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Original Paper

Parental Influences on Children's Oral Health Behaviors, Reading Behaviors, and Reading Attitudes Associated with the Sharing of a Digital Story from the eBook for Oral Health Literacy© Curriculum

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Abstract

This study investigated the relationships between parents and their children on oral health behaviors, reading behaviors, reading attitudes, and liking perceptions of one chapter from an eBook curriculum intervention. A Qualtrics platform was used to survey 316 parent-child dyads across the United States before and after the shared reading of one chapter from the eBook for Oral Health Literacy© entitled "Setting Goals for Going to the Dentist". Participants answered 75 questions about their teeth brushing and flossing behaviors, number of cavities, how often they visited libraries and bookstores, enjoyment of reading, and perceptions (liking) of the words and pictures of the chapter that they read and heard. Statistically significant relationships were found between parents and their children on oral health behaviors ($\chi^2 = 49.12$, $p < 0.001$); reading behaviors ($\chi^2 = 10.4$, $p < 0.01$), reading attitudes ($\chi^2 = 8.773$, $p < 0.01$), and perception (liking) of the eBook chapter that they read and heard ($\chi^2 = 113.813$, $p < 0.01$). Results from 301 parent-child dyads point to the importance of social modeling that parents play in the development of their children's oral health behaviors, reading behaviors, and reading attitudes. Testing of additional chapters from the eBook intervention is warranted.

Keywords

oral health literacy, oral health behaviors, reading behaviors, reading attitudes, parent-child dyads, eBook

1. Introduction

Oral health is a high-priority health issue as indicated by the *Healthy People 2030* document which sets public health agenda in the United States for the next ten years. Oral health has been a leading health indicator for the past decade and the current decade (USDHHS, 2020b), owing to the importance of oral health being foundational to overall health. As former Surgeon General Satcher stated "you can't have good oral health if you don't have good general health" (Lee, Watt, Williams, & Giannobile, 2017). Oral health hygiene, intake of water and milk, access to fluoride, and regular dental checkups are important factors in oral health promotion (Singleton, Day, Thomas, Schroth, Klejka, Lenaker, and Berner, 2019).

Parents play important roles in modeling oral health behaviors for their children (Okada, Kawamura, Kaihara, Matsuzaki, Kuwahara, Ishidori, & Miura, 2002), and low oral health literacy of parents is associated with higher dental caries of their children (Firmino, Ferreira, Martins, Granville-Garcia, Fraiz, & Paiva, 2018). Parents with low literacy have less health knowledge and poorer health behaviors (DeWalt & Hink, 2009), which may disadvantage the health behaviors and health literacy levels of their children who would benefit from healthy role models. Low parent (caregiver) literacy has been associated with more cavities and poorer dental health of their children (Miller, Lee, DeWalt, & Vann, 2010). Adults with limited oral health literacy have poorer oral health status, including more filled permanent teeth, more missing teeth due to disease, and increased gum disease (Baskaradoss, 2018).

Parental behaviors and attitudes toward reading also influence their children's linguistic and literacy development (Niklas, Wirth, Guffler, Drescher, & Ehmig, 2020), including their early reading achievement (Abu-Rabia & Yaari, 2012). According to Vygotsky's Zone of Proximal Development (Vygotsky, 1978 & 1986), children are influenced to learn language signs and symbols from their parents, peers, and other significant people who are proximally close and interacting with them. Parents, peers, and professionals are responsible for scaffolding learning and serving as a guide on the side in helping children learn information that they would otherwise not be able to learn by themselves (Leong, Hassan, Isa, & Jalil, 2018).

The home literacy environment has been found to mediate between parental attitudes toward shared reading time with their children and their children's language comprehension and production (Niklas, Wirth, Guffler, Drescheer, & Ehmig, 2020). One literacy objective from *Healthy People 2030* is to increase to greater than 63.2 percent of children whose parents read to them at least four days per week. In 2016-17, the National Survey of Children's Health (NSCH) found that the proportion of children aged five years and younger whose family member read to them four or more days per week was 58.3 percent (USDHHS, 2020).

The current project focuses on a reading intervention in which parents and their children share a chapter from the eBook for Oral Health Literacy© while the story is read aloud at a pace comfortable for them. Reading skills are "related to health knowledge and outcomes" (USDHHS, 2005, p. 181) and are one way to increase background knowledge when educating for health (Ubbes, Black, & Ausherman, 2009;

Ubbes, 2008; Ubbes, 2002) and educating for science (Kaefer, 2020), leading to the development of comprehension or the capability to understand something (Johnson, 1982; Deshpande, 2016).

Children also attain the knowledge needed to form health habits by observing the social behavioral patterns modeled by those around them in different situations (Bandura, 1999), including home literacy environments (Niklas, Wirth, Guffler, Drescher, & Ehmig, 2020). Parents often serve as important role models for their children when it comes to developing daily health routines that lead to health habits. Johnson, Davy, Boyett, Weathers, and Roetzheim (2001) showed that parent knowledge and attitudes for certain health practices can have a significant impact on the health of their children. For example, positive oral health behaviors in children have been linked to parent reading behaviors in a family. Zullig, Ubbes, and Mann (2013) showed that students who saw a parent or caregiver reading in the past two days reported a significantly greater number of regular dental checkups than those who had not seen a parent or caregiver reading in the past two days. Children living in low-income families are exposed to fewer words and less-affirming responses from parents which results in a lower vocabulary for their academic lives (Hart & Risley, 2003). Parent's ability to read dental terminology (word recognition) was not associated with vocabulary knowledge or with comprehension. However, vocabulary knowledge about oral health was strongly associated with comprehension (Richman, Hueber, Leggott, Mouradian, & Mand, 2011).

Oral health is defined as the quality of an individual's mouth, teeth, and gums. Oral health is measured by the number of dental caries (cavities) and the frequency of teeth brushing and flossing behaviors. An individual's oral health is influenced by the ability to access and understand oral health information and apply that information to oral health, which is called oral health literacy (Horowitz & Kleinman, 2008). The U.S. Department of Health and Human Services in its report, *Healthy People 2010*, first defined oral health literacy 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". According to an earlier report of a workgroup sponsored by the National Institute of Dental and Craniofacial Research (USDHHS, 2000b), the above definition addressed *functional* oral health literacy which includes the ability to use and apply knowledge when making oral health decisions and when communicating oral health information via speech, conversation, reading, writing, numeracy, speaking, and listening.

Oral health hygiene is the science of preserving the mouth, teeth, and gums via health-promoting practices. The American Association of Pediatric Dentists recommends that children receive regular teeth cleaning and exams every six months. Guidelines for oral health hygiene include brushing teeth with fluoride toothpaste twice a day, flossing daily, eating a healthy diet that limits sugary beverages and snacks, and visiting the dentist regularly for a check-up (American Dental Association, 2021).

