



## Nonpharmacological Behavior Guidance for the Pediatric Dental Patient

Vineet Dhar, BDS, MDS, PhD<sup>1</sup> • Elizabeth Gosnell, DMD, MS<sup>2</sup> • Jayakumar Jayaraman, BDS, MDS, MS, PhD<sup>3</sup> • Clarice Law, DMD, MS<sup>4</sup> • Martina Majstorović, DDS, PhD<sup>5</sup> • Abdullah A. Marghalani, BDS, MSD, DrPH<sup>6</sup> • Cameron L. Randall, PhD<sup>7</sup> • Janice Townsend, DDS, MS<sup>8</sup> • Martha Wells, DMD, MS<sup>9</sup> • Chia-Yu Chen, DDS<sup>10</sup> • Rachel Wedeward, MLIS, AHIP<sup>11</sup>

**Abstract: Purpose:** To present evidence-based recommendations on nonpharmacological behavior guidance for the pediatric dental patient. **Methods:** The work group assessed eight systematic reviews for effectiveness of nonpharmacological behavior guidance techniques in children undergoing preventive care or a dental treatment visit. The key outcomes assessed included cooperative behavior, anxiety, and procedural pain. To formulate the recommendations, the work group used the GRADE framework to obtain consensus on domains such as priority of the problem, certainty of the evidence, balance between desirable and undesirable consequences, patients' values and preferences, acceptability, and feasibility. **Results:** Overall, the use of basic nonpharmacological behavior guidance techniques resulted in trivial-to-small effect on improvement in behavior or reduction in anxiety. However, for children and adolescents undergoing preventive care, mobile applications and modeling showed large effects in reduction of anxiety. For those undergoing dental treatment, strategies such as modeling, positive reinforcement, biofeedback relaxation, breathing relaxation, animal-assisted therapy, combined tell-show-do, audiovisual distraction, and cognitive behavior therapy showed large reduction in anxiety. For children and adolescents with special health care needs, audiovisual distraction and sensory-adapted dental environment showed large reduction of anxiety. **Conclusions:** All the formulated recommendations were conditional and were mostly based on very low certainty of evidence. Conditional recommendations imply that different choices or combinations of behavior guidance techniques may be most appropriate for different patients. Clinicians should use techniques consistent with the parent/patient values and preferences. These recommendations are based on the best available evidence to-date and are intended to aid clinical decision making. (*Pediatr Dent* 2023;45(5):385-410) Received April 7, 2023 | Last Revision August 7, 2023 | Accepted August 8, 2023

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### Plain language summary

**Purpose.** The purpose of this first clinical practice guideline on nonpharmacological behavior guidance published by the American Academy of Pediatric Dentistry (AAPD) was to formulate evidence-based recommendations on use of previsit and in-office (pretreatment, during treatment, and posttreatment)

basic and advanced nonpharmacological behavior guidance techniques for children and adolescents undergoing dental treatment.

**Background.** Children and adolescents undergo periodic preventive dental care visits and dental treatment visits as needed. Dental anxiety and existing and anticipated pain are among factors likely to influence the experience of the child at the dental office. In this clinical practice guideline document, the term 'office' implies the dental environment and/or dental operatory and encompasses those environments in private practice, hospital settings, community clinics, academic settings, etc. While dental visits can be stressful, most of the care in dental offices can be provided using nonpharmacological behavior guidance techniques. Children with special health care needs may need additional consideration and utilization of specific behavior guidance techniques tailored to their individual needs.

**Study characteristics.** The guideline is based on systematic reviews of evidence on basic and advanced nonpharmacological behavior guidance interventions used during preventive dental visits (i.e., examination, cleaning, fluoride application, x-rays) and treatment visits (i.e., sealants, dental local anesthesia, fillings [restorations], nerve treatment [pulp treatment], simple extractions). The work group included five<sup>1-5</sup> existing moderate-to high-quality systematic reviews published in the last five years on basic nonpharmacological behavior guidance techniques such as parental presence/absence, preparation, traditional distraction techniques (i.e., counter-stimulation, camouflaging of syringe, positive suggestion, mirror and conversation, toys, books/children stories), and technology-based distraction techniques (audio distraction, audiovisual distraction, virtual reality glasses, and smart phones/tablets) and an advanced

<sup>1</sup>Dr. Dhar is a clinical professor and chair, and <sup>5</sup>Dr. Majstorović is a clinical associate professor, both in the Department of Orthodontics and Pediatric Dentistry, University of Maryland School of Dentistry, Baltimore, Md; <sup>2</sup>Dr. Randall is an assistant professor, Department of Oral Health Sciences, University of Washington School of Dentistry, Seattle, Wash; <sup>3</sup>Dr. Jayaraman is an associate professor, Department of Pediatric Dentistry, VCU School of Dentistry, Richmond, Va; <sup>10</sup>Dr. Chen is a pediatric dentist in private practice, Kent, Wash; <sup>9</sup>Dr. Wells is chief of dentistry, St. Jude Children's Research Hospital, and <sup>4</sup>Dr. Law is an associate professor and chair, Department of Pediatric Dentistry and Community Oral Health, The University of Tennessee Health Science Center, both in Memphis, Tenn; <sup>2</sup>Dr. Gosnell is an associate professor, Department of Pediatrics, University of Cincinnati College of Medicine, and Division of Pediatric Dentistry, Cincinnati Children's Hospital Medical Center, Cincinnati, and <sup>8</sup>Dr. Townsend is a professor and chief, Pediatric Dentistry, Nationwide Children's Hospital, and chair, Division of Pediatric Dentistry, The Ohio State University College of Dentistry, both in Columbus, Ohio; and <sup>11</sup>Ms. Wedeward is a research project manager, Pediatric Oral Health Research and Policy Center, American Academy of Pediatric Dentistry, Chicago, Ill, all in the United States. <sup>6</sup>Dr. Marghalani is an assistant professor, Department of Preventative Dentistry, Umm Al-Qura University, Makkah, Saudi Arabia.

Correspond with Dr. Dhar at VDhar@umaryland.edu

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**ABBREVIATIONS**

**AAPD:** American Academy of Pediatric Dentistry.  
**AAT:** Animal-assisted therapy.  
**AGREE:** Appraisal of Guidelines Research and Evaluation.  
**AMSTAR:** A MeaSurement Tool to Assess systematic Reviews.  
**app:** Application.  
**ASD:** Autism spectrum disorder.  
**ATA:** Ask-tell-ask.  
**AVD:** Audiovisual distraction.  
**BPRS:** Behavior Profile Rating Scale.  
**CBC:** Chotta Bheem-Chutki.  
**CBT:** Cognitive behavior therapy.  
**CFSS:** Children's Fear Survey Scale.  
**CFSS-DS:** Children's Fear Survey Scale Dental Subscale.  
**FBR:** Frankl's Behavior Rating Scale.  
**FIS:** Facial Image Scale.  
**GRADE:** Grading of Recommendations Assessment, Development and Evaluation.  
**HR:** Heart rate.  
**PDAS-CH:** Picture Dental Anxiety Scale-Child.  
**PECS:** Picture exchange communication system.  
**PICO:** Population Intervention Control Outcome.  
**RCT:** Randomized clinical trial.  
**SADE:** Sensory-adapted dental environments.  
**SHCN:** Special health care needs.  
**SMD:** Standardized mean difference.  
**3D:** Three-dimensional.  
**TPD:** Tell-play-do.  
**TSD:** Tell-show-do.  
**UK:** United Kingdom.  
**U.S.:** United States.  
**VAS:** Visual analogue scale.  
**VR:** Virtual reality.  
**VPT:** Venham Picture Test.  
**WG:** Work group.

nonpharmacological behavior guidance techniques (hypnosis) for healthy children and adolescents undergoing preventive and treatment visits. In addition, the work group conducted three new systematic reviews<sup>6,8,9</sup> based on 65 studies from various countries that met the inclusion criteria. The new systematic reviews evaluated basic nonpharmacological behavior guidance techniques such as communication (verbal/nonverbal), positive imagery, direct observation/modeling, desensitization, various distraction techniques, tell-show-do (TSD), tell-play-do ([TPD], a modification of TSD), ask-tell-ask, voice control, positive reinforcement, memory restructuring, biofeedback relaxation, breathing relaxation, animal assisted therapy, sensory-adapted dental environment, combination of basic behavior guidance therapies, picture exchange communication system, as well as advanced nonpharmacological behavior guidance techniques such as cognitive behavior therapies and protective stabilization, when used individually or in combination.

**Key results.** The evidence from all the eight systematic reviews was generally of very low quality, leading to conditional recommendations for the studied basic and advanced nonpharmacological behavior guidance techniques. Although the evidence is uncertain, it supports the use of basic behavior guidance techniques to reduce anxiety and improve cooperative behavior during dental visits. Also, the use of technology (mobile applications) as distraction may reduce anxiety in patients undergoing preventive care. For anxious patients, in addition to basic behavior guidance (modeling, positive reinforcement, relaxation

techniques), the use of animal assisted therapy, and combined therapy of TSD with audiovisual distraction (AVD) may help during the dental visit. When used appropriately, advanced non-pharmacological behavior guidance techniques such as cognitive behavior therapy and hypnosis may help patients with severe anxiety undergoing a dental treatment visit. AVD, sensory-adapted dental environment, and picture exchange communication system (PECS) or other visual schedules and social stories could help alleviate anxiety for children with special health care needs.

**Conclusion.** Evidence-based recommendations have been formulated considering the best available evidence in context of clinical expertise and patient values and preferences. This guideline is intended to assist clinicians in decision making and does not replace clinical judgment.

**Scope and specific objectives**

The AAPD intends for this guideline to help clinicians in choosing from the evidence-based nonpharmacological behavior guidance techniques to optimize patient care during dental treatment. The work group (WG) defined the Population, Interventions, Comparisons, and Outcomes (PICO) to be assessed and formulated a comprehensive list of relevant clinical questions<sup>6</sup>, which were reviewed and approved by the stakeholders including the AAPD's Council on Clinical Affairs, Council on Scientific Affairs, and Evidence-Based Dentistry Committee. The AAPD has previously published a Best Practices document on *Behavior Guidance for the Pediatric Dental Patient*<sup>7</sup>.

To develop clinical practice guidelines, the WG met between June 2021 and December 2022 to systematically search, select, synthesize, appraise, and contextualize the best available evidence to create evidence-based recommendations. The WG formulated evidence-based recommendations on **basic and advanced nonpharmacological behavior guidance techniques** for children undergoing **preventive dental visits** (examination, prophylaxis, radiographs, fluoride application), for children undergoing **dental treatment visits** (sealants, local anesthesia, restorative care, pulp therapy, simple extractions), and for **children with special health care needs (SHCN) undergoing preventive or treatment visits**.

Clinical questions:

1. In children and adolescents, does the use of previsit and in-office pre-/posttreatment preparation as basic behavior guidance strategies influence cooperative behavior, dental anxiety, procedural pain, and treatment completion during the dental visit?
2. In children and adolescents, does the use of basic behavior guidance techniques influence cooperative behavior, dental anxiety, procedural pain, and treatment completion during the dental visit?
3. In children and adolescents, does the use of advanced nonpharmacological behavior guidance techniques influence cooperative behavior, dental anxiety, procedural pain, and treatment completion during the dental visit?

Guidance on parental anxiety and behavior is beyond the scope of this document.

**Search strategy and evidence inclusion criteria.** The WG identified eight moderate-to-high-quality systematic reviews<sup>1-6, 8,9</sup> to inform these guidelines. Of the eight included systematic reviews, five<sup>1-5</sup> were previously published and three<sup>6,8,9</sup> were conducted de novo by the WG to address clinical questions that lacked existing moderate-to-high-quality systematic reviews (Figure).

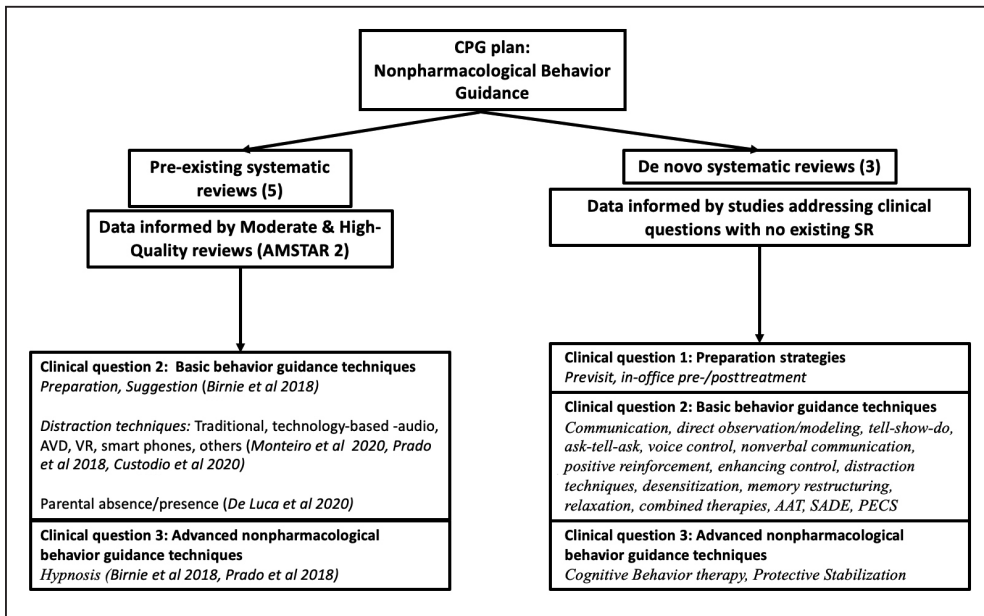


Figure. Clinical practice guideline (CPG) plan. AMSTAR=A MeaSurement Tool to Assess systematic Reviews; AAT=Animal-assisted therapy; AVD=Audiovisual distraction; SR=Systematic review; PECS=Picture exchange communication system; SADE=Sensory-adapted dental environments; VR=Virtual reality.

