



The Influence of Parenting Style on Child Behavior and Dental Anxiety

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Abstract: Purpose: Previous studies provide mixed and inconclusive evidence for an effect of parenting style on children's dental anxiety and behavior. The purpose of this study was to analyze the association between parenting style and children's dental anxiety and behavior and assess the methodological quality of published literature. **Methods:** PubMed, EMBASE, Web of Science, and the Cochrane Central Register of Controlled Trials were searched for articles published up to November 1, 2017. The children's dental anxiety score and behavior score were the primary outcomes. The modified Newcastle-Ottawa score was used to assess methodological quality. Of the 983 articles identified, eight cross-sectional studies, with a total of 1,611 participants, met our inclusion criteria. **Results:** We observed significant differences in children's dental anxiety and behavior, according to parenting style, in studies of preschool children without dental experience or a history of dental phobia. Conversely, no differences were seen in studies of school-aged children with previous dental experience or who were referred to a dentist. **Conclusions:** The evidence supports a relationship between parenting style and children's dental anxiety and behavior. However, this association was limited to preschool children with no dental experience or dental phobia. (*Pediatr Dent* 2018;40(5):327-33) Received December 21, 2017 | Last Revision July 30, 2018 Accepted August 2, 2018

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Dental anxiety is defined as abnormal fear or dread of visiting the dentist for preventive care or therapy and unwarranted anxiety over dental procedures. The most obvious cause of anxiety is previous experience with dental treatment or a history of dental pain.^{1,2} A recent systematic review using a meta-regression analysis found that dental anxiety significantly affects predicted pain before, during, and after treatment,³ suggesting the importance of dental anxiety control.

Infant development is influenced by the family environment, and parenting style directly affects personality formation and growth in the child. Parenting style refers to the attitudes, beliefs, and behaviors that parents use to create an approach or parental emotional atmosphere used to nurture their children.^{4,5} The behavior and emotional expression of the children varies from kindness, humor, and encouragement to actions that embarrass parents and dentists in the dental office. These behaviors may be caused by a number of factors, including the child's temperament, age, maturity, dental history or anxiety, parenting environment, and dentist reaction and attitude.⁶⁻⁹ It is clear that the pediatric dentist can influence child behavioral control and anxiety more than any other factor.¹⁰ However, intergenerational differences in parenting style may be related to children's problematic behavior in the dental office.¹¹ Pediatric dentists may find that, currently, children are less cooperative and cry more than children in previous decades and the response to normal behavior training is more destructive.¹² To respond to these changes, dentists are gradually moving toward behavior guidance using drugs for sedation, protective stabilization, and parental separation rather than traditional methods.^{13,14} One change in parenting style frequently reported

by dental professionals is that "more parents often have increasingly lower expectations for their children and higher expectations of the dentist".¹⁵

Previous studies have reported that parenting style can affect children's dental anxiety and behavior.^{14,16-19} Some studies have reported no association. In a dental setting, it is unclear if this association between parenting style and dental anxiety or a behavior management problem were present.²⁰⁻²² Based on these inconsistencies, the purpose of this paper was to conduct a systematic review in order to analyze the possible association between parenting style with dental anxiety and/or behavior management problems.

Methods

Protocol. This systematic review was conducted using the meta-analysis of observational studies in epidemiology (MOOSE) guidelines for design, implementation, and reporting²³ (systematic review registration no. PROSPERO: CRD42018081593).

Eligibility criteria. We designed this systematic review to answer the following questions: "Is there an association between parenting style and child behavior in a dental setting?" and "Is there an association between parenting style and dental anxiety in a dental setting?" Regarding the eligibility criteria, study population, condition of interest, exposure or intervention, outcome(s) considered, and study design employed in this study: the study population comprised children (up to and including 18 years old or an equivalent school year) with or without reported dental anxiety symptoms and/or behavior problems (questionnaire/clinical observations); exposure or intervention was related to different parenting styles; the condition of interest was children raised in various child care settings; the outcomes considered children's dental anxiety scores and behavior mode; and the study type was not limited. Eligible studies were assessed, according to the following inclusion criteria: studies that include dental anxiety and/or behavior as an outcome; and studies that have clearly defined criteria for assessing parenting style, dental anxiety, and behavior

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mode. The exclusion criteria were as follows: literature or systematic reviews, narrative review, and case reports; protocols, comments, editorials, letters, and interviews; and studies without child subjects.