The first purpose of this study was to determine if there was a relationship between parents' oral health behaviors and their child's oral health behaviors. The second purpose of this study was to determine if there was a relationship between parents' and children's reading behaviors. The third purpose was to

determine if there was a relationship between parents' and children's reading attitudes. The fourth purpose was to determine if there was a relationship between parents' perceptions (liking) of one chapter from the eBook for Oral Health Literacy© curriculum and their children's perceptions (liking) of the same chapter.

2. Methods

2.1 Participants

Participants included 316 parent-child dyads who answered online questions before and after an oral health story intervention which was also online. The parent-child dyads came from 43 states in the United States. After the data cleaning process, the final data set included a total of 301 parent-child dyads who answered separate and sometimes different questions on the Oral Health Survey.

The parents' ages ranged from 19 to 60, with the mean age being 38.5 years. Parents included 89.8% females and 10.2% males. The children ranged in age from 9 to 11 years old, with the mean age being 10.1 years. Children included 50.2% female and 49.8% males. Participants were from 75% white families (n = 239) and 25% minority families. About 9.8% of participants (n = 31) identified as Black, African American, or Haitian; 6.3% of participants (n = 20) identified as Hispanic or Latinx; 3.5% of participants (n = 11) identified as Asian, Asian American, and Pacific Islanders; 0.9% of participants (n = 3) identified as American Indian or Alaskan Native; and 3.8% of participants (n = 12) identified as another race.

2.2 Procedures

Parent-child dyads (n = 316) took an online survey using the Qualtrics platform (Salt Lake City, Utah) before and after exposure to one chapter of the eBook for Oral Health Literacy© entitled "Setting Goals for Going to the Dentist". In order to participate, parents had to live with a child between the ages of 9 and 11 who would also participate in the study. Researchers followed the approved protocol from the Institutional Review Board for Human Subjects Research at the referent university. Parents first gave consent for their child to participate and then each child gave assent to participate.

To the best of our knowledge, this study was one of the first to integrate educational curriculum material into the national Qualtrics survey platform for use by participants online. Hence, parent-child dyads answered a total of 75 questions divided before and after the intervention which included the shared reading of one chapter from the eBook for Oral Health Literacy© curriculum. Specifically, the Qualtrics survey was presented in a phased process in which the parents began by answering 23 questions about personal demographics, oral health behaviors and attitudes, and reading behaviors and attitudes. Parents then invited their child to the computer to answer 25 questions about personal demographics, oral health behaviors and attitudes, and reading behaviors and attitudes. Next, parent-child dyads read and listened to the eBook chapter together known as shared reading. After exposure to the intervention, children answered 14 questions about their attitudes toward oral health and the eBook chapter. Then parents

answered 13 questions about their attitudes toward the eBook chapter.

2.3 eBook Curriculum Intervention

The eBook for Oral Health Literacy© curriculum contains child-centered digital stories, which are organized by 17 chapters for learning about oral health hygiene, oral health and nutrition, oral health and beverages, and the importance of dental check-ups. The eBook curriculum is available as open-sourced educational material (https://dlp.lib.miamioh.edu/ebook/index.html) on the Digital Literacy Partnership website @ https://dlp.lib.miamioh.edu/. The eBook curriculum has been evaluated for its readability, suitability, understandability, actionability, and gist-based message design (Ubbes, Witter, Kraska, & Justus, 2020) and for its eye tracking effects of the visual-textual-lexical page layouts (Ubbes, Coyle, & Tzoc, 2018). Each online composition includes ten sequential positive-frame photographs with declarative sentences as captions that promote oral health behaviors of children. Each frame requires the user to scroll over or touch a sound icon with a cursor in order to activate and hear an audio narration of the message on each page. For the purposes of this research, Chapters 14 and 15 were employed and selected by the child by their gendered preferences. If the child preferred to read and hear the narration of a highly visual account of a child's life through the actions of a boy's oral health routine, Chapter 14 was chosen. If the child preferred to read and hear the narration of a highly visual account of a girl's oral health routine, Chapter 15 was chosen. The declarative sentences focused on setting goals for going to the dentist and were aligned to three salient beliefs from the integrative theory of behavioral prediction (Fishbein & Yzer, 2003; Yzer, 2012). Specifically, the second and last pages of the chapter focused on self-efficacy belief statements and the middle of the narrative contained three pages each of health outcome beliefs and (social) normative beliefs. Peirce (1992) defined beliefs as "rules for action". Pajares (1996, p. 566) suggested "As such, beliefs become the internal rules individuals follow as they determine the effort, persistence, and perseverance required to achieve optimally".

2.4 Instrument and Measures

2.4.1 Parent-Related Data

Survey questions for parental oral health included how often parents brushed their teeth in a week, how often parents flossed their teeth in a week and the number of cavities in their lifetime. Survey questions for parent reading behaviors included visits to a library in the past year, visits to an online bookstore in the past year, self-rated reading ability, and how often parents read books for fun. Survey questions pertaining to parent perceptions of the online curriculum included how parents felt about the storyline words of the curriculum, how parents felt about the storyline pictures of the curriculum, and if the curriculum was written at an appropriate reading level for their child.

2.4.2 Child-Related Data

Survey questions for child oral health included how often the children brushed their teeth in the morning and at night, if the children flossed their teeth, and how many cavities the children have had in their lifetime. Survey questions pertaining to child reading behaviors included how often children read books

for fun, if children like to read books on the Internet, children's self-rated ability to read, children's visits to a library in the past year, and if children like going to the library. Survey questions pertaining to children's perceptions of the online curriculum included how children felt about the storyline words of the curriculum, how children felt about the storyline pictures of the curriculum, and if the curriculum was written at an appropriate reading level for them.

2.4.3 Recoding for Binary Indicators

Most of the survey questions included multiple answer options on a Likert scale. As such, the answers were re-coded into binary indicators in order to perform chi square analyses. For example, parents were asked "How often did you floss your teeth over the past 7 days?" The answer options included once a day, every second day, once a week, and not at all. These answer options were re-coded into binary indicators so that the answer "once a day" was re-coded as a "1" indicating that the oral health goal was met, and the rest of the answers were re-coded as a "0" indicating that the oral health goal was not met. A similar method was employed for questions concerning teeth brushing of parents and children. Oral health goals were met if participants brushed their teeth twice a day and flossed once a day.

Data for the reading behaviors of parents and children were calculated similarly. A "good" reading goal was met for the parent if the parent visited the library in the past year, visited an online bookstore in the past year, and enjoyed reading. A "good" reading goal was met for the child if the child visited a library in the past year, liked going to the library, and enjoyed reading. If one or more of the subcategories were not met, then the score for "good" reading behaviors was "0". Data were excluded whenever responses were listed as "not sure" which occurred occasionally for questions about visiting the library or an online bookstore.

