

Parental acceptance toward behavior guidance techniques for pediatric dental visits: a meta-analysis

Carla Massignan¹, Josiane Pezzini Soares², Maria Marlene de Souza Pires³, Bruce D. Dick⁴, André Luís Porporatti⁵, Graziela De Luca Canto⁶, Michele Bolan⁷

Affiliations:

¹DDS, MSc, PhD student, Department of Pediatric Dentistry, School of Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil

²DDS, MSc, PhD student, Department of Pediatric Dentistry, School of Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil

³MD, PhD, Department of Pediatrics, Federal University of Santa Catarina, Florianópolis, SC, Brazil

⁴MD, PhD, Department of Anesthesiology and Pain Medicine, University of Alberta, Edmonton, Canada

⁵DDS, MSc, PhD, School of Dentistry, Federal University of Santa Santa Catarina, Brazilian Center for Evidence-Based Research, Federal University of Santa Catarina Florianópolis, SC, Brazil

⁶DDS, MSc, PhD, School of Dentistry, Federal University of Santa Santa Catarina, Brazilian Center for Evidence-Based Research, Federal University of Santa Catarina Florianópolis, SC, Brazil

⁷DDS, MSc, PhD, Department of Pediatric Dentistry, Federal University of Santa Catarina, Florianópolis, SC, Brazil

Email:

¹carmassignan@yahoo.com.br; ²josipeczzini@hotmail.com; ³mmspires@gmail.com;

⁴bruce.dick@ualberta.ca; ⁵andre.porporatti@ufsc.br; ⁶delucacanto@gmail.com;

⁷michele.bolan@ufsc.br

Address correspondence to: Michele Bolan, Departamento de Odontologia, Universidade Federal de Santa Catarina, UFSC, Campus Universitário, CCS-ODT-Trindade Florianópolis, Santa Catarina, Brasil 88040-900 [michele.bolan@ufsc.br], +55483721-9920

Funding Source: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) and Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina (FAPESC).

Financial Disclosure: "This work was supported by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES)" (C.M. grant number 001) and (J.P.S. grant number 001)

Conflict of Interest: None.

Author contributions:

Carla Massignan: Conceptualized and designed the study, collected data, carried out the data analyses, drafted the initial manuscript, and revised the manuscript.

Josiane Pezzini Soares: Worked on study design, data collection, drafted the initial manuscript, reviewed the manuscript, and approved the final manuscript as submitted.

Maria Marlene de Souza Pires: Worked on study design, critically reviewed the manuscript for important intellectual content, and approved the final manuscript as submitted.

Bruce Dick: Worked on study design, critically reviewed the manuscript for important intellectual content, and approved the final manuscript as submitted.

André Luís Porporatti: Worked on study design, critically reviewed the manuscript for important intellectual content, and approved the final manuscript as submitted.

Graziela De Luca Canto: Conceptualized and designed the study, critically reviewed the manuscript for important intellectual content, and approved the final manuscript as submitted.

Michele Bolan: Worked on study conceptualization and design, coordinated and supervised data collection, critically reviewed manuscript for important intellectual content, and approved the final manuscript as submitted.

Abstract

Objective: The systematic review aimed to compare agreement with behavior guidance techniques (BGT) between parents of children with special health care needs (SHCN) and those non-SHCN. **Methods:** A structured search of Cochrane Library, Latin American and Caribbean Health Sciences, PubMed, PsycInfo, Scopus, Web of Science, ProQuest Dissertations and Theses Database, Opengrey and Google Scholar was taken up to October 2020. Two authors selected studies independently, extracted the data, assessed the studies' methodological quality using the Joanna Briggs scale and the Recommendations, Assessment, Development and Evaluation (GRADE). **Results:** Forty-eight studies covering the parents' agreement with BGT were included and 41 were retained for random-effects proportion meta-analysis. The methodological quality assessment varied from low to high. Among the parents of non-SHCN children, the agreement with BGT varied from 84.1% (95% CI: 75.8-90.9; $p < 0.001$; I^2 93.3%) for tell-show-do to 25.7% (95% CI: 17.8-34.4; $p < 0.001$; I^2 90.4%) for passive protective stabilization, without hand-over-mouth. Among the parents of children with SHCN, the acceptance of BGT varied from 89.1% (95% CI: 56.1-99.7; $p < 0.001$; I^2 95.7%) for tell-show-do to 29.1% (95% CI: 11.8-50.0; $p = 0.001$; I^2 84.8%) to general anesthesia. **Conclusion:** There is very low certainty in evidence that both the parents of children SHCN and non-SHCN were more likely to agree with basic BGT and that they were less likely to agree with the advanced ones.

Keywords: Children, Parents, Behavior, Systematic Review, Acceptance

Introduction

The long-term success of any dental treatment provided for children depends on the behavior guidance technique (BGT). The dentist approach needs to be integrated to the overall BGT use, taking into account children's individuality, the practitioner's skills and the parents' opinion². Given the changes in the society in the past years where more fathers, mothers, and siblings are accompanying children to their dental appointments³, there is considerable interest of families to take part of the treatment decisions. As a result, the attitudes of modern parents have influenced the use of BGT⁴.

The techniques utilized by the dental team have evolved along the years accompanying the society and parenting changes⁴. Currently, according to American Academy of Pediatric Dentistry (AAPD), the BGT are divided in basic behavior guidance, which include communication and communicative guidance; positive pre-visit imagery; direct observation; tell-show-do; ask-tell-ask; voice control; nonverbal communication; positive reinforcement and descriptive praise; distraction; memory restructuring; parental presence/absence; communication techniques for parents and age appropriate patients; and nitrous oxide/oxygen inhalation; and advanced behavior guidance which include protective stabilization, sedation, and general anesthesia⁶. Furthermore, protective stabilization can involve another person, a device or a combination thereof⁵.

Behavioral guidance techniques are used to reduce anxiety and fear, establish a positive attitude, and provide oral health care with physical and emotional security for children with and without special health care needs children (SHCN)⁵. Some patients find it very difficult to cooperate during treatment and the use of only non-pharmacological techniques may be insufficient. In such cases, behavior guidance can be individualized according to the patient's needs and the parents' preferences⁶.

Considering that the treatment plan also depends on the parents' opinion about BGT use, exploring parents' opinions is critical when identifying BGT application priorities. More invasive procedures can produce clinical situations of greater stress, demanding from the professional greater performance in the management of a child's behavior. Such cases might require more restrictive techniques⁷. Therefore, dentists should pay particular attention to parents' acceptance of BGT use to accomplish children's treatment. It is noteworthy, however, that no scientific evidence is available to attest to the parents' agreement with BGT. Thus, the purpose of this systematic review was to evaluate parental agreement with BGT during dental visits.

MATERIAL AND METHODS

Study design

The protocol of this systematic review was planned following the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols (PRISMA-P)⁸. It was registered in the International Prospective Register of Systematic Reviews (PROSPERO) under number CRD42018103834. The research is reported following the PRISMA Statement⁹.

Study question

We addressed the acronym PECOS (Population, Exposition, Comparison, Outcomes, and Study design) to formulate the focused question: 'What is the proportion of acceptance reported by the parents toward pediatric BGT?' Where P – the parents of special health care needs (SHCN) children and the parents of non-special health care needs (non-SHCN) children submitted to dental care; E – the use of BGT in dental pediatric visits; C – none; O – the proportion of the parent's acceptance with behavior guidance techniques; and S – observational studies.

Eligibility criteria

To be included in this systematic review, the studies had to have observational designs. Studies that evaluated the parents' agreement with BGT during the child's dental treatment were included. Parents and legal guardians were accepted. The parents of non-special health care needs (non-SHCN) and special health care needs (SHCN) children of all ages were evaluated. Any kind of parental awareness of BGT (ex.: questionnaire, video, verbal or written information) was accepted. Due to limitation in publication records in some newer behavior guidance, the most BGT described by the AAPD in the current guideline⁵ were evaluated, including GA. Although hand over mouth (HOM) is no longer recommended by the guidelines, it was included in the study as well because many older studies have evaluated this technique. Hypnosis is not listed as one of the behavior management, also not in the past. It is worth mentioning, however, that primary studies did evaluate parents acceptance of hypnosis, therefore it was also evaluated. All dental procedures described in the studies were considered and all measures of the parents' agreement were accepted.

The exclusion criteria were as follows: 1) Studies that did not evaluate the parents' agreement of behavior guidance techniques but instead addressed the parents' satisfaction/preferences and/or success rate and treatment costs, 2) Lacked data regarding parents' agreement with BGT, 3) Secondary studies (review articles, letters to the editors, books, book chapters, etc.), 4) the studies that could not be found available in the complete text and 5) articles that duplicated participants from other publications.

Information sources and search strategies

Detailed search strategies for each database were developed with the help of a health science librarian and they included MeSH terms and important synonyms (Appendix 1). The databases utilized were Cochrane Library, Latin American and Caribbean Health Sciences

(LILACS), PubMed (including MedLine), PsycINFO, Scopus and Web of Science. A partial grey literature search was also carried out using the System for Information on the Grey Literature in Europe (OpenGrey), ProQuest Dissertations and Theses Database and Google Scholar. The search date was January 13th, 2019 and a search update was conducted on October 5th 2020. No publication periods and language restrictions were applied. The reference lists from the included studies were also examined for relevant studies.

EndNote® X7 (Thomson Reuters, New York, EUA) and Rayyan software¹⁰ programs were used to manage the references. Duplicate identified studies were removed.

Study selection and data collection process

Two reviewers (CM, JPS) independently selected the studies in two phases. First based on the titles and abstracts and in phase-two, based on the full-texts. The third reviewer (MB) made the final decision. The same procedure was applied for the meta-analysis data collection.

The following structured information was collected from each included study in pre-piloted forms: the authors, the year of publication, country, study design and setting, sample size, the participants' gender, the children's age, BGT, the measures of assessment of the BGT, main findings and the conclusions.