The three systematic reviews published by the WG focused on nonpharmacological behavior guidance strategies for: (1) a child undergoing a preventive visit,<sup>6</sup> (2) a child undergoing a treatment visit,<sup>8</sup> and (3) a child with special health care needs undergoing preventive or treatment dental visit.<sup>9</sup>

To identify the previously published systematic reviews that were relevant to the clinical questions, the WG utilized a search strategy developed specific to the identified PICO questions with Filters / Limits: Language – English Language; and Age Groups – Children & Adolescents. There was no restriction to study design. The search strategy has been described in detail elsewhere.<sup>6</sup> For purposes of guideline development, the WG agreed a priori to consider only moderate-to-high-quality systematic reviews that included Grading of Recommendations, Assessment, Development, and Evaluations ([GRADE] assessment). From the search process, the WG identified 24 systematic reviews which were reviewed by three WG members (VD, JJ, and AM). Fourteen systematic reviews/meta-analyses were found to be relevant to the clinical questions and were short-listed<sup>1-5,10-18</sup> for quality assessment using A MeaSurement Tool to Assess systematic Reviews ([AMSTAR] 2 tool).<sup>19</sup> Two WG members (AM and JJ) evaluated the reviews and met to reach consensus on the quality assessment of the selected reviews. Five moderate-to-high-quality systematic reviews<sup>1-5</sup> that were published within the past five years and included the GRADE level of certainty assessment were selected to formulate the evidence-based recommendations (Table 1). The WG also used the publications shortlisted for data extraction to update the selected systematic reviews where necessary.

Therefore, the WG analyzed data from a total of eight systematic reviews and utilized the GRADE Evidence-to-Decision Framework to develop clinical practice guidelines.

**Assessment of evidence.** The variety of studied outcomes and their assessment methods were reviewed by the WG and ranked a priori by the WG as critical; important, but not critical; and of limited importance. Three key outcomes were included: cooperative behavior, anxiety (including fear and

phobia), and procedural pain as measured by specific rating scales.<sup>6</sup> The WG categorized the variety of self-reported (child or parent), physician-rated (dentist or other providers), and physiologic tools used for ranking these outcomes and developed a criterion to guide the decision making.<sup>6</sup> Considering the variation in units of measure of outcomes across the eight included systematic reviews, where possible the authors reanalyzed data and calculated the standardized mean difference (SMD) to measure the effect in a standardized manner. To calculate SMDs, the corresponding author of included systematic reviews was contacted for additional information/data as needed. To communicate the findings of the systematic reviews using clinically informative statements, the size of estimate interpreted from SMD's was categorized as **large effect**, **moderate effect**, **small important effect** (interpreted as statistically

significant), **or trivial effect** (interpreted as small unimportant or statistically nonsignificant or no effect).<sup>20</sup>

The certainty of the evidence was assessed using the GRADE approach, which recognizes the certainty of evidence as high, moderate, low, and very low based on serious or very serious issues, including the risk of bias, imprecision, inconsistency, indirectness of evidence, and publication bias.<sup>21</sup> The WG evaluated and obtained consensus on the certainty of evidence for each studied outcome.

**Values and preferences.** The WG utilized a recent article that surveyed the AAPD membership to identify the non-pharmacological behavior techniques routinely used in dental offices in the United States (U.S.) and Canada.<sup>22</sup> That survey also sought information regarding clinicians' perception of parent/caregiver acceptance of various contemporary behavior guidance techniques used in their practices. Of the 518 active AAPD members who responded (response rate 7.45 percent), a majority (79.5 percent) of the participants were in private practice (solo or group), 5.8 percent worked at dental service organizations, 7.7 percent at community clinics, 12.9 percent at academic institutions, and 11 percent in hospital settings. Pediatric dentists certified by the American Board of Pediatric Dentistry constituted 79 percent of the participants. In terms of practice district and demographic characteristics, the survey respondents were comparable to large samples from previous research and generally reflective of the profession in the U.S. and Canada and the AAPD membership overall. The results suggest that the responding pediatric dentists routinely use basic behavior guidance techniques recommended by AAPD. More resource-intensive (time, costs, or training-related) techniques, such as memory restructuring and technology-based distraction, and advanced nonpharmacological behavior guidance techniques, such as cognitive behavior therapy, were used less frequently. Respondents reported that techniques such as voice control, parental absence, and protective stabilization encountered higher parent/caregiver hesitancy and refusal.

**Formulation of recommendations.** The clinical question(s) informed by the included systematic reviews were subject to the clinical practice guideline development process following the Appraisal of Guidelines for Research and Evaluation

([AGREE] II) tool.<sup>23</sup> The recommendations were developed by the GRADE Evidence-to-Decision (EtD) process and are referred to in the current document as “Evidence-based Recommendations.” As a part of the process, the WG obtained

Table 1. AMSTAR 2.0 ASSESSMENT OF SELECTED SYSTEMATIC REVIEWS\*

	Author names (first three names, et al) and year				
	Birnie KA, Noel M, Chambers CT et al., 2018 <sup>1</sup>	Prado I, Carcavalli L, Abreu L, et al., 2018 <sup>2</sup>	Custódio N, Costa F, Cademartori M et al., 2020 <sup>3</sup>	De Luca M, Massignan C, Bolan M, et al., 2020 <sup>4</sup>	Monteiro J, Tanday A, Ashley PE, et al., 2020 <sup>5</sup>
1. Did the research questions and inclusion criteria for the review include the components of PICO?	Yes	Yes	Yes	Yes	Yes
2. Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?	Yes	Yes	Yes	Yes	Partially yes
3. Did the review authors explain their selection of the study designs for inclusion in the review?	Yes	Yes	Yes	Yes	Yes
4. Did the review authors use a comprehensive literature search strategy?	Yes	Yes	Yes	Yes	Yes
5. Did the review authors perform study selection in duplicate?	Yes	Yes	No	Yes	Yes
6. Did the review authors perform data extraction in duplicate?	Yes	Yes	Yes	Yes	Yes
7. Did the review authors provide a list of excluded studies and justify the exclusions?	Yes	Yes	Yes	Yes	Yes
8. Did the review authors describe the included studies in adequate detail?	Yes	Partially yes	Partially yes	Yes	Yes
9a. For RCT's, did the review authors use a satisfactory technique for assessing the RoB in individual studies that were included in the review?	Yes	Yes	Yes	Yes	Yes
9b. For NRSI's, did the review authors use a satisfactory technique for assessing the RoB in individual studies that were included in the review?	Includes only RCTs	Includes only RCTs	Includes only RCTs	Yes	Includes only RCTs
10. Did the review authors report on the sources of funding for the studies included in the review?	Yes	No	No	No	Yes
11. If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results?	Yes	NA	Yes	Yes	NA
12. If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?	Yes	NA	Yes	Yes	NA
13. Did the review authors account for RoB in individual studies when interpreting/ discussing the results of the review?	Yes	Yes	Yes	Yes	Yes
14. Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	Yes	Yes	Yes	Yes	Yes
15. If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?	Yes	No	Yes	No	Yes
16. Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?	Yes	Yes	Yes	Yes	Yes
Your score on overall confidence in the results of the review	High (zero or one noncritical weakness)	High (zero or one noncritical weakness)	Moderate (more than one noncritical weakness; no critical flaw)	Moderate (more than one noncritical weakness; no critical flaw)	High (zero or one noncritical weakness)

\* Abbreviations used in this table: AMSTAR=A MeaSurement Tool to Assess systematic Reviews: The systematic reviews relevant to clinical questions that include GRADE Certainty assessment were selected for evaluation using AMSTAR Tool; NA=Not applicable; NRSI=Nonrandomized studies of interventions; PICO= Population, Interventions, Comparisons, and Outcomes; RCTs=Randomized clinical trials; RoB=Risk of bias.



consensus on domains such as priority of the problem, certainty of the evidence, balance between desirable and undesirable consequences, patients' values and preferences, acceptability, and feasibility.<sup>24</sup>

The presented recommendations are primarily based on the direct evidence from the relevant systematic reviews and, where appropriate, on the indirect evidence from other included systematic reviews applicable to the clinical question.

No recommendation was made for interventions that lacked supporting evidence or if the available evidence had very serious indirectness and/or uncertain applicability. A summary of the available evidence was provided when possible.

The supporting evidence informing the evidence-based recommendations has been described in the summary of finding sections.

**Understanding and interpreting the recommendations.**

The formulated evidence-based recommendations aim to help clinicians, clinician educators, parents (as defined by the AAPD<sup>25</sup>) /patients and policy makers make decisions on usage of various behavior guidance techniques<sup>7</sup> in a dental office. The recommendations are intended to aid clinical judgement and not replace it.

The strength of an evidence-based recommendation was assessed to be either strong or conditional, which presents different implications for patients, clinicians, and policy makers (Table 2).<sup>21</sup> A strong recommendation in favor of the intervention implies the WG is confident that the desired benefits of the intervention outweigh any undesirable effects and that, in most situations, clinicians should follow the suggested intervention. A conditional recommendation in favor indicates that, while there is appreciable uncertainty, the desired effects may outweigh the undesired effects of the intervention and that the clinician may want to follow the suggested course of action while being cognizant of the various other treatment choices and individual patient's circumstances, preferences, and values. The recommendations for children and adolescents on previsit and in-office pre-/posttreatment strategies are presented in

Table 3, the recommendations on basic behavior guidance techniques during treatment in Appendix 1, and the recommendations on advanced nonpharmacological behavior guidance techniques are presented in Appendix 2. A decision tree has been presented to summarize available evidence and aid clinicians in decision making (Appendix 3).

A recommendation statement with 'must' or 'shall' indicates an imperative need and/or duty, is an essential or indispensable item/mandatory; a recommendation with 'should' indicates the recommended need and/or duty is highly desirable; and a recommendation with 'may' or 'could' indicates freedom or liberty to follow a suggested alternative.<sup>25</sup>

Clinicians must utilize the presented evidence-based recommendations in an empathetic manner to facilitate treatment completion, optimize dental experience, and instill a positive dental attitude in a child. Decisions regarding the use of behavior guidance techniques, other than communicative management, should be made in collaboration with the parent and, if appropriate, the child; and an informed consent should be obtained consistent with the applicable state laws.<sup>7</sup>

**Recommendations**

**1. In children and adolescents, does the use of previsit and in-office pre-/posttreatment preparation as basic behavior guidance strategies influence cooperative behavior, dental anxiety, procedural pain, and treatment completion during the dental visit?**

The recommendations formulated by the WG to address this question are presented in Table 3.

**1.1. Effect of previsit techniques implemented at home or in a nonclinical setting**

*Summary of findings:* For children and adolescents undergoing preventive visits, the systematic review<sup>6</sup> conducted by the WG found two randomized clinical trials (RCTs)<sup>26,27</sup> conducted in Australia and the U.S. that tested the effect

Table 2. GRADE INTERPRETATION OF STRENGTH OF RECOMMENDATIONS<sup>21\*</sup>

Implications	Strong recommendations	Conditional recommendations
For patients	Most individuals in this situation would want the recommended course of action and only a small proportion would not.	The majority of individuals in this situation would want the suggested course of action, but many would not.
For clinicians	Most individuals should receive the recommended course of action. Adherence to this recommendation according to the guideline could be used as a quality criterion or performance indicator. Formal decision aids are not likely to be needed to help individuals make decisions consistent with their values and preferences.	Recognize that different choices will be appropriate for different patients, and that you must help each patient arrive at a management decision consistent with her or his values and preferences. Decision aids may well be useful helping individuals making decisions consistent with their values and preferences. Clinicians should expect to spend more time with patients when working towards a decision.
For policy makers	The recommendation can be adapted as policy in most situations including for the use as performance indicators.	Policymaking will require substantial debates and involvement of many stakeholders. Policies are also more likely to vary between regions. Performance indicators would have to focus on the fact that adequate deliberation about the management options has taken place.
<b>GRADE Certainty in the Evidence</b>		
High	We are very confident that the true effect lies close to that of the estimate of the effect.	
Moderate	We are moderately confident in the effect estimate. The true effect is likely to be close to the estimate of the effect.	
Low	Our confidence in the effect estimate is limited.	
Very low	We have very little confidence in the effect estimate.	

\* Abbreviation used in this table: GRADE=Grading of Recommendations, Assessment, Development, and Evaluations.

Reprinted with permission. GRADE Handbook: Handbook for grading the quality of evidence and the strength of recommendations using the GRADE approach. Update October 2013. The GRADE Working Group. Available at: "https://gdt.grade.org/app/handbook/handbook.html#h.9rdbelsnu4iy".