2.5 Data Analysis

Chi square tests were calculated to evaluate the statistical significance of relationships between the categorical variables (McHugh, 2013). P-values greater than an alpha of 0.05 meant that the variables were independent from each other. A contingency coefficient was also used to measure the association between variables. The closer to 1 the contingency coefficient was, the stronger the relationship between the two variables. Data analyses were completed in SPSS 25.0 (SPSS, Inc., Chicago, IL).

3. Results

Results are organized by our four research questions. The first research question asked if there was a relationship between the oral health behaviors of parents and the oral health behaviors of their children. The second research question analyzed the relationship between the reading behaviors of parents and the reading behaviors of their children. The third research question analyzed the relationship between the reading attitudes of parents and the reading attitudes of their children. The fourth research question investigated the relationship between parents' liking of the eBook for Oral Health Literacy© chapter and their children's liking of the chapter.

Our independent variables were parent oral health behaviors, parent reading behaviors, parent reading attitudes, and parent perception of the eBook chapter. Our dependent variables were child oral health behaviors, child reading behaviors, child reading attitudes, and child perception of the eBook chapter.

3.1 Research Question 1: Are Parents' Oral Health Behaviors Related to their Children's Oral Health Behaviors?

The first research question examined the relationship between the oral health behaviors of parents with the oral health behaviors of their children. Self-reported frequency of teeth brushing and flossing, as well as the number of cavities that parents and children have had in their lifetime, were used to evaluate oral health behaviors. In addition, self-reported frequency of confidence (self-efficacy) in teeth brushing was included.

Table 1. Oral Health Behaviors of Parents and Children (n = 301)

	Parent Meeting Daily Oral Health Guideline	No	Yes	Total
Children Meeting Daily Oral Health Guideline				
No		130	61	191
Yes		28 (17.7%)	82 (57.3%)	110
Total		158 (52.5%)	143 (47.5%)	301

Table 1 shows that there was a significant relationship between the oral health behaviors of parents and the oral health behaviors of their children *($\chi^2 = 49.12$, $df = 1$, $p < 0.001$).* A large percentage of children (57.3%, n = 82) had positive oral health behaviors when their parents had positive oral health behaviors (47.5%, n = 143). Positive oral health behaviors were defined as brushing teeth twice a day and flossing teeth once a day (American Dental Association, 2021). However, only 17.7% (n = 28) of children had positive oral health behaviors when their parents did not practice positive oral health behaviors (52.5%, n = 158).

Table 2. Parent Teeth Brushing Behaviors and Children Oral Health Behaviors (n = 301)

	Parent Positive Teeth Brushing Habit	No	Yes	Total
Children Positive Oral Health Habit				
No		31	160	191
Yes		6 (16.2%)	104 (39.4%)	110
Total		37 (12.3%)	264 (87.7%)	301

Table 2 shows that there was a significant relationship between the teeth brushing behaviors of parents and the overall oral health behaviors of children *($\chi^2 = 6.55$, $df = 1$, $p < 0.05$).* Children had significantly better oral health behaviors, as defined as brushing teeth twice a day and flossing teeth once a day, when their parents practiced positive teeth brushing behaviors, which was defined as brushing teeth twice a day, regardless of parental flossing behaviors. Therefore, oral health behaviors were defined slightly differently between the children and their parents. When surveyed, 39.4% of children (n = 104) reported positive oral health behaviors when their parents practiced positive teeth brushing behaviors (87.7%, n = 264). However, only 16.2% of children (n = 6) had positive oral health behaviors when their parents did not have positive teeth brushing behaviors (12.2%, n = 37).

Table 3. Parent Flossing Behaviors and Children Oral Health Behaviors (n = 301)

	Parent Positive Flossing Habit	No	Yes	Total
Children Positive Oral Health Habit				
No		124	67	191
Yes		27 (17.9%)	83 (55.3%)	110
Total		151 (50.2%)	150 (49.8%)	301

Flossing teeth is considered a positive oral health habit when completed once a day. Table 3 indicates that there was a significant relationship between the flossing habits of parents and the oral health behaviors of their children *($\chi^2 = 43.92$, $df = 1$, $p < 0.001$)*. When surveyed, 55.3% of children (n = 83) reported good oral health habits when their parents practiced good flossing habits (49.8%, n = 150). However, only

17.9% of children (n = 27) had positive oral health habits when their parents did not have positive flossing habits (50.2%, n = 151).

Table 4. Flossing Behaviors of Parents and Children (n = 301)

	Parent Flossing Behaviors	**Every second day**	**Not at all**	**Once a day**	**Once a week**	**Total**
Child Flossing Behaviors						
Never		8	20	10	7	45
Sometimes		36	19	43	24	122
By myself		15	2 (04.9%)	77 (51.7%)	9	103
With help		8	0	19	4	31
Total		67	41 (13.6%)	149 (49.5%)	44	301

Table 4 shows that there was a significant relationship between the flossing behaviors of parents and their children *(χ^2 = 83.042, df =1, p < 0.01)*. When surveyed, 51.7% of children (n = 77) reported that they flossed their teeth by themselves when their parents flossed once a day (49.5%, n = 149). However, only 4.9% of children (n = 2) reported that they flossed their teeth by themselves when their parents did not floss their teeth at all (13.6%, n = 41). The contingency coefficient (0.465) showed a moderate relationship between the two variables.

Table 5. Cavity Numbers of Parents and Children (n = 301)

Parent Cavity Count	**0**	**1**	**2**	**3**	**4**	**Total**
Child Cavity Count						
0	57 (69.5%)	16	32	18	43 (46.7%)	166
1	10	11	16	12	16	65
2	10	5	7	3	15	40
3	4	1	1	0	12	18
4	1	1	2	2	6	12
Total	82 (27.2%)	34	58	35	92 (30.6%)	301

Table 5 shows that there was a significant relationship between the number of cavities parents have had in their lifetime and the number of cavities their children have had *($\chi^2 = 31.321$, $df = 1$, $p < 0.05$)*. When surveyed, 69.5% of children (n = 57) reported that they had 0 cavities in their lifetime when their parents also reported 0 cavities in their lifetime (27.2%, n = 82). However, only 46.7% of children (n = 43) reported that they had 0 cavities in their lifetime when their parents had 4 cavities in their lifetime (30.6%, n = 92). The contingency coefficient (0.307) showed a moderate relationship between the two variables.