Risk of bias in individual studies

The Joanna Briggs Institute Critical Appraisal Checklist for Analytical Cross-Sectional Studies¹¹ was used to assess the methodological quality of the individual included studies. The critical appraisal tool is composed of eight questions addressing the sample characteristics, the measurement of exposure, the condition being studied and any confounding factors. The possible answers to the tool's questions are "yes", if the study addressed the issue proposed in the question, "no" if the study did not address the issue, "unclear" in the case of unclear or information not completely reported; and "NA" for not

applicable if a specific questions do not suit the issue addressed in the systematic review. The tool assesses the methodological quality of a study to determine extend to which it has addressed the possibility of bias in its design, conduct and analysis. The same two reviewers independently evaluated the included studies and disagreements were solved by consensus. As recommended by the reviewer's manual, decisions about rating were discussed and agreed upon all reviewers before the critical appraisal begins. The grading system was determined by the authors considering: the studies that presented "yes" for all questions were rated as having good methodological quality therefore low risk of bias, those that presented at least one answer "unclear" was rated as unclear risk of bias, and at least one answer "no" was rated as high risk of bias. The plot was generated with the web app robvis¹².

Summary measures and synthesis of the results

The primary outcome was the proportion of the parent's acceptance of BGT use for pediatric dental visits. Secondary outcomes included the differences in agreement with BGT between the parents of non-SHCN children and the parents of SHCN children and the differences in agreement with BGT between the parents who received an explanation before the presentation of the technique and those who did not. The proportion of the parent's acceptance with the use of BGT was measured by a dichotomous outcome using the parent's acceptance with each technique (yes/no) and the continuous outcome using the mean ratings of the parents' agreement and the differences in means using a Visual Analog Scale (VAS) measured in millimeters (mm).

For data analysis, when the studies presented the mean VAS scores of the parents' agreement using the rating anchors of zero mm as most accepted and 100 mm as the least accepted behavior technique, the data was transformed by reversing the value from 100 to zero to represent the least accepted and 100 mm to the most accepted. When the studies used

a VAS measured in centimeters, the ratings were converted to mm. When the studies used a Likert scale, the “most acceptable” grade was pooled with the acceptance responses of “yes” for those studies that used “yes” or “no” for acceptance.

In addition, “conscious sedation” and “sedation” were pooled together as sedation, “parents' separation” was combined with “parents present/ absent” and presented as “parental presence/absence”, “protective stabilization” and “physical restraints” were coded as active protective stabilization (APS) and “papoose board” and “passive restraint” were coded as passive protective stabilization (PPS).

Regarding SHCN children, independently of their specific health care needs, the parents' agreement with BGT for all SHCN children were pooled together.

Studies with sufficient information were included in four different meta-analysis: 1) Proportion of acceptance with BGT separately for the parents of non-SHCN and SHCN children with the aid of MedCalc Statistical Software version 14.8.1 (MedCalc Software, Ostend, Belgium), 2) the mean of the agreement with BGT was measured with VAS for the parents of both non-SHCN children and SHCN children separately, with the aid of the Comprehensive Meta-Analysis Software (Biostat, Englewood, USA). All studies with the parents' acceptance measured with VAS were included and a separate meta-analysis was performed for each BGT, 3) differences in the means of agreement with BGT measured with VAS among the parents of non-SHCN children were compared with the parents of SHCN children, using the RevMan Software (Review Manager, version 5.3, Cochrane Collaboration, Copenhagen, Denmark), and 4) differences in the means of agreement with BGT measured with VAS among the parents of non-SHCN who received an explanation before the presentation of the technique and those who did not, also measured with RevMan. Since the included studies were selected based on the inclusion and exclusion criteria, there was a potential for effects to be dissimilar, so a random-effects model was applied¹³.

Heterogeneity was assessed using the I^2 test (ratio of true heterogeneity to total observed variation) and a value $>50\%$ was considered to be an indicator of substantial heterogeneity between the studies¹³. The level of significance was set at 5%.

Certainty of the evidence

Two independent reviewers (CM, JPS) assessed the certainty of evidence using the Grading of Recommendations, Assessment, Development and Evaluation (GRADE)¹⁴ criteria. Disagreements were resolved by consensus. The overall certainty of evidence is presented with a Summary of Findings (SoF) table, from GRADEpro software (McMaster University, Hamilton, Canada) (Appendix 7). Aspects such as risk of bias, inconsistency, indirectness, imprecision, and publication bias are causes to lower the certainty of the evidence and the presence of a large effect, dose response gradient and controlling of plausible confounders are causes of increasing it in observational studies. Certainty of evidence starts with low in observational studies and can be either upgraded or downgraded.

RESULTS

Study selection

The literature search identified 1633 citations across the six databases. After deduplication, 876 articles remained. An additional 14 studies were identified in the grey literature search, and after the article reference list examination and updated search. The full text of the 81 studies was accessed and 49 were found to meet the inclusion criteria for the review. From these, 41 contained sufficient information to allow for quantitative analysis. The detailed search and selection criteria are presented in Figure 1. The excluded studies with the exclusion rationale have been included in Appendix 2.

Study characteristics

All of the 49 studies had cross-sectional designs with the enrollment of 4474 participants; and were published between 1984 and 2019. Most of the studies were conducted in clinics and pediatric hospitals (Table 1).

Seven studies evaluated the parents of SHCN children. The children were medically or physically compromised with neuropathological disorders¹⁵, with intellectual disabilities¹⁶, with physical or mental disabilities¹⁷, with physical or congenital disabilities, with mental, intelligence or behavioral deviations and/or systemic chronic diseases¹⁸ with a range of disabilities including Down's Syndrome and cerebral palsy¹⁹. They also may have had autism²⁰, and a cleft lip and/or palate²¹ (Table 1).

Risk of bias within the studies

The assessment of risk of bias is presented in Figure 2. According to Joanna Briggs Critical Appraisal Tool assessment, overall 33 studies were assessed as high risk of bias; five as unclear and only as 11 low risk of bias. A major concern regarding the risk of bias was observed, mainly issues with response rate, representativeness, and confounding.

Synthesis of the results

The pooled analysis results for the primary outcome, namely the proportion of the parent's agreement with the use of BGT for pediatric dental visits, were as follows:

1) The proportion of agreement with BGT by the parents of non-SHCN, reported based on acceptability/unacceptability, was examined using a separate meta-analysis for each technique. Overall, the analysis included 29 studies (n=2594) that evaluated 16 different BGT techniques. The random-effects model was employed. The proportion of acceptance varied from 84.1% (95%; confidence interval (CI) 75.8 to 90.9) to 21.2% (95% CI 11.0 to 33.7; $p < 0.001$; I^2 94.5%) with TSD being found to be the most acceptable and HOM the least accepted (Figure 3 and Table 2). The I^2 statistics, which refer to the proportion of the observed variance that reflects the differences in the true effects sizes (in log units)¹³, varied

from not important at 32.5% (oral premedication) to considerable at 98.1% (modeling). Since $I^2 > 50\%$ was considered to be an indication of high heterogeneity, most of the meta-analysis showed considerable heterogeneity.

The proportion of agreement with BGT by the parents of SHCN children analysis included five studies (n=748) with nine BGT techniques analyzed. The most accepted BGT in this analysis was TSD with 89.1% (95% CI 56.1 to 99.7; $p < 0.001$; I^2 95.7%) of the parents agreeing and the least accepted was GA with 29.1% (95% CI 11.8 to 50.0; $p = 0.001$; I^2 84.8). HOM was not assessed (Figure 4 and Table 3). The I^2 statistics varied from zero (SE) to 98.5% (VC).

2) The mean of agreement with BGT measured with VAS for parents of non-SHCN children has been presented (Appendix 3). The random-effects model was employed. Distraction was the most accepted BGT with a mean of 94.2 mm (95% CI 93.6 to 94.8; $p = 0.423$; I^2 0%) and PPS was the least accepted with the parents showing a mean of 42.2 mm (95% CI 29.4 to 55.0; $p < 0.001$; I^2 99.8%) in VAS. The I^2 varied from zero (TSD, PR, distraction, N₂O, SE and GA) to 67.6% (PP/A).

It was not possible to analyze the mean of the agreement with BGT measured with VAS for the parents of SHCN children due to the differences in the way that the data was presented among the studies.

The following meta-analyses show the results of the secondary outcomes:

1) The direct comparison of the acceptance of BGT among the parents of non-SHCN and SHCN children: the analyses were performed using two studies^{15,17} (n=245). The main outcome was the mean parental VAS rated acceptance in mm and the effect size was the standardized difference in mean. The random-effects model was again employed. The results showed that for active protective stabilization, the parents of SHCN children rated an average of 0.47 mm more for acceptance than the parents of non-SHCN children (Standard mean

difference (SMD) 0.47; 95% CI 0.21 to 0.72; $p < 0.001$; $I^2 = 0\%$). There was no significant difference found in the acceptance of HOM (SMD 0.22; 95% CI -0.03 to 0.47; $p = 0.08$; $I^2 = 0\%$), SE (SMD 0.21; 95% CI -0.04 to 0.46; $p = 0.10$; $I^2 = 0\%$) and GA (SMD 0.07; 95% CI -0.18 to 0.32; $p = 0.57$; $I^2 = 0\%$) (Appendix 4).

2) The difference in the means of an agreement with the BGT measured with VAS among the parents of non-SHCN children who received an explanation before the presentation of the technique and those who did not were examined. In the meta-analysis, the ratings from 112 parents from the two studies^{22,23} were made available. There was a significant difference in mean mm marked in VAS for those who received an explanation prior to judging the BGT for HOM (Mean difference (MD) -18.2; 95% CI -30.2 to -6.2; $p = 0.003$; $I^2 = 94\%$); APS (MD -13.7; 95% CI -22.1 to -5.2; $p = 0.002$; $I^2 = 89\%$) and TSD (MD -9.8; 95% CI -12.7 to -7.0; $p < 0.001$; $I^2 = 75\%$) with zero mm representing the most acceptable. The variable 'had received an explanation' did not significantly increase the parents' agreement with N₂O, GA, PPS, oral premedication and VC. A detailed analysis has been presented in Appendix 5. There was not enough data to analyze the parents of SHCN children.

Results of the individual studies

A synthesis of parental acceptance and the scales used to measure it in the included studies are presented in Table 1. Overall, both parents of non-SHCN and SHCN children accepted communicative techniques and reported negative ratings on restrictive ones. Also, parents that were informed enhanced their level of acceptance of all techniques. Children's age, parents' previous experience in the dentist, sex, number of children, ethnicity, parenting style and income showed mixed results regarding parents preferences. While were parents' age, education level, reason for children's visit to the dentist, and children's previous experience did not affect significantly parents' level of acceptance.