Table 3. RECOMMENDATIONS ON USE OF PREVISIT AND IN-OFFICE PRE-/POSTTREATMENT NONPHARMACOLOGICAL BEHAVIOR GUIDANCE

Clinical question 1		<i>In children and adolescents, does the use of previsit and in-office pre-/posttreatment preparation as basic behavior guidance strategies influence cooperative behavior, dental anxiety, procedural pain, and treatment completion during the dental visit?</i>	
	Statement*	Strength	Certainty
<b>Previsit nonpharmacological behavior guidance strategies</b>			
Children undergoing** preventive visits	For children and adolescents needing a preventive care visit, the use of previsit video (filmed) modeling techniques or imagery may have a small effect on reduction in fear, a trivial effect on reduction in anxiety, and a trivial effect on improvement in cooperative behavior compared to no intervention. Clinicians may choose to implement previsit strategies considering costs and resources involved and parent/patient values and preferences.	Conditional	Very Low
Children undergoing† dental treatment visits	For children and adolescents needing dental treatment visits, the use of previsit video (filmed) modeling techniques may result in a variable (small to large effect) reduction in anxiety. Use of illustrations (computer or paper) and storytelling at home may lead to small improvement in behavior at the treatment visit. Clinicians may choose to implement previsit strategies considering costs and resources involved and parent/patient values and preferences.	Conditional	Very Low
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, the use of previsit strategies such as visual pedagogy (positive imagery) illustrating the dental visit step-by-step may have a trivial effect on improvement in cooperative behavior. Given lack of evidence on other strategies, clinicians should make the decision based on their expertise, individual patient factors, and parent/patient values and preferences.	Conditional	Very Low
<b>In-office pretreatment nonpharmacological behavior guidance strategies</b>			
<i>Waiting spaces</i>			
Children undergoing** preventive visits	The Workgroup recognizes the importance of creating a welcoming and inclusive environment in the dental office; however, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on incorporating distraction strategies in office design such as games, music, and media in the waiting spaces should be made based on clinician's expertise, costs and resources needed, necessary accessibility features, and parent/patient values and preferences.		
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits			
<i>Positive imagery in dental office</i>			
Children undergoing** preventive visits	For children and adolescents needing preventive care visits, the use of positive imagery may have a trivial effect on reduction in anxiety. Clinicians may choose to implement positive imagery considering costs and resources involved and parent/patient values and preferences.	Conditional	Very Low
Children undergoing† dental treatment visits	For children and adolescents needing dental treatment visits, the use of positive imagery technique may result in a variable (trivial to large effect) reduction in anxiety and have a small effect on improvement in cooperative behavior. Clinicians may choose to use positive imagery during treatment visits considering costs and resources involved and parent/patient values and preferences.	Conditional	Very Low
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of positive imagery should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		
<i>Direct observation/ modeling in dental office</i>			
Children undergoing** preventive visits	For children and adolescents needing preventive care visits, the use of modeling techniques (direct observation, video modeling, video modeling with stress coping skills) may result in a variable (trivial to large) improvement in cooperative behavior and a variable (trivial to small) reduction in anxiety as compared to no intervention. Clinicians may choose to implement modeling strategies considering costs and resources involved and parent/patient values and preferences.	Conditional	Very Low
Children undergoing† dental treatment visits	For children and adolescents needing dental treatment visits, the use of modeling techniques (direct observation, video modeling, video modeling with stress coping skills) may result in a variable (trivial to large) improvement in cooperative behavior and variable (trivial to large) reduction in anxiety compared to no intervention. Clinicians may choose to implement modeling strategies considering costs and resources involved and parent/patient values and preferences.	Conditional	Very Low
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, the use of video modeling techniques may have a trivial effect on improvement in cooperative behavior and a trivial reduction in anxiety compared to no intervention. Clinicians may choose to implement modeling strategies considering costs and resources involved and parent/patient values and preferences.	Conditional	Very Low

\* Assessment of effect=large effect, moderate effect, small important (statistically significant) effect, or trivial (small unimportant or statistically nonsignificant or no effect).

\*\* Preventive visits=included procedures such as examination, prophylaxis, fluoride, radiographs.

† Dental treatment visits=included procedures such as sealants, restorative care, use of local anesthesia, pulp therapies, and simple extractions.

‡ SHCN=Special health care needs.

Table 3. CONTINUED

Statement*		Strength	Certainty
<b>In-office pretreatment nonpharmacological behavior guidance strategies</b>			
<i>Suggestion</i>			
Children undergoing** preventive visits	For children and adolescents needing preventive care visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of suggestion strategies should be made based on clinical expertise and parent/patient values and preferences.		
Children undergoing† dental treatment visits (dental local anesthesia)	For children and adolescents undergoing local anesthesia, suggestion may lead to a trivial effect on reduction in self-reported pain. Clinicians may choose to use positive suggestions to reassure patients considering their expertise and parent/patient values and preferences.	Conditional	Very Low
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of suggestion strategies should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		
<i>Preparation and information</i>			
Children undergoing** preventive visits	For children and adolescents needing preventive care visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of preparation and information strategies should be made based on clinical expertise and parent/patient values and preferences.		
Children undergoing† dental treatment visits	For children and adolescents undergoing local anesthesia, preparation strategies may have a trivial effect on reduction in self- or observer-reported pain. Clinicians may choose to provide preparatory information considering their expertise and parent/patient values and preferences.	Conditional	Very Low
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of preparation and information strategies should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		
<b>In-office posttreatment nonpharmacological behavior guidance strategies</b>			
Children undergoing** preventive visits	For children and adolescents needing preventive or dental treatment visits, the use of posttreatment live modeling may have trivial effect on reduction in anxiety. Clinicians may use posttreatment strategies based on their clinical expertise and parent/patient values and preferences.	Conditional	Very Low
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of posttreatment strategies should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		

\* Assessment of effect=large effect, moderate effect, small important (statistically significant) effect, or trivial (small unimportant or statistically nonsignificant or no effect).

\*\* Preventive visits=included procedures such as examination, prophylaxis, fluoride, radiographs.

† Dental treatment visits=included procedures such as sealants, restorative care, use of local anesthesia, pulp therapies, and simple extractions.

‡ SHCN=Special health care needs.

of a filmed model demonstrating coping techniques and the guided rehearsal of these techniques. Weinstein et al.<sup>27</sup> reported a small reduction in dental fear measured by the visual analogue scale (VAS). Another study<sup>26</sup> reported a trivial effect on reduction in anxiety as measured by Picture Dental Anxiety Scale (PDAS) and heart rate (HR) and a trivial effect on reduction in behavioral disturbance as measured by Dimensions of Anxiety Index (DAI).

For children and adolescents undergoing **dental treatment visits**, the systematic review<sup>8</sup> conducted by the WG found four RCTs<sup>28-31</sup> conducted in the UK and Iran that evaluated the effectiveness of previsit preparatory techniques. Two studies evaluated modeling,<sup>28,29</sup> one study evaluated computer illustration,<sup>30</sup> and one study used storytelling.<sup>31</sup> The children who received the modeling intervention exhibited significantly less anxiety throughout the dental procedure, as reported by the self-reported Abeer Children Dental Anxiety Scale (ACDAS) and VAS. Campbell et al.<sup>30</sup> concluded that interactive computer

illustration improved coping behavior in children prior to general anesthesia induction. Another study<sup>31</sup> used previsit conditioning by the mother telling stories related to the dental procedure, with results indicating that conditioning by mothers can improve patients' behavior.

For children and adolescents with **SHCN undergoing preventive or treatment visits**, the systematic review<sup>9</sup> conducted by the WG found no studies on the effect of previsit techniques conducted prior to dental visit that met the inclusion criteria.

*Remarks:* The WG noted lack of high-quality research needed to establish association of pre-/postvisit preparation with improvement in cooperative behavior and reduction in anxiety and pain. Therefore, the recommendation is based on very low certainty evidence. There were no undesirable effects reported on use of pre-/postvisit techniques to manage patient's experience during the dental visit. It was judged that there is no important uncertainty or variability about how the parents/patients would value these

techniques. A recent AAPD member survey revealed that 62.5 percent of the responding pediatric dentists use pre-visit preparation to provide information to patient and/or the parent, and most providers reported never or rarely encountering any hesitancy, reluctance, or refusal by parents/caregivers when attempting to provide pre-visit information<sup>22</sup>. The pre-/postvisit techniques were considered acceptable to providers and parents/caregivers and feasible to implement with low resource utilization.

## 1.2 Pretreatment techniques implemented in a dental office.

### 1.2.1 Waiting spaces

*Summary of findings:* A systematic review<sup>13</sup> evaluated interventions aimed at reducing anxiety in pediatric health care waiting spaces and found eight studies investigating play opportunities, media distractions, combined play opportunities and media distractions, and music. The studies used various assessment tools in children such as HR, behavior mapping, VAS, Venham Picture Test (VPT), and Modified Yale Preoperative Anxiety Scale (mYPAS). In pediatrics, play opportunities, including provision of small toys, access to a playroom, and distribution of coloring books were most studied and facilitated statistically significant preprocedural anxiety reduction. Overall, there was insufficient evidence to corroborate effectiveness of play opportunities, media distractions, and music for mitigating anxiety in pediatric waiting areas. The WG decided not to formulate recommendations because the quality of the systematic review was judged to be critically low using the AMSTAR 2 tool.

*Remarks:* The AAPD member survey<sup>22</sup> revealed that about one-half of the members who responded used distraction by office design. There is need for high-quality research studying the effect of interventions used in dental office waiting spaces on reduction in anxiety and improvement in cooperation.

### 1.2.2 Positive imagery

*Summary of findings:* For children and adolescents undergoing preventive visits, the systematic review<sup>1</sup> conducted by the WG found one RCT<sup>32</sup> conducted in Brazil that tested the effect of positive pre-visit imagery (i.e., photos of positive dental situations such as a child smiling in the dental chair) and reported a trivial effect on reduction in dental anxiety during dental examination as measured by VPT.

For children and adolescents undergoing dental treatment visits, the systematic review<sup>8</sup> conducted by the WG found two RCTs<sup>33,34</sup> conducted in the United Kingdom (UK) and Egypt that evaluated the effectiveness of positive dental images as a pretreatment preparation strategy. Results showed a wide range of effect (trivial to large) on reduction in anxiety<sup>33,34</sup> and a small improvement in cooperative behavior.<sup>34</sup>

For children and adolescents with SHCN undergoing preventive or treatment visits, the systematic review<sup>9</sup> conducted by the WG found no studies on the effect of positive imagery conducted prior to dental visit that met the inclusion criteria.

*Remarks:* The AAPD member survey<sup>22</sup> revealed that only one-third of the responding pediatric dentists used positive imagery and reported rarely encountering any hesitancy, reluctance, or refusal by parents/caregivers for its use as

a pretreatment strategy. The recommendations were based on very low certainty evidence. It was judged that there is no important uncertainty or variability about how the parents/patients would value these techniques. Given no undesirable effects, the techniques were considered acceptable to providers and parents/patients and feasible to implement with low resource utilization.

### 1.2.3 Direct observation/modeling

*Summary of findings:* For children and adolescents undergoing preventive visits, the systematic review<sup>1</sup> conducted by the WG found six RCTs<sup>35-40</sup> representing five different countries (Canada, India, Lebanon, Spain, and two from the U.S.) that explored the effects of direct observation/modeling during a preventive clinical visit including various combinations of examination, radiographs, oral prophylaxis, and/or fluoride application. Hine et al.<sup>39</sup> reported a large improvement in cooperative behavior from video modeling compared to control which was watching children's cartoons. A trivial effect on reduction in anxiety was reported by three studies using physiologic measures (HR)<sup>37,38,40</sup> and by one study using the self-reported Facial Image Scale (FIS).<sup>40</sup>

For children and adolescents undergoing dental treatment visits, the systematic review<sup>8</sup> conducted by the WG found ten RCTs<sup>41-50</sup> conducted in the U.S., Australia, Saudi Arabia, and South Korea that evaluated the use of direct observation/modeling. Six studies found significantly less negative behavior in children exposed to video modeling, as rated by the dentist utilizing Frankl's Behavior Rating Scale (FBRS)<sup>41,43</sup>, the Behavior Profile Rating Scale (BPRS)<sup>42,44,45</sup>, and the modified Houpt scale.<sup>47</sup> Nine studies found a reduction in dental anxiety in children receiving dental treatment, based on assessment results obtained using the self-reported Children's Fear Survey Scale (CFSS)<sup>42,44</sup>, Picture Dental Anxiety Scale-Child (PDAS-CH)<sup>46</sup>, State-Trait Anxiety Inventory (STAI)<sup>47</sup>, and physiologic assessment using the Palmer Sweat Index test<sup>42,45</sup>, HR<sup>47,49</sup>, respiration<sup>44</sup>, and skin conductance tests.

For children and adolescents with SHCN undergoing preventive or treatment visits, the systematic review<sup>9</sup> conducted by the WG found one clinical trial<sup>51</sup> conducted in the U.S. that reported trivial effect on reduction in anxiety and improvement in cooperative behavior in the group that was exposed to video modeling, with a slideshow of images with voiceover depicting a preventive visit shown immediately prior to a preventive visit (examination, oral prophylaxis, and fluoride application).

*Remarks:* The AAPD member survey<sup>22</sup> revealed that 80 percent of the responding pediatric dentists used direct observation/modeling and reported rarely encountering any hesitancy, reluctance, or refusal by parents/caregivers for its use. The recommendations were based on very low certainty of evidence. It was judged that there is no important uncertainty or variability about how the parents/patients would value these techniques. Given no undesirable effects, the techniques were considered acceptable to providers and parents/patients and feasible to implement with low resource utilization.

### 1.2.4 Suggestion

*Summary of findings:* One systematic review<sup>1</sup> studied the effect of positive suggestion before needle-related procedures in a medical setting, that is, reassuring the patient



that adequate steps have been taken to make treatment easier or less painful, and reported a trivial effect on reduction in self-reported pain. The WG found no publications that studied the effect of suggestion in a dental setting for a **preventive visit**, for a **treatment visit**, or for children with SHCN undergoing a preventive or treatment visit.

*Remarks:* There is need for high quality research studying the effect of suggestion on reduction in anxiety and improvement in cooperation.

### 1.2.5 Preparation and information

*Summary of findings:* One systematic review<sup>1</sup> studied the effect of preparatory information provided to children through pictures/photo storybooks before needle-related procedures in a medical setting and reported a trivial effect on reduction in self-/observer-reported pain. The WG found no publications that studied the effect of preparation in a dental setting for **preventive visit**, for **treatment visit**, or for children with SHCN undergoing preventive or treatment visit.

*Remarks:* The AAPD member survey<sup>22</sup> revealed that 62.5 percent of the responding pediatric dentists use preparation and information in their practice and never or rarely encountered any hesitancy, reluctance, or refusal by parents/caregivers. There is need for high quality research studying the effect of preparation and information on reduction in anxiety and improvement in cooperation.

### 1.3 Posttreatment techniques in dental office

*Summary of findings:* For children and adolescents undergoing **preventive visits**, the systematic review<sup>6</sup> conducted by the WG found no studies on the effect of posttreatment interventions conducted in the dental office that met the inclusion criteria. However, the indirect evidence from the systematic review on children undergoing dental treatment visits<sup>5</sup> was deemed acceptable and subjected to GRADE process to inform the recommendations for children undergoing preventive visits.

For children and adolescents undergoing **dental treatment visits**, the systematic review<sup>8</sup> conducted by the WG found one RCT<sup>52</sup> conducted in the UK that tested the effectiveness of a posttreatment modeling intervention (passivity to activity through live symbolic modeling) after dental restorative visits. The study reported trivial effect on reduction in anxiety in the subsequent treatment visit using Modified Child Dental Anxiety Scale (MCDAS).

