

Factors affecting children's adherence to regular dental attendance

A systematic review

Parvaneh Badri, DDS; Humam Saltaji, DDS, MSc;
Carlos Flores-Mir, DDS, MSc, DSc;
Maryam Amin, DMD, MSc, PhD

The prevalence of early childhood caries (ECC) is five times higher than that of asthma,¹ making it the most common chronic childhood disease.² ECC is a serious public health problem that is largely preventable^{3,4} through adequate adherence to oral hygiene, proper diet and feeding practices, and regular preventive dental visits.⁵⁻⁷ Poor oral health has a significant impact on children's growth and development, overall well-being and quality of life.⁸

According to the American Academy of Pediatric Dentistry (AAPD), children should have their first dental visit within six months of the first tooth's eruption and no later than their first birthday.⁹ The AAPD guideline also states that the "most common interval of examination is six months. . . ."⁹ The regular use of professional dental services, especially preventive services, has been associated with better oral health,¹⁰ because regular dental visits permit early detection and better treatment of oral diseases, as well as raise parental awareness of the causes and prevention of oral disease.^{11,12} Nonadherence to dentists' advice has been recognized as a significant problem. Kühner and Raetzke¹³ reported that a low percentage of patients followed recommended preventive periodontal regimens. Regular dental attendance might have a significant influence on the uptake of preventive measures related to oral hygiene and diet by increasing parental education and awareness of oral disease and its prevention.

To date, adherence studies have focused primarily on medical regimens and treatment,^{14,15} whereas adherence to dental regimens and preventive practices has received little attention. Despite the importance of preventive dental measures in children, researchers in few studies have evaluated pediatric patients' adherence to these measures.^{16,17} These researchers also paid more attention to preventive measures concerning oral hygiene rather than regular dental attendance. Moreover, the existing

ABSTRACT

Background. Parents' adherence to regular dental attendance for their young children plays an important role in improving and maintaining children's oral health. The authors conducted a systematic review to determine the factors that influence parental adherence to regular dental attendance for their children.

Type of Studies Reviewed. The authors searched nine electronic databases to May 2013. They included quantitative and qualitative studies in which researchers examined factors influencing dental attendance in children 12 years or younger. The authors considered all emergency and nonemergency visits. They appraised methodological quality through the Health Evidence Bulletins Wales methodological quality assessment tool.

Results. The authors selected 14 studies for the systematic review. Researchers in these studies reported a variety of factors at the patient, provider and system levels that influenced dental attendance. Factors identified at the patient level included parents' education, socioeconomic status, behavioral beliefs, perceived power and subjective norms. At the provider level, the authors identified communication and professional skills. At the system level, the authors identified collaborations between communities and health care professionals, as well as a formal policy of referring patients from family physicians and pediatricians to dentists.

Practical Implications. Barriers to and facilitators of parents' adherence to regular dental attendance for their children should be identified and considered when formulating health promotion policies. Further research is needed to investigate psychosocial determinants of children's adherence to regular dental visits.

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Dr. Badri is a graduate student, Pediatric Dentistry, School of Dentistry, University of Alberta, Edmonton, Alberta, Canada.

Dr. Saltaji is a doctoral candidate and a graduate student, Orthodontic Graduate Program, School of Dentistry, University of Alberta, Edmonton, Alberta, Canada.

Dr. Flores-Mir is an associate professor and head, Division of Orthodontics, School of Dentistry, University of Alberta, Edmonton, Alberta, Canada.

Dr. Amin is an associate professor and head, Division of Pediatrics, School of Dentistry, University of Alberta, 5513-476 Edmonton Clinic Health Academy, 11405-87 Ave. N.W., 5th Floor, Edmonton, Alberta, Canada T6G 1C9, e-mail maryam.amin@ualberta.ca. Address correspondence to Dr. Amin.

literature on adherence to dental visits is mainly empirical. van Dulmen and colleagues¹⁸ conducted a systematic review, the results of which showed that a poor definition of adherence or the lack of a theoretical framework resulted in failed attempts to improve adherence to medical treatment in the short term. Thus, innovations in oral health theory and practice are needed urgently, especially those that target young children, because their adherence depends on caregivers' willingness to comply with the indicated regimen.¹⁹

For these reasons, it is important to understand fully the factors that facilitate or impede children's adherence to regular dental attendance. Therefore, the purpose of this review was to systematically identify and analyze the facilitators of and barriers to children's adherence to regular dental attendance.