Information sources and search strategy: electronic search. We searched the following databases for articles

published from the earliest available date to November 1, 2017, that explored the association between parenting style and children’s dental anxiety and behavior: PubMed®/MEDLINE; EMBASE; Web of Science; and Cochrane Central Register of Controlled Trials. We used a combination of medical subject heading (MeSH) terms and free text words, including ‘parenting’ [MeSH terms]; ‘parenting’ [text word]; ‘child rearing’ [MeSH terms]; ‘child rearing’ [text word]; ‘child care’ [MeSH terms]; ‘child care’ [text word]; ‘dental anxiety’ [MeSH terms]; ‘dental anxiety’ [text word]; ‘dental fear’ [text word]; ‘dental phobia’ [text word]; ‘behavior’ [MeSH terms]; and ‘behavior’ [text word]. Studies written in English and published in fully peer-reviewed journals were included. The detailed search strategy is shown in the Figure.

Hand search. The reference lists from included studies and related studies that were not included were screened in an attempt to identify any additional studies.

Study selection. To remove duplicated entries and studies that failed to meet the inclusion criteria, the title and abstract of each identified article was independently screened by two authors. To avoid excluding potentially relevant articles, abstracts with unclear results were included in the full-text analysis. Any disagreement was resolved by discussion. Eligible articles were selected based on a full-text assessment of all remaining studies. The review authors were not blinded to the authors of the study, institutions, or publication. When any part of a study was unclear, we contacted the author by email for clarification.

Data collection. Data were independently extracted from each article by two of the authors. The following data were inputted into a predesigned data collection form in Microsoft Excel: (1) study identification: first author’s name and country, publication year, and journal name; (2) study design and dental setting; (3) population: sample size, and mean age; (4) parenting style assessment criteria; (5) dental anxiety and behavior assessment; (6) other assessed variables; and (7) results. Discrepancies were resolved by discussion.

Table 1. NEWCASTLE OTTAWA SCORES (NOS) QUALITY ASSESSMENT TOOL		
Selection		
1	Did the authors present their reasons for selecting or recruiting the number of people included or analyzed?	0. No 1. Yes
2	Was study sample likely to be representative of the study population?	0. Nonprobability sampling (including: purposive, quota, convenience, and snowball sampling) 1. Probability sampling (including: simple random, systematic, stratified g, cluster, two-stage, and multi-stage sampling)
3	Was the measurement tool used for ascertainment of parenting style valid and reliable?	0. No 1. Yes
4	Was a response rate mentioned within the study?	0. No 1. Yes
Confounding factors		
5	Were there any considerations for important disturbance variables, such as dental treatment experience or specific phobia related to dental settings?	0. No 1. Yes
Outcome		
6	Was the measurement tool used for assessment of outcome (dental anxiety or behavior aspects) valid and reliable?	0. No 1. Yes
7	Were clinical procedures adequately explained (i.e., the same operator provided identical dental treatments to all subjects under study)?	0. No 1. Yes
8	Was the evaluation performed independently by two raters and blinded to each other?	0. No 1. Yes
Methodological appraisal score (%)		
Bad	Satisfactory	Good
0-33	34-66	67-100

* 0=no or not reported; 1=yes. Total score was divided by total number of items multiplied by 100. Quality appraisal score: weak=0-33.9%; moderate=34-66.9%; strong=67-100%.

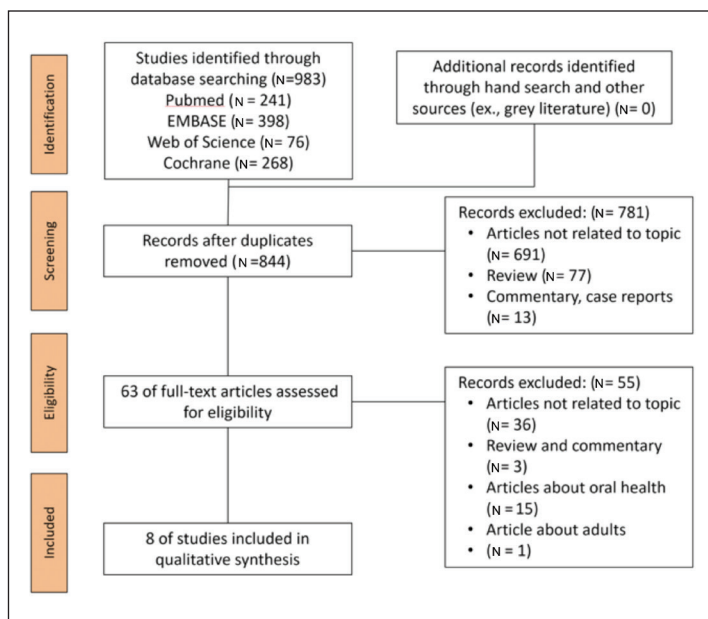


Figure. Flow diagram for identification of relevant studies.