For children and adolescents with SHCN undergoing **preventive or treatment visits**, the systematic review<sup>9</sup> conducted by the WG found no studies on the effect of post-treatment interventions conducted in the dental office that met the inclusion criteria.

*Remarks:* The AAPD member survey<sup>22</sup> revealed that only 33.9 percent of the responding pediatric dentists use postvisit debrief/preparation as a behavior guidance technique and reported never or rarely encountering any hesitancy, reluctance, or refusal by parents/caregivers in relation to its implementation. The recommendations were based on very low certainty evidence. It was judged that there is no important uncertainty or variability about how the parents/patients would value these techniques. Given no undesirable effects, the techniques were considered acceptable to providers and parents/patients and feasible to implement with low resource utilization.

## 2. In children and adolescents, does the use of basic behavior guidance techniques influence cooperative behavior, dental anxiety, procedural pain, and treatment completion during the dental visit?

The recommendations formulated by the WG to address this question are presented in Appendix 1.

### 2.1 Communication and communicative guidance

#### 2.1.1 Communication (verbal)

*Summary of findings:* The WG found no studies on the effect of communicative guidance conducted in the dental office that met the inclusion criteria for children undergoing **preventive visit**, for children undergoing dental **treatment visit**, or for children with SHCN undergoing **preventive or treatment visit**.

#### 2.1.2 Communication (nonverbal)

*Summary of findings:* For children and adolescents undergoing **preventive visits**, the systematic review<sup>6</sup> conducted by the WG found one RCT<sup>53</sup> conducted in the U.S. that studied the effect of nonverbal communication (e.g., reassuring pat on the arm) and reported trivial effect on reduction in dental fear-related-emotion and a small reduction in fidgeting behavior in children older than seven compared to children younger than seven as measured by BPRS.

For children and adolescents undergoing **dental treatment visits** and for the children with SHCN undergoing **either preventive or treatment visits**, the systematic reviews<sup>8,9</sup> conducted by the WG found no studies on the effect of nonverbal communication conducted in the dental office that met the inclusion criteria.

*Remarks:* Communication was considered universally applied and integral to the success of accompanying behavior guidance techniques. The AAPD member survey<sup>22</sup> revealed that 97.3 percent of the responding pediatric dentists use verbal communication and counseling skills to build rapport and trust and 72.1 percent report using nonverbal communication as a behavior guidance technique. Respondents never or rarely encountered any hesitancy, reluctance, or refusal by parents/caregivers when using the communication techniques. The recommendation for nonverbal communication was based on very low certainty evidence. It was judged that there is no important uncertainty or variability about how the parents/patients would value these techniques. Given no undesirable effects, communicative techniques were considered acceptable to providers and parents/patients and feasible to implement with low resource utilization.

### 2.2 Tell-show-do and its modifications

*Summary of findings:* For children and adolescents undergoing **preventive visits**, the systematic review<sup>6</sup> conducted by the WG found three RCTs<sup>40,54,55</sup> conducted in India and Pakistan that tested the effectiveness of TSD or its modification TPD compared to other behavior guidance techniques (modeling and mobile dental application). Vishwakarma et al.<sup>54</sup> compared TPD to live modeling and reported a small reduction in dental anxiety in the TPD group measured by HR, FIS, and VPT as determined by SMD. Karekar's study<sup>40</sup> compared TSD to both filmed and live modeling and reported large reduction in anxiety measured by HR favoring both modeling techniques compared to TSD, as well as a trivial effect on

reduction in anxiety measured by FIS favoring TSD. Abbasi et al.<sup>55</sup> compared TSD to no behavior guidance techniques and reported a trivial effect on reduction in dental anxiety between two groups measured by HR and FIS.

For children and adolescents undergoing **dental treatment visits**, the systematic review<sup>8</sup> conducted by the WG found eight randomized clinical trials<sup>54,56-62</sup> conducted in India, China, Israel, and Brazil that studied the effect of TSD and TPD, TPD/audio and AVD, and virtual reality (VR) glasses in different population samples of healthy children. Only one study compared TSD with a control group (no specific behavior guidance technique)<sup>58</sup> and found trivial to small effect on reduction in anxiety measured by VPT and physiologic methods. Compared to TSD, distraction interventions had a large reduction in anxiety measured by physiologic methods (HR and blood pressure, rated as critical outcomes).<sup>56,61</sup> Another study compared TSD with hiding/camouflaging the dental needle technique and found trivial effect on reduction in anxiety (assessed by FIS and HR), reduction in pain (assessed by the Wong-Baker FACES Pain Rating Scale), and improvement in cooperative behavior (assessed by the FBRS).<sup>62</sup>

For children and adolescents with **SHCN undergoing either preventive or treatment visits**, the systematic review<sup>9</sup> conducted by the WG found no studies on the effect of TSD and its modifications conducted in the dental office that met the inclusion criteria.

*Remarks:* TSD and its modifications are among the most used and universally applied basic behavior guidance techniques. The AAPD member survey<sup>22</sup> revealed that 98.3 percent of the responding pediatric dentists use TSD in their practice and never or rarely encountered any hesitancy, reluctance, or refusal by parents/caregivers. Given the lack of high-quality research, the recommendation for use of TSD was based on very low certainty evidence. Many studies used TSD as a control group comparing it to an active technology-based distraction technique. It was judged that there is no important uncertainty or variability about how parents/patients would value these techniques. Given no undesirable effects, TSD and its modifications were considered acceptable to providers and parents/patients and feasible to implement with low resource utilization.

### 2.3 Ask-tell-ask (ATA)

*Summary of findings:* The WG found no studies on the effect of ATA conducted in the dental office that met the inclusion criteria for children undergoing **preventive visits**, for children undergoing **dental treatment visits**, and for children with **SHCN undergoing preventive or treatment visits**.

*Remarks:* The AAPD member survey<sup>22</sup> on AAPD members revealed that less than one-half of the members who responded used ATA as a behavior guidance technique in their practices. Those who used this technique never or rarely encountered any hesitancy, reluctance, or refusal by parents/caregivers. There is need for high quality research studying the effect of interventions used in a dental environment on reduction in anxiety and improvement in cooperation.

### 2.4 Voice control and its modifications

*Summary of findings:* For children and adolescents undergoing **preventive visits**, the systematic review<sup>6</sup> conducted

by the WG found no studies on the effect of voice control conducted in the dental office that met the inclusion criteria. However, the indirect evidence from the systematic review on children undergoing dental treatment visits<sup>8</sup> was deemed acceptable and subjected to GRADE process to inform the recommendation for children undergoing preventive visits.

For children and adolescents undergoing **dental treatment visits**, the systematic review<sup>8</sup> conducted by the WG found one RCT<sup>63</sup> conducted in the U.S. that tested the effectiveness of voice control (contingent, loud, and firm voice command) during dental restorative visits and reported trivial effect on reduction in fear and a trivial effect on improvement in cooperative behavior when voice control was used compared to normal voice.

For children and adolescents with **SHCN undergoing preventive or treatment visits**, the systematic review<sup>9</sup> conducted by the WG found no studies on voice control conducted in the dental office that met the inclusion criteria.

*Remarks:* The AAPD member survey<sup>22</sup> revealed that 59.2 percent of the responding pediatric dentists use voice control in their practice. The practitioners frequently encountered hesitancy, reluctance, or refusal by parents/caregivers on the use of loud voices. Though traditional voice control involves use of loud voice, its modification (i.e., the practice of lowering the voice) may also be utilized. Given the lack of high-quality research, the recommendation for use of voice control was based on very low certainty evidence. While voice control was considered feasible to implement with low resource utilization, it is likely to have inconsistent acceptance by providers and parents/patients thus necessitating engaging parents in shared decision making before implementing the technique.

### 2.5 Positive reinforcement and descriptive praise

*Summary of findings:* For children and adolescents undergoing **preventive visits**, the systematic review<sup>6</sup> conducted by the WG found one RCT<sup>64</sup> conducted in Brazil that studied children receiving a positive reinforcement reward after dental care. The reward after dental care led to a small reduction in anxiety among preschool children at the second visit assessed in the reception room before any dental treatment.

For children and adolescents undergoing **dental treatment visits**, the systematic review<sup>8</sup> conducted by the WG found two randomized clinical trials<sup>65,66</sup> conducted in the U.S. and China studying the effectiveness of positive reinforcement (small prize such as a sticker or eraser<sup>66</sup> or contingent access to AVD<sup>65</sup>) for dental treatment. In the Xia et al.<sup>66</sup> study, there was a large reduction in fear assessed by the Children's Fear Survey Scale Dental Subscale (CFSS-DS) Chinese version. Ingersoll et al.<sup>65</sup> reported that in the contingent reinforcement group there was a significant reduction in disruptive behavior measured by the Allard Stokes Scale for disruptive behavior (critical outcome), and an insignificant tendency toward reduction in self-reported fear and anxiety measured by CFSS-DS and VPT.

For children and adolescents with **SHCN undergoing preventive or treatment visits**, the systematic review<sup>9</sup> conducted by the WG found no studies on the effect of positive reinforcement conducted in the dental office that

met the inclusion criteria. However, the indirect evidence from the systematic review on children undergoing dental treatment visits<sup>8</sup> was deemed acceptable and subjected to GRADE process to inform the recommendations for children with SHCN undergoing preventive or treatment visits.

*Remarks:* Positive reinforcement and descriptive praise are among the most used and universally applied basic behavior guidance techniques. The AAPD member survey<sup>22</sup> revealed that 95.1 percent of responding pediatric dentists use positive reinforcement in their practice and never or rarely encountered any hesitancy, reluctance, or refusal by parents/caregivers. However, no studies examined the effectiveness of descriptive, specific praise on anxiety, fear, or behavior. The recommendation on use of positive reinforcement was based on moderate certainty evidence for preventive visits and very low certainty evidence for dental treatment visits and for children with SHCN. It was judged that there is no important uncertainty or variability about how the parents/patients would value these techniques. Given no undesirable effects, positive reinforcement and descriptive praise were considered acceptable to providers and parents/patients and feasible to implement with low resource utilization.

## 2.6 Memory restructuring

*Summary of findings:* For children and adolescents undergoing **preventive visits**, the systematic review<sup>6</sup> conducted by the WG found no studies on memory restructuring conducted in the dental office that met the inclusion criteria.

For children and adolescents undergoing **dental treatment visits**, the systematic review<sup>8</sup> conducted by the WG found one study conducted in the U.S. that examined memory restructuring completed just prior to the second (restorative) treatment and reported a trivial effect on reduction in fear and pain.<sup>67</sup>

For children and adolescents with SHCN undergoing **preventive or treatment visits**, the systematic review<sup>9</sup> conducted by the WG found no studies on memory restructuring conducted in the dental office that met the inclusion criteria.

*Remarks:* The AAPD member survey<sup>22</sup> revealed that only 22.4 percent of the responding pediatric dentists use memory restructuring in their practice and never or rarely encountered any hesitancy, reluctance, or refusal by parents/caregivers. Given the lack of high-quality research, the recommendation for use of memory restructuring was based on very low certainty evidence. While memory restructuring was considered feasible to implement with low resource utilization, it is likely to have varying acceptance among providers and parents/patients thus necessitating parental engagement in shared decision making prior to implementing the technique.

## 2.7 Biofeedback relaxation

*Summary of findings:* For children and adolescents undergoing **preventive visits**, the systematic review<sup>6</sup> conducted by the WG found no studies on biofeedback relaxation conducted in the dental office that met the inclusion criteria.

For children and adolescents undergoing **dental treatment visits**, the systematic review<sup>8</sup> conducted by the WG found two RCTs<sup>68,69</sup> conducted in India that tested the effectiveness of biofeedback relaxation. Biofeedback relaxation

techniques those allowing patients an opportunity to receive feedback on their physiological responses using electro-mechanical devices and voluntarily learning to control some facets of their response resulted in a large reduction in anxiety measured by HR but a trivial effect on reduction in anxiety measured by the Chotta Bheem-Chutki (CBC) Scale.<sup>68</sup> In the other study, the SMD showed a large reduction in anxiety measured by HR as measured by VAS.<sup>69</sup>

For children and adolescents with SHCN undergoing **preventive or treatment visits**, the systematic review<sup>9</sup> conducted by the WG found no studies on biofeedback relaxation conducted in the dental office that met the inclusion criteria.

*Remarks:* Given the lack of high-quality research, the recommendation for use of biofeedback relaxation was based on very low certainty evidence. Given unknown undesirable effects, biofeedback relaxation may be accepted as an intervention by providers and parents/patients, however, the feasibility is likely to vary based on the resources needed to implement it.

## 2.8 Breathing relaxation

*Summary of findings:* For children and adolescents undergoing **preventive visits**, the systematic review<sup>6</sup> conducted by the WG found no studies on the effect of breathing relaxation conducted in the dental office that met the inclusion criteria. However, the indirect evidence from the systematic review on children undergoing dental treatment visits<sup>8</sup> was deemed acceptable and subjected to GRADE process to inform the recommendations for children undergoing preventive visits.

For children and adolescents undergoing **dental treatments**, the systematic review<sup>8</sup> conducted by the WG found one study<sup>70</sup>, conducted in Italy, which examined the use of diaphragmatic breathing (i.e., breathing relaxation) and reported variable reduction in anxiety based on HR data and large reduction based on respiratory rate (RR) data. The effect on reduction in pain, fear, sadness, and anger and the improvement in happiness were assessed to be trivial.

For children and adolescents with SHCN undergoing **preventive or treatment visits**, the systematic review<sup>9</sup> conducted by the WG found no studies on breathing relaxation conducted in the dental office that met the inclusion criteria.

*Remarks:* The AAPD member survey<sup>22</sup> revealed that two-thirds of the responding pediatric dentists use breathing relaxation techniques in their practice and never or rarely encountered any hesitancy, reluctance, or refusal by parents/caregivers. It was judged that there is no important uncertainty or variability about how the parents/caregivers would value these techniques. Given the very low likelihood of undesirable effects, breathing relaxation techniques were considered acceptable to providers and parents/patients and feasible to implement with low resource utilization.