Table 6. Confidence in Teeth Brushing of Parents and Children (n = 301)

	Parent Confidence in Teeth Brushing	**Confident**	**Not confident**	**Not sure**	**Strongly confident**	**Strongly not confident**	**Total**
Child Confidence in Teeth Brushing							
Not confident at all		1	3	0	1	2	7
Not very confident		9	4	7	9	0	29
Somewhat confident		40	2	7	31	1	81
Very confident		43 (46.2%)	5	6	129	1 (25.0%)	184
Total		93 (30.9%)	14	20	170	4 (01.3%)	301

Table 6 shows that there was a significant relationship between the confidence of parents in teeth brushing and the confidence of their children in teeth brushing *($\chi^2 = 116.600$, $df = 1$, $p < 0.01$)*. When surveyed, 46.2% of children (n = 43) reported that they were very confident that they could brush their teeth twice a day when their parents also reported that they were confident that they could brush their teeth twice a day (30.9%, n = 93). However, only 25.0% of children (n = 1) reported that they were very confident that they could brush their teeth twice a day when their parents were strongly not confident that they could brush their teeth twice a day (1.3%, n = 4). The contingency coefficient (0.528) showed a moderately strong relationship between these two variables.

3.2 Research Question 2: Is there a Relationship between Parents' Reading Behaviors and their Children's Reading Behaviors?

The second research question investigated the relationship between the reading behaviors of parents and their children. Self-reported frequency of positive reading habits, visiting a library, and visiting an online bookstore were used to evaluate the reading behaviors of parents and children.

Table 7. Reading Behaviors of Parents and Children (n = 301)

	Parent Positive Reading Habit	**No**	**Yes**	**Total**
Children Positive Reading Habit				
No		50	31	81
Yes		88 (63.8%)	132 (81.0%)	220
Total		138 (45.8%)	163 (54.2%)	301

Table 7 shows that there was a significant relationship between the reading behaviors of parents and their children *($\chi^2 = 10.4$, $df = 1$, $p < 0.01$)*. A large percentage of children (81.0%, n = 132) had positive reading behaviors when their parents also practiced positive reading behaviors (54.2%, n = 163). Positive reading behaviors for children were defined as visiting a library in the past year, liking the library, and enjoyment of reading. Positive reading behaviors for parents were defined as visiting a library in the past year, visiting an online bookstore in the past year, and enjoyment of reading. Only 63.8% of children (n = 88) had positive reading behaviors when their parents did not practice positive reading behaviors (45.8%, n = 138).

Table 8. Visiting the Library in Parents and Children (n = 301)

	Parents Visiting Library	**No**	**Yes**	**Total**
Children Visiting Library				
No		27	3	30
Yes		33 (55.0%)	238 (98.8%)	271
Total		60 (19.9%)	241 (80.1 %)	301

Table 8 shows that there was a significant relationship between if parents visited a library in the past year and if their children visited a library in the past year *($\chi^2 = 97.677$, $df = 1$, $p < 0.001$)*. A large percentage of children (98.8%, n = 238) visited the library in the past year when their parents also visited the library in the past year (80.1%, n = 241). However, only 55.0% of children (n = 33) visited the library in the past year when their parents had not visited a library in the past year (19.9%, n = 60).

Table 9. Parents Visiting an Online Bookstore and Whether Children Enjoyed Reading Books Online (n = 301)

	Parents Online Bookstore Visit	No	Yes	Total
Children Enjoyment of Online Book Reading				
No		52	66	118
Yes		49 (48.5%)	134 (67.0%)	183
Total		101 (33.6%)	200 (66.4%)	301

Table 9 indicates that there was a significant relationship between if parents visited an online bookstore in the past year and whether their children liked to read books on the Internet *($\chi^2 = 8.8613$, $df = 1$, $p < 0.01$)*. A large percentage of children (67.0%, n = 134) enjoyed reading a book online when their parents had visited an online bookstore in the past year (66.4%, n = 200). However, only 48.5% of children (n = 49) liked to read books online when their parents had not visited an online bookstore in the past year (33.6%, n = 101).

3.3 Research Question 3: Is there a Relationship between Parents' Reading Attitudes and their Children's Reading Attitudes?

The third research question investigated the relationship between the reading attitudes of parents and their children. Self-reported frequency of reading enjoyment (love of reading) and reading motivations (reading for fun) by parents and children were used to evaluate the reading attitudes of participants.

Table 10. Reading Attitudes of Parents and Children (n = 301)

	Parents Love of Reading	No	Yes	Total
Children Love of Reading				
No		12	50	62
Yes		15 (55.6%)	224 (81.8%)	249
Total		27 (09.0%)	274 (91.0%)	301

Table 10 indicates that there was a significant relationship between parents' attitudes toward the love of reading and their children's attitudes toward the love of reading *($\chi^2 = 8.773$, $df = 1$, $p < 0.01$)*. When surveyed, 81.8% of children (n = 224) reported that they loved to read given that their parent loved to

read (91.0%, n = 274). However, only 55.6% of children (n = 15) indicated that they love to read when their parents did not love to read (9.0%, n = 27).

Table 11. Reading Motivations of Parents and Children (n = 301)

How Often Parents Read Books For Fun	Never	Often	Rarely	Sometimes	Usually	Total
How Often Children Read Books For Fun						
Always	1 (14.3%)	28	12	21	32 (42.7%)	94
Never	1	1	2	0	1	5
Often	0	34	6	20	13	73
Rarely	1	3	4	8	6	22
Sometimes	4	20	18	42	23	107
Total	7 (02.3%)	86	42	91	75 (24.9%)	301

Table 11 shows that there was a significant relationship between if parents' motivation to read was for fun, and if children's motivation to read was for fun *($\chi^2 = 41.451$, $df = 1$, $p < 0.01$)*. When surveyed, 42.7% of children (n = 32) reported that they always read books for fun given that their parents usually read books for fun (24.9%, n = 75). However, only 14.3% of children (n = 1) indicated that they always read books for fun when their parents never read books for fun (2.3%, n = 7). The contingency coefficient (0.348) showed that there was a moderate relationship between the two variables.

3.4 Research Question 4: Is there a Relationship between Parents' Liking of the Oral Health Curriculum and their Children's Liking of the Oral Health Curriculum?

The fourth research question investigated the relationship between the parents' liking of one chapter of the eBook for Oral Health Literacy© and their children's liking of the chapter. The parents' and children's liking of the storyline words and pictures, as well as their perceptions of the story's reading level, were used to evaluate participants' liking of the curriculum.

Table 12. Parents and Children Liking of the Oral Health Storyline-Words (n = 301)

	Did Parents Like The Storyline Words?	**Maybe**	**No**	**Yes**	**Total**
Did Children Like The Storyline Words?					
Maybe		7	10	37	54
No		11	24	17	52
Yes		4	3 (08.1%)	188 (77.7%)	195
Total		22	37 (12.3%)	242 (80.4%)	301

Based on Table 12, there was a significant relationship between the proportion of parents and children who liked the storyline words of the curriculum *($\chi^2 = 113.813$, $df = 1$, $p < 0.01$)*. When surveyed, 77.7% of children (n = 188) reported that they liked the storyline words of the curriculum given that their parents liked the storyline words (80.4%, n = 242). However, only 8.1% of children (n = 3) indicated that they liked the storyline words of the curriculum when their parents did not like the storyline words (12.3%, n = 37). The contingency coefficient (0.524) showed that there was a moderately strong relationship between parents' perception of the storyline words and their children's perception of storyline words.