METHODS

We reported this systematic review in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement for reporting systematic reviews of health sciences.²⁰

Eligibility criteria. For this review, we considered studies meeting the following predefined eligibility criteria. Studies should have included examination of the barriers to and facilitators of dental attendance in emergency or nonemergency situations (that is, treatment visits, preventive care visits) among children 12 years or younger, with no restrictions on sex or language. We chose this age group because the highest prevalence of caries with the lowest rate of dental attendance was found in this group.^{3,21} Moreover, regular dental attendance by children in this age group depends on the willingness of parents and caregivers.¹⁶ With respect to study design, we included quantitative, qualitative and mixed-methods studies. We excluded studies in which investigators reported on dental attendance of children older than 12 years, unless they reported data separately for different age groups.²²

Data sources and searches. We conducted comprehensive searches up to May 31, 2013, by using the following electronic bibliographic databases: PubMed (1946 to March 29, 2013), Embase (1974 to 2013, week 12), Cochrane Database of Systematic Reviews (2005 to first quarter 2013), Database of Abstracts of Reviews of Effects (first quarter 2013), Cochrane Central Register of Controlled Trials (first quarter 2013), PASCAL (1984 to 2013, week 13), CINAHL (1937 to March 2013) and Scopus (1973 to March 2013).

We developed the search strategy with the help of a specialized health sciences librarian at the John W. Scott Health Sciences Library, University of Alberta, Edmonton, Alberta, Canada. We established search terms in PubMed and then adjusted them as required for each electronic database. The search terms included the following: "dental attendance," "dental visit," "adherence,"

"compliance," "barriers," "facilitators" and "obstacles." For a more detailed account, see eTable 1 (available as supplemental data to the online version of this article [found at <http://jada.ada.org/content/145/8/817/suppl/DC1>]). In addition, we screened by hand the reference lists of the selected articles for any articles that might have been omitted. We did not apply any restrictions regarding publication year or language.

Study selection. Two authors (P.B. and H.S.) independently reviewed the list of titles and abstracts for inclusion. They then retrieved the full articles for the final selection process. If an abstract was judged to contain insufficient information to make a decision about inclusion, the two authors reviewed the full article. They then applied the same selection criteria to the complete articles that had been applied in the initial selection phase. The reviewers discussed any discrepancies in decisions until they reached a consensus.

Data collection process. The same investigators (P.B. and H.S.) performed data extraction and resolved any discrepancies via discussion until consensus was reached. If the reviewers deemed any article to be unclear after a full evaluation, they contacted the authors of the study for clarification.

Data items. The two investigators extracted data from each of the selected studies on the basis of study design, participants' ages, sample size, recruitment method, and barriers to and facilitators of dental attendance. Quantitative studies involved the use of data from closed-ended questions, with researchers using numerical and statistical tools to appraise facilitators of adherence to regular dental attendance among children. In contrast, investigators in qualitative studies used open-ended interviews or focus groups to elicit information regarding both barriers to and facilitators of adherence to regular dental visits.

Risk of bias in individual studies. The reviewers (P.B. and H.S.) assessed the methodological quality of selected studies, and they resolved discrepancies via discussion until reaching a consensus. They used the Health Evidence Bulletins Wales methodological quality assessment tool to appraise the quality of the selected studies.²³ We included the following methodological quality items in our assessment: methods of participant selection, sample size calculation, assessment methods, efforts to address potential sources of bias and description of statistical methods (including those used to control for confounding data).

Summary measures and synthesis of results. The study included factors—classified as barriers or facilitators—that affected adherence to regular dental attendance. The final outcome was a list of identified

ABBREVIATION KEY. AAPD: American Academy of Pediatric Dentistry. ECC: Early childhood caries. NA: Not applicable. PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses. TPB: Theory of planned behavior.