## 2.9 Desensitization

*Summary of findings:* For children and adolescents undergoing **preventive visits**, the systematic review<sup>6</sup> conducted by the WG found no studies on the effect of desensitization conducted in the dental office that met the inclusion criteria. However, the indirect evidence from the systematic

review on children undergoing dental treatment visits<sup>8</sup> was deemed acceptable and subjected to GRADE process to inform the recommendation for children undergoing preventive visits.

For children and adolescents undergoing dental treatment visits, the systematic review<sup>8</sup> conducted by the WG found one RCT<sup>41</sup> conducted in the U.S. that tested the effectiveness of desensitization and reported small improvement in cooperative behavior when desensitization was used compared to the control group.

For children and adolescents with SHCN undergoing preventive or treatment visits, the systematic review<sup>9</sup> conducted by the WG found no studies on the effect of desensitization conducted in the dental office that met the inclusion criteria. However, the indirect evidence from the systematic review on children undergoing dental treatment visits<sup>8</sup> was deemed acceptable and subjected to GRADE process to inform the recommendation for children with SHCN.

*Remarks:* The AAPD member survey<sup>22</sup> revealed that three-fourths of the responding pediatric dentists use desensitization in their practice and never or rarely encountered any hesitancy, reluctance, or refusal by parents/caregivers. It was judged that there is no important uncertainty or variability about how the parents/patients would value these techniques. Given that the benefits of desensitization outweigh any temporary undesirable effects, the technique is considered acceptable to providers and parents/caregivers and is feasible to implement with low resource utilization.

## 2.10 Enhancing control

*Summary of findings:* The WG found no studies on the effect of enhancing control techniques utilized in the dental office that met the inclusion criteria for children undergoing preventive visits, dental treatment visits, or for children with SCHN undergoing preventive or treatment visits.

*Remarks:* The AAPD member survey<sup>22</sup> revealed that two-thirds of the responding pediatric dentists use enhancing control in their practice and never or rarely encountered any hesitancy, reluctance, or refusal by parents/caregivers. Considering that the intervention is likely to be used by the majority of pediatric dentists, there is need for high quality research studying the effect of enhancing control on reduction in anxiety and improvement in cooperation.

## 2.11 Distraction

### 2.11.1 Magic tricks

*Summary of findings:* For children and adolescents undergoing preventive visits, the systematic review<sup>6</sup> conducted by the WG found two RCTs<sup>71,72</sup> conducted in Israel and India that tested the effectiveness of distraction with a 'magic trick' on children's dental anxiety<sup>72</sup> and on children's readiness to receive radiographs<sup>71</sup> or a prophylaxis treatment<sup>72</sup> measured by the time it took to sit in the dental chair<sup>71</sup> or to enter the treatment area<sup>72</sup>. One study used an acrylic thumb light that could 'magically' appear and reappear<sup>72</sup> and showed small effect on reduction in the anxiety when compared to baseline. Another study used a 'magic book' in which pictures could be erased magically and drawn again<sup>71</sup> and reported a trivial effect on improvement in cooperative behavior.

For children and adolescents undergoing dental treatment visits, the systematic review<sup>8</sup> conducted by the WG found no studies on the effect of magic tricks conducted in the dental office that met the inclusion criteria. However, the indirect evidence from the systematic review on children undergoing preventive visit<sup>8</sup> was deemed acceptable and subjected to GRADE process to inform the recommendation for children undergoing treatment visits.

For children and adolescents with SHCN undergoing preventive or treatment visits, the systematic review<sup>9</sup> conducted by the WG found no studies on the effect of magic tricks conducted in the dental office that met the inclusion criteria.

*Remarks:* Given the lack of high-quality research, the recommendations for use of magic tricks as distraction techniques were based on very low certainty evidence. Given unknown undesirable effects, magic tricks are likely to have inconsistent acceptance as an intervention among providers and parents/patients, however, it may be feasible to implement after considering the needed resources and training.

### 2.11.2 Traditional distraction techniques

*Summary of findings:* For children and adolescents undergoing preventive and dental treatment visits, one systematic review<sup>2</sup> evaluated the effect of mirror and conversation, toys, and books and children's stories and, based on one study<sup>64</sup>, found no difference in effect on dental anxiety compared to control group. The systematic review<sup>6</sup> found no additional studies on the effect of traditional distraction techniques conducted in the dental office during a preventive visit that met the inclusion criteria. Due to limited evidence, the WG was unable to formulate evidence-based recommendations on its use.

For children and adolescents undergoing dental treatment visits (dental local anesthesia), two systematic reviews<sup>2,5</sup> evaluated the effect of traditional distraction techniques (camouflaging of syringe, use of counterstimulation [shaking or pulling the mucosa with intraoral or extraoral finger]), and asking the patient to do breathing exercises or to draw letters in the air with their feet, cooperative behavior, anxiety and pain during delivery of local anesthetic. Results of the meta-analysis were analyzed and converted into standardized terms using SMD to assist interpretation and deliberation among the WG members. Both systematic reviews evaluated the effect of distraction techniques such as camouflaging the syringe on cooperative behavior dental anxiety and pain perception triggered during dental treatment. The results from Prado et al.<sup>2</sup> suggested that camouflaging the syringe may result in a reduction in pain-related behavior and improvement in overall cooperative behavior. Results from Monteiro et al.<sup>5</sup> suggested that the use of counter stimulation and camouflaging the syringe showed varying levels of reduction in anxiety and pain perception during administration of local anesthesia. In addition, camouflaging the syringe also resulted in improvement in cooperative behavior. Based on very low certainty of evidence, one systematic review<sup>3</sup> reported that local anesthetic delivered using a digital injection technology (Wand) compared to the traditional technique may result in small reduction in anxiety, a variable effect (trivial to small) on reduction in pain perception, and a trivial effect on cooperative behavior.



For children and adolescents with SHCN undergoing preventive or treatment visits, the systematic review<sup>9</sup> conducted by the WG found no studies on the effect of traditional distraction techniques conducted in the dental office that met the inclusion criteria.

*Remarks:* The AAPD member survey<sup>22</sup> revealed that 82.4 percent of responding pediatric dentists used distraction by imagination (e.g., stories) as a behavior guidance technique and reported never or rarely encountering any hesitancy, reluctance, or refusal by parents/caregivers. The traditional distraction techniques are considered acceptable to providers and parents/patients and feasible to implement with low resource utilization. The recommendations are based on very low certainty evidence. There is a need for high-quality research to substantiate the effect of traditional distraction techniques during dental treatment.

### 2.11.3 Technology-based distraction techniques

*Summary of findings:* For children and adolescents undergoing preventive visits, the systematic review<sup>6</sup> conducted by the WG found two RCTs<sup>55,72</sup> conducted in India and Pakistan that tested effectiveness of a mobile dental application (app). One of the studies<sup>55</sup> reported a small reduction in anxiety measured by HR and a large reduction in anxiety as measured by FIS when a mobile app was used compared to no intervention control. The second study<sup>72</sup> reported a trivial effect on reduction in anxiety compared to the TSD group as measured by CBC Scale and found a small effect on reduction in time taken to accept dental treatment (readiness of the child) for the mobile app group compared to the TSD group.

For children and adolescents undergoing dental treatment visits, three systematic reviews<sup>2,3,5</sup> evaluated the effect of technology-based distractions such as music distraction, three-dimensional (3D) glasses, and AVD on cooperative behavior, anxiety, and/or pain during restorative procedures. Results of the meta-analysis were analyzed using SMD to assist interpretation and deliberation among the WG members. Prado et al.<sup>2</sup> evaluated the effect of distraction techniques such as audio songs, 3D glasses, eyeglasses, and AVD on cooperative behavior, dental anxiety, and pain perception triggered during dental treatment. The results suggested a small reduction in anxiety favoring audio songs, and a variable (trivial to small) effect favoring use of AVD/3D glasses/eyeglasses in reducing anxiety and improving cooperative behavior. Custodio et al.<sup>3</sup> reported trivial (small unimportant) or no benefits for administering local anesthesia, caries removal, and placement of rubber dam; however, that systematic review showed large reduction in anxiety and pain perception during restorative treatment. The WG considered that part of this effect could be attributed to the natural reduction in anxiety (habituation) experienced over the length of the procedure. Monteiro et al.<sup>5</sup> evaluated the effect of technology-based distraction techniques such as music, 3D glasses, video modelling, tablet, and VR box on cooperative behavior, dental anxiety, and pain perception triggered during administration of local anesthesia. Use of technology-based distractions such as VR-box and tablets showed trivial (small unimportant) or no benefits; however, music distraction, 3D glasses, and video modeling showed varying levels of reduction in anxiety and pain perception and improvement in cooperative behavior during administration of local anesthesia.

Three studies on technology-based distractions were identified and included in the review to update the most recent systematic reviews published in 2020. One RCT<sup>73</sup> conducted in Turkey tested robot distraction versus verbal distraction on children needing restorative (with or without local anesthesia) or pulpotomy treatment. They assessed behavior using a physician-rated scale (FBRS) and anxiety using the self-reported FIS (by children), Corah's Dental Anxiety Scale ([DAS], answered by parents), and physiologic measures (HR) and found that the robotic technology can successfully help in coping with dental anxiety (small reduction) and stress and helps children cooperate (small effect) in the dental office. The second RCT, cross-over design<sup>74</sup> conducted in Spain, tested effectiveness of PlayStation™ video game (versus cartoon control group) for restorative care. The outcomes studied were behavior, dental anxiety, and dental pain using child-rated (VPT, Wong-Baker Faces Pain Rating Scale), physician-rated (FBRS), physiologic (HR), and parent-reported (Modified Corah Dental Anxiety Scale [MDAS]) scales. The study showed no significant differences in self-reported anxiety (measured by VPT), no significant differences in self-reported pain (measured by Wong-Baker FACES Pain Rating Scale), and no significant differences in global behavior (measured by FBRS). The third RCT,<sup>75</sup> conducted in Jordan, evaluated the use of immersive VR goggles during treatment completed without local anesthesia including fissure sealant placement, space maintainer placement, fluoride application, impression, or scaling. The study measured dental pain, both self-rated (Wong-Baker FACES Pain Rating Scale, VAS) and physician-rated (by a research assistant using the Face Legs Arms Crying Consolability scale). The use of VR was found to be an effective distraction tool to ease pain and anxiety in the tested dental procedures.

For children and adolescents with SHCN undergoing preventive or treatment visits, the systematic review<sup>9</sup> conducted by the WG found three RCTs<sup>76-78</sup> conducted in the U.S. and Italy that evaluated the use of AVD techniques such as video goggles. One trial studied reported trivial effect on improvement in cooperative behavior and reduction in anxiety in patients with autism spectrum disorder (ASD) during a preventive visit<sup>76</sup>. In the second study, the use of video glasses resulted in large reduction in pain during preventive care visit and in a trivial effect on reduction in pain-related behavior during restorative visit, which was evident only in the second clinical session<sup>77</sup>. In the third study, when compared to protective eyeglasses, the use of video glasses resulted in a trivial effect on reduction in pain during a preventive visit.<sup>78</sup>

*Remarks:* The AAPD member survey<sup>22</sup> revealed that the responding pediatric dentists commonly use technology-based distraction techniques such as music/audio songs (50.9 percent) and AVD (77 percent). The practitioners never or rarely encountered any hesitancy, reluctance, or refusal by parents/caregivers. The technology-based distraction techniques are considered acceptable to providers and parents/caregivers and have varying feasibility to its implementation depending on the costs and resources needed for implementation. There is moderate certainty evidence to inform the recommendation for use of VR glasses during placement of a restoration; however, the recommendations for other technology-based approaches (such as audio songs and AVD/3D glasses/eyeglasses) are

based on very low certainty of evidence. Clinicians should ensure that any video or VR glasses used meet the standards required for eye protection during dental treatment. Also, it may be prudent for clinicians to periodically monitor the eyes to see how the child is coping with the treatment and check for any early indicators of health-related issues. In addition, care should be taken so that children with hearing impairments have a full visibility of their surroundings<sup>79</sup>. The AAPD member survey<sup>22</sup> revealed that only 2.1 percent of the responding pediatric dentists use VR as a behavior guidance technique in their practices, which highlights a potential disparity in published research on techniques that may be of research interest but have low clinical application. It is important that practitioners use their clinical judgement based on their expertise, patient preferences, costs, resources involved before implementing new behavior guidance techniques in their offices.

### 2.12 Parental presence/absence

*Summary of findings:* For children and adolescents undergoing **preventive or dental treatment visits**, one systematic review<sup>6</sup> evaluated whether parents' presence in the operatory influenced children's cooperative behavior, anxiety, and fear during dental treatment. The included studies used the FBRS and VPT scales to assess behavior, VPT to assess anxiety, CFSS-DS to assess fear, and Wong-Baker FACES Pain Rating Scale to assess child's perception of treatment/pain. Results of the meta-analysis were analyzed and converted into standardized terms using SMD to assist interpretation and deliberation among the work group members. Parental presence showed trivial (small unimportant) benefits for the studied outcomes.

For children and adolescents with SHCN undergoing preventive or treatment visits, the systematic review<sup>9</sup> found no studies on the effect of parental presence in the operatory that met the inclusion criteria.

*Remarks:* The AAPD member survey<sup>22</sup> revealed that 86.7 percent of the responding pediatric dentists used parental presence and 56.3 percent utilized parental absence as a behavior guidance technique. They reported encountering frequent hesitancy, reluctance, or refusal by parents/caregivers when they were asked to leave the operatory (parental absence). The parental presence/absence techniques are considered acceptable to providers; however, there is likely to be inconsistent acceptance to parental absence by the parents/patients. The techniques are feasible to implement with low resource utilization. Considering that the recommendations are based on very-low certainty evidence, it is suggested that clinicians help parents understand the risks and benefits of their presence or absence in the operatory and make shared decisions best suited for the patient and the planned care. There is need for high quality research to substantiate the effect of parental presence/absence on patient anxiety, procedural pain, and cooperative behavior during dental treatment.

### 2.13 Combined nonpharmacological behavior therapies

*Summary of findings:* For children and adolescents undergoing **preventive visits**, the systematic review<sup>6</sup> conducted by the WG found no studies on the effect of combining therapies that met the inclusion criteria. However, the indirect evidence from the systematic review on children undergoing dental treatment visits<sup>8</sup> was deemed acceptable

and subjected to GRADE process to inform the recommendations for children undergoing preventive visits.

