



Original Research Article

Creating a textured book for oral health among preschool-children

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ABSTRACT

Background: Poor oral hygiene in young children is a major public health problem that is affected by many societal, communal, and environmental factors. Children as young as 12 months old can get early childhood caries (ECC), which can impact their growth, development, and quality of life. ECC affects between 6% and 90% of people around the world, so kids in preschool need to learn good oral health habits.

Aim & Objective: The study's objective is to create an explained book model that can be used to teach preschoolers about good oral care and get around the problems with current methods.

Materials and Methods: The textured book model was developed with input from faculties from Public Health Dentistry, Pedodontics and pre-school teachers. Questionnaires assessing face, content, construct and criterion validity through a Likert scale captured detailed feedback. The glossy book, made with design tools and printed on cloth, met all four validity criteria, indicating its effectiveness as a teaching tool.

Results: This study assessed the validity of an assessment questionnaire for a textured book model aimed at improving oral hygiene knowledge among young learners. Strong correlations were found between overall scores and items Q4, Q5, and Q7 ($p < 0.001$). Factor analysis revealed three key dimensions—comprehensiveness, relevance, and effectiveness—demonstrating the model's efficacy in promoting positive oral hygiene practices. Content validity ratio was obtained using the Lawshe Method, and estimated to be 0.83. The reliability of the questionnaire was assessed using Cronbach's alpha, which was 0.81. The significant level was set at p -value < 0.05 .

Conclusion: The textured book model is a fun and engaging way to encourage preschoolers to care for their teeth. It combines learning with play, making it an effective tool to teach good dental habits that can last a lifetime.

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1. Introduction

A major public health concern is short comings in oral health of young children.¹ Numerous environmental, cultural, and socioeconomic factors have an effect on the health and well-being of indigenous children. Dental caries in children is a complicated health problem with many underlying causes.² Hiremath et al. conducted a study where the results showed the average mean DMFT of India was 2.67.³ Concerningly, a significant proportion of

children have dental caries at an alarmingly early age, with certain individuals as young as 12 months old already afflicted by this condition.⁴ Early Childhood Caries (ECC) and decayed teeth in children under six years of age can impact growth and development because of pain and discomfort, feeding and dietary issues, decrease in weight and impaired quality of life.⁵ The frequency of ECC has been measured to range from 6% to 90%, with most developed countries being on the lower end of the scale and most developing countries being on the middle to upper end.⁶

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Maintaining proper oral hygiene is crucial for preschoolers as their dental and gingival structure develop. Early care fosters lifelong healthy habits and promotes better oral outcomes by encouraging consistent brushing from a young age.⁷ Early childhood is a critical period of rapid growth across physical, emotional and cognitive domains, with peak neuroplasticity enabling quick skill acquisition. Teaching proper toothbrushing during this phase builds motor skill, fosters self-care habits, and strengthens neural connections through repetition, promoting lasting behaviour.⁸ Tooth decay in children is influenced by oral hygiene, nutrition and the knowledge, habits and attitudes of parents and teachers, highlighting the need to address these factors in preschool oral health program.⁹

Traditionally oral health education programs have an objective of enhancing oral health literacy in order to promote adoption of new behaviours and the maintenance of good oral health.¹⁰ The primary approach suggested in the literature for oral health education is traditional lecture to a group conducted by a healthcare professional. This approach enhances individuals' understanding of oral health, but it has limited efficacy in influencing oral health behaviours and attitudes.^{11,12} Toddlers and preschoolers should be taught to brush their teeth regularly and properly by using fun and interactive methods that hold their interest. Adding games to lessons can help kids stay focused and interested, and it can also help them learn and remember what they are learning.¹³

Promoting oral health literacy from an early age is critical for installing lifelong positive dental care habits. Preschool children are at a pivotal developmental stage where behaviours can be readily acquired and reinforced. The dental health textured book model serves as an educational tool that intends to promote good oral habits among children. This innovative approach modifies traditional picture books by incorporating textured elements, allowing children to experience tactile sensations while viewing the images. The tactile experience not only enhances children's creativity and reading abilities but also stimulates their curiosity and fosters the development of motor skills. Creating an engaging, age-appropriate educational resource tailored to this formative window could lead to improvement in oral hygiene and good oral hygiene. Despite the growing recognition of the importance of oral health education for preschool children, there remains a notable gap in the literature regarding the effectiveness of textured book as a tool for delivering oral health education in this age group. While traditional methods such as verbal instructions and visual aids are commonly used, there is limited research exploring the use of tactile and interactive materials like textured books in promoting oral health behaviours among preschool children.