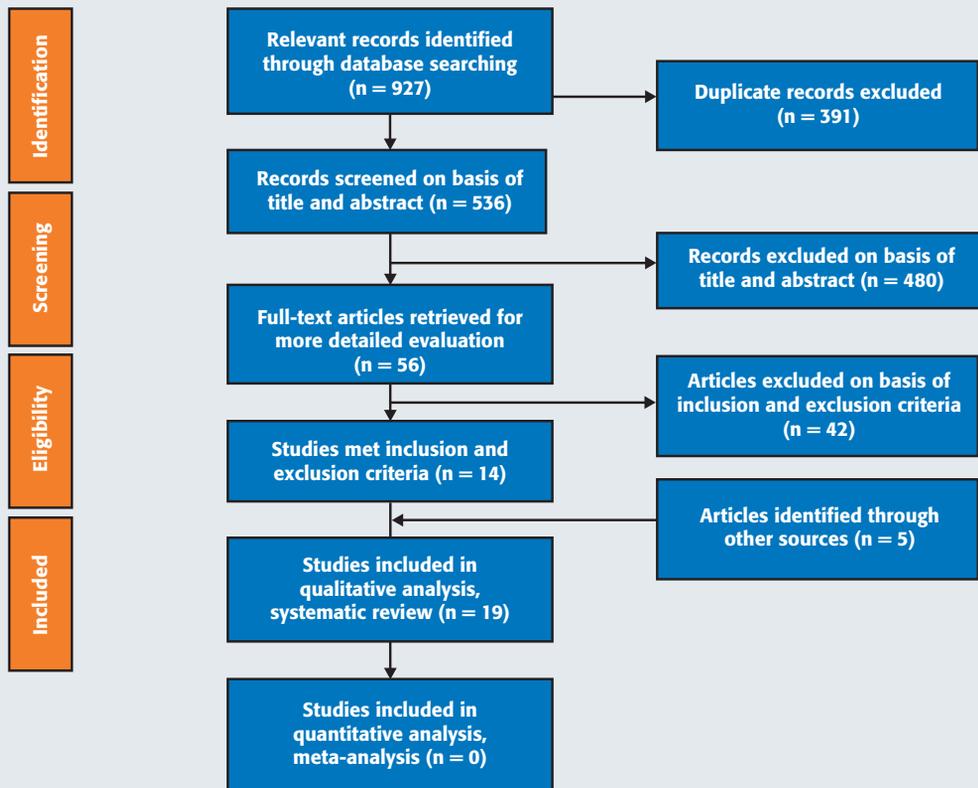


Figure 1. Flow diagram of the literature search, according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).²⁰

determinants. Whenever possible, we analyzed each item according to the methodological strength of the study from which it was retrieved.

Owing to the nature of the outcome, a meta-analysis was not possible. Our intent was to conduct only a qualitative synthesis.

RESULTS

Study selection. The search strategy resulted in identification of 927 studies, including 391 duplicates. After eliminating the duplicates, the reviewers excluded an additional 480 studies on the basis of title and abstract screening; this resulted in 56 complete texts for further evaluation. After the reviewers applied the inclusion and exclusion criteria, only 14 studies remained. An additional five reports were found by hand-searching the references of these 14 studies, for a total of 19 studies that fulfilled the inclusion and exclusion criteria (Figure 1²⁰). (Of the 61 full-text studies identified, 11 were excluded because the population was inappropriate [based on our inclusion criteria], 27 were excluded because of the population's age, three were excluded because they were reviews of other studies or guidelines, and

one was excluded because of an inadequate objective.) eTable 2 (available as supplemental data to the online version of this article [found at <http://jada.ada.org/content/145/8/817/suppl/DC1>]) presents a summary of the excluded studies and the reasons for their exclusion.

Study characteristics. Of the 14 studies identified through the electronic databases, 12 were quantitative studies and two were qualitative studies. Four of the quantitative studies were conducted in North America,²⁴⁻²⁷ five in Europe,²⁸⁻³² one in Africa,³³ one in Asia³⁴ and one in South America.³⁵ The study by Liena Puy and Ausina Márquez²⁸ was published in Spanish and translated into English by a Spanish-speaking researcher for this review. Of the two qualitative studies, one was conducted in North America³⁶ the other in Europe.³⁷ The reviewers found five additional studies by means of hand-searching. These included a mixed-methods study³⁸ from England, two quantitative studies (one²² from North America and one³⁹ from the Caribbean) and two qualitative studies (one⁴⁰ conducted in North America and one⁴¹ conducted in the West Indies). Table 1^{22,24-42} presents a summary of the data extracted from the included studies. (An expanded version of Table 1 is presented as eTable 3, available as

TABLE 1

Description of quantitative, qualitative and mixed-methods studies.					
SOURCE (COUNTRY OF STUDY)	STUDY DESIGN	PARTICIPANTS (SAMPLE SIZE)	CHILDREN'S AGE	PARTICIPATION METHOD	STATISTICAL/ ANALYTIC METHOD
Quantitative Studies					
Amin,²² 2011 (Canada)	Cross-sectional survey	Clients of Alberta Child Health Benefit (N = 405); clients of Alberta Adult Health Benefit (N = 356)	9 Years	Telephone interviews	Descriptive
Brickhouse and Colleagues,²⁴ 2009 (United States)	Cross-sectional questionnaire	Caregivers (N = 55)	3-12 Years	Mailed questionnaires	Multivariate regression
Denloye and Colleagues,³³ 2004 (Nigeria)	Cross-sectional and 3 years (2001-2003) prospective collection of recorded data	Children (N = 875)	7.5 Years	Visits to pediatric clinic of preventive dentistry area, University College Hospital Ibadan (Nigeria)	Descriptive
Goettems and Colleagues,³⁵ 2012 (Brazil)	Cross-sectional questionnaires and dental examination	Mother-child dyads (N = 608)	2-5 Years	Children's National Immunization Campaign	Bivariate and multivariate analysis
Leroy and Colleagues,²⁹ 2013 (Belgium)	Cross-sectional and prospective study; validated questionnaires and clinical examination; pilot study	Parent-child dyads (N = 1,057)	3 and 5 Years; children recruited at birth (2003-2004) and examined in 2007-2009	Recruited shortly after birth	Logistic regression and multiple imputation analyses
Liena Puy and Ausina Márquez,²⁸ 1997 (Spain)	Cross-sectional study; descriptive longitudinal study	Children (N = 957)	Mean age, 11 years	Attending one of preventive odontology unit clinics for any reason	Descriptive
Quiñonez and Colleagues,²⁵ 2008 (United States)	Cross-sectional questionnaire and longitudinal study; medical encounter with child (medical provider completed dental encounter forms)	Parent-child dyads (N = 744)	12-24 Months	Parents of Medicaid-enrolled children	Descriptive and univariate/bivariate/multivariate analysis
Razak and Jaafar,³⁴ 1987 (Malaysia)	Cross-sectional study; randomly selected patients' records	Children (N = 166)	2-12 Years	Treatment for first time	Descriptive
Reiss and Colleagues,²⁶ 1976 (United States)	Random allocation experimental study and clinical screening	Parents and children (N = 180)/33 families	6-12 Years	Notices mailed to home address, telephone call, \$5 incentive	Binomial (nonparametric) test
Rodd and Colleagues,³⁰ 2007 (England)	Prospective study of failed appointments over 12 months	45 children with cleft lip/palate, 45 age-, sex- and postal code-matched children without cleft lip/palate	2-15 Years; mean age, 8.8 years	Computerized hospital appointment database/12-month period/three specialist cleft clinics	Independent-sample <i>t</i> test/stepwise multiple regression