For children and adolescents undergoing **dental treatment visits**, the systematic review<sup>8</sup> conducted by the WG found two RCTs<sup>58,80</sup> conducted in India<sup>58</sup> and Egypt<sup>80</sup> that tested the effectiveness of combined therapies (TSD with AVD<sup>58</sup> and parental active presence with TSD compared to parental passive presence with TSD<sup>80</sup>). The systematic review reported variable reduction in anxiety for TSD with AVD, and small reduction in anxiety (assessed by FIS) and small improvement in cooperative behavior (assessed by FBRS) for TSD with active parental presence.

For children and adolescents with SHCN undergoing **preventive or treatment visits**, the systematic review<sup>9</sup> conducted by the WG found no studies on the effect of combining therapies that met the inclusion criteria.

*Remarks:* Most practitioners use a combination of basic and/or advanced nonpharmacological behavior guidance techniques during the dental visit. Given the lack of data, there is need for high quality research studying the effect of combined therapies on cooperative behavior, anxiety, and procedural pain. The recommendations are based on very low certainty evidence.

### 2.14 Sensory-adapted dental environments (SADE)

*Summary of findings:* The WG found no studies that met the inclusion criteria on use of SADE in healthy children presenting for **preventive or dental treatment visits**.

For children and adolescents with SHCN undergoing preventive or treatment visits, the systematic review<sup>9</sup> conducted by the WG found four RCTs<sup>81-84</sup> conducted in Israel<sup>81-83</sup> and the U.S.<sup>84</sup> that evaluated the effect of SADE for dental prophylaxis. One study showed large improvement in cooperative behavior as recorded by the hygienist using a Likert scale<sup>82</sup>, and another study showed a trivial effect on improvement in cooperative behavior using the Children Dental Behavior Rating Scale.<sup>84</sup> Another study<sup>83</sup> showed moderate reduction in the duration (in minutes) of accumulative anxious behaviors using the Negative Dental Behavior Checklist, favoring SADE. All four studies<sup>81-84</sup> showed a variable (trivial to large) effect on reduction in anxiety for the SADE group.

*Remarks:* The AAPD member survey<sup>22</sup> revealed that 7.2 percent of the responding pediatric dentists used SADE to aid with behavior guidance and reported never or rarely encountering any hesitancy, reluctance, or refusal by parents/caregivers. SADE is considered an acceptable technique by the providers and parents/patients to optimize dental visits of children with SHCN. The feasibility is likely to vary depending on the cost and resources required for its implementation. The recommendation is based on very-low certainty evidence. There is a need for high quality research to substantiate the effect of SADE during dental treatment.

### 2.15 Animal-assisted therapy (AAT)

*Summary of findings:* For children and adolescents undergoing **preventive visits**, the systematic review<sup>6</sup> conducted by the WG found no studies on the effect of AAT that met the inclusion criteria. However, the indirect evidence from the systematic review on children undergoing dental treatment visits<sup>8</sup> was deemed acceptable and subjected to GRADE process to inform the recommendation for children undergoing preventive visits.

For children and adolescents undergoing **dental treatment visits**, the systematic review<sup>8</sup> conducted by the WG found two RCTs<sup>85,86</sup> conducted in the U.S. and one in India<sup>87</sup> that evaluated effectiveness of AAT. The results from one study showed no significant differences between the groups for anxiety-related behavioral distress measured by the Observational Scale of Behavioral Distress and physiologic arousal measured by peripheral skin temperature.<sup>85</sup> The results from the Charowski et al.<sup>86</sup> study showed high level of satisfaction observed in children using AAT; however, the behavioral outcomes, measured by the FBRS and Modified Houpt Scale (Movement, Crying, Overall), and the physiologic outcomes (HR, pulse oxygen saturation) were similar to those who did not receive AAT. The results from the other study showed AAT led to large reduction in anxiety measured by pulse rate and the revised modified faces version of the MCDAS.<sup>87</sup> The pooled results from meta-analysis based on two studies showed a trivial effect on reduction in anxiety (measured by HR) during dental treatment following AAT when compared to the control group.<sup>86,87</sup>

For children and adolescents with SHCN undergoing **preventive or treatment visits**, the systematic review<sup>9</sup> conducted by the WG found no studies on the effect of AAT that met the inclusion criteria.

*Remarks:* The AAPD member survey<sup>22</sup> revealed that only 7.7 percent of the responding pediatric dentists used AAT to aid with behavior guidance and reported never or rarely encountering any hesitancy, reluctance, or refusal by parents/caregivers. The acceptability is likely to vary among the providers and parents/patients. The feasibility is likely to vary depending on the local regulations, costs, and resources required for its implementation. The recommendations are based on very low certainty evidence. There is need for high quality research to substantiate the effect of AAT during dental treatment.

### 2.16 Picture exchange communication system (PECS)

*Summary of findings:* The WG found no studies that met the inclusion criteria on use of PECS in healthy children presenting for **preventive or dental treatment visits**.

For children and adolescents with SHCN undergoing **preventive or treatment visits**, the systematic review<sup>9</sup> conducted by the WG found two randomized clinical trials<sup>88,89</sup> conducted in Canada and Brazil evaluating the use of PECS for oral examination and prophylaxis with children with ASD. In one study, visual pedagogy using PECS showed a trivial effect on reduction in pain-related behavioral distress and a trivial effect on improvement in cooperative behavior (assessed by the completion time).<sup>88</sup> Another study compared a mobile app and PECS using flash cards and found that the mobile app was more effective compared to PECS in terms of improvement in patient communication and decreasing number of appointments for preventive dental care and clinical examinations.<sup>89</sup>

*Remarks:* The AAPD member survey<sup>22</sup> revealed that only 5.2 percent of the responding pediatric dentists used PECS to aid with behavior guidance and reported never or rarely encountering any hesitancy, reluctance, or refusal by parents/caregivers. For children with SHCN (especially ASD), PECS is considered acceptable to providers and parents/patients and feasible to implement with low resource utilization. The recommendation is based on very low certainty

of evidence. There is a need for high quality research to substantiate the effect of PECS during dental treatment.

### 3. In children and adolescents, does the use of advanced nonpharmacological behavior guidance techniques influence cooperative behavior, dental anxiety, procedural pain, and treatment completion during the dental visit?

The WG's literature search and systematic review work identified cognitive behavior therapy and hypnosis as relevant behavior guidance techniques. The WG considered these to be advanced nonpharmacological behavior guidance techniques given their complexity (compared to basic techniques described above) and the training and practice required to use them, which is comparable to the training and practice necessary to use other advanced behavior guidance techniques safely and effectively. The recommendations formulated by the WG to address this question are presented in Appendix 2.

#### 3.1 Cognitive behavior therapy (CBT)

*Summary of findings:* For children and adolescents undergoing **preventive visits**, the systematic review<sup>6</sup> conducted by the WG found no studies on the effect of CBT conducted in the dental office that met the inclusion criteria. However, the indirect evidence from the systematic review on children undergoing dental treatment visits<sup>8</sup> was deemed acceptable and subjected to GRADE process to inform the recommendation for children undergoing preventive visits.

For children and adolescents undergoing **dental treatment visits**, the systematic review<sup>8</sup> conducted by the WG found four RCTs<sup>90-93</sup> conducted in Sweden, the U.S., Norway, and Iran that tested the effectiveness of CBT sessions prior to dental treatment, involving different combinations of two or more cognitive and behavioral strategies, including distraction, preparation/information, modeling and rehearsal, breathing, suggestion, relaxation, guided imagery, positive coping statements, cognitive restructuring, positioning, and parent coaching combined with sequential visits for treating children.

The effect on improvement in cooperative behavior measured by HR was trivial in preschool children.<sup>91</sup> The difference in reduction of anxiety (assessed by VPT and HR) between the CBT intervention group and control group was also trivial in preschool children;<sup>91</sup> however, CBT combined with sequential visits in preschoolers with baseline anxiety showed a moderate reduction in anxiety (assessed by VPT) and a varied (small to large) improvement in cooperative behavior (assessed by Venham's Clinical Anxiety Scale and Venham's Clinical Cooperation Scale).<sup>93</sup> CBT showed a significant effect in reducing anxiety (measured by CFSS-DS) and phobia (assessed by Self-Efficacy Questionnaire for Specific Phobias) during dental visit treatment in the seven- to 18-years-old children with baseline dental anxiety and/or fear of injection.<sup>90</sup> The pooled data of two studies<sup>90,92</sup> showed large improvement in cooperative behavior and a large reduction in anxiety during dental treatment following CBT compared to no intervention in older children with baseline dental anxiety and/or fear of injection.

For children and adolescents with SHCN undergoing **preventive or treatment visits**, the systematic review<sup>9</sup> conducted by the WG found no studies on the effect of CBT conducted in the dental office that met the inclusion criteria.



*Remarks:* The AAPD member survey<sup>22</sup> revealed that only 4.3 percent of the responding pediatric dentists used CBT to aid with behavior guidance and reported never or rarely encountering any hesitancy, reluctance, or refusal by parents/caregivers. For children with anxiety, CBT is likely to have varying acceptance among providers and parents and inconsistent feasibility, especially considering the likely need for collaboration with a behavioral health professional and/or the training and resources (including time) needed to implement CBT in dental office. The recommendations are based on very low certainty evidence. There is a need for high quality research to substantiate the effect of CBT during dental treatment.

### 3.2 Hypnosis

*Summary of findings:* For children and adolescents undergoing **preventive visits**, the systematic review<sup>6</sup> conducted by the WG found no studies on the effect of hypnosis conducted in the dental office that met the inclusion criteria. Considering the lack of data and the limited applicability of hypnosis for preventive procedures, no recommendations were formulated.

For children and adolescents undergoing **dental treatment visits**, one systematic review<sup>4</sup> found trivial effect on reduction in anxiety from classic directive hypnosis (a form of audio distraction) during dental local anesthesia. Another systematic review<sup>1</sup> conducted in a medical setting on children undergoing needle-related procedures, reported that hypnosis led to a large reduction in self-reported pain, self-reported distress, and behavioral distress and a trivial effect on behavioral pain.

For children and adolescents with **SHCN undergoing preventive or treatment visits**, the systematic review<sup>9</sup> conducted by the WG found no studies on the effect of hypnosis conducted in the dental office that met the inclusion criteria. Considering the lack of data and the limited applicability of hypnosis studies on healthy children undergoing a dental treatment visit, no recommendations were formulated.

*Remarks:* Given the lack of high-quality research, the recommendation for use of hypnosis was based on very low certainty evidence. Hypnosis is likely to have varying acceptance as an intervention among providers and parents/ patients; however, it may be feasible to implement based on the resources and training needed to implement it. It is necessary to engage parents in shared decision making before implementing the technique.

### 3.3 Protective stabilization

*Summary of findings:* The WG found no studies that met the inclusion criteria on use of protective stabilization in children presenting for **preventive visits, dental treatment visits, or for children with SHCN undergoing preventive or dental treatment procedures**.

*Remarks:* The AAPD member survey<sup>22</sup> revealed that 30.6 percent of the responding pediatric dentists used protective stabilization in their practice; however, they frequently encountered hesitancy, reluctance, or refusal by parents/caregivers when choosing to use physical restraints. While protective stabilization could be considered feasible to implement with low resource utilization, it is necessary to engage parents in shared decision making prior to its usage due to its inconsistent acceptability.

### Implications for practice

For delivery of evidence-based care at an interpersonal level, it is important for clinicians to value and apply the behavioral sciences just as much as they value and apply the biological sciences.<sup>94</sup> Orodonal disease as well as visits to a dental office can be distressing, and the dental health care providers can utilize various techniques, whether nonpharmacological or pharmacological for behavior guidance before, during, or after the treatment to guide the dental experience.

“Behavior guidance is described as a continuum of interactions involving the dentist, dental team, patient, and the parent, and is directed toward communication and education, while ensuring the safety of both oral health professionals and the child, during the delivery of medically necessary care.”<sup>97</sup>

Correct and efficient use of appropriate nonpharmacological behavior guidance techniques should facilitate an optimal experience during the child’s dental visit. Thus, the techniques used should be able to effectively alleviate dental anxiety, promote cooperative behavior, reduce procedural pain or improve the ability to cope with it, facilitate treatment completion, and instill a positive dental attitude. Though clearly important, there is limited evidence mostly of low to very low certainty on the effectiveness of different nonpharmacological behavior guidance techniques on the outcomes. Moreover, the available evidence is complicated by the demographic and cultural conditions of the varied study populations. Additional high-quality clinically oriented research and implementation work is needed. It is also important to note that the application of behavior guidance techniques is largely influenced by the dentists’ training, preferences, and intrinsic personality traits and continues to evolve due to societal changes and emerging behavioral research.

Recognizing the importance of behavior guidance, the AAPD prioritized developing the current clinical practice guidelines that are informed by systematic reviews constituting the best available evidence. However, it is important to consider the available research evidence in context, especially with respect to provider experience specific to the patient population. That consideration entails recognizing the influences of societal factors on patient values and preferences. A person-centered approach requires a balance of the best available evidence with clinical expertise and patient values and preferences, with care delivered with compassion and patience to build trust and provide an optimal dental experience.

This is the first comprehensive clinical practice guideline on behavior guidance of a pediatric dental patient. Weaknesses of this guideline are inherent to the limitations found in the systematic reviews upon which this guideline is based.

### Implications for research

The systematic review of literature revealed a significant gap between the behavior guidance techniques routinely practiced in dental offices and those that are of research interest and have been published widely. For example, about 98 percent of pediatric dentists use communication techniques, but there is a dearth of research published to test the effectiveness of communication (and specific communication skills or techniques) as a behavior guidance tool in pediatric dentistry. Similarly, significant research and literature is dedicated to the use of VR glasses while the national survey of AAPD-member dentists reveals that only 2.1 percent use it in their offices. Therefore the topic of research interests such as VR and hypnosis have more supporting data compared to routinely used behavior



guidance techniques. Reasons for high research interest in nontraditional approaches could be due to curiosity in new technology, increased likelihood of publication, and the challenges related to methodology and tangible metrics while studying traditional approaches. The WG discussed lack of high-quality data for the nonpharmacological behavior guidance techniques used commonly in U.S. pediatric dental offices, and efforts were made to factor indirect evidence while making the recommendations. Due to the very low certainty of available evidence, it is suggested that more well-designed studies on nonpharmacological behavior guidance interventions used alone or in various combinations should be conducted.