So, the objective of the study is to develop a textured book model regarding oral health for preschool children.

2. Materials and Methods

2.1. Sample size

The design of the textured book was obtained through selection and comprised individuals from various backgrounds, including faculty members from public health dentistry, pedodontics, and teachers from kindergarten schools.

This study used questionnaires to assess four types of validity: face, content, construct and criterion. The validity evaluates through a Likert format. The questionnaire development process entailed meticulous consideration of each validity aspect to ensure comprehensive assessment. The Likert scale chosen to capture nuanced responses from participants, providing a structured yet flexible approach to gauge their perceptions and experiences with textured book model. The content for the book was derived through interview of subject experts from the specialities of Public Health Dentistry and Pedodontics and Preventive dentistry. The construct and criterion validity were assessed based on the interviews with school teachers.

2.2. Product/Model design

The data gathered from the information collection phase informed the design of the product/model. Findings underscored the importance of instilling independent tooth brushing habits in preschool children to optimize their dental health in adulthood. Firstly, the conceptualization of the content and format of the textured book model, which typically comprises twelve pages centered around the theme of tooth brushing, was completed. Secondly, design software such as Canva or PowerPoint has been utilized to create the book layout, aiming for a size of 10x9 cm per page, with each page background composed of one sheet of cloth. Thirdly, the design was imprinted onto white cloth, serving as the book's pages. Next, the cloth pages have been filled with foam and sewn together using a needle and sewing thread, with the option of utilizing a sewing machine for neater edges with every page having a type of textures. Lastly, the individual sheets were assembled to form a cohesive book structure.

2.3. Statistical analysis

Statistical Package for Social Sciences (SPSS 20.0) version was used for analysis. *p* value less than 0.05 was considered statistically significant at 95% confidence interval.

3. Results

The five stages for face validity are delineated sequentially: preparing the face validity form, selecting the expert panel, distributing and receiving the face validity form, reviewing the received forms and compiling responses. It serves as an initial check to ascertain if the instrument appears

appropriate and relevant to its intended purpose, target population and context.

The Pearson correlation coefficient was employed to assess construct validity, quantifying the strength and direction of the relationship between the measurement instrument and related constructs. The p -value <0.05 was considered to be significant.

The (Table 1) presents Pearson Correlation Coefficients between the total score and individual items (Q1 to Q7) from the assessment questionnaire. The results indicate strong positive correlations, particularly with Q4($r=0.710$), Q5($r=0.722$) and Q7 ($r=0.829$), suggesting that these items are closely related to the overall construct being measured. Notably, all correlations are statistically significant ($p<0.001$), except for Q2, which doesn't meet the conventional threshold for significance.

The Pearson correlation coefficient for construct validity revealed significant correlation between overall score and all seven questions. Q2 and Q3 had a moderate positive correlation indicating that higher ratings on these questions tended to correspond with modestly higher overall scores. The rest 5 questions exhibited a strong positive correlation, suggesting that higher responses on this question were strongly associated with overall scores.

Table 2 The explanatory factor analysis revealed three distinct factors-comprehensiveness, relevance and effectiveness, with high factor loadings for the respective items measuring these constructs. Using a stringent cut-off of a loading of 0.5 for item inclusion, 15 items loaded on to three factors and presented a simple structure. Based on the rotated component matrix which represent the comprehensiveness aspect, as it has high factor loadings from items C1(0.72), C2(0.87), C3(0.64), C4(0.71) and C5(0.69). The second component represents the Relevance dimension, with strong relationship from items R1(0.79), R2(0.86), R3(0.70), R4(0.65) and R5(0.88). The third component represents the effectiveness aspect where item E1(0.91), E2(0.87), E3(0.62), E4(0.61) and E5(0.75) shows high factor loading. These outcomes support the validity of the textured book model in achieving its intended purpose of enhancing oral hygiene knowledge and positive practises among young learners.

For content validity, content validity ratio was obtained using the Lawshe Method, and estimated to be 0.83.

The expert validity assessment yielded a p -value of 0.00 (Table 3), indicating that the textured book is statistically significant and relevant learning model for enhancing oral hygiene practises among preschool children. The reliability of the questionnaire was assessed using Cronbach's alpha, which was 0.81.