* Source: U.S. Department of Health and Human Services.⁴²

supplemental data to the online version of this article [found at <http://jada.ada.org/content/145/8/817/suppl/DC1>].)

Although only four of the 19 studies (two quantitative and two qualitative) mentioned the word “barriers” in their titles, barriers to dental attendance were reported in the content and outcome of all but four (three quantitative studies^{26,34,35} and one mixed-methods study³⁸) of the remaining 15 studies. In the four studies in which investigators did not report barriers, factors with a positive

influence (that is, facilitators) were identified instead. We found the factors influencing children's adherence to regular dental attendance to be diverse among the studies.

To better describe the identified factors in this review, we grouped them into three main categories, according to the classification by Scheppers and colleagues⁴³: patient level, provider level and system level. We used the theory of planned behavior (TPB) to present factors at the patient level in addition to sociodemographic

TABLE 1 (CONTINUED)

SOURCE (COUNTRY OF STUDY)	STUDY DESIGN	PARTICIPANTS (SAMPLE SIZE)	CHILDREN'S AGE	PARTICIPATION METHOD	STATISTICAL/ANALYTIC METHOD
Quantitative Studies (Continued)					
Talekar and Colleagues,²⁷ 2005 (United States)	Cross-sectional study using national survey data	Caregivers and children (N = 3,424)	2-5 Years	Third National Health and Nutrition Examination Survey*	Preliminary descriptive
Vignarajah,³⁹ 1997 (Caribbean island of Antigua)	Cross-sectional questionnaire/pilot study	Schoolchildren (N = 350)	12 Years	In class/randomly selected primary schools	Descriptive
Wang and Aspelund,³¹ 2009 (Norway)	Children recalled for routine examination; historical data and data about failed appointments collected	Children (N = 576)	3-18 Years; mean age, 10 Years	Regular recall visit, free-of-charge dental services	Multiple logistic regression
Yuan and Colleagues,³² 2007 (Northern Ireland)	Quasi-experimental, nonequivalent, two-group comparison	Mothers and newborns (N = unknown) (report gives mean percentage of samples); children from 9 intervention and 14 control wards	0-2 and 3-5 Years	Community-based home visits	t test method
Qualitative Studies					
Hoelt and Colleagues,³⁶ 2011 (United States)	Interview approach	Mothers (N = 48)	10 Years or younger; mean age, 5 years	Multiple sources: immigrants' parents, low-income clinics, snowball referral, community festivals	Standard qualitative analytic procedures
Kelly and Colleagues,⁴⁰ 2005 (United States)	Focus group approach	Caregivers and children (N = 76)	4-12 Years	Caregivers of Medicaid-enrolled children	Standard qualitative analytic procedures
Naidu and Colleagues,⁴¹ 2012 (West Indies)	Focus group approach	Parents and caregivers (N = 18)	Preschool-aged	Letters sent to three preschools from a list used for previous epidemiologic study in area	Thematic content analysis method
Vanobbergen and Colleagues,³⁷ 2007 (Belgium)	Focus group approach	Mothers and children (N = 150)	10-12 Years	Participants recruited in social services, neighborhood groups, mothers' groups in schools	Content analysis method
Mixed-Methods Study					
Eckersley and Blinkhorn,³⁸ 2011 (England)	Interviews, structured questionnaires, qualitative and quantitative methods included; Jarman scores and Townsend deprivation indexes	Mothers (N = 284)	3 Years	Play groups and nurseries used to contact parents in city	Standard qualitative analytic procedures, χ^2 tests

characteristics of participants. The role of TPB is to link behavioral, normative and perceived control beliefs to behavior via behavioral intention.⁴⁴ The efficacy of TPB in predicting health-related behaviors is well supported by empirical evidence.⁴⁴⁻⁴⁶ According to Ajzen,⁴⁴ "intentions to perform behaviors of different kinds can be predicted with high accuracy from attitudes toward the behavior, subjective norms, and perceived behavioral control; and these intentions, together with perceptions of behavioral control, account for considerable variance in actual behavior."⁴⁴ The results of a study by Van den

Branden and colleagues⁴⁶ show the applicability of TPB in predicting parental behaviors regarding oral health, including parental adherence to regular dental attendance.