Certainty of the evidence

The certainty of the evidence according to the GRADE¹⁵ criteria was judged to be very low (Appendix 6). Major concerns were related to risk of bias (very serious) related to lack of definition of eligibility criteria and confounding factors; inconsistency (very serious) with heterogeneity above 50% and wide confidence intervals suggesting very low confidence in the estimated effect, and imprecision (serious) with less than 400 observation for continuous measures. Indirectness was not a concern. Publication bias was considered undetected because potential conflict of interest in the included studies was not observed. Furthermore, there was an effort to make a wide search including gray literature.

DISCUSSION

Understanding parental acceptance toward BGT may have implication for planning children's oral health treatment. In the present systematic review, we found that parents of non-SHCN and SHCN children demonstrated high acceptance of basic behavior guidance. Regarding advanced behavior guidance, the proportion of acceptance was good among parents of SHCN children and low among parents of non-SHCN. Active protective stabilization was more accepted among special parents than among non-SHCN. Overall, explanation about the technique increased parental acceptance, however not for all the techniques. Nevertheless, the high risk of bias of the included studies; the high clinical, methodological and statistical heterogeneity; and the very low certainty of the evidence represent a challenge in interpreting the results.

Perhaps the parents of SHCN children are more used to physical restraint, especially when their children present with aggressive behavior¹⁶. This could be the reason in the results as to why the parents accept protective stabilization and sedation leaving N₂O and GA as the last choices. Additionally, the parents of uncooperative SHCN children were more open to accepting advanced BGT^{20,24}.

For dental care providers, there is an obligation to offer accurate information to parents about their children's treatment. In the case of need for advanced behavior guidance, dentists should support the decisions on the evidence-based guidelines and systematic reviews. Nevertheless, the potential harm of a more invasive guidance technique such as protective stabilization or GA should be considered along with parents' opinions⁵. A 2-way conversation about risks and benefits of BGT allows parents to express their values and preferences while sharing the choice with the oral care team regarding the best way their children could be treated²⁵. Moreover, well-informed parents accept better^{26,27} and are more prone to give consent on BGT use²⁸.

Children present multifaceted behavior according to their age range. The present study analysis did not approach parents' BGT acceptance regarding children's age because there was not sufficient homogeneous data to perform subgroup analysis among included studies. However, studies showed mixed results suggesting that age did not affect significantly parents' level of acceptance⁷. In other case younger ages presented greater parents' acceptability to N₂O²⁸. Likewise, parents' previous experience in the dentist^{29,30}, sex^{2,31,32,29}, number of children^{33,34}, ethnicity^{2,35}, parenting style^{36,24} and income^{37,31,32,2,29,33} showed controversial results while parents' age^{31,32}, education level^{2,31,32}, reason for children's visit to the dentist⁷, and children's previous experience^{38,29} did not affect significantly parents' level of acceptance. Unfortunately, there is no reliable anticipatory way dentists can predict which BGT will be more likely to be accepted.

The results, however, allowed to observe that in cases of pain and/or emergency and uncooperative children, parents were more willing to accept advanced techniques^{24,39,40,30}. Furthermore, parents of cooperative children did not approve sedation²⁴ while stressed parents accepted less BGT²². Therefore, recommendations would rely on using the technique that can provide the behavior management that is particularly needed to effectively treat the

child. Usually, dentists pay attention to the parent-child relationship; therefore the results of the present review may help dentists to seek for the parent acceptance of the more suitable BGT for that particular family.

Different relationships may be obtained in different countries. Culture and social mores can influence on the parents point of view in the dental visit approach. Each country has state laws and regulations concerning dental practice and BGT are included in these regulatory efforts. For instance, in Nordic European countries, devices for protective stabilization are forbidden⁴¹. Advanced behavior guidance requires informed consent signed by the parents and kept in the patient record⁶. Even when basic behavior techniques are planned, informed consent is required for alternative methods in case of the necessity to change the BGT⁴¹.

Although HOM is a technique no longer accepted, it was included in the present systematic review due to the number of the included studies that have assessed it. Indeed parents showed disagreement about the use of HOM. There are growing concerns regarding the ethical boundaries of more restrictive techniques^{42,43} especially if the dentist does not have the scientific knowledge and training to perform it⁵. Even for SHCN children that present limited cooperation, physical restraint is seen as a final option for managing behavior⁴⁴.

This systematic review also investigated hypnosis. The agreement with hypnosis varied from low²⁴ to moderate². The parents that agreed were more likely to be women³⁸, older and younger children²⁴. Perhaps parents' perceptions of the benefits to the child anxiety favor their acceptance of the technique.

There are common issues among the included studies that compromise the present results. Firstly, most of them did not present inclusion criteria, did not present sample size calculation, did not describe the settings and did not address confounding factor such as

participants' age, socioeconomic characteristics, previous experience with the dentist and with BGT, number of siblings, anxiety, pain and treatment. Secondly, the methodological problems certainly affect solid conclusions. Another limitation is the outcome measurement. The included studies used a range of scales to assess parents' acceptance with a range of methods to present BGT to parents.

The SHCN children were assessed without any differences in their health conditions and the limitations associated with those conditions. It is possible that the parents' acceptance would be different among the children with a condition such as cerebral palsy, especially because the parents are used to stabilization depending on the level of the disability when compared with the parental preferences for children with systemic chronic diseases. Furthermore, some health disabilities were not assessed such as deafness and blindness.

The present systematic review had a comprehensive search including grey literature with the help of a health science librarian, and presented a high number of included studies, however it is not possible to be sure that all possible eligible studies were included. Also, the effect estimates varied greatly since substantial heterogeneity across studies was observed limiting the confidence in the results. All the mentioned limitations influenced the GRADE assessment, which showed very low-level certainty of the overall evidence.

Based on the issues herein discussed, it is clear that all the pointed limitations affect the present systematic review conclusions and applicability. Yet, dentists should discuss BGT options with parents having in mind that generally basic guidance techniques are well accepted among parents of non-SHCN children as well as among parents of SHCN and probably, for advanced behavior guidance, there will be more resistance among all parents. Moreover, explanation increased parents' acceptability.

Future research should address the BGT presented in the current AAPD guideline⁵ such as positive pre-visit imagery, ask-tell-show, memory recruiting and the communication

techniques for parents, which involves ask-tell-ask, teach-back and motivational interviewing.

Conclusions

This systematic review and meta-analysis suggests with very low certainty that parents' attitudes towards BGT are more likely to be accepting of basic behavior guidance with a high level of acceptance and less likely to accept advanced behavior guidance. This was the case for both parents of non-SHCN and SHCN children. Parents were less likely to accept more restrictive measures. Further, there is some evidence that parents' benefit from education and experience with respect to BGT suggesting that dentists should discuss BGT options with both the parents of non-SHCN and SHCN children. These findings provide potentially helpful direction for dental care providers aimed at improving child health and child- and family-centered dental care.

Acknowledgments: Thanks to Mrs. Maria Gorete Savi for her contribution in the search strategy.

References

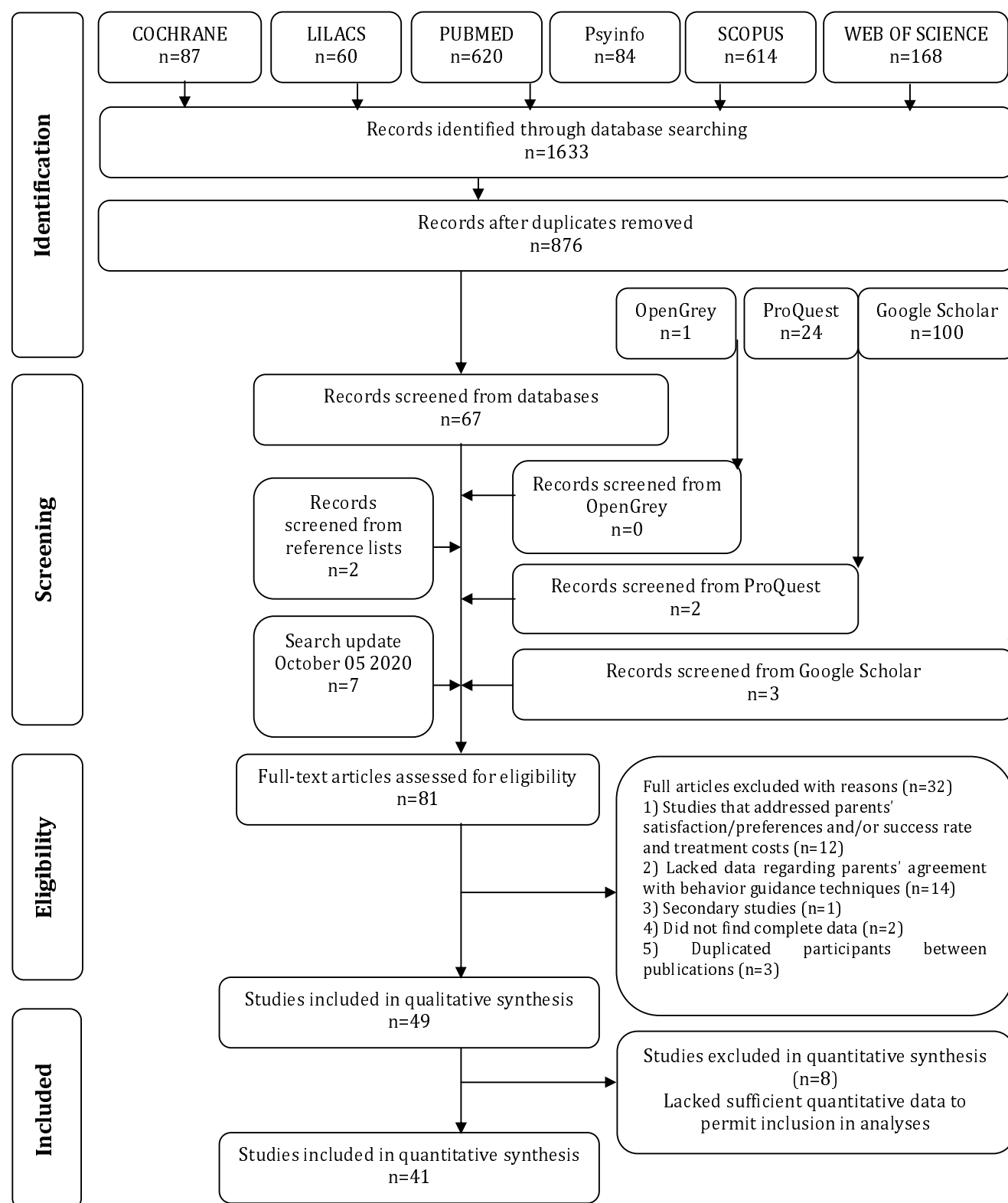
1. Cardoso CL, Loureiro SR. Stress and collaboration behavior in facing pediatric dental treatment. *Psicol Estud* 2008;13(1):133-141.
2. Muhammad S, Shyama M, Al-Mutawa SA. Parental attitude toward behavioral management techniques in dental practice with schoolchildren in Kuwait. *Med Princ Pract* 2011;20(4):350-355.
3. Koplik EK, Lamping DL, Reznikoff M. The relationship of mother-child coping styles and mothers' presence on children's response to dental stress. *J Psychol* 1992;126(1):79-92.
4. Oliver K, Manton DJ. Contemporary behavior management techniques in clinical pediatric dentistry: out with the old and in with the new? *J Dent Child (Chic)* 2015;82(1):22-28.
5. American Academy of Pediatric Dentistry. Behavior Guidance for the Pediatric Dental Patient. Reference Manual of Pediatric Dentistry. Chicago, Ill.: American Academy of Pediatric Dentistry; 2019: 40(6):266-279.
6. Lourenço-Matharu L, Ashley PF, Furness S. Sedation of children undergoing dental treatment. *Cochrane Database Syst Rev*. 2012 Mar 14;(3):CD003877.
7. Goettems ML, Zborowski EJ, Costa FD, Costa VP, Torriani DD. Nonpharmacologic Intervention on the Prevention of Pain and Anxiety During Pediatric Dental Care: A Systematic Review. *Acad Pediatr*. 2017 Mar;17(2):110-119.
8. Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev* 2015;4(1):1.
9. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *J Clin Epidemiol* 2009;62(10):1006-1012.
10. Ouzzani M, Hammady H, Fedorowicz, Z. Elmagarmid, A. Rayyan—a web and mobile app for systematic reviews. *Syst Rev*;2016(5):210.
11. Moola S, Munn Z, Tufanaru C, Aromataris E, Sears K, Sfetcu R, Currie M, Qureshi R, Mattis P, Lisy K, Mu P-F. Chapter 7: Systematic reviews of etiology and risk . In: Aromataris E, Munn Z (Editors). *Joanna Briggs Institute Reviewer's Manual*. The Joanna Briggs Institute, 2017. Available from <https://reviewersmanual.joannabriggs.org/>
12. McGuinness, LA, Higgins, JPT. Risk-of-bias VISualization (robvis): An R package and Shiny web app for visualizing risk-of-bias assessments. *Res Syn Meth*. 2020; 1-7. <https://doi.org/10.1002/jrsm.1411>
13. Higgins Jpt GS. *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.1.0 [updated March 2011]. <http://www.handbook.cochrane.org>. Published 2011.
14. Guyatt GH, Oxman AD, Vist GE, Kunz R, Falck-Ytter Y, Alonso-Coello P, et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* 2008;336(7650):924-926.
15. Elango I. A Comparartive Evaluation Of Attitude And Acceptability Of Various Behavior Management Techniques In Parents Of Normal And Special Children 2009.
16. Oliveira ACB, Paiva SM, Pordeus IA. Parental acceptance of restraint methods used for children with intellectual disabilities during dental care. *Spec Care Dent* 2007;27(6):222-226.