### Cost effectiveness

Cost-effectiveness for therapies with proven health benefits and minimal adverse effects is an important consideration for clinicians, patients, and third-party payors.<sup>95</sup> Dental practitioners treating children incur initial and recurring costs associated with incorporating basic and advanced non-pharmacological behavior guidance techniques. The costs and resources needed vary based on the nonpharmacological behavior guidance techniques utilized by the dental practitioners.

An efficient use of nonpharmacological behavior guidance techniques can alleviate anxiety and pain and improve patient cooperation allowing for the completion of dental treatment. Such techniques can also reduce the need for sedation or general anesthesia. Taken together, nonpharmacological behavior guidance can result in significant cost saving while facilitating more positive dental experiences for children in a dental home setting, which can have lifetime benefit.

About one-half of Medicaid state dental plans currently cover the CDT code D9920 (Behavior Management, by report).<sup>96</sup> However, the code for behavior management is billed infrequently with a small percent of claims per population served submitted annually by general dentists and pediatric dentists.<sup>97</sup> The coverage is important to allow the providers to take necessary time to carefully and sufficiently apply the behavior guidance techniques.

The CDT code D9920 states this code is not for billing services that merely take 'extra time' without additional reporting. It is indicated for a patient with SHCN or a patient that is especially uncooperative and difficult to manage resulting in the dental staff providing additional time and skill to provide treatment. When billing this code, the patient record must include the reason (narrative of medical necessity), the type of technique or therapies used, and the duration of the services provided. Documentation of the specific techniques used according to individual patient's needs may also aid in reproducing positive dental experiences during future visits.<sup>96</sup> Providers should check their local state regulations and coverage policies to guide the appropriate use of this code in their practices. Rules around the coverage tend to be stringent to safeguard against misuse, overreporting, fraud, and abuse. Providers should not bill Medicaid for this code for basic behavior guidance techniques such as positive reinforcement, parental presence, or absence.

The AAPD supports Medicaid coverage for the appropriate use of behavior guidance techniques to improve children's dental care experiences and attitudes toward oral health, and to reduce the need for dental rehabilitation through more invasive techniques such as sedation and general anesthesia.<sup>96</sup>

### Work group, stakeholders, review, and quality assurance

In December 2018, the AAPD Board of Trustees approved a panel nominated by the Evidence-Based Dentistry Committee to develop a new evidence-based clinical practice guideline on behavior guidance of pediatric patients in the dental office. The WG consisted of pediatric dentists and a clinical health psychologist who are involved in research, education, and clinical practice across a variety of settings, including private practice. The recommendations were circulated for feedback from internal stakeholders including members of the AAPD Council on Clinical Affairs, AAPD Council on Scientific Affairs, and the AAPD Evidence-Based Dentistry Committee, as well as the external stakeholders, such as the American Dental Association, the American Academy of Pediatrics, the American Dental Hygienists Association, and the International Association of Paediatric Dentistry. Revisions were made by the WG based on the feedback received and the final version of the recommendations was produced. This clinical practice guideline adhered to the AGREE II<sup>23</sup> instrument to ensure methodological quality of the reported guideline.

**Target population(s), end users, and settings:** These guidelines are intended primarily for pediatric dentists. General dentists, other dental specialists, dental hygienists, policy makers, and parents/caregivers may also benefit from this document.

### Guideline implementation

This clinical practice guideline the AAPD's first evidence-based guideline on behavior guidance of pediatric patients, is published in both the journal *Pediatric Dentistry* and *The Reference Manual of Pediatric Dentistry*. Additionally, AAPD members will be notified of the new guidelines via social media, newsletters, and presentations. The guidelines are available as an open-access publication on the AAPD's website. Guidelines are used by insurers, patients, and health care practitioners to determine the quality of care. Adherence to guideline recommendations and best practices is likely to reduce inappropriate care and improve outcomes.

### Guideline updating process

The AAPD's Evidence-Based Dentistry Committee will monitor the research to identify new evidence that may impact the current recommendations. These recommendations will be updated five years from the time of the last systematic search unless the Evidence-Based Dentistry Committee determines that an earlier revision or update is warranted.

*References after Appendices.*

## Appendices

Appendix 1. RECOMMENDATIONS ON USE OF BASIC BEHAVIOR GUIDANCE TECHNIQUES			
Clinical question 2		<i>In children and adolescents, does the use of basic behavior guidance techniques influence cooperative behavior, dental anxiety, procedural pain, and treatment completion during the dental visit?</i>	
	Statement*	Strength	Certainty
<b>Communication and communicative guidance</b>			
<i>Communication (Verbal)</i>			
Children undergoing** preventive visits	For children and adolescents needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The Workgroup recognizes verbal communication is universally applied for all patients and integral for success of accompanying behavior guidance strategies. It is suggested that clinicians use a verbal communication strategy that is culturally sensitive and appropriate for the patient's age, cognitive development, and health condition to optimize the child's behavior during the dental visit.		
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits			
<i>Communication (Nonverbal)</i>			
Children undergoing** preventive visits	For children and adolescents needing preventive care visits, the use of nonverbal communication may have a trivial effect on reduction in fear and a small effect on improvement in behavior related to fear. The Workgroup recognizes that nonverbal communication is universally applied for all patients and integral for the success of accompanying behavior guidance strategies. The Workgroup suggests that clinicians use age-appropriate nonverbal communication in a culturally sensitive manner to optimize the child's behavior during the dental visit.	Conditional	Very Low
Children undergoing† dental treatment visits	For children and adolescents needing dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The Workgroup recognizes that nonverbal communication is universally applied for all patients and integral for the success of accompanying behavior guidance strategies. It is suggested that clinicians use nonverbal communication strategies that are appropriate given the patient's age, cognitive development, and health condition, and are culturally sensitive to optimize the child's behavior during the dental visit.		
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The Workgroup recognizes that nonverbal communication is universally applied for all patients and integral for the success of accompanying behavior guidance strategies. It is suggested that clinicians use nonverbal communication strategies that are culturally sensitive and appropriate for the patient's age, cognitive development, and health condition to optimize the child's behavior during the dental visit.		
<b>Tell-show-do (TSD) and its modifications</b>			
Children undergoing** preventive visits	For children and adolescents needing preventive care visits, the use of TSD and its modifications may result in a variable (trivial to large) effect on reduction in anxiety as compared to no intervention. The Workgroup recognizes that TSD is among key basic behavior guidance techniques utilized and suggests that the clinicians implement TSD strategies (using euphemistic/age-appropriate terms) considering their expertise and the parent/patient values and preferences.	Conditional	Very Low
Children undergoing† dental treatment visits	For children and adolescents needing dental treatment visits, the use of TSD and its modifications may have a trivial effect on improvement in cooperative behavior, trivial reduction in pain, and a variable (trivial to large) effect on reduction in anxiety as compared to no intervention. Clinicians may choose to implement TSD strategies (using euphemistic/age-appropriate terms) considering their expertise and the parent/patient values and preferences.	Conditional	Very Low
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of TSD (using euphemistic/age-appropriate terms) and its modifications should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		
<b>Ask-tell-ask</b>			
Children undergoing** preventive visits	Given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of Ask-tell-ask should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits			
<b>Voice control and its modifications</b>			
Children undergoing** preventive visits	For children and adolescents needing preventive or dental treatment visits, the use of increased volume as a voice control technique may have a trivial effect on improvement in cooperative behavior and a trivial reduction in anxiety. Considering the lower parental acceptance, the Workgroup suggests use of voice control and its modifications only after engaging parents in shared decision making.	Conditional	Very Low
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits			

Appendix 1. CONTINUED

Positive reinforcement and descriptive praise

Children undergoing** preventive visits	For children and adolescents needing preventive care visits, positive reinforcement strategies may have a small effect on reduction in anxiety compared to no intervention. The Workgroup recognizes that positive reinforcement is among key basic behavior guidance techniques and suggests that the clinicians implement positive reinforcement strategies considering their clinical expertise and parent/patient values and preferences.	Conditional	Moderate
Children undergoing† dental treatment visits	For children and adolescents needing dental treatment visits, positive reinforcement strategies may result in a variable (trivial to large) reduction in fear and have a trivial effect on reduction in anxiety and a trivial effect on improvement in cooperative behavior compared to no intervention. The Workgroup recognizes that positive reinforcement is among key basic behavior guidance techniques and suggests that clinicians implement positive reinforcement strategies considering their clinical expertise and parent/patient values and preferences.	Conditional	Very Low
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, the use of positive reinforcement strategies may result in variable reduction in anxiety or improvement in cooperative behavior; however, the decision should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.	Conditional	Very Low

Memory restructuring

Children undergoing** preventive visits	For children and adolescents needing preventive care visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of memory restructuring strategies if indicated should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		
Children undergoing† dental treatment visits	For children and adolescents needing dental treatment visits, memory restructuring strategies may have a trivial effect on reduction in fear, and a trivial effect on reduction in pain compared to no intervention. Clinicians may choose to implement these strategies considering their expertise, training, and parent/patient values and preferences.	Conditional	Very Low
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of memory restructuring strategies if indicated should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		

Biofeedback relaxation

Children undergoing** preventive visits	For children and adolescents needing preventive care visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of biofeedback relaxation strategies should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		
Children undergoing† dental treatment visits	For children and adolescents needing dental treatment visits, biofeedback relaxation strategies may result in a variable (trivial to large) reduction in anxiety compared to no intervention. Clinicians may choose to implement biofeedback relaxation strategies considering costs and resources involved and parent/patient values and preferences.	Conditional	Very Low
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of biofeedback relaxation strategies should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		

Breathing relaxation

Children undergoing** preventive visits	For children and adolescents needing preventive or dental treatment visits, breathing relaxation strategies may have a variable (trivial to large) effect on reduction in anxiety, a trivial effect on reduction in fear and pain, and a large effect on improvement in happiness after treatment compared to no intervention. Clinicians may choose to implement breathing relaxation strategies considering their expertise and the parent/patient values and preferences.	Conditional	Very Low
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of breathing relaxation strategies should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		

Desensitization

Children undergoing** preventive visits	For all children and adolescents needing preventive or dental treatment visits, the use of desensitization techniques may have a small effect on improvement in cooperative behavior compared to no intervention. The Workgroup recognizes that desensitization is among key basic behavior guidance techniques utilized and suggests that the clinicians implement desensitization strategies considering their expertise and parent/patient values and preferences.	Conditional	Very Low
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits			

\* Assessment of effect=large effect, moderate effect, small important (statistically significant) effect, or trivial (small unimportant or statistically nonsignificant or no effect).  
 \*\* Preventive visits=included procedures such as examination, prophylaxis, fluoride, radiographs.  
 † Dental treatment visits=included procedures such as sealants, restorative care, use of local anesthesia, pulp therapies, and simple extractions.  
 ‡ SHCN=Special health care needs.

Table continued on the next page.

Appendix 1. CONTINUED			
Clinical question 2		<i>In children and adolescents, does the use of basic behavior guidance techniques influence cooperative behavior, dental anxiety, procedural pain, and treatment completion during the dental visit?</i>	
	Statement*	Strength	Certainty
<b>Enhancing control</b>			
Children undergoing** preventive visits	Given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of enhancing control should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits			
<b>Distraction techniques</b>			
<i>Magic tricks</i>			
Children undergoing** preventive visits	For children and adolescents needing preventive care visits, the use of magic tricks as a distraction technique may have a trivial effect on improvement in cooperative behavior and a trivial effect on reduction in anxiety; however, it may result in a variable (small to large) improvement in readiness to accept dental treatment or sit on the dental chair compared to no intervention. Clinicians may choose to implement magic tricks considering costs, training, and resources involved and parent/patient values and preferences.	Conditional	Very Low
Children undergoing† dental treatment visits	For children and adolescents needing dental treatment visits, there is lack of evidence on reduction in anxiety or improvement in cooperative behavior related to the use of magic tricks as a distraction technique; however, it may have a variable (small to large) effect on improvement in readiness to accept dental treatment or sit on the dental chair compared to no intervention. Clinicians may choose to implement magic tricks considering costs and resources involved and parent/patient values and preferences.	Conditional	Very Low
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of magic tricks as a distraction technique should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		
<i>Traditional distraction techniques</i>			
Children undergoing** preventive visits	For children and adolescents undergoing preventive or dental treatment visits, there is limited evidence to make a recommendation substantiating the effect of mirror and conversation, toys, and books/children's story on reducing anxiety and improving cooperative behavior. The decision on use of these strategies should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		
Children undergoing† dental treatment visits			
Children undergoing† dental treatment visits (dental local anesthesia)			
	For children and adolescents undergoing dental local anesthesia, use of counter-stimulation or distraction techniques (pulling the mucosa, intraoral or extraoral finger vibration adjacent to the injection site during delivery of local anesthetic, and distraction techniques by asking the patient to do breathing exercises or to draw letters in the air with their feet) during delivery of local anesthetic may result in a large reduction in pain and anxiety; however, there is no evidence of its effect on improving cooperative behavior. Clinicians may choose to use traditional distraction strategies considering their expertise and parent/patient values and preferences.	Conditional	Very Low
	For children and adolescents undergoing dental local anesthesia, camouflaging of the syringe may result in large reduction in pain-related behavior anxiety and improve overall cooperative behavior. It is suggested that clinicians use their expertise to incorporate strategies to camouflage the syringe during the delivery of local anesthesia.	Conditional	Very Low
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of distraction strategies should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		
<i>Technology-based distractions</i>			
Children undergoing** preventive visits	For children and adolescents needing preventive care visits, use of mobile dental apps may have a variable (trivial to large) effect on reduction in anxiety, and a small effect on improvement in readiness to accept treatment compared to no intervention. Clinicians may choose to implement mobile app-based strategies considering their expertise, costs, resources, and parent/patient values and preferences.	Conditional	Very Low
Children undergoing† dental treatment visits (restorative)	For children and adolescents needing dental treatment visits, use of audio songs (through computer screen) may have a small effect on reduction in anxiety; however, there is no evidence of effect in improving cooperative behavior. Clinicians may choose to implement music distraction considering their experience, child sensitivities, resources, and parent/patient values and preferences.	Conditional	Very Low

\* Assessment of effect=large effect, moderate effect, small important (statistically significant) effect, or trivial (small unimportant or statistically nonsignificant or no effect).