Patient-level factors. Family sociodemographic characteristics. Dental attendance by very young children depends mostly on parents or caregivers' willingness to adhere to dental visits for their children. Investigators in two studies reported that in families with multiple children, younger children were more likely than older children to have visited a dentist.^{25,29} Although dental

TABLE 2

Critical appraisal of quantitative studies.*							
QUESTIONS PERTAINING TO METHODOLOGICAL QUALITY	REVIEWERS' ASSESSMENT, ACCORDING TO STUDY						
	Amin,²² 2011	Brickhouse and Colleagues,²⁴ 2009	Denloye and Colleagues,³³ 2004	Eckersley and Blinkhorn,³⁸ 2001[†]	Goettems and Colleagues,³⁵ 2012	Leroy and Colleagues,²⁹ 2013	Liena Puy and Ausina Márquez,²⁸ 1997
Is Study Relevant to Project Needs?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Does Report Address a Clearly Focused Issue?	Yes	Yes	Yes	Yes	Yes	Yes	Can't tell
Is Choice of Study Method Appropriate?	Can't tell	Yes	Yes	Can't tell	Yes	Yes	Can't tell
Is Population Appropriate?	Yes	NA [‡]	Yes	Yes	Yes	Yes	Yes
Was Confounding and Bias Considered?	No	Yes	Can't tell	Yes	Yes	Yes	No
Cohort Study: Was Follow-up Long Enough?	NA	NA	NA	NA	NA	NA	NA
Are Tables/Graphs Labeled Adequately and Understandable?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Are You Confident About Authors' Choice and Use of Statistical Methods?	NA	Yes	Can't tell	No	Yes	Yes	No
What Are the Results of This Piece of Research?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Can Results Be Applied to Local Situation?	Yes	Can't tell	Yes	Yes	Yes	Can't tell	Can't tell
Were All Important Outcomes/Results Considered?	Can't tell	Yes	Yes	Yes	Yes	Yes	Yes
Is Any Cost Information Provided?	No	No	No	No	No	No	No
Accept for Further Use as Type IV Evidence[§]?	NA	NA	NA	NA	NA	NA	NA

* Source: Weightman and colleagues.²³
[†] Mixed-methods study.
[‡] NA: Not applicable.
[§] Type IV evidence is an observational study or economic analysis.²³

visits for preschool-aged children depend exclusively on parental decisions, the oral health of school-aged children also is under the influence of schools through requests for dental checkups and school examination schedules.⁴¹ However, with the exception of two studies' findings, the child's sex had no significant effect on adherence to regular dental visits. Researchers in one study reported that girls had significantly more symptomatic and asymptomatic dental visits than did boys,³³ and those in another study found that girls with clefts tended to miss more appointments than did boys.³⁰

Furthermore, several researchers reported a significant correlation between children's adherence to regular dental attendance and parents' level of education,^{24-29,33,35,40} economic status^{22,33,35,36,41} and marital status.²⁵ We found only one study in which researchers did not report an association between parents' education and their children's dental attendance.³⁶ Researchers also reported that dental visits, especially preventive visits, occurred less frequently among families with a lower

income status^{22,33,35,36,41} and among those headed by single parents.²⁵

Parents' perceptions and attitudes. Parents' lack of knowledge regarding the oral health of their children, the importance of primary teeth, the timing of the first dental visit and the frequency of dental visits, as well as the perceived lower priority of dental health compared with general health and the perceived lack of need for regular dental visits for a healthy child have been shown to directly influence parents' intentions to adhere to dental visits for their children.^{22,33,35,36,41}

In addition, an unpleasant first dental visit, dissatisfaction with previous appointments, uncertainty about dental treatments, children's aversion to dental visits and dental care-related anxiety can have a negative effect with regard to parents' adherence to recommended dental visits by their children.^{24,29,35,37,39-41}

Parental awareness of social demands (that is, subjective norms) that make them responsible for maintaining their children's health (including oral health), in addition

TABLE 2 (CONTINUED)