Risk of bias in individual studies. Risk of bias in the included studies was independently evaluated by two of the authors using an modified version of the Newcastle Ottawa Scores (NOS) quality assessment tool (Table 1).²⁴ Included observational studies were mainly evaluated with eight methodological items. Each study could only be awarded one star for each item; hence, the maximum possible score for each study was eight stars. Study quality was assessed independently by two reviewers. Discrepancies were resolved by discussion.

Summary measures and synthesis of results. For the synthesis of results, meta-analysis was planned to be conducted if the heterogeneity (methodological or statistical) of the included studies was not significant. Regarding summary measurements, if the information to calculate the appropriate effect size and 95 percent confidence interval was given in the individual study, it was expressed as the effect size and confidence interval.

Results

Study selection. Electronic searches identified 983 publications (Figure). After eliminating duplicates, titles and abstracts were screened in the remaining 844 articles, resulting in the exclusion of 781 articles. The full text of the remaining 63 articles was reviewed and excluded (N equals 55) for the following reasons: unrelated (N equals 36); evaluated the impact of oral hygiene (N equals 15); articles about adults (N equals one); and review and commentary articles (N equals three). The remaining eight articles were included in our qualitative analyses.

Study characteristics: study design and population.

The main characteristics of all included studies are shown in Table 2. Included studies were published between 1979 and 2015. Except for one case-control study,²² all others were considered cross-sectional observational studies.^{14,16-21} Some studies included preschool children,²⁰⁻²² and others examined a wider age range,^{14,16-19} including school-aged children. Aminabadi et al., Howenstein et al., and Venham et al. selected preschool children with no experience of dental treatment, no dental fear, or no experience of tooth pain. On the other hand, Krikken et al. included subjects who had experienced dental treatment,²¹ children who were referred for behavior control problems,²⁰ or both subjects in a case-control manner.²²

Exposure types. Most studies on parenting style used the Primary Caregivers Practices Reports (PCRR), Parenting Styles and Dimensions Questionnaire (PSDQ), and Child Rearing Practices Reports (CRPR). Parenting style was classified as authoritative, authoritarian, permissive, or negative. All studies used the survey method to evaluate parenting style, and one study¹⁶ also used the observation method.

Outcome measures. Dental anxiety was measured in six of the studies, and behavioral assessments were made in five studies. The Child Fear Survey Schedule—Dental Subscale (CFSS-DS) was used most frequently to measure dental anxiety. The Frankl scale, sound-eye-motor (SEM) scale, and Venham scale were used for behavioral evaluation.

Synthesis of results: effect of parenting style on dental anxiety. Due to the heterogeneity of methodology and outcomes in the included studies, data were synthesized with a narrative approach and structured based on associations reported. Among the included eight studies, six examined the effect of parenting style on dental anxiety,^{16,18-22} but the results were mixed and inconclusive. Possible associations

were reported in the studies by Aminabadi et al.,^{14,18,19} Howenstein et al.,¹⁷ and Venham et al.¹⁶ but not in studies by Krikken et al.²⁰⁻²² To investigate these differences, we categorized each results, according to subject age, researchers, and dental visit experience. All studies of preschool-aged children found significant differences,^{14,16-19} whereas those that included school-aged children did not.²⁰⁻²² Parenting style was shown to affect dental anxiety in a study of children who visited the dentist for the first time.^{14,16-19} whereas no effects were seen in children with previous dental experience.²⁰⁻²² Overall, Krikken et al. concluded that the associations were weak or not found, whereas Venham et al., Howenstein et al., and Aminabadi et al. reported that dental anxiety were less observed in children of parents with positive parenting styles.

Effect of parenting style on child behavior in dental setting. Among the included eight studies, five^{14,17-20} examined the effect of parenting style on child behavior management problems. Most of the observational studies used the Frankl, Venham, and SEM scales. Among these, four studies^{14,17-19} that included preschool children with no previous dental experience or history of dental pain reported a statistically significant difference in parenting style and child behavior problems. However, one study by Krikken et al. did not find a difference between parenting style and child behavioral problems.