Table 13. Parents and Children Liking of Oral Health Storyline-Pictures (n = 301)

	Did Parents Like The Storyline Pictures?	**Maybe**	**No**	**Yes**	**Total**
Did Children Like The Storyline Pictures?					
Maybe		3	6	24	33
No		9	19	15	43
Yes		10	12 (32.4%)	203 (83.9%)	225
Total		22	37 (12.3%)	242 (80.4%)	301

Table 13 shows that there was a significant relationship between parents' perception of the storyline pictures and children's perception of the pictures *($\chi^2 = 72.985$, $df = 1$, $p < 0.01$)*. When surveyed, 83.9%

of children (n = 203) reported that they liked the storyline pictures of the curriculum given that their parents liked the storyline pictures (80.4%, n = 242). However, only 32.4% of children (n = 12) indicated that they liked the storyline pictures of the curriculum when their parents did not like the storyline pictures (12.3%, n = 37). The contingency coefficient (0.442) showed that there was a moderate relationship between parents' perception of the curriculum pictures and children's perception of the pictures.

Table 14. Parents and Children Perceptions of Story Reading Level (n = 301)

	Parents' perception	**Just right for my child**	**Too easy for my child**	**Too hard for my child**	**Total**
Children's perceptions					
Just right		140 (88.1%)	11 (08.2%)	2 (25.0%)	153
Too easy		13	123	0	136
Too hard		6	0	6	12
Total		159 (52.8%)	134 (44.5%)	8 (02.7%)	301

As shown in Table 14, there was a significant relationship between parents' perception of the story reading level, and children's perception of the story reading level *($\chi^2 = 315.060$, df =1, $p < 0.01$)*. When surveyed, 88.1% of children (n = 140) reported that they thought the story reading level was just right given that their parents thought that the story reading level was just right for their child (52.8%, n = 159). However, only 8.2% of children (n = 11) indicated that the story reading level was just right when their parents thought that the story reading level was too easy for their child (44.5%, n = 134), and 25.0% of children (n = 2) reported that the story reading level was just right given that their parents thought the story reading level was too hard for their child (2.7%, n = 8). The contingency coefficient (0.715) showed that there was a strong relationship between parents' and children's perception of the story reading level.

4. Discussion

Given the importance of the family as a social determinant of health (Maynard & Harding, 2010), our findings point to the significant role of parents in offering their children opportunities for going to the dentist, going to a library, and reading health literacy materials. To date, there has been little emphasis on family oral health education (Tseng, Pleasants, Ivey, Sokal-Gutierrez, Kumar, Hoeft, Horowitz, Ramos-Gomez, Sodhi, Liu, & Neuhauser, 2021). However, *Healthy People 2030* now provides new definitions for personal health literacy and organizational health literacy as recognition for the importance of multilevel interventions in public health at home, in the community, and at school.

In the current project, personal health literacy of the parents and the children included their ability to

understand goal setting for going to the dentist who could "...inform health-related decisions and actions for themselves and others" (Brach & Harris, 2021, p. 1084). The dental clinic is a health organization where literacy-rich environments can be implemented to improve oral health literacy of the parent-child dyads. To build organizational health literacy, the dental clinic needs to "equitably enable individuals to find, understand, and use information and services to inform health-related decisions and actions for themselves and others" (Brach & Harris, 2021, p. 1084). The current oral health literacy intervention called the eBook for Oral Health Literacy© could be one way for dental clinics to incorporate decision making skills by providing oral health reading materials for their pediatric and adult patients. Family-based clinics can also help to boost both individual and institutional health literacy, and in this context, oral health literacy.

There is also a vital need to promote oral health literacy in schools on an organizational level. Unless children are in multiple places where they see and talk with dentists in community clinics or in one of the 2500 school-based health clinics in the United States, there may be continued slow progress in developing the oral health behaviors of children if only left to parent messaging and role modeling at home. Multiple studies have found that "Low health-related reading and numeracy (i.e., functional health literacy) has been associated with poor health outcomes including less use of preventative services, higher rates of hospitalization, and poor overall health status" (Lim, Beauchamp, Dodson, O'Hara, McPhee, Fulton, Wildey, & Osborne, 2017; Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011). Therefore, newer interventions that focus on oral health literacy should include ways for parents and children to learn together and to learn from each other.

The current study specifically focused on a skill-based approach to oral health literacy. The curriculum intervention emphasized goal setting as a cognitive-behavioral skill while employing reading and listening skills to boost oral health literacy. The short one-minute chapter that the parents and children read together included ten cues for setting a goal for going to the dentist and for improving oral health hygiene. Goal-setting and short- and long-term planning are the most effective strategies for producing behavior changes (Michie, Abraham, Whittington, McAteer, & Gupta, 2009; Lim, Beauchamp, Dodson, O'Hara, McPhee, Fulton, et al., 2017) and are key cognitive skills for effective health education curricula (CDC, 2021a). The eBook for Oral Health Literacy© chapter that was read by the parent-child dyads in this study focused on goal setting, which is one of the eight National Health Education Standards that students should know and be able to do for school health education because the cognitive skill of goal setting increases the adoption of healthy behaviors (CDC, 2021b). As such, "Goal-setting skills are essential to help students identify, adopt, and maintain healthy behaviors" (CDC, 2021b).

The visual-textual story called "Setting Goals for Going to the Dentist" included three main sections. The first and last slides were composed as "self-efficacy belief" statements and included: "I believe that I can be ready to go to the dentist for a check-up on my mouth, teeth, and gums", and "I believe that I can have a good check-up at my dentist, so I can have healthy teeth and gums".

The second section of three slides included “health outcome belief” statements which explained why the behavior was important for health: “I set a goal to get a toothbrush from my dentist when I need one, so I can brush my teeth”, “I set a goal to brush my teeth every night with my Mom, so I have a fresh breath and clean teeth”, and “I set a goal to visit my dentist 2 times a year, so I know I do not have any holes in my teeth (cavities)”.

The last section of three slides included “normative belief” statements which emphasized social interactions with a dentist and peers: “I set a goal to open my mouth wide, so my dentist can see and count my 20 teeth”, “I set a goal with my friends to learn the right way to brush on the front and back of each tooth”, and “I set a goal to show my dentist my bright smile during my 6 month check-up”.