REVIEWERS' ASSESSMENT, ACCORDING TO STUDY							
Quiñonez and Colleagues, ²⁵ 2008	Razak and Jaafar, ³⁴ 1987	Reiss and Colleagues, ²⁶ 1976	Rodd and Colleagues, ³⁰ 2007	Talekar and Colleagues, ²⁷ 2005	Vignarajah, ³⁹ 1997	Wang and Aspelund, ³¹ 2009	Yuan and Colleagues, ³² 2007
No	Can't tell	Yes	Yes	Yes	Yes	Yes	Yes
Can't tell	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Can't tell	Yes	Yes	Yes	No	Can't tell	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Yes	No	No	No	Yes	Yes	No	Yes
NA	NA		NA	NA	NA	Yes	NA
Yes	Yes	Yes	NA	Yes	Yes	Yes	Yes
Yes	No	Can't tell	Yes	No	Can't tell	Yes	Yes
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Can't tell	Can't tell	Yes	Yes	Can't tell	Can't tell	Yes	Yes
Yes	Yes	Can't tell	Yes	Yes	Yes	Yes	Yes
Yes	No	Yes	No	No	No	Yes	Yes
NA	NA	NA	NA	NA	NA	NA	NA

to school requirements for dental checkups, can improve parental intentions and act as a positive predictor of children's dental attendance.^{40,41} Moreover, researchers in several studies identified factors that parents perceived as impediments to regular dental attendance by their children; these included a lack of control over their children's oral health behavior, the high cost of dental services, school examinations and class schedules (time constraints), difficulty accessing dental services, low household income, travel distance and time required to access dental services, and communication difficulties with oral health care providers.^{28,30,33,36,39}

Provider-level factors. Factors identified at the provider level that may have influenced parental decisions to adhere to dental services for their children included providers' communication skills (especially for immigrants of diverse ethnicity), providers' professional skills, difficulties accessing dental services (such as lengthy waiting lists), limited professional services for young and disabled children, and low level of respect for patients

accessing public dental services.^{24,36-38,41}

System- and structural-level factors. Researchers identified several factors at the system and structural levels that influenced adherence to regular dental visits.^{32,40} These include referrals from family physicians and pediatricians, collaboration between communities and health care professionals, community-based education of parents about children's oral health, parents and caregivers' general reliance on health-related institutions, perceived discrimination in the Medicaid system, trust in the quality of the Medicaid system, and school schedules and examinations (time constraints).^{32,40} Figure 2 presents the three main categories identified in this study and their correlations.

Risk-of-bias assessment in included studies. Overall, the studies included in this systematic review attained a medium methodological quality, according to the grading method used.²³ Table 2^{22-35,38,39} presents a critical appraisal of the quantitative studies and the quantitative part of the mixed-methods study.