Risk of bias assessment. The quality assessment of observational trials using the modified NOS Tool is summarized in Table 3. All included studies^{14,16-22} were described as observational studies. Sample size calculation was only performed in three studies (38 percent). Sample representation was considered appropriate in all studies. Parenting style assessment tools used in all observational studies (standardized questionnaire surveys) were considered adequate. Only four (50 percent) studies reported a response rate. Six (75 percent) studies considered possible confounding factors, previous dental experience, history of dental fear, and referral status, in relation to outcome variables. Assessment outcomes were used in all observational studies, and all included studies provided sufficient explanations of the treatment process. Only four studies (67 percent) made blind and independent assessments and evaluations of dental anxiety or behavior management problem.

Discussion

Overall, regarding children's behavior problems, we found that children with authoritative parents exhibited more positive behavior ($P < .001$) compared to children with authoritarian and permissive parents. Most studies showed supportive evidence on the association between parenting style and children's dental anxiety, except in Krikken et al.²⁰⁻²² About this, Krikken et al.²⁰⁻²² noted that the reason for the lack of difference in behavior between the different parenting styles may be due to the absence of parents in the treatment room. Furthermore, in contrast to other studies, their research seems to be different because it involves children referred for behavior management problems or straightforward dental anxiety.

Regarding dental anxiety, there were some studies with conflicting results. There are several potential explanations for these discrepancies. First, studies that showed positive conclusions to support an association included children who have no dental experience (first visit), no history of dental phobia, no history of dental pain, and no diagnosed behavior disorders.^{14,16-19} Second, Krikken et al. included subjects who had experienced dental treatment,²¹ children who were referred for behavior control problems,²⁰ or both subjects in a case-control

Table 2. STUDY CHARACTERISTICS OF INCLUDED STUDIES*

No.	Author (country)	Year	Journal	Study design	Dental setting	Population/patients	Parenting style
1	Howenstein et al. ¹⁷ (USA)	2015	Pediatr Dent	Cross-sectional	An initial examination/hygiene appointment	132 children (3-6 years old) admitted to Nationwide Children's Hospital dental clinic	PSDQ
2	Aminabadi et al. ¹⁹ (Iran)	2015	Pediatr Dent	Cross-sectional	Amalgam filling in primary molars with inferior alveolar nerve block	288 children (4-6 years old) admitted to the Department of Pediatric Dentistry	PCRR
3	Krikken et al. ²¹ (Netherlands)	2013	Eur J Paediatr Dent	Cross-sectional	NA	454 interviews for children and parents (mean age=8.7±2.5 years old)	Combination of four questionnaires, total 117 items (CRPR, PS, A-PARI and PSDQ)
4	Krikken et al. ²² (Netherlands)	2012	Community Dent Health	Case control	NA	446 children (4-12 years old): 120=nonreferred group; 335=referred group	CRPR
5	Aminabadi et al. ¹⁸ (Iran)	2012	Med Oral Patol Oral Cir Bucal	Cross-sectional	Amalgam filling in primary molars with inferior alveolar nerve block	117 children (56 boys and 61 girls; mean age=5.24±0.31 years old; range=4-6 years old)	Baumrind's parenting style scale
6	Aminabadi et al. ¹⁴ (Iran)	2008	Acta Odontol Scand	Cross-sectional	Amalgam filling in primary molars with inferior alveolar nerve block	72 children (4-6 years old; mean age=5.12 years old)	PCRR
7	Krikken et al. ²⁰ (Netherlands)	2008	Eur Arch Paediatr Dent	Cross-sectional	Standard procedure (fixed protocol reported in VeerKamp et al., 1995) without parent	76 referred children (26 females; mean age=76±24.8 months old) with dental anxiety or behavior management problems	CRPR
8	Venham et al. ¹⁶ (USA)	1979	J Dent Res	Cross-sectional	Mirror and explorer exam, prophylaxis, and topical fluoride application	26 children (3-5 years old) with no prior dental experience	STIM (dentist's assessment) and CRPQ (parent's assessment)

No.	Author (country)	Dental anxiety	Behavior assessment	Other variables	History of dental pain or previous dental experience	Results
1	Howenstein et al. ¹⁷ (USA)	NA	Frankl scale	Sociodemographic data and dental caries status	<ul style="list-style-type: none"> • First dental visit • No history of phobias related to the dental or medical setting • No history of pain secondary to pulpitis • No diagnosed behavior disorders. 	Children with authoritative parents exhibited more positive behavior ($P<.001$) compared to children with authoritarian (ES=16.2; 95% CI=3.8-68.9) and permissive parents (ES=18.3; 95% CI=6.2-53.9).
2	Aminabadi et al. ¹⁹ (Iran)	VSS (dentist's assessment)	Frankl scale	Child temperament was assessed by children's behavior questionnaire—very short form	<ul style="list-style-type: none"> • First dental visit • No history of post-traumatic stress disorders or specific phobia related to dental settings • No history of invasive medical procedures or traumatic experiences in the medical setting • No previous experience of intraoral injections • No dental pain 	Parenting style appeared to mediate child temperament and anxiety and was related to the child's behavior.