By scripting a photographic narrative with different situations and scenarios for practicing oral health behaviors, children and their parents were guided by a gain-frame message design that emphasized the benefits of self-care while reading the story together. The International Literacy Association (2019) suggests that reading together around a blended use of digital and nondigital resources have the potential to increase oral language skills between parents and children. Parent-child reading routines on a daily basis have been documented to enhance emergent literacy skills as promoted by the national program called Reach Out and Read, endorsed by the American Academy of Pediatrics (Diener, Hobson-Rohrer, & Byington, 2012). Parents who participated in the Reach Out and Read program, which encourages reading books aloud to children every day, were more likely to report that reading was a favorite activity. Furthermore, children participating in the shared book reading program with their parents show higher receptive and expressive vocabulary scores than children not participating in the pediatric program (High, LaGasse, Becker, Ahlgren, & Gardner, 2000; Theriot, Franco, Sisson, Metcalf, Kennedy, & Bada, 2003; Sharif, Rieber, & Ozuah, 2002). Multiple studies have found that families with more exposure to the Reach Out and Read program showed larger effects in developing literacy skills (Weitzman, Roy, Wallis, & Tomlin, 2004; Theriot, Franco, Sisson, Metcalf, Kennedy, & Bada, 2003).

Positive oral health behaviors are linked to good overall health (USDHHS, 2000b), but a lack of positive oral health behaviors and dental checkups have been linked to heart disease (Takahashi, Davey, Yumoto, Gibson, & Genco, 2006) and cancer (St. John, Li, Zhou, Denny, Ho, Montemagno et al., 2004). Zullig, Ubbes & Mann (2013) showed that higher reading abilities of middle school youth were linked to the practice of preventative health behaviors, such as frequent dental checkups. The importance of modeling by parents who show positive attitudes and proactive behaviors toward oral health hygiene (Takahashi, Davey, Yumoto, Gibson, & Genco, 2006), including children who reported seeing their parents reading in the last two days (Zullig, Ubbes, & Mann, 2013), will be able to influence the overall health of children. Social cognitive theory (Bandura, 1991 & 1999) is influential in describing human agency which supports individuals to self-regulate their actions by planning, making decisions about their behavior, and reflecting on their thinking and actions. Reciprocal determinism (Bandura, 1999) is the major principle that helps parent-child dyads to negotiate personal health literacy factors, oral health and reading

behaviors, and home environments. Children who observed role modeling by their parents for teeth brushing and flossing may construct and come to understand the importance of oral health hygiene especially when observing these personal behaviors at home in a social context. Children can also select the environments where they may brush and floss their teeth or not, depending on whether they are encouraged to do so when visiting grandparents, neighbors, and best friends' houses with different situational cues for oral hygiene behaviors. In the reciprocal interplay between personal factors, behavioral factors, and environmental factors, children need patterned influences to establish daily behaviors (Bandura, 1978). Genetics and environmental factors interact to influence individual health patterns, especially among mothers with poor self-rated oral health whose children are more likely to grow up with poorer oral health (Shearer, Thomson, Broadbent, & Poulton, 2011). The higher the number of a mother's decayed, missing, or filled permanent teeth (DMFT score), the higher the children's DMFT score was for their permanent teeth (Lee, Kim, Lee, & Kim, 2019). Although DMFT tends to increase with the age of the child (Singleton, Day, Thomas, Schroth, Klejka, Lenaker, & Berner, 2019), parents also need to be educated on the role that cavities play beyond the consequences of decayed teeth of their children, which may include reduced nutritional deficiencies and unhealthy body weights (Lee & Vann, 2012).

In the current study, parent-child dyads read an eBook that focused on setting goals. Bandura (1999, 2001) stated that "goals, rooted in a value system and a sense of personal identity…give meaning and purpose" (p. 8) and "…serve as powerful motivators of action" (Bandura, 1991). Health educators need to consider the differences between children and their parents when they set goals to go to the dentist for a six-month checkup. Children usually go to pediatric dental checkups in a community clinic or a school-based health clinic whereas adults usually go to a community dental clinics that cater to their age group. Unfortunately from the standpoint of social modeling, children may not see their parents go to a dentist. Also parents need to schedule dental appointments for their children or the child will not go to the dentist. The current online study asked written questions of the parent-child dyads before and after the oral health literacy intervention, which were embedded into a Qualtrics panel study (facilitated for a fee by Qualtrics). This maximized the ability of parents and their children to be in one location to discuss the oral health story and the social actions of the children regarding their oral health goals. More considerations must be made on how to evaluate oral health literacy of parent-child dyads and give them opportunities for sharing dental health checkups in virtual and real-time situations. Efficacy beliefs are the foundation of human agency (Bandura, 1999, 2001) and influence whether people are able to think optimistically or pessimistically to enhance their wellbeing (Bandura, 1999, 2001). In the current study, Table 6 showed that parental beliefs in their ability to brush and floss their teeth were significantly associated with their children's ability to perform similar oral health behaviors. With regard to reading behaviors, Table 7 showed that when a large percentage of children (81%, n = 132) had positive reading behaviors, their parents also practiced positive reading behaviors. These results were significant ($\chi^2 = 10.4$, $p < 0.01$).

Positive reading behaviors for children were defined as visiting a library in the past year, liking the library, and enjoyment of reading, when their parents also practiced positive reading behaviors. Positive reading behaviors for parents were defined as visiting a library in the past year, visiting an online bookstore in the past year, and enjoyment of reading. Only 63.8% of children (n = 88) had positive reading behaviors when their parents did not practice positive reading behaviors. This may speak to the fact that children do have positive influences when they have access to school libraries and public libraries (Garces-Bacsal & Yeo, 2017) regardless of what reading is observed by parents at home. However, the American Academy of Arts & Sciences (2017) has reported a rather bleak picture with regard to the reading behaviors of adolescents and younger adults so a shift may be occurring. Americans between the ages of 15 to 44 years spend approximately 10 minutes per day reading for personal interest, but they spend almost 3 hours watching television and 28 minutes playing games and using computers for leisure. Garces-Bacsal and Yeo (2017, p. 248) urge children "to read for pleasure and to identify themselves as readers", because reading helps provide an avenue for "self-construction and self-identification" (Howard, 2011).