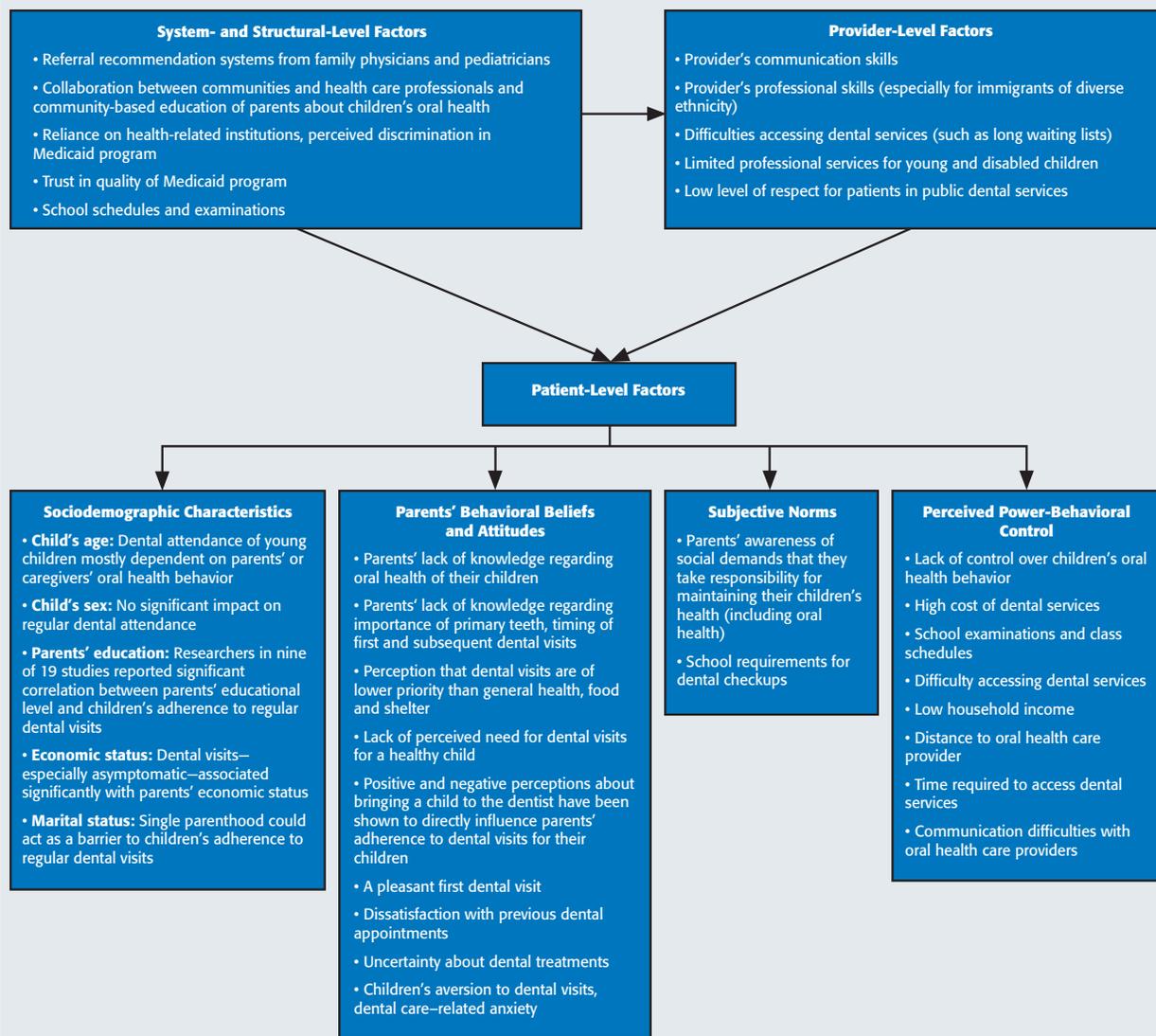


Figure 2. Flow diagram of patient-level, provider-level and system- and structural-level factors, as classified by Scheppers and colleagues,⁴³ that influence children's dental attendance, according to systematic review findings.

Table 3^{23,36-38,40,41} presents a critical appraisal of the qualitative studies. We conducted a qualitative synthesis only; a meta-analysis was not possible owing to the type of data collected.

DISCUSSION

Children generally face more barriers to obtaining dental care services than they do accessing primary medical services.⁴⁷ On the other hand, high degrees of availability and accessibility of care, although important, do not necessarily lead to better utilization of services.⁴⁸ Despite clear evidence of the positive impact of regular dental attendance on children's oral health and quality of life,⁴⁹⁻⁵¹ the underutilization of dental services remains of great concern in oral health promotion policies for children.²² Therefore, given the prevalence of ECC and

the importance of regular dental attendance as the third main component of the behavioral level of preventive oral health (after oral hygiene and diet),^{6,7} we looked for evidence of influencing factors in reliable qualitative and quantitative studies. Investigators in the included studies used cross-sectional and quasi-experimental or randomly experimental methods, as well as a focus group conducted with an in-depth interview design.

One limitation of this systematic review was our use of the PRISMA statement, which focuses primarily on randomized clinical trial reports as a guideline for clarity and transparency.⁵² No reporting guidelines, to our knowledge, have been developed specifically for observational studies. In addition, although we used the Health Evidence Bulletins Wales methodological quality assessment tool to assess bias risk, because of the nature of the

TABLE 3

Critical appraisal of qualitative studies.*					
QUESTIONS PERTAINING TO METHODOLOGICAL QUALITY	REVIEWERS' ASSESSMENT, ACCORDING TO STUDY				
	Eckersley and Blinkhorn,³⁸ 2001†	Hoef and Colleagues,³⁶ 2011	Kelly and Colleagues,⁴⁰ 2005	Naidu and Colleagues,⁴¹ 2012	Vanobbergen and Colleagues,³⁷ 2007
Is Study Relevant to Project Needs?	Yes	Yes	Yes	Yes	Yes
Does Report Address a Clearly Focused Issue?	Yes	Yes	Yes	Yes	No
Is Choice of Qualitative Method Appropriate?	Can't tell	Yes	Yes	Yes	Can't tell
Was Author's Position Stated Clearly?	Yes	Yes	Yes	Yes	Yes
Was Sampling Strategy Clearly Described and Justified?	No	No	Yes	Yes	Yes
Was an Adequate Description of Data Collection Method Given?	Not applicable	Can't tell	Yes	Yes	Yes
Were Procedures for Data Analysis/ Interpretation Described and Justified?	Yes	Can't tell	Yes	No	Can't tell
What Are the Primary Findings?	No	Yes	Yes	Yes	Yes
Are the Results Credible?	Yes	Can't tell	No	Yes	Yes
Can the Results Be Applied to Local Situation?	Yes	Can't tell	Can't tell	Can't tell	Can't tell
Were All Important Outcomes/ Results Considered?	Yes	Yes	Yes	Yes	Yes
Accept Study Findings for Further Use?	Can't tell	Can't tell	Can't tell	Can't tell	Can't tell

* Source: Weightman and colleagues.²³
† Mixed-methods study.

outcomes evaluated, we were unable to use it objectively to give more weighting to outcomes of studies with a lower risk of bias. However, this might not be a significant limitation, as almost all the studies in our systematic review had a similar risk of bias.