17. Brandes DA, Wilson S, Preisch JW, Casamassimo PS. A comparison of opinions from parents of disabled and non-disabled children on behavior management techniques used in dentistry. *Spec Care Dent* 1995;15(3):119-123.
18. Castro AM, Espinosa RCG, Pereira CAM, Castro TC, Santos M, Santos DR, et al. Behavior Guidance Techniques used in Dental Care for Patients with Special Needs: Acceptance of Parents. *Pesqui Bras Odontopediatria Clin Integr* 2016;16(1):113-121.
19. De Castro AM, De Oliveira FS, De Paiva Novaes MS, Araújo Ferreira DC. Behavior guidance techniques in Pediatric Dentistry: Attitudes of parents of children with disabilities and without disabilities. *Spec Care Dent* 2013;33(5):213-217.
20. Marshall J, Sheller B, Mancl L, Williams BJ. Parental attitudes regarding behavior guidance of dental patients with autism. *Pediatr Dent* 2008;30(5):400-407.
21. Ramos MM, Carrara CF, Gomide MR. Parental acceptance of behavior management techniques for children with clefts. *J Dent Child* 2005;72(2):74-77.
22. Lawrence SM, McTigue DJ, Wilson S, Odom JG, Waggoner WF, Fields HW, Jr. Parental attitudes toward behavior management techniques used in pediatric dentistry. *Pediatr Dent* 1991;13(3):151-155.
23. Scott S, Garcia-Godoy F. Attitudes of Hispanic parents toward behavior management techniques. *ASDC J Dent Child* 1998;65(2):128-131.
24. Peretz B, Zadik D. Parents' attitudes toward behavior management techniques during dental treatment. *Pediatr Dent* 1999;21(3):201-204.
25. Barry MJ, Edgman-Levitan S. Shared decision making: pinnacle of patient-centered care. *N Engl J Med*. 2012;366(9):780-781.
26. Havelka C, McTigue D, Wilson S, Odom J. The influence of social status and prior explanation on parental attitudes toward behavior management techniques. *Pediatr Dent* 1992;14(6):376-381.
27. Jahanimoghadam F, Hasheminejad N, Horri A, Rostamizadeh MR, Baneshi MR. Does verbal explanation change parental acceptance level of different Behavior Management techniques in dental office? *J Oral Health Oral Epidemiol* 2018;7(2):80-86.
28. Allen KD, Hodges ED, Knudsen SK. Comparing four methods to inform parents about child behavior management: how to inform for consent. *Pediatr Dent* 1995;17(3):180-186.
29. Luis de Leon J, Guinot Jimeno F, Bellet Dalmau LJ. Acceptance by Spanish parents of behaviour-management techniques used in paediatric dentistry. *Eur Arch Paediatr Dent* 2010;11(4):175-178.
30. Patel M, McTigue DJ, Thikkurissy S, Fields HW. Parental Attitudes Toward Advanced Behavior Guidance Techniques Used in Pediatric Dentistry. *Pediatr Dent* 2016;38(1):30-36.
31. Eaton JJ, McTigue DJ, Fields HW, Beck FM. Attitudes of contemporary parents toward behavior management techniques used in pediatric dentistry. *Pediatr Dent* 2005;27(2):107-113.
32. Jafarzadeh M, Kooshki F, Malekafzali B, Ahmadi S. Attitude of Parents Referred to the Department of Pediatric Dentistry towards Different Behavioral Management Techniques Used in Pediatric Dentistry. *Journal of Dental School Shahid Beheshti University of Medical Sciences* 2015;33(1):44-50.
33. Murphy MG, Fields HW, Jr., Machen JB. Parental acceptance of pediatric dentistry behavior management techniques. *Pediatr Dent* 1984;6(4):193-198.
34. Razavi S, Purtaji B. Determining the behavior management technique's acceptance of mothers referred to the department of pediatric dentistry in Qazvin (2007).

35. Chang CT. Ethnic influence on parental preferences towards behavioral management techniques used in pediatric dentistry [10132134]. Ann Arbor: The University of Texas School of Dentistry at Houston; 2016.
36. Taran PK, Kaya MS, Bakkal M, Ozalp S. The Effect of Parenting Styles on Behavior Management Technique Preferences in a Turkish Population. *Pediatr dent* 2018;40(5):360-364.
37. Chen X, Jin SF, Liu HB. [Analysis of possible factors that impact parents to accept dental general anesthesia]. *Shanghai journal of stomatology* 2010;19(2):151-154.
38. Alammouri M. The attitude of parents toward behavior management techniques in pediatric dentistry. *J Clin Pediatr Dent* 2006;30(4):310-313.
39. Al Zoubi L, Schmoeckel J, Mustafa Ali M, Alkilzy M, Splieth CH. Parental acceptance of advanced behaviour management techniques in normal treatment and in emergency situations used in paediatric dentistry. *Eur Arch Paediatr Dent* 2019;20(4):319-323.
40. Fields HW, Machen JB, Murphy MG. Acceptability of various behavior management techniques relative to types of dental treatment. *Pediatr Dent* 1984;6(4):199-203.
41. Hallonsten A, Jensen B, Raadal M, Veerkamp J, Hosey M, Poulsen S. EAPD guidelines on sedation in paediatric dentistry.
42. Paryab M, Afshar H, Mohammadi R. Informing Parents about the Pharmacological and Invasive Behavior Management Techniques Used in Pediatric Dentistry. *J Dent Res, Dent Clin, Dent Prospects* 2014;8(2):95-100.
43. Machado G, Mundim A, Prado M, Campos C, Costa L. Does protective stabilization of children during dental treatment break ethical boundaries? A narrative literature review. *OHDM: oral health and dental management, Constanta* 2015;14(4):1-6.
44. Perkins E, Prosser H, Riley D, Whittington R. Physical restraint in a therapeutic setting; a necessary evil? *Int J Law Psychiatry* 2012;35(1):43-49.
45. Abushal MS, Adenubi JO. Attitudes of Saudi parents toward behavior management techniques in pediatric dentistry. *J Dent Child* 2003;70(2):104-110.
46. Boka V, Arapostathis K, Vretos N, Kotsanos N. Parental acceptance of behaviour-management techniques used in paediatric dentistry and its relation to parental dental anxiety and experience. *Eur Arch Paediatr Dent* 2014;15(5):333-339.
47. Cordero N, Cárdenas JM, Álvarez LG. Parental acceptance of pharmacologic and non-pharmacologic behavior management techniques in pediatric dentistry. *CES Odontol* 2012;25(2):24-32.
48. Enciso PA, Posada MC, Quintero AM, Valencia C, Vásquez J, Ríos S, et al. Aceptabilidad, percepción y permisividad de los padres a las diferentes técnicas de manejo del comportamiento utilizadas en los pacientes pediátricos de la Clínica CES. *CES Odontol* 2001;14(1):28-35.
49. Kupietzky A. Effects of video information on parental preoperative anxiety level and their perception of conscious sedation vs. general anesthesia for the dental treatment of their young child. *J Clin Pediatr Dent* 2006;31(2):90-92.
50. Kuscu OO, Caglar E, Sandalli N. Parents' assessments on the effectiveness of nonaversive behavior management techniques: A pilot study. *J Dent Sci* 2014;9(1):29-34.
51. Simões FXPC, Macedo TG, Coqueiro RS, Pithon MM. Percepção dos pais sobre as técnicas de manejo comportamental utilizadas em Odontopediatria. *Rev Bras Odontol* 2016;73(4):277-282.
52. Wilson S, Antalis D, McTigue DJ. Group effect on parental rating of acceptability of behavioral management techniques used in pediatric dentistry. *Pediatr Dent* 1991;13(4):200-203.