\*\* Preventive visits=included procedures such as examination, prophylaxis, fluoride, radiographs.

† Dental treatment visits=included procedures such as sealants, restorative care, use of local anesthesia, pulp therapies, and simple extractions.

‡ SHCN=Special health care needs.



Appendix 1. CONTINUED			
<i>Technology-based distractions (continued)</i>			
Children undergoing† dental treatment visits (restorative)	In children and adolescents needing dental treatment visits, use of virtual reality (VR) glasses may cause a trivial effect on reduction in anxiety and small effect on improvement in cooperative behavior at the time of caries removal; a trivial effect on anxiety and cooperative behavior during the placement of rubber dam; and a variable effect on reduction in anxiety and a large reduction in pain perception during restorative procedures. Clinicians may choose to use VR glasses based on their expertise, available resources, and by shared decision making with parents while considering individual circumstances pertaining to child's sensitivities, individual patient factors, and patient preferences.	Conditional	Moderate
	For children and adolescents needing dental treatment visits, use of audiovisual distraction (AVD)/3D glasses/eyeglasses may produce a variable (trivial to small) effect in reducing anxiety and improving cooperative behavior. Clinicians may choose to implement AVD, 3D glasses/eyeglasses considering their expertise, costs, child sensitivities, resources, and parent/patient values and preferences.	Conditional	Very Low
Children undergoing† dental treatment visits (dental local anesthesia)	For children and adolescents with positive baseline behavior needing dental local anesthesia, use of music distraction may have a large effect on reduction in anxiety and improving pain-related behavior. Evidence is uncertain regarding the effect of music distraction on children with baseline negative behavior. Clinicians may choose to implement music distraction considering their experience, child sensitivities, resources, and parent/patient values and preferences.	Conditional	Very Low
	For children and adolescents with positive baseline behavior needing dental local anesthesia, use of AVD using 3D Glasses may have a large effect on reduction in anxiety, an improvement in pain-related behavior, and a reduction in postinjection anxiety. Evidence is uncertain regarding the effect of audiovisual distraction on children with baseline negative behavior. Clinicians may choose to implement AVD considering their experience, child sensitivities, resources, and the parent/patient values and preferences.	Conditional	Very Low
	For children and adolescents with positive baseline behavior needing dental local anesthesia, use of an electronic Tablet may have a trivial or no effect on reducing pain experience; however, it has a small effect on improving pain related behavior at the time of administration of injection. Clinicians may choose to use a Tablet considering their experience, child sensitivities, resources, and the parent/patient values and preferences.	Conditional	Very Low
	For children younger than 12 years of age needing dental local anesthesia, use of VR glasses or VR box may result in trivial or no benefit in reducing anxiety and pain perception. Clinicians may use VR technology based on their expertise, assessment of risks and benefits, available resources, and after shared decision making with parents while considering individual circumstances pertaining to the child's sensitivities, temperament, cooperativeness, anxiety/fear, systemic health, and past experiences.	Conditional	Very Low
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of mobile dental apps or VR glasses should be made based on clinical expertise, individual patient factors and sensitivities, and parent/patient values and preferences.		
	For children and adolescents with SCHN needing preventive or dental treatment visits, use of audiovisual distraction techniques may have a trivial effect on reduction in anxiety, a trivial effect on improvement in cooperative behavior, and a variable (trivial to large) effect on reduction in pain. Clinicians may choose to implement AVD strategies considering their expertise, costs, resources, individual patient factors and sensitivities, and parent/patient values and preferences.	Conditional	Very Low
<b>Parental absence or presence</b>			
Children undergoing** preventive visits	For children and adolescents undergoing preventive or dental treatment visits, the presence of parents in the dental operatory may result in trivial or no effect on improvement in child's cooperative behavior and perception of treatment, or in reduction of anxiety and fear. Clinicians may choose to have parents in the operatory based on their expertise and shared decision making with parents while considering individual circumstances pertaining to the child's temperament, cooperativeness, anxiety/fear, systemic health, past experiences, and the treatment needed.	Conditional	Very Low
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on presence or absence of parents in the dental operatory should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		
<b>Combined nonpharmacological behavior therapies</b>			
Children undergoing** preventive visits	For children and adolescents needing preventive or dental treatment visits, combined therapy of TSD and AVD may have a variable (trivial to large) effect on reduction in anxiety compared to no intervention. A combined therapy of TSD with active parental presence may result in small effect on reduction of anxiety and small improvement in cooperative behavior. Clinicians may choose to combine strategies considering their expertise, costs, resources, and the parent/patient values and preferences.	Conditional	Very Low
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits	For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of combined therapies should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		

Table continued on the next page.

Appendix 1. CONTINUED			
Clinical question 2	<i>In children and adolescents, does the use of basic behavior guidance techniques influence cooperative behavior, dental anxiety, procedural pain, and treatment completion during the dental visit?</i>		
	Statement*	Strength	Certainty
<b>Sensory-adapted dental environment (SADE)</b>			
Children undergoing** preventive visits	Given the lack of evidence, the Workgroup is unable to formulate a recommendation. The decision on use of SADE for healthy children undergoing preventive or treatment visits should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits		For children and adolescents with SHCN needing preventive or dental treatment visits, SADE may have a variable (trivial to large) effect on reduction in anxiety and a variable (trivial to large) effect on improvement in cooperative behavior compared to regular dental environment. Clinicians may choose to implement SADE strategies considering their expertise, costs, resources, the child's sensitivities, individual patient factors and the parent/patient values and preferences.	Conditional
<b>Animal assisted therapy (AAT)</b>			
Children undergoing** preventive visits	For children and adolescents needing preventive or dental treatment visits, use of AAT may have a variable (trivial to large) effect on reduction in anxiety, and a small effect on improvement in cooperative behavior compared to no intervention. Clinicians may choose to implement AAT considering their expertise, costs, resources, local regulations, and the parent/patient values and preferences.		
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits		For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of AAT should be made based on clinical expertise, costs, resources, local regulations, individual patient factors, and parent/patient values and preferences.	
<b>Picture exchange communication system (PECS)</b>			
Children undergoing** preventive visits	Given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of PECS should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits		For children and adolescents with SHCN needing preventive or dental treatment visits, there is limited evidence to support PECS. Current data suggests that PECS may result in a lesser reduction in anxiety compared to mobile apps. Clinicians may choose to implement PECS strategies considering their expertise, costs, resources, and parent/patient values and preferences.	Conditional

\* Assessment of effect=large effect, moderate effect, small important (statistically significant) effect, or trivial (small unimportant or statistically nonsignificant or no effect).  
 \*\* Preventive visits=included procedures such as examination, prophylaxis, fluoride, radiographs.  
 † Dental treatment visits=included procedures such as sealants, restorative care, use of local anesthesia, pulp therapies, and simple extractions.  
 ‡ SHCN=Special health care needs.

Appendix 2. RECOMMENDATIONS ON USE OF ADVANCED NONPHARMACOLOGICAL BEHAVIOR GUIDANCE TECHNIQUES			
Clinical question 3	<i>In children and adolescents, does the use of advanced nonpharmacological behavior guidance techniques influence cooperative behavior, dental anxiety, procedural pain, and treatment completion during the dental visit?</i>		
	Statement*	Strength	Certainty
<b>Cognitive behavior therapy (CBT)</b>			
Children undergoing** preventive visits	For children and adolescents needing preventive or dental treatment visits, use of CBT when indicated may result in a variable (trivial to large) reduction in anxiety, large reduction in phobia, and a variable (trivial to large) improvement in cooperative behavior compared to no intervention. Clinicians may choose to implement CBT strategies for anxious patients in collaboration with a behavioral health professional considering their expertise, costs, resources, training, parent/patient values and preferences.		
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits		For children and adolescents with SHCN needing preventive or dental treatment visits, given the lack of evidence, the Workgroup was unable to formulate a recommendation. The decision on use of CBT should be made based on clinical expertise, consultation with a behavioral health professional, individual patient factors, and parent/patient values and preferences.	
<b>Hypnosis</b>			
Children undergoing** preventive visits	Given the lack of evidence and the unclear applicability, the Workgroup was unable to formulate a recommendation. The decision on use of hypnosis during preventive visits should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		

Appendix 2. CONTINUED

Hypnosis - continued

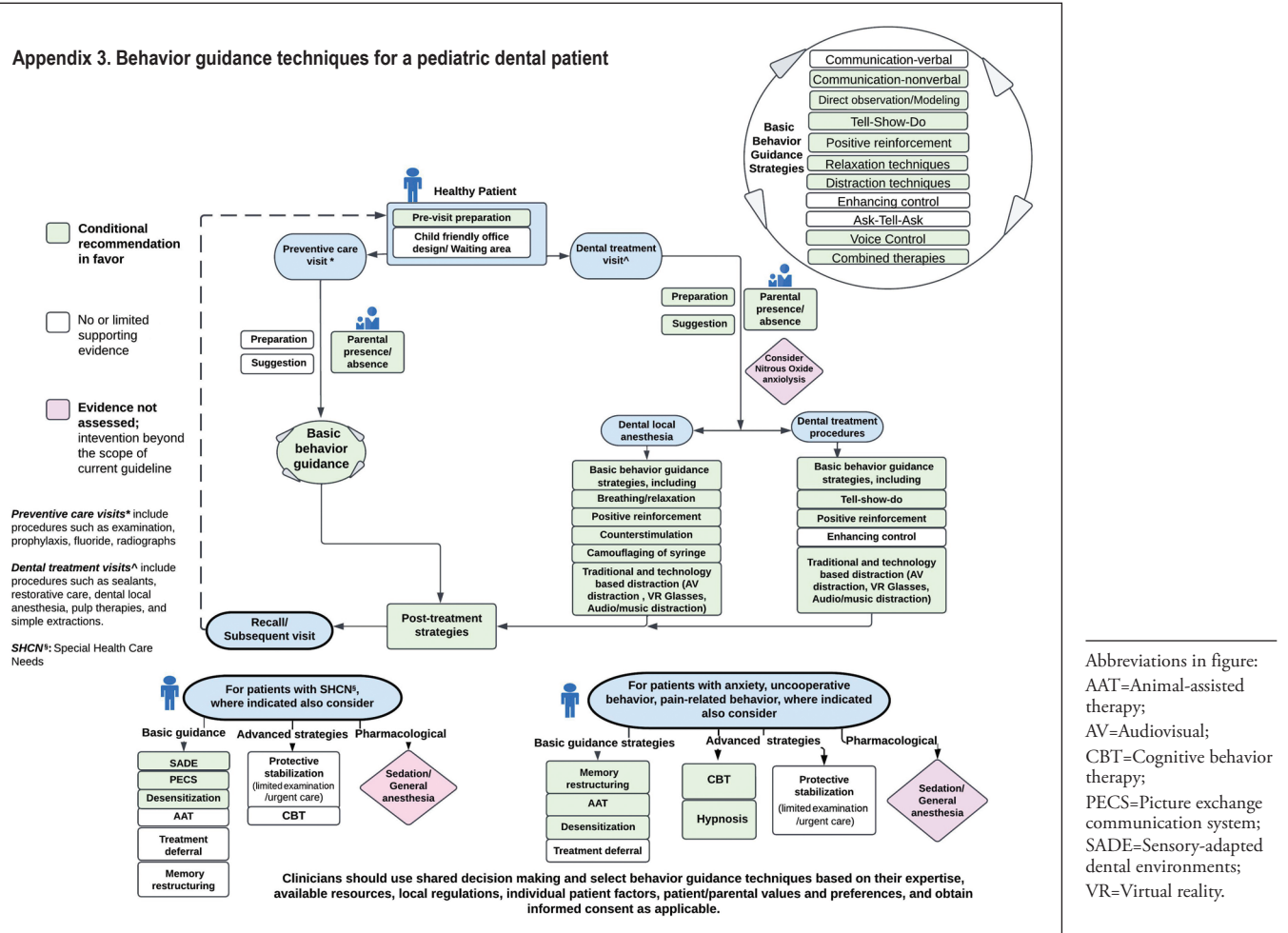
Children undergoing† dental treatment visits	For children and adolescents needing dental local anesthesia, use of hypnosis alone or in combination with conventional behavior modification techniques may result in a variable (trivial to large) reduction in anxiety and pain; however, there is no evidence of effect in improving cooperative behavior or behavioral pain. Clinicians may choose to use hypnosis during treatment visits considering their expertise, training and resources involved, and after engaging parents using a shared decision model.	Conditional	Very Low
Children with SHCN‡ undergoing preventive or dental treatment visits	Given the lack of evidence and the unclear applicability, the Workgroup is unable to formulate a recommendation. The decision on use of hypnosis for children with SHCN should be made based on clinical expertise, individual patient factors, and parent/patient values and preferences.		

**Protective stabilization**

Children undergoing** preventive visits	Given the lack of evidence, the Workgroup is unable to formulate a recommendation. The decision on use of protective stabilization should be made based on clinical expertise, individual patient factors including medical history, and parent/patient values and preferences.		
Children undergoing† dental treatment visits			
Children with SHCN‡ undergoing preventive or dental treatment visits			

\* Assessment of effect=large effect, moderate effect, small important (statistically significant) effect, or trivial (small unimportant or statistically nonsignificant or no effect).  
 \*\* Preventive visits=included procedures such as examination, prophylaxis, fluoride, radiographs.  
 † Dental treatment visits=included procedures such as sealants, restorative care, use of local anesthesia, pulp therapies, and simple extractions.  
 ‡ SHCN=Special health care needs.

Appendix 3. Behavior guidance techniques for a pediatric dental patient



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