist manual v9.pdf%5Cnwww.cosmin.nl

9. Stein L, Pettersen KS, Bergdahl M, Bergdahl JAN. Development and validation of an instrument to assess oral health literacy in Norwegian adult dental patients. Acta Odontol Scand 2015;(January):1–9.
10. Naghibi Sistani MM, Montazeri A, Yazdani R, Murtomaa H. New oral health literacy instrument for public health: development and pilot testing. J Investig Clin Dent 2014;5(4):313–21.
11. Wong HM, Bridges SM, Yiu CKY, Mcgrath CPJ, Au TK, Parthasarathy DS. Validation of the Hong Kong oral health literacy assessment task for paediatric dentistry (HKOHLAT-P). Int J Paediatr Dent 2013;23(5):366–75.
12. Richman JA. Beyond Word Recognition: Understanding Pédiatrie Oral Health Literacy. Pediatr Dent 2011;33(5):420–5.
13. Macek MD, Atchison KA, Watson MR, Holtzman J, Wells W, Braun B, et al. Assessing health literacy and oral health: preliminary results of a multi-site investigation. J Public Health Dent [Internet] 2016;(3):1–11. Available from: http://doi.wiley.com/10.1111/jphd.12156
14. Lee J, Stucky B, Rozier G, Lee S, Zeldin LP. Oral Health Literacy Assessment : development of an oral health literacy instrument for Spanish speakers. 2012;30(7).
15. Sabbahi DA, Lawrence HP, Limeback H, Rootman I. Development and evaluation of an oral health literacy instrument for adults. Community Dent Oral Epidemiol 2009;37(5):451–62.
16. Lee JY, Rozier RG, Lee SYD, Bender D, Ruiz RE. Development of a word recognition instrument to test health literacy in dentistry: The REALD-30 - A brief communication. J Public Health Dent 2007;67(2):94–8.
17. Gironda M, Der-Martirosian C, Messadi D, Holtzman J, Atchison K. A brief 20-item dental/medical health literacy screen (REALMD-20). J Public Health Dent 2013;73(1):50–5.
18. Dickson-Swift V, Kenny A, Farmer J, Gussy M, Larkins S. Measuring oral health literacy: a scoping review of existing tools. BMC Oral Health [Internet] 2014;14(148):1–13. Available from: http://www.pubmedcentral.nih.gov/ articlerender.fcgi?artid=4417207&tool= pmcentrez& rendertype=abstract
19. Kaur N, Kandelman D, Nimmon L, Potvin L. Oral Health Literacy: Findings of A Scoping Review. EC Dent Sci 23 2015;2(3):296–306.