Table 2. CONTINUATION

No.	Author (country)	Dental anxiety	Behavior assessment	Other variables	History of dental pain or previous dental experience	Results
3	Krikken et al. ²¹ (Netherlands)	CFSS-DS (parent's assessment)	NA	Dental history reported by parents	Almost all children (99%) visit the dentist at least once a year for a check-up	No clear association between parenting style and dental anxiety was found
4	Krikken et al. ²² (Netherlands)	CFSS-DS (parent's assessment)	NA	Referral status of children	115 nonreferred and 331 referred children	No differences existed between parents of referred children and parents of nonreferred children on parental rearing style. Nonreferred children with parents using an authoritarian parenting style were more anxious than other nonreferred children
5	Aminabadi et al. ¹⁸ (Iran)	SCAS (parent's assessment)	Frankl scale	Emotional Intelligence by EQ-i	<ul style="list-style-type: none"> • First dental visit • No previous experience of dental operation and/or intraoral injections • No history of pain secondary to pulpitis or tooth infection • No history of unpleasant experiences in the medical settings 	There were significant correlations between authoritarian parenting style and separation anxiety ($r=0.186$; $P<0.05$) as well as authoritative parenting style and mother's EQ ($r=0.286$; $P<0.01$)
6	Aminabadi et al. ¹⁴ (Iran)	NA	SEM scale	Behavior guidance strategies	<ul style="list-style-type: none"> • No history of post-traumatic stress disorders • No history of unpleasant experience • No previous experience of intraoral injection • No history of pain secondary to pulpitis 	The mean SEM score in children belonging to authoritative parents was significantly lower than in children of permissive and authoritarian parents ($P<0.05$)
7	Krikken et al. ²⁰ (Netherlands)	CFSS (parent's assessment)	Venham scale	Assessment of parent's preparation style of their child before dental treatment	Children were referred to the center due to behavior management problems or straightforward dental anxiety	No relation was found between parenting style and dental anxiety and behavior during treatment
8	Venham et al. ¹⁶ (USA)	Clinical anxiety rating scale (parent's assessment)	NA	Heart rate	<ul style="list-style-type: none"> • First dental visit • No prior dental experience 	Significant relationships emerged, suggesting that child-rearing practices influence the child's acquisition of coping skills and stress tolerance

* ES=effect size (mean difference); CI=confidence interval; PSDQ=parenting styles and dimensions questionnaire; PCRR=primary caregivers practices reports; VSS=verbal skill scale; CRPR=child rearing practices reports; PS=parenting scale; A-PARI=Amsterdam version of the parental attitude research instrument; CFSS-DS; Dutch version of the Child Fear Survey Schedule—Dental Subscale; SCAS=Spence children's anxiety scale; EQ-I=bar-on emotional quotient inventory; SEM=sound-eye-motor, NA=not available.

manner.²² Previous dental experience and dental pain are known to cause dental anxiety.^{3,21} Therefore, no differences were found in studies that did not control or consider the relationship between these factors. Overall, we found some supportive evidence that parenting style could have an effect on dental anxiety and behavior problems in preschool children at the first dental visit.

In our review process, we found consistent results that parenting style was not related to dental anxiety and/or

behavior in children who had prior dental experience. This might be explained by other factors, including the type of previous dental experience, severity of dental pain, dental phobia, and parental attitude or belief. We recommend adjusting for these factors when the relationship is investigated for children in the subsequent dental visits in addition to the examined independent variables such as parental presence.²⁵⁻³¹ In order to overcome negative dental experiences and pain and to cooperate with dental treatment, the type of parenting as well as the

parental presence should be considered. Hence, additional research is needed to determine the impact of parenting styles on dental anxiety and/or behavior after the first dental treatment.