4. Discussion

Preschool children are at a critical stage of cognitive and motor skill development. A textured book that incorporates

tactile elements aligns with their need for hands-on, multisensory learning experiences. Young children often have shorter attention spans and may find traditional instructional method less engaging. A textured book with its interactive features and appealing visuals can make the learning process more enjoyable and motivating, increasing their interest in developing good oral hygiene habits.

In order to ensure that the book with a textured surface effectively encourages the formation of oral hygiene habits in preschool children, it is essential to carry out comprehensive validity evaluations. By including expert validation into the development process, researchers can verify that the book's interactive and tactile features are both captivating and instructive, thereby improving its ability to attain the intended goals.

Validity assessments help determine whether the textured book model is an effective educational resource that can successfully impart the intended knowledge and skills to the target audience. A concept that is essential in research and testing is approached comprehensively by considering face, content, criteria within a framework which allows for the empirical testing of logical hypotheses regarding the interpretation and usefulness of scores obtained from tests or assessments.¹⁴ Validation by experts is crucial during product or model development to ensure the creation of effective tools that enhance educational quality. This process helps maintain the reliability and validity of the research findings by ensuring that the textured book for oral health education appropriately measures the variables of interest and can be used effectively.

The need for creating a textured book arises from recognition that establishing proper oral hygiene habits early in life is crucial for promoting long-term oral health. Ngatemi et al. stated in his study that the provision of education and stimulation to early childhood must be suitable and aligned with every aspect of child development. The investigation employed a questionnaire as the primary research instrument. Notably, the results of expert validation processes yielded a statistically significant p -value (0.000), a finding that underscores validity of the employed measures.⁷ The current findings further corroborates the findings, as the expert validation process yielded a statistically significant p -value of 0.000, these findings indicate the textured book exhibits significant potential as an effective educational model to promote better oral hygiene habits in preschool children. This multi-sensory learning tool seems well-suited to instil crucial oral health knowledge and integrate positive oral hygiene practises in their formative years.

Utilizing vibrant and visually stimulating cloth-based text and images, the textured book functions as a medium for effectively communicating oral health education in an engaging manner. This method is expected to enhance the enjoyment of oral health education among preschoolers

Table 1: Pearson correlation coefficient

Questions	Q1	Q2	Q3	Q4	Q5	Q6	Q7
Pearson Correlation Coefficient	0.683	0.292	0.389	0.710	0.735	0.722	0.829
Significant(two-tailed)	0.001	0.118	0.034	0.001	0.001	0.001	0.001
N	30	30	30	30	30	30	30

Table 2: Rotated Component Matrix

	1	2	3
C1	0.72		
C2	0.87		
C3	0.64		
C4	0.71		
C5	0.69		
R1		0.79	
R2		0.86	
R3		0.70	
R4		0.65	
R5		0.88	
E1			0.91
E2			0.87
E3			0.62
E4			0.61
E5			0.75
Percentage of variance explained	0.19	0.27	0.22

[Principal component analysis. C-Comprehensive, R-Relevance, E-effectiveness]

Table 3: Expert validation statistical test results

	n	f (%)	p-Value
Relevant	30	100	0.000
Irrelevant	0	0	

Validity Expert*

*Intraclass correlation coefficient

while promoting comprehension and retention of the educational content. Ngtemi et al.¹⁵ used dental health guide books as a medium for oral health education because it can accommodate extensive written and visual content, aiding parents with young children in sustaining oral health practises.

This study attempts to promote early adoption of good oral hygiene habits among preschool children aged 3-6 years. This age range signifies a crucial developmental phase during which children undergo substantial physical, social, emotional and intellectual growth milestones.¹⁶ The textured book for oral health education shows that it is a high-quality and reliable resource through various evaluations. The book was meticulously assessed, ensuring that all relevant oral health concepts and practices were adequately covered and accurately represented.

5. Conclusion

Promoting oral hygiene awareness in children from a young age can be turned into an enjoyable experience by combining teaching and fun via the use of oral health-based

children’s books. The use of vibrant and vivid graphics, along with clear and comprehensible wording, enhances the understanding and enjoyment of learning about dental care.

In summary, the textured book for oral health education has undergone comprehensive validation process, demonstrating excellent face, content, criterion and construct validity. This robust validity evidence underscores the book’s potential to serve as an effective and scientifically sound educational resource for promoting oral health in preschool settings.

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7. Source of Funding

None

8. Conflicts of Interest

None


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