Our study alludes to the enjoyment of reading and going to libraries and bookstores as positive prosocial literacy behaviors. Table 8 indicated that there was a significant relationship ($\chi^2 = 97.677$, $p < 0.001$) between parents and children who visited a library in the past year with a large percentage of children (98.7%, n = 238) reporting a visit to a library when their parents also visited the library in the past year. A large percentage of children in the current study (67%, n = 134) enjoyed reading a book online when their parents had visited an online bookstore in the past year ($\chi^2 = 8.8613$, $p < 0.01$), and there was a moderate but significant relationship between parents' and children's motivations to read for fun ($\chi^2 = 41.451$, $p < 0.01$). Geurtsen (2008) found that children who visited a library reported more leisure time reading than a control group of students, and they also held a more positive attitude toward books. Like the eBook for Oral Health Literacy©, there remains a need for skill-based curriculum materials to bridge the gap between the role of health literacy in educating children and their parents about a variety of health behaviors, especially oral health hygiene. More reading materials are needed that show pro-social norms among family and friends to help build an emphasis influencing children to read for pleasure while learning about reasoned actions for doing healthy habits. Ubbes, Dillhoff, and Maldonado (2018) found that reading attitudes toward recreational (leisure) reading differed among children with girls showing higher reading attitudes toward academic and recreational reading than boys. Cunningham (2008) has argued that reading attitudes are investigated less in comparison to reading comprehension and that reading attitudes are important for two reasons: 1) attitude influences the engagement and patience needed when reading complexity increases, and 2) poor attitudes of a fluent reader may cause the child to choose other activities over reading. In the current study, the reading attitudes of parents had a significant positive effect on the reading attitudes of their children, owing to the important contribution that role modeling has on the culture of reading in a home environment. Kleijnen, Huysmans, Ligtvoet, and Elbers (2017) advocated for children needing access to a reading culture at home, because that culture is an

important predictor of reading attitudes and reading behavior. By reading for fun, children can gain a sense of pleasure along with cultural and practical knowledge (Cunningham & Stanovich, 1998) and new perspectives and solutions about daily life experiences (Kortliever & Lemmens, 2012).

This is one of the first studies to conduct an online assessment of parents and children reading a story together in real time while also answering questions before and after a story intervention about oral health hygiene and the importance of a dental checkup. This study demonstrated that there is a significant relationship between parent-child attitudes and motivations surrounding reading. For example, Table 14 showed that there was a strong significant relationship between parents' perception of the reading level needed for the oral health story, and their children's perception of the reading level as being just right, too hard, or too easy *($\chi^2 = 315.060$, $p < 0.01$)*. Table 13 showed that there was also a significant moderate relationship between parents' perception of the curriculum pictures and children's perception of the pictures *($\chi^2 = 72.985$, $p < 0.01$);* this relationship speaks to the value of offering visual-textual reading materials to promote oral health literacy, especially photographs where children are demonstrating action. Table 13 shows that with the current curriculum intervention, children were also getting auditory cues because the stories were read to them and they were able to use the mouse to advance the pages of the chapter for tactile and kinesthetic effects. Curricula that helps to develop functional health literacy should continue to use multisensory and multimodal cues for action (Ubbes, Coyle, & Tzoc, 2018), while building a rich vocabulary of words and promoting the synergistic effects of oral language, written language, and body language. This may be especially helpful for children who are actively building cognitive-behavioral skills (e.g., goal setting, decision making, communication) with literacy skills (e.g., reading, writing, and speaking) across multiple health topics.

Bus, Leseman, and Keultjes (2000, p. 71) explained parental influence on the reading attitudes and motivations of their children by reporting that "when parents do not have important personal needs served by reading, they are less inclined to initiate conversations that may make texts enjoyable and comprehensible for young, inexperienced readers." This shows that quality parent interaction with children is important in shaping children's attitudes around reading, and the need for including health-related stories that build health literacy. Parents can provide quality interactions by asking questions and making comments about the text and pictures, helping the child to understand the story, and relating the story to their own life (Bus, Leseman, & Keultjes, 2000). Interactions during shared reading are important because "poor readers tire easily, take words literally, read slowly, miss meaning, skip over words, and miss the context" (Jamison, 2001, p. 333), which could apply to both adult readers and young readers alike. The health literacy materials used in the current study included the use of audio narration that supported the parent-child dyads in hearing and thinking about the oral health story to improve their understanding (comprehension) of going to the dentist for a checkup. Parents also served as co-readers of the survey questions for their child before and after reading the story together with the hopes that comprehension would be enhanced.

5. Strengths

One strength of this study was the large sample size of 316 parent-child dyads which were surveyed online and given access to the curriculum intervention through a Qualtrics panel (see Qualtrics.com). Parent-child dyads were from 43 states in the United States, providing a geographically representative sample of parents and their children across the country.

The second strength of this study was that the oral health story afforded the parent-child dyads a chance to view a realistic oral health environment as depicted in ten color photographs rather than simply reading ten declarative sentences without oral health pictures. The narrative composition included visual, textual, lexical, and gestural communication patterns for each of the ten pages, affording the parent-child dyads an authentic, multimodal experience for thinking about their own oral health behaviors as they read and listened to the story together. From a design perspective, the electronic story accessed from a digital platform represented a new genre of children's literature that combined narrative storytelling with an informational expository text about the importance of oral health hygiene and a dental checkup.

The third strength of the study was that the oral health literacy intervention helped children to build their self-efficacy beliefs, health outcome beliefs, and social norm beliefs for going to a dentist for a checkup. Dental checkups have the potential to improve oral health hygiene, boost overall health, prevent chronic disease, and reduce dental caries. Individuals with a high number of dental caries have been associated with a lower level of oral health literacy (Lee, Divaris, Baker, Rozier, & Vann, 2012). In the current study, there was a significant relationship between the number of cavities that parents reported in their lifetime and the number of cavities their children had (Table 5). Therefore, the parent-child intervention written as a first person narrative to show a photograph of a healthy child believing in their ability to set a goal for going to the dentist for a checkup. As shown below, each sentence used a lexical repetition about goal setting, beginning with the title page:

Setting Goals for Going to the Dentist

"I *believe* that I can be ready to go to the dentist for a check-up on my mouth, teeth, and gums. I *set a goal* to get a toothbrush from my dentist when I need one, so I can brush my teeth. I *set a goal* to brush my teeth every night with my Mom, so I have a fresh breath and clean teeth. I *set a goal* to visit my dentist 2 times a year, so I know I do not have any holes in my teeth (cavities). I *set a goal* to open my mouth wide, so my dentist can see and count my 20 teeth. I *set a goal* with my friends to learn the right way to brush on the front and back of each tooth. I *set a goal* to show my dentist my bright smile during my 6 month check-up. I *believe* that I can have a good check-up at my dentist, so I can have healthy teeth and gums. How about you? Can you set a goal to have a healthy check-up at your dentist too?"

Since efficacy beliefs are the foundation of human agency (Bandura, 1999, 2001), it is important for parents to motivate children to improve their oral health behaviors by brushing, flossing, and going to the dentist regularly and by building reading skills to increase vocabulary knowledge and comprehension about oral health literacy. Ultimately, parents play a pivotal role in developing the oral health behaviors

and oral health literacy of their children. The eBook for Oral Health Literacy© was an educational way to prime oral health behaviors and oral health literacy in tandem. Future interventions should look at the benefits of using multiple chapters of the curriculum for improving brushing, flossing, rinsing, eating fresh foods and beverages, and other oral health habits while "reading to learn" about oral health literacy.