Our study is the first to systematically investigate the effects of parenting on dental anxiety and child behavior problems. However, it has several limitations. First, differences were found in the limited parenting style classification. Previous studies of the relationship between parenting styles and dental anxiety and/or behavior focused on a variable-centered approach, focusing primarily on individual variables that constitute parenting styles. A variable-centered approach is useful in identifying the predictor variable most representative of the variance in the criterion variable.^{32,33} However, the method of analyzing the influence of the individual variables limits the understanding of complex parenting styles.³⁴ It is difficult to grasp how the various elements of maternal parenting are combined in the individual and affect their children using a variable-centered approach that focuses on the average relevance in the population. Therefore, a person-centered approach is needed to examine the influences of parenting style on the development of young children's social skills. According to Laursen and Hoff,³² a person-centered approach reflects a reality in which an actor's attitude or behavior does not take place by only a single variable.

While the relationships among variables are similar within a group, different subgroups may appear in different groups (e.g., cultures of various races); also, the main purpose of the individual-centered approach is to find and reveal these differences. Most studies included in this review classify the parenting method using a variable-centered approach. Therefore, it would be helpful to use person-centered strategies (e.g., cluster analysis, latent profile analysis) in future studies. Latent profile analysis can reasonably determine the number of potential layers using a model-based approach and can find groups or types that share certain attributes or similar relationships between different properties.^{35,36} Using accurate analytical criteria to classify mothers' parenting styles and understand the mechanisms of dental anxiety and behavior for each type and infant could have important implications for healthy child care and adaptation of dental care to infants. Second, a methodological quality assessment was conducted to evaluate each individual study. Overall, the modified NOS evaluation item showed moderate to high quality, and the lowest score was found in items that evaluated sample size calculation. Third, the significance of the results for each of the papers included in the individual studies was judged on the basis of statistical significance, which can be particularly misleading in studies of small sample sizes.³⁷ One way to overcome this is

Table 3. QUALITY OF THE STUDIES ON THE MODIFIED NEWCASTLE-OTTAWA QUALITY ASSESSMENT SCALE FOR OBSERVATIONAL STUDIES*†‡

Author (year)	Selection				Confounding factor		Outcome		Total score n (%)
	1	2	3	4	5	6	7	8	
Howenstein et al., ¹⁷ 2015	0	1	1	1	1	1	1	1	7 (88)
Aminabadi et al., ¹⁹ 2015	1	1	1	1	1	1	1	1	8 (100)
Krikken et al., ²¹ 2013	0	1	1	0	0	1	NA	NA	3 (50)
Krikken et al., ²² 2012	1	1	1	1	1	1	NA	NA	6 (100)
Aminabadi et al., ¹⁸ 2012	1	1	1	1	1	1	1	0	7 (88)
Aminabadi et al., ¹⁴ 2008	0	1	1	0	1	1	1	1	6 (75)
Krikken et al., ²⁰ 2008	0	1	1	0	0	1	1	0	4 (50)
Venham et al., ¹⁶ 1979	0	1	1	0	1	1	1	1	6 (75)
Sum n (%)	3 (38)	8 (100)	8 (100)	4 (50)	6 (75)	8 (100)	6 (100)	4 (67)	
<i>Methodological appraisal score (%)</i>									
Bad			Satisfactory				Good		
0-33			34-66				67-100		

* Criteria include: sample size calculation; representativeness of study sample; ascertainment of assessment tool for parenting style; response rate; consideration of important confounding factors at start of study; ascertainment of assessment tool for dental anxiety or child behavior; dental setting; appropriateness of clinical procedure; independent blind assessment for child behavior.

† 0=No or not reported; 1=Yes.

‡ Total score is divided by total number of items multiplied by 100. Quality appraisal score: weak=0-33.9%; moderate=34-66.9%; strong=67-100%; NA=not applicable (because they used only the questionnaire for evaluation; items with NA were not included when calculating percentages in each item).

to present the effect size as a 95 percent confidence interval. However, if there was not enough statistical data to calculate, the effect size could not be calculated.

Therefore, future studies should aim to correct the confounding factors related to inclusion criteria, use a person-centered diagnostic approach of parenting style, and conduct sample size calculation. Pediatric dentists need to better understand the various maternal parenting styles that change with time. There is a need for a comprehensive analysis of how home care style affects dental anxiety and behavioral responses of children. Parenting style is important for child-parent-dentist interactions and should be considered when selecting an effective behavioral guidance technique.

Conclusions

Based on this systematic review's results, the following conclusions can be made:

1. There is a supportive association between parenting style and child dental anxiety and behavior problem.
2. However, this association was limited to preschool children who have no dental experience and no dental phobia during their first visit the dentist.

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