53. Alkandari SA, Almousa F, Abdulwahab M, Boynes SG. Dentists' and Parents' Attitude Toward Nitrous Oxide Use in Kuwait. *Anesth Prog* 2016;63(1):8-16.
54. Acharya S. Parental acceptance of various behaviour management techniques used in pediatric dentistry: A pilot study in Odisha, India. *Pesqui Bras Odontopediatria Clin Integr* 2017;17(1).
55. Betancur E, Londoño S, Alvarez C, Cárdenas JM, Manrique RD. Evaluación de la aceptación de la técnica de sedación inhalada con óxido nítrico por parte de padres y niños entre los 4 y 12 años de edad. *CES Odontol* 2006;19(1):33-37.
56. Bhandari R, Thakur S, Singhal P, Chauhan D, Jayam C, Jain T. Parental awareness, knowledge, and attitude toward conscious sedation in North Indian children population: A questionnaire-based study. *Indian J Dent Res* 2018;29(5):693-697.
57. Brill WA. Parents' assessment and children's reactions to a passive restraint device used for behavior control in a private pediatric dental practice. *ASDC J Dent Child* 2002;69(3):310-313.
58. Chen X, Jin SF, Liu HB. [Survey of parental acceptance rate to behavior management techniques used in pediatric dentistry]. *Shanghai journal of stomatology*. 2008;17(5):475-478.
59. Frankel RI. The Papoose Board and mothers' attitudes following its use. *Pediatr dent* 1991;13(5):284-288.
60. Fúccio F, Ferreira K, Watanabe S, Jorge M, Pordeus I, Paiva S. Aceitação dos pais em relação às técnicas de manejo do comportamento utilizadas em odontopediatria. *JBP* 2003;6(30):146-151.
61. Kamolmatayakul S, Nukaw S. Parent attitudes toward various behaviour management techniques used in pediatric dentistry in Southern Thailand. *Int J Health Promot Edu* 2002;40(3):75-77.
62. Peretz B, Kharouba J, Blumer S. Pattern of parental acceptance of management techniques used in pediatric dentistry. *J Clin Pediatr Dent* 2013;38(1):27-30.
63. Subramaniam P, Girish Babu KL, Lakhota D. Evaluation of nitrous oxide-oxygen and triclofos sodium as conscious sedative agents. *J Indian Soc Pedodontics Prev Dent* 2017;35(2):156-161.
64. Tsuchihashi N, Uehara N, Takagi Y, Miwa Z, Sugimoto K. Internal stress in children and parental attitude to dental treatment with passive restraint. *Pediatric Dental Journal*. 2012;22(2):170-177.
65. Venkataraghavan K, Shah J, Kaur M, Trivedi K, Shah S, Virda M. Pro-Activeness of Parents in Accepting Behavior Management Techniques: A Cross-Sectional Evaluative Study. *J Clin Diagn Res* 2016;10(7):46-49.
66. Martinez Mier E, Walsh C, Farah C, Vinson L, Soto-Rojas A, Jones J. Acceptance of Behavior Guidance Techniques Used in Pediatric Dentistry by Parents From Diverse Backgrounds. *Clin Pediatr (Phila)*. 2019 Aug;58(9):977-984. Epub 2019 May 8. PMID: 31068000.

Figure 1 - Flow diagram of literature search and selection criteria.¹



¹ Adapted from PRISMA.

Figure 2. Methodological quality assessed by the Joanna Briggs Institute Critical Appraisal tools - Checklist for Analytical Cross-Sectional Studies. The studies that presented “yes” for all questions were rated as having low risk of bias, those that presented at least one answer “unclear” was rated as unclear risk of bias, and at least one answer “no” was rated as high risk of bias. Plot generated with the web app robvis.

	Risk of bias								Overall
	D1	D2	D3	D4	D5	D6	D7	D8	
Aburshat 2003	●	●	●	●	●	●	●	●	●
Alammouri 2006	●	●	●	●	●	●	●	●	●
Alkandari 2016	●	●	●	●	●	●	●	●	●
Allen 1995	●	●	●	●	●	●	●	●	●
Al Zoubi 2019	●	●	●	●	●	●	●	●	●
Aschra 2017	●	●	●	●	●	●	●	●	●
Betancur 2006	●	●	●	●	●	●	●	●	●
Bhandari 2018	●	●	●	●	●	●	●	●	●
Boka 2014	●	●	●	●	●	●	●	●	●
Brandes 1995	●	●	●	●	●	●	●	●	●
Brill 2002	●	●	●	●	●	●	●	●	●
Castro 2016	●	●	●	●	●	●	●	●	●
Chang 2016	●	●	●	●	●	●	●	●	●
Chen 2010	●	●	●	●	●	●	●	●	●
Chen 2008	●	●	●	●	●	●	●	●	●
Cordero 2012	●	●	●	●	●	●	●	●	●
De Castro 2013	●	●	●	●	●	●	●	●	●
Eaton 2005	●	●	●	●	●	●	●	●	●
Elango 2009	●	●	●	●	●	●	●	●	●
Enciso 2001	●	●	●	●	●	●	●	●	●
Fields 1984	●	●	●	●	●	●	●	●	●
Frankl 1991	●	●	●	●	●	●	●	●	●
Fuccio 2003	●	●	●	●	●	●	●	●	●
Havelka 1992	●	●	●	●	●	●	●	●	●
Jafarzadeh 2015	●	●	●	●	●	●	●	●	●
Jahanimoghadam 2018	●	●	●	●	●	●	●	●	●
Kamolmatayakul 2002	●	●	●	●	●	●	●	●	●
Kupietzky 2007	●	●	●	●	●	●	●	●	●
Kuscu 2014	●	●	●	●	●	●	●	●	●
Lawrence 1991	●	●	●	●	●	●	●	●	●
León 2010	●	●	●	●	●	●	●	●	●
Marschall 2008	●	●	●	●	●	●	●	●	●
Mier et al 2019	●	●	●	●	●	●	●	●	●
Muhammad 2011	●	●	●	●	●	●	●	●	●
Murphy 1984	●	●	●	●	●	●	●	●	●
Oliveira 2007	●	●	●	●	●	●	●	●	●
Paryab 2014	●	●	●	●	●	●	●	●	●
Patel 2016	●	●	●	●	●	●	●	●	●
Peretz 1998	●	●	●	●	●	●	●	●	●
Peretz 2013	●	●	●	●	●	●	●	●	●
Ramos 2005	●	●	●	●	●	●	●	●	●
Razavi, Purtaji 2009	●	●	●	●	●	●	●	●	●
Scott and Garcia 1998	●	●	●	●	●	●	●	●	●
Simões 2016	●	●	●	●	●	●	●	●	●
Subramaniam 2017	●	●	●	●	●	●	●	●	●
Tarari et al 2018	●	●	●	●	●	●	●	●	●
Teuchuhashi 2012	●	●	●	●	●	●	●	●	●
Venkatraghavan 2016	●	●	●	●	●	●	●	●	●
Wilson 1991	●	●	●	●	●	●	●	●	●

D1: Were the criteria for inclusion in the sample clearly defined?
D2: Were the study subjects and the setting described in detail?
D3: Was the exposure measured in a valid and reliable way?
D4: Were objective, standard criteria used for measurement of the condition?
D5: Were confounding factors identified?
D6: Were strategies to deal with confounding factors stated?
D7: Were the outcomes measured in a valid and reliable way?

Judgement
● High
● Unclear
● Low

Figure 3 - Meta-analysis of proportion (non-special health care needs children)

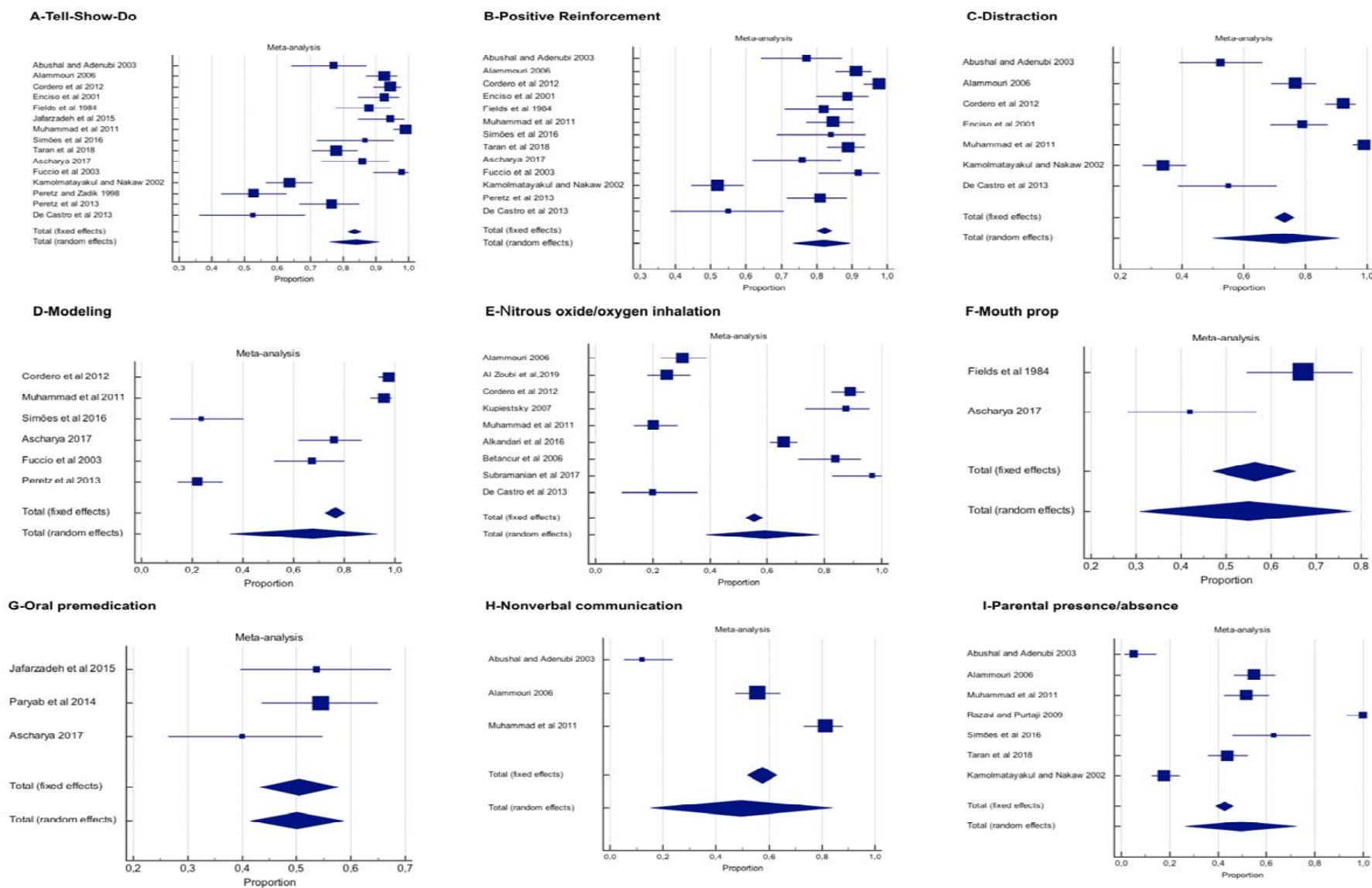
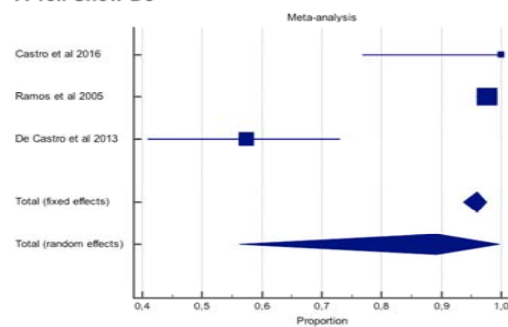
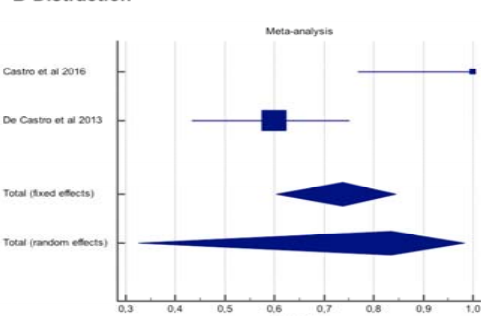