In this review, we identified diverse determinants of adherence to dental attendance. The main foci of the included studies were sociodemographic factors, attitudes based on behavioral beliefs, perceived power and behavior control, and subjective norm determinants at patient, provider and system levels. Researchers in most of the studies who used the above determinants discovered more barriers than facilitators to regular dental attendance among vulnerable children in low-income households, immigrants of diverse ethnicity and those with a medical history of illness. The participants

in these studies primarily were parents or caregivers, because children's oral health behavior primarily is based on parents' decisions.^{53,54}

Although nearly all of the selected studies attained a medium methodological quality according to the grading method used (Table 2^{22-35,38,39} and Table 3^{23,36-38,40,41}), we identified some factorial differences and similarities. For instance, the demographic characteristics of the participants varied. Some researchers included only age, sex^{22,28,32,33,38,39} or both, whereas others included the educational level of parents, household income, family status, ethnicity, distance traveled and medical history.^{24-27,29,31,35-37} On the basis of these and other variables, we found discrepancies in the findings. Studies conducted by Amin,²² Rodd and colleagues³⁰ and Wang and Aspelund³¹ showed no significant asso-

ciation between dental attendance and demographic characteristics such as age, sex, income and parents' educational level, whereas other studies^{24,25,27,28,33,35} showed significant correlations, either as barriers or facilitators. This latter evidence confirms the findings of previous reports showing significant correlations between regular dental visits and socioeconomic characteristics such as income, education and geographical location of participants.^{55,56}

Investigators in several studies reported that subjective norms were less influential than were other determinants of dental attendance; thus, some investigators^{22,27,30,35} highlighted the need for further investigations into the effect of psychosocial determinants of oral health behaviors. Kegeles⁵⁶ and Ball⁵⁷ made a similar suggestion, but we excluded their studies from this systematic review because they lacked an age cat-

egory. Ball⁵⁷ divided the major determinants of oral health behaviors (including dental visits) into four main categories: cultural factors such as family/community cultural perceptions; social factors such as reference groups (those that directly or indirectly influence one's attitudes or behavior) and aspirational groups (those to which a person aspires); personal factors such as age and economic circumstances; and psychological factors such as motivation, beliefs and attitudes.

Similarly, attempts by Kegeles⁵⁶ to identify psychosocial factors motivating people to seek and obtain preventive dental care resulted in the author's finding fewer studies with a focus on facilitators. Therefore, our finding that investigators in more studies explored barriers rather than facilitators is consistent with Kegeles's findings. Ball⁵⁷ and Kegeles⁵⁶ suggested that motivation is a key factor in determining utilization of dental services, a finding similar to that for other health care services.

Children rely on their parents' or caregivers' motivation, particularly concerning health behaviors involving a financial outlay. Ball⁵⁷ argued that people have biogenic (for example, hunger or thirst) and psychogenic needs (for example, recognition or esteem). Biogenic needs are more intense motivators than are most psychogenic needs. Given that the adherence to preventive dental visits is associated partly with psychogenic needs, further research is required to better understand factors that influence psychogenic perceptions of parents regarding their children's regular dental attendance. Consequently, we found the need for a paradigm shift toward investigating the psychosocial determinants, and this was the main objective of some studies^{22,27,35,37,40} included in this review. However, because researchers in these studies ad-

opted a satellite approach (that is, an isolated approach) rather than a theory-driven approach, their identification of psychosocial barriers and facilitators was less significant.

A solution to the challenge of identifying factors that have an impact on adherence to dental visits might be found in similar studies of adult participants that involved the use of TPB to collect and analyze data. For example, Luzzi and Spencer⁴⁹ found that attitude and subjective norm had a positive effect on dental visits, whereas control perception had a negative effect. Another recent study conducted by Anderson and colleagues⁵⁸ highlighted the significance of subjective norm-based messages and satisfaction with the dentist, as well as environmental constraints in dental care-seeking behavior, which we also identified in this systematic review. The successful application of TPB in adult populations might

indicate its potential success in addressing psychosocial determinants of children's adherence to regular dental attendance.

Finally, the main role of systematic reviews is to distill knowledge and to provide appropriate guidelines for improving health practices, effective health services and the overall function of the health care system. Although a review of the literature reveals ongoing interest in the topic of dental attendance, the underutilization of dental services persists for young children, especially among low-income and immigrant families. In this systematic review, we identified several studies in which researchers explored determinants of children's adherence to dental visits; we also highlighted the factor of "motivation" and its potential to defeat the identified barriers, many of which were linked to psychosocial factors.

CONCLUSIONS

In this systematic review, we identified demographic, socioeconomic, and structural and cultural factors that had a strong potential to act as barriers to regular dental attendance by children in various circumstances. On the basis of the order of importance, we identified structural factors, health policy decisions, community factors, and cultural and demographic characteristics that facilitated children's regular dental attendance. When making oral health recommendations, dental professionals should identify and consider barriers to and facilitators of parents' adherence to regular dental visits and to other aspects of professional recommendations for their children. Further research is needed to investigate psychosocial determinants of children's adherence to regular dental visits among at-risk populations. ■

Although a review of the literature reveals ongoing interest in the topic of dental attendance, the underutilization of dental services persists for young children, especially among low-income and immigrant families.

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