6. Limitations

The first limitation of the study is that the oral health literacy questions were not pretested so validity and reliability of the survey instrument cannot be reported. Because we wanted to survey both parents and the children on different items, we did not find an instrument suitable to use from the existing oral health literacy tools reported in the literature (Dickson-Swift, Kenny, Farmer, Gussy, & Larkins, 2014), including a dearth of instruments in pediatric dentistry for parent-child dyads (Wong, Bridges, Yiu, McGrath, Au, & Parthasarathy, 2013; Vann, Lee, Baker, & Divaris, 2010). We sought to assess the perceptions of parent-child dyads on their liking of the eBook intervention and found one instrument for measuring the functional health literacy of parents in dentistry, but not with parent-child dyads (Gong, Lee, Rozier, Pahel, Richman, & Vann, 2007).

A second limitation of the study is that a significantly larger proportion of the parents surveyed in the study identified as female. A significant relationship *($p<0.001$)* was found among the oral health behavior of parents and their children (Okada, Kawamura, Kaihara, Matsuzaki, Kuwahara, Ishidori et al., 2002). Future research will need to increase the participation of fathers in oral health literacy research, because the influence of female parent figures may differ from the influence that male parents have on their children's oral health hygiene and their children's reading behaviors. Oral health research has frequently demonstrated the importance of maternal influences on oral health hygiene (Shearer, Thomson, Broadbent, & Poulton, 2011; Lee, Kim, Lee, & Kim, 2018; Adil, Eusufzai, Kamruddin, Ahmad, Jamayet, Karobari, & Alam, 2020).

A third limitation of the study is that, while many race ethnicities were represented in the study, minorities made up a smaller proportion of those surveyed. Several studies have demonstrated that "parent-child joint book reading is sensitive to the cultural background of the family" (Bus, Leseman, & Keultjes, 2000; Diener, Hobson-Rohrer, & Byington, 2012). Thus, future research could increase the number of participants from different cultural backgrounds to read and respond to the oral health story books Psychographics are a qualitative methodology that studies people based on their preferences, interests, values, lifestyle choices, and goals. More qualitative methodologies are needed in oral health research to ensure that we understand the emotions, attitudes, and beliefs of children and their parents regarding their dental routines, daily oral hygiene, and emotions for going to the dentist. Elicitation interviews (Erbe, Middlestadt, Lohrmann, & Beckmeyer, 2020) are needed to learn the preferences, beliefs, and attitudes of children in health education. As such, structured and semi-structured interviews regarding children's oral health practices (e.g., brushing, flossing, rinsing, and going to a dental check-up)

could be used to design even more oral health literacy curricula in the future that are skill-based and inclusive to goal setting, decision making, and communication.

A fourth limitation of the study is that parents and children self-reported their number of cavities due to the online nature of the study instead of being assessed with an objective measure by a dental professional called the DMFT (decayed, missing, and filled teeth). Among the 316 parents who self-reported the number of ~~their~~ cavities they had in a lifetime, the average number of cavities were 3 (SD 1.59) with a low of 0 cavities and a high of 4 or more cavities. Results showed that 95 (30%) parents reported four or more fillings; 36 (11%) reported three fillings; 61 (19%) reported two fillings; and 37 (12%) reported one filling. No fillings were reported by 86 parents (27%). Research on the oral health literacy of parents in multiple countries has been significantly correlated with the mean DMFT score of their children (Adil, Eusufzai, Kamruddin, Ahmad, Jamayet, Karobari, & Alam, 2020). The lower the parental oral health literacy, the higher the prevalence of caries in their children. Future research could implement the eBook for Oral Health Literacy© in school-based health clinics so that dental professionals can assess the DMFT of children as an objective measure and help to identify children in most need of dental, behavioral, and educational interventions.

7. Recommendation for Future Research

Future recommendations for research include testing student knowledge and attitudes before and after reading several curriculum chapters associated with a theme, e.g., oral health hygiene, oral health and nutrition, oral health and beverages, dental checkups, rather than only one chapter as was done in this study. Dentists and health educators may benefit by knowing the cumulative effect of many oral health literacy chapters on children spanned over several weeks. Future research could also investigate the work and career niche of parents because literacy patterns play a role in individual health status. Jaafar, Ab Malik, and Al-Kadhim (2020) showed that individuals in health, science, and technology fields had better oral health literacy than those individuals with careers in the social sciences.

The connections between health, oral health, and literacy (e.g., reading and writing) still need further development in health education curricula and public health messaging for children and their parents. Parent-child dyads will benefit from more environmental prompts, cues, and reminders about oral health hygiene through additional digital applications, electronic books, printed books, pamphlets, brochures, posters, and billboards so they can read and speak about oral health in a variety of situations and settings The more opportunities to see and hear different people of all ages and backgrounds talk about their smiles, the health of their teeth, and the benefits of going to a dentist, the better the social norms will be to reinforce oral health behaviors of children and their families. To develop skills for oral health literacy, children can learn to write their own picture stories about oral health using a design template modeled after the eBook for Oral Health Literacy©, which is accessible on the Digital Literacy Partnership website (Ubbes, 2021). Children can also practice their vocabulary words, spelling, and reading

comprehension by downloading the eBook for Oral Health Literacy© Workbook found at @https://dlp.lib.miamioh.edu/ebook/workbook/FullCurriculumWorkbookUbbes&WallaceMay2021Final.pdf associated with each of the 17 stories in order to build their functional health literacy in oral health. Future researchers should use the reading comprehension questions in the workbook to determine what children actually recall from reading the chapters and correlate those scores with objective assessments of decayed, missing, or filled teeth (e.g., DMFT) by dental professionals in school-based health clinics.

8. Conclusion

This oral health literacy study investigated the association of reading behaviors and oral health behaviors when children were educated on setting a goal for a dental checkup as outlined by a *Healthy People 2030* leading health indicator. The study demonstrated that parents had a significant influence on their children's oral health behaviors (e.g., brushing, flossing) and oral health attitudes. The study also showed that parents had a significant influence on their children's reading behaviors and attitudes. Previous research has indicated that self-reported reading abilities were associated with better oral health (Zullig, Ubbes, & Mann, 2013), linking reading with oral health behaviors. This study reinforced the fact that parents have the ability to build the oral health literacy of their children. Reading one story from the eBook for Oral Health Literacy© curriculum had a significant effect on the oral health literacy skills of children, especially how to set goals and make decisions for the development of their personal health literacy. Future studies with parent-child dyads should try to quantify the effect of reading additional chapters of the oral health literacy curriculum in order to influence oral health behaviors, attitudes, and motivations especially self-efficacy beliefs.

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