Figure 4 - Meta-analysis of proportion special health care needs children

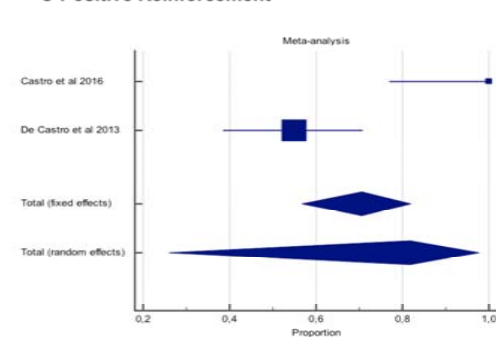
A-Tell-Show-Do



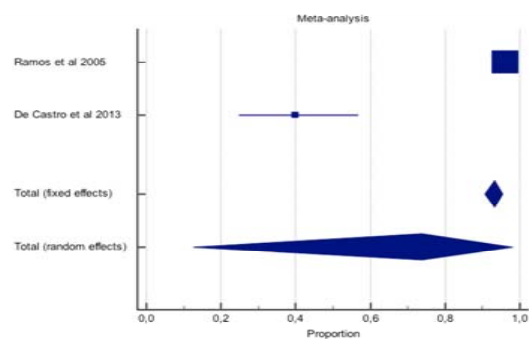
B-Distracton



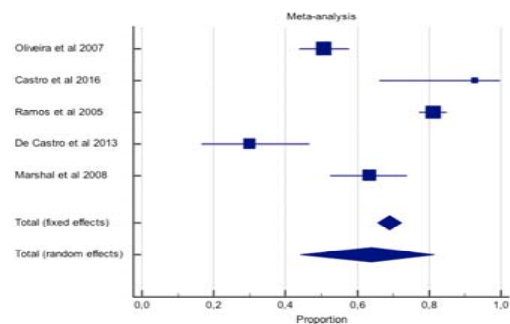
C-Positive Reinforcement



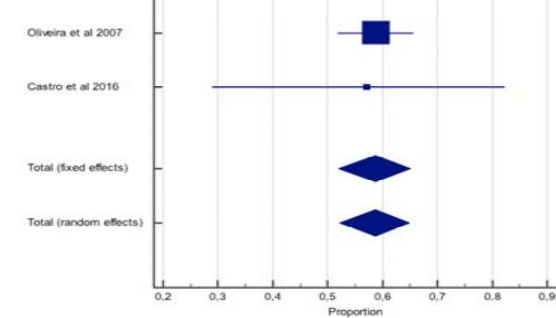
D-Voice control



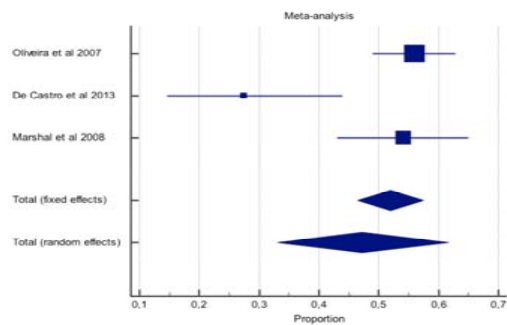
E-Active Protective Stabilization



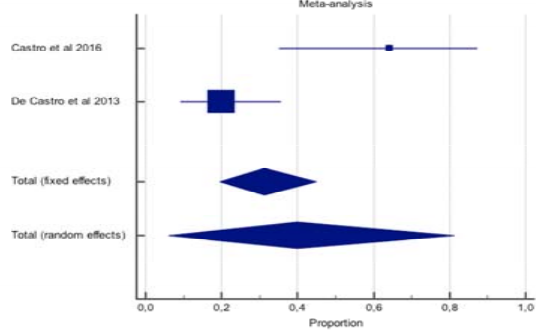
F-Sedation



G-Passive Protective Stabilization



H- Nitrous oxide/oxygen inhalation



I-General Anesthesia

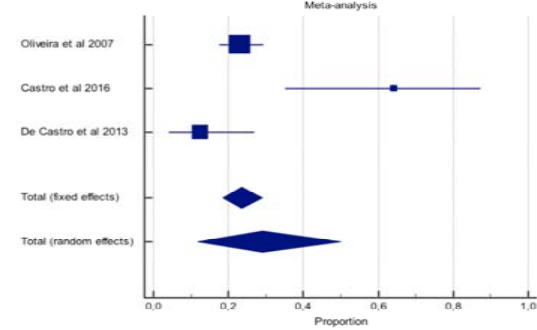


Table 1 - Summary of descriptive characteristics of included articles in non-special health care needs children and special health care needs children.

Non-special health care needs children						
Group	Author, year, country	Settings/ Total parents N; Sex (M/F)/ Children's age (years); Mean; Range	Behavior Guidance Technique (BGT)	Scale (VAS, Likert); Yes/No response; Ranking preference	Main Findings	Main conclusion
Video-based research	Abushal and Adenubi 2003 ⁴⁵ , Saudi Arabia	University 133 NI	TSD; PR; HOM; CS; APS; DIS; VC; PP/A; NC; GA.	VAS (4 categories by the authors); Ranking preference.	TSD and PR were the most acceptable. The most unacceptable was VC and HOM.	Parents accepted most of the techniques. Explanation enhanced their level of acceptance.
	Alammouri 2006 ³⁸ , Jordan	University 138 66M 70F NI	TSD; PR; NC; VC; PP/A; DIS; HOM; APS; Hyp; N2O; CS; GA.	Yes/No response.	Parents had positive attitudes to TSD, PR and DIS. Did not accept the HOM, APS, N2O, CS and GA.	The general parental attitudes were positive regarding the BGT.
	Allen et al 1995 ²⁸ , USA	University 120 120 F 2-8	TSD; N2O; PPS; VC; HOM; OP; APS; GA.	Likert scale (1-9) and consenting (Yes/No).	Only the oral method produced significantly better consent for individual procedures. All the parents consented to TSD.	Oral information to parents about each technique is most likely to result in parents who feel well informed and who are likely to provide written consent.
	Boka et al 2014 ⁴⁶ , Greece	University 229 60 M 129 F 3-12 (7.8)	TSD; N2O.; PPS; VC; HOM; CS; APS; GA; PPA.	VAS (0-10)	TSD was rated higher than any other by all parents. PPA was the second most accepted technique followed by N2O. The least accepted techniques were PPS and GA.	Parents with negative dental experience would prefer GA over any of active or passive restraint, HOM and VC techniques. PPA was a highly acceptable technique.
	Chang 2016 ³⁵ , USA	Pediatric Dentistry Clinic 104 30 M 74 F NI	TSD; VC; NC; PR; DIS; PPA; N2O; GA; SE; APS.	VAS (0-100)	PR and TSD were the most acceptable techniques. Decreasing of acceptance DIS, PPA, N2O, NC, SE, VC and APS.	PR and TSD are most accepted by parents, while invasive techniques such as VC and PP/A, are the least accepted.
	Cordero et al 2012 ⁴⁷ , Colombia	Private practice and University 129 26 M 103 F 3-15	TSD; PR; DIS; APS; PPS; N2O; GA.	Likert scale	89.1% accepted the N2O. And 35.9% accepted the GA. The communicative techniques had more acceptances with TSD (94.6%), PR (97.7%), DIS (92.2%).	There was high rejection of parents to the traditional use of restrictive techniques and greater acceptance of communication techniques.
	Eaton et al 2005 ³¹ , USA	University 46	TSD; N2O.; PPS; VC; HOM; SE;	VAS (0-100)	TSD was rated as the most acceptable technique, followed	All techniques had acceptable ratings except for HOM. GA was

	8 M 38 F NI	APS; GA.		(in order of decreasing acceptance) by N2O, GA, APS, OP, VC, PPS, and HOM.	ranked as the third most acceptable technique.
Enciso et al 2001 ⁴⁸ , Colombia	University 81 NI	TSD; DIS; RP; APS; PPS.	Yes/no response.	TSD, PR and DIS were the most accepted techniques. Restrictive BGT had lower acceptance ratings.	Parents compared to those that did not require some type of physical restriction less accepted restrictive techniques.
Fields et al 1984 ⁴⁰ , USA	University 67 NI	TSD; MP; VC; PR; HOM; APS; PPS; SE; GA.	Yes/no response (acceptable and unacceptable).	TSD was the most accepted technique followed by PR, VC and MP.	GA and SD were rated as acceptable by a majority of parents. VC, MP, PR, and TSD were acceptable. Use of PPS was the lowest rated technique acceptable by parents.
Havelka et al 1992 ²⁶ , USA	Private practices and University 122 17 M 105 F NI	TSD; N2O; PPS; VC; HOM; OP; APS; GA.	VAS (0-100)	Acceptable ratings reported for TSD, VC, N2O, APS, OP, GA, PPS and HOM, (in that order).	Techniques judged least acceptable were HOM (the most unacceptable), GA, PPS and OP.
Jafarzadeh et al 2015 ³² , Iran	University 54 18 M 36 F NI	TSD; VC; PPS; PR; HOM; OS; GA.	VAS (0-100) presented as yes/no.	TSD had the highest acceptance, PPS (35%) and HOM (30%) the lowest.	Parents reported negative ratings of physical techniques (PPS and HOM) as in past studies. But, advanced pharmaceutical techniques (SE and GA) were reported to have gained higher levels of acceptability.
Jahanimoghadam et al 2018 ²⁷ , Iran	University 60 20 M 40 F 2-15	TSD; VC; HOM; APS; PPA; GA.	VAS (0-100)	TSD and HOM had the highest and lowest mean scores respectively. The most accepted techniques was: TSD, PPA, APS, VC, GA and HOM.	Parents rated non-invasive methods more favorably.
Kupietzky 2006 ⁴⁹ , Israel	Private dental clinic 40 14 M 26 F Mean age 3.7	SE and GA.	VAS and Yes/No responses.	The majority of parents preferred SE over GA. The majority of the parents stated that their perception of GA was not reflected as much as in the video shown.	Parents better-accepted SE.
Kuscu et al 2014 ⁵⁰ , Turkey	University 25 12 M 13 F 5-13 (7.56)	TSD; PR; VC; DIS; NC; PPA; perceived control; gifts.	VAS (0-10)	Perceived control and PR were rated the most effective and NC and PPA the least effective.	All the advanced techniques were found to be effective by some parents. Perceived control and positive reinforcement were rated the most effective.
Lawrence et al	University	TSD; N2O; PPS;	VAS (0-100)	GA was the more unacceptable,	Informed parents were

1991 ²² , USA	80 21 M 59 F NI	VC; HOM; OP; APS; GA.		followed by OP and PPS. The techniques better accepted were TSD, N2O and VC, respectively.	significantly more accepting of behavior guidance techniques than the uninformed parents but both groups were positive about the techniques.
Leon et al 2010 ²⁹ , Spain	University 50 16 M 34 F 3-13	TSD; N2O; SE; PPS; VC; HOM; OP; GA; APS.	VAS (0-10)	The most acceptable technique was TSD, while the least accepted was the HOM. Decreasing order of acceptance, by VC, APS, N2O, OP and PPS and last HOM.	The techniques were well accepted with the exception of HOM and the PPS. The socioeconomic and gender of parents influenced level of acceptance of techniques.
Martinez Mier et al 2019 ⁶⁶ , USA	Community centers and University 136 28 M 108 F Under 18	TSD; VC; APS; GA; N2O; OP; PPS	VAS (0-100)	Comparisons among study groups showed that acceptance was statistically different between Hispanic and non-Hispanic white participants for GA and PPS where Hispanic parents are more accepting of PPS but less accepting of GA. Statistical differences exist between non-Hispanic black and Hispanic parents for APS and GA where Hispanic parents are less accepting of both techniques. No differences existed between non-Hispanic white and non-Hispanic black parents. Significant differences were not found for N2O, TSD, and VC.	Differences in acceptance of behavior management techniques exist between Hispanic, non-Hispanic white, and non-Hispanic black parents, which suggest that practitioners should take into account cultural differences when electing to use them.
Muhammad et al 2011 ² , Kuwait	University 118 54 M 64 F 6-13 (8.8)	TSD; PR; NC; effective communication; Mo; VC; PP/A; DIS; HOM; APS; Hyp; N2O; CS; GA.	Yes/no questions.	PR (100%), effective communication, TSD, DIS, M and NC were considered as the most approved techniques. Hyp and PP/A were moderately approved. VC, N2O, SE, APS, GA (5.9%), HOM (5.1%) technique and CS (4.2%) were the least approved techniques.	Most parents preferred the nonpharmacological techniques (PR, TSD, NC, DIS, Mo) to pharmacological techniques. Techniques employing drugs and restraint were considered least acceptable.
Murphy et al 1984 ³³ , USA	University 67 NI	TSD; VC; MP; PR; HOM; APS by dentist; APS by assistant; PPS; SE; GA.	VAS (divided in quartile).	Parents favored TSD, PR, MP and VC, in this order. Physical restraint by the dentist and assistant were significantly more favorable than HOM and SE. The least acceptable techniques were GA and PPS.	Techniques not requiring restriction were rated as more acceptable. Techniques employing drugs and restraint were less acceptable.

	Paryab et al 2014 ⁴² , Iran	NI 90 90 F 3-6	APS; PPS; HOM; OP; GA.	Likert scale.	The technique most accepted was APS by assistant or mother (82.2%), followed by OP (54.4%), HOM (53.3%), GA (38.9%) and PPS (37.8%).	None of the presentation methods had a significant preference over the others in selecting the BGT.
	Patel et al 2016 ³⁰ , USA	University and private practice 105 20 M 85 F NI	PPS; APS; SE; GA.	VAS (0-100)	The techniques more accepted were SE, follow by GA, APS and passive immobilization.	Advanced pharmacologic techniques (SE and GA) were rated as the most acceptable. Passive immobilization was rated as the least acceptable technique.
	Razavi and Purtaji 2007 ³⁴ , Iran	University 50 50F U	GA; PP/A; HOM; VC.	Yes/No acceptance.	Acceptance ratios were as follows: PP/A 100%; VC 92 %; HOM 50% AND GA 30%.	PP/A was the most acceptable and GA the least.
	Scott and Garcia-Godoy 1998 ²³ , USA	University 32 6 M 26 F NI	TSD; VC; N2O; OP; GA; APS; HOM; PPS.	VAS (0-99)	HOM was rated unacceptable by 63% of the parents with previous explanation and 81% without. TSD was the technique better accepted in both groups.	An informed parent is more likely to show greater acceptance of a techniques. HOM and PPS showed a statistically greater degree of nonacceptance. Parents would rather have the child subjected to GA than HOM.
	Simões et al 2016 ⁵¹ , Brazil	Pediatric dental clinic 38 7 M 32 F 0-12	TSD; VC; PR; PPA; HOM; APS; PPS; SE.	Always, sometimes, never.	TSD and PR were the most acceptable techniques before and after explanation. Acceptance of the HOM technique rose from 34.2% to 68.5% after explanation.	Non-restrictive techniques had high acceptance rates both before and after the explanations, while restrictive techniques had low rates of acceptance. After receiving explanations of BGT, parents are more likely to accept the use of certain techniques.
	Taran et al 2018 ³⁶ , Turkey	University 146 17 M 125 F 3-12	TSD; VC; PR; PPA; PPS, SE; GA.	Applicable, applicable if really needed, or not applicable.	Acceptance ratios were as follows: PR 91.5%; TSD 80.3 %; PPA 45.1 %; VC 36.6 %; SE 33.8 %; GA 25.4 % and PPS 16.9%	Parental preferences for BGT may be related to parenting styles and parental dental anxiety.
	Wilson et al 1991 ⁵² , USA	University 60 17 M 43 F NI	TSD; VC; HOM; APS; PPS; N2O; OP; GA.	VAS (0-100)	TSD was most acceptable technique, follow by VC; N2O; APS; GA; OP; PPS and HOM (in group) and TSD; APS; VC; N2O; GA; PPS; OP and HOM (individually).	Small groups of parents viewing techniques tend to rate them as less acceptable than parents viewing the same techniques individually.
Non-video-based research (Questionnaire, photographs,	Alkandari et al 2016 ⁵³ , Kwait	Kuwait and private clinics 381 179 M	N2O and GA.	Yes/No acceptance.	66% of parents accept the N2O. Similar percentage of them would prefer N2O (64%) over GA (36%).	Parents are accepting nitrous oxide sedation as a BGT for their children.

power point,
verbal
explanation)

197 F
1-15 (5.9)

Acharya 2017 ⁵⁴ , India	University 50 32 M 18 F 3-6	VC; TSD; PR; APS; HOM; N2O; GA; OP; Mo; MP.	VAS (0-100) presented in ranking.	The most acceptable technique was TSD (86%), followed by PP/A (76%). The least acceptable were HOM, voice control and APS.	TSD was the most accepted behavior technique and HOM the least.
Al Zoubi et al 2019 ³⁹ , Germany	University 136 41 M 95 F NI	PPS; APS; N2O; GA.	Likert scale	In normal treatment, N2O (52.6%) followed by APS (39.3%), GA (28%) and PPS (19.9%). In emergency situations, N2O (68.2%), followed by GA (62.8%), APS (54%) and PPR (37.8%)(p<0.001).	Parents in Germany are more willing to accept advanced BGT in emergency situations, in comparison to normal treatment.
Betancur et al 2006 ⁵⁵ , Colombia	Private practices 50 NI 4-12 (8)	N2O.	12 questions (4 options – extremely positive; positive; negative; extremely negative).	66% considerate the technique appropriate, 84% accepted, just 2% considerate not acceptable.	There was a high perception and acceptance of the technique by both parents and children.
Bhandari et al 2018 ⁵⁶ , India	University 320 NI 2-5	SE.	Conscious sedation safety (yes/no).	Parents acceptance: with high school 15%; graduate 90%; postgraduate 93%; not completed high school 61%. Most of parents (40%) were graduates.	Parents feel sedation is safe in the dental office.
Brill 2002 ⁵⁷ , USA	NI 42 1-6	APS.	Happy/neutral or Unhappy.	95% of parents were happy/neutral to the APS. And 92% of parents answered that the use of APS was very/moderately successful.	Parents accept the use of passive restraint even when they feel high levels of stress while watching their child held in such devices.
Chen 2010 ³⁷ , China	U 299 U	GA.	VAS (0-100)	Acceptance rate of GA was positively related to the monthly income and negatively related to the evaluated score of child cooperation degree.	There was no correlation in GA acceptance rate and the age of the child, age of the parents, educational level and the frequency of dental visit for the child. The major factors for mother to accept GA were income level and the level of children's cooperation.

Chen 2008 ⁵⁸ , China	U 285 U	TSD; VC; GA; SE; APS.	VAS (0-100)	Decreasing the acceptance rates for the following in order was: TSD, VC, SE, GA and PPS. Females accepted more TSD and males accepted more APS, and this difference was significant.	No techniques were found to be totally acceptable by all parents.
Frankel 1991 ⁵⁹ , USA	Pediatric dental practice 59 59 F 0-5 or more (3.1)	PPS.	Questions yes/no and Likert scale.	62% reported that the use of PPS was very helpful and necessary. 86% did not think that just seating the child in the dental chair and holding him/her would have been successful.	The mothers had positive attitudes toward the use of PPS after experiencing its use with their children.
Fuccio et al 2003 ⁶⁰ , Brazil	University 49 11 M 38 F 3-12	TSD; VC; PR; HOM; SE; GA; APS; PPS.	Three options determined by author (always; usually; never).	Non-restrictive techniques were accepted always by 81%, TSD was the most accepted by 98%, followed by PR 91.8%. Restrictive techniques were accepted always by 29% of parents.	Non-restrictive techniques were the most accepted by parents (TSD; VC; PR) and the restrictive and SE/GA was rated as most unacceptable.
Kamolmatayakul and Nakaw 2002 ⁶¹ , Thailand	University 185 2-15	TSD; PR; DIS; PP/A; VC; HOM; PPS; SE; GA.	Likert scale (total acceptance, acceptance, neutral, not accepted, and totally unacceptable).	TSD was accepted by all parents followed by PR (94%) and DIS (83%). PPS was accepted by 49%. The least acceptable were GA (62%), HOM (58%), VC (56%), and SE (55%).	Parents better accepted non-restrictive techniques compared to restrictive methods.
Peretz and Zadik 1999 ²⁴ , Israel	University 104 2-13 (6.5)	VC; APS; PPS; SE.	Total unacceptance, partial acceptance, acceptance.	VC was totally accepted by most parents (53%), APS was accepted partially by 64% of parents, PPS was total unacceptable by 44% and SE was partial accepted by 53% of parents.	Detailed explanations and witnessing children during dental treatment may raise parents' tolerance level toward aggressive guidance techniques.
Peretz et al 2013 ⁶² , Israel	University and private clinics 90 23 M 66 F 2-15 (8.8)	TSD, Mo, PR, VC, APS, Hyp. SE (nitrous oxide and oxygen alone or combined with pharmacological sedation).	Total unacceptance, dislike, apply only if really needed, acceptance.	The most accepted technique was PR (81.1%) followed by TSD (76.7%). The least accepted techniques were restraint (1.1%) and VC (7.8%). SE was unacceptable to 15.6%.	Parents preferred more positive approaches and guidance techniques that involve demonstrations geared for the child's level of understanding. Restraint and voice control were more strongly rejected than sedation.
Subramaniam et al 2017 ⁶³ , India	University 60 5-10	N2O and SE.	Good, poor.	Good parental acceptance was observed for both routes of administration.	Parental acceptance for both routes was good.

					The parent acceptance was good in 96.67% in Group N2O and 100% for Group SE.	
	Tsuchihashi et al 2012 ⁶⁴ , Japan	University 50 50 F 3-5 (4.3)	Restraint technique.	Yes/no/ambivalent.	94% of mothers thought that decisions to use restriction were appropriate. 26% mothers feel bad for the child (before) and 13% (after).	Parents accepted the necessity of passive restraint for dental treatment.
	Venkataraman et al 2016 ⁶⁵ , India	University 51 2-4	TSD; PR; PPA; VC; HOM; APS; N2O; GA.	Most acceptable/least acceptable.	The most preferred technique was TSD followed by PR and least preferred was GA followed by physical restraint.	Parents preferred positive approaches even in the emergency dental condition. There was a generalized low tolerance level for firm guidance techniques.
Special health care needs children						
Video-based research	Elango 2009 ¹⁵ , India	Dental College and Hospital 204 Group A (non-special) 53 M 49 F Group B (special) 42 M 60 F 2-15	TSD; PR; Mo; VC; HOM; APS; SE; GA; MP; CE.	VAS (0-100)	Group B parents were less accepting than Group A for APS, HOM and GA.	Contingent escape and live modeling were the first ranked technique by both parents. Least accepted technique by both the parental groups was VC and HOM.
	Oliveira et al 2007 ¹⁶ , Brazil	Institutionalized children with intellectual disabilities 209 0-15	APS; PPS; SE; GA.	Accept/Do Not Accept	SE was the most accepted technique with 58.9%, followed by PPS (55.9%), APS (50.7%) and GA with 22.9%.	The restraint methods most accepted by parents who had children with intellectual disabilities were APS; PPS; SE. The most rejected was GA.
Non-video-based research (Questionnaire, photographs, power point, verbal explanation)	Brandes et al 1995 ¹⁷ , USA	University 80 (40 with disabled child and 40 without disabled child) 74 M 6 F NI	HOM; GA; PPS; SE.	VAS (0-100)	The SE was the most accepted followed by HOM. GA was better accepted than PPS on invasive procedures, but for checking/cleaning the PPS was better accepted than GA.	Having a disabled child or receiving a prior rationale for pediatric BGT was not significantly related to differences in acceptance of the techniques for the procedures described. Parents of disabled children tended to be slightly more accepting of techniques overall.
	Castro et al 2016 ¹⁸ , Brazil	University 83 (data of only	TSD; DIS; PR; NC; N2O; APS;	Accept; accept with restrictions;	TSD; DIS; NC; PR were considerate totally accepted.	Communicative guidance and protective stabilization were the

	14 were used) 15 M 68 F 1-10 (other age ranges were not used)	SE; GA.	do not accept.	92.8%, 57.1%, 64.2% and 64.2% of parents accepted APS, SE, GA and N2O respectively.	methods most readily accepted by parents.
De Castro et al 2013 ¹⁹ , Brazil	University 80 80 F 4-8 (no special needs) 3-10 (special needs)	TSD; VC; PR; DIS; N2O, GA, APS by parents; PPS.	Totally unacceptable, somewhat acceptable, acceptable, totally acceptable.	Parents of children with disabilities showed a statistically significant difference related to acceptance for a protective stabilization with a restrictive device. For both groups, the GA was the least accepted.	Children's parents with and without disabilities accepted behavioral guidance techniques, but basic techniques showed higher rates of acceptance than advanced techniques.
Marshall et al 2008 ²⁰ , USA	Dental school and private pediatric dental practices 85 66 M 19 F 0-19 (9.6)	TSD; VC; PR; NC; DIS; PPA; N2O; SE; GA; APS.	Yes/No/Uncertain.	All the techniques were rated as acceptable by ≥54% of parents. The most acceptable in declining order were PR; TSD; DIS.	Parents reported highly acceptable ratings except for staff restraint. Stabilization device acceptability was higher among parents of children treated using this technique.
Ramos et al 2005 ²¹ , Brazil	University 400 58 M 342 F 4-10	TSD; VC; APS; HOM.	Accepts; accepts with modification; does not accept.	The levels of acceptance of the techniques were 98% (TSD), 96% (VC), 81% (APS), and 85% (HOM).	There was wide acceptance of the four BGT among caretakers of children with cleft.

Legend: Active protective stabilization (APS); Behavior guidance technique (BGT); Contingent escape (CE); Distraction (DIS); Female (F); General anesthesia (GA); Hand over mouth (HOM); Hypnosis (Hyp); Male (M); Modelling (Mo); Mouth props (MP); Nitrous oxide/oxygen inhalation (N2O); Nonverbal communication (NC); Not informed (NI); Oral premedication (OP); Parental present/absence (PP/A); Passive protective stabilization (PPS); Positive reinforcement (PR); Sedation (SE); Tell-show-do (TSD); Unknown (U); Voice control (VC).

Table 2 - Proportion meta-analysis of agreement with BGT by the parents of non-SHCN children

Behavior Guidance Technique	Total of studies	Total of sample	Proportion	CI 95%	p-value	I²
Tell-show-do	15	1346	84.1%	75.8-90.9	<0.001	93.3
Positive Reinforcement	13	1188	82.1%	73.3-89.3	<0.001	92.4
Distraction	7	748	73.1%	49.9-90.9	<0.001	97.7
Modeling	6	474	67.6%	34.8-92.8	<0.001	98.1
Nitrous oxide/oxygen inhalation	9	1062	59.1%	38.5-78.2	<0.001	97.6
Mouth prop	2	117	54.9%	30.8-77.8	0.006	86.4
Oral premedication	4	194	50.1%	41.5-58.6	0.227	32.5
Nonverbal communication	3	313	49.4%	15.3-83.9	<0.001	95.7
Parental presence/absence	7	732	49.2%	26.3-72.3	<0.001	97.6
Voice control	13	1082	40.2%	24.4-57.2	<0.001	96.8
Active protective stabilization	17	1333	38.7%	25.0-53.3	<0.001	96.6
Sedation	11	1313	33.7%	18.1-51.9	<0.001	97.7
Hypnosis	3	346	32.5%	7.12-65.5	<0.001	97.5
General Anesthesia	15	1681	27.4%	16.8-39.4	<0.001	96.3
Passive protective stabilization	12	1129	25.7%	17.8-34.4	<0.001	90.4
Hand over mouth	11	896	21.2%	11.0-33.7	<0.001	94.5

Table 3 - Proportion meta-analysis of agreement with BGT by the parents of SHCN children

Behavior Guidance Technique	Total of studies	Total of sample	Proportion	CI 95%	p-value	I²
Tell-show-do	3	454	89.1%	56.1-99.7	<0.001	95.7
Distraction	2	54	83.4%	32.5-98.4	<0.001	92.6
Positive reinforcement	2	54	81.6%	25.9-97.7	<0.001	93.8
Voice control	2	440	73.8%	12.5-98.1	<0.001	98.5
Active protective stabilization	5	748	63.8%	43.9-81.5	<0.001	95.7
Sedation	2	223	58.6%	52.1-65.0	0.871	0
Passive protective stabilization	3	334	47.2%	33.0-61.6	0.003	82.6
Nitrous oxide/oxygen inhalation	2	54	40.0%	5.9-81.2	0.003	88.6
General Anesthesia	3	263	29.0%	11.8-50.0	0.001	84.8