Supplementary material

Supplementary Table 1. PRISMA checklist.

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| --- | --- | --- | --- |
| Section and Topic | # | Checklist item | Location |
| TITLE |
| Title | 1 | Identify the report as a systematic review. | Title page |
| ABSTRACT |
| Abstract | 2 | See the PRISMA 2020 for Abstracts checklist. | Abstract |
| INTRODUCTION |
| Rationale | 3 | Describe the rationale for the review in the context of existing knowledge. | Introduction |
| Objectives | 4 | Provide an explicit statement of the objective(s) or question(s) the review addresses. | Introduction |
| METHODS |
| Eligibility criteria | 5 | Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses. | Methods |
| Information sources | 6 | Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted. | Methods |
| Search strategy | 7 | Present the full search strategies for all databases, registers and websites, including any filters and limits used. | Methods, **Supplementary Table 2** |
| Selection process | 8 | Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process. | Methods |
| Data collection process | 9 | Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process. | Methods |
| Data items | 10a | List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (*e.g.*, for all measures, time points, analyses), and if not, the methods used to decide which results to collect. | Methods |
| 10b | List and define all other variables for which data were sought (*e.g.*, participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information. | Methods, Tables 1,2 |
| Study risk of bias assessment | 11 | Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process. | Methods |
| Effect measures | 12 | Specify for each outcome the effect measure(s) (*e.g.*, risk ratio, mean difference) used in the synthesis or presentation of results. | Methods |
| Synthesis methods | 13a | Describe the processes used to decide which studies were eligible for each synthesis (*e.g.*, tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)). | Methods, Fig. 1, Table 1, **Supplementary Table 3** |
| 13b | Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions. | Methods |
| 13c | Describe any methods used to tabulate or visually display results of individual studies and syntheses. | Methods |
| 13d | Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used. | Methods |
| 13e | Describe any methods used to explore possible causes of heterogeneity among study results (*e.g.*, subgroup analysis, meta-regression). | Methods |
| 13f | Describe any sensitivity analyses conducted to assess robustness of the synthesized results. | Methods |
| Reporting bias assessment | 14 | Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases). | Methods |
| Certainty assessment | 15 | Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome. | Nil |
| RESULTS |
| Study selection | 16a | Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram. | Results, Fig. 1, **Supplementary Tables 2,3** |
| 16b | Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded. | Results, **Supplementary Table 3** |
| Study characteristics | 17 | Cite each included study and present its characteristics. | Results, Table 1 |
| Risk of bias | 18 | Present assessments of risk of bias for each included study. | Table 2, Fig. 2 |
| Results of individual studies | 19 | For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimates and its precision (*e.g.*, confidence/credible interval), ideally using structured tables or plots. | Figs. 3,4,5,6,7,8, **Supplementary Fig. 1** |
| Results of syntheses | 20a | For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies. | Results, Table 2 |
| 20b | Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (*e.g.*, confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect. | Results, Figs. 3,4,5,6,7,8, **Supplementary Fig. 1** |
| 20c | Present results of all investigations of possible causes of heterogeneity among study results. | Results, Figs. 3,4,5,6,7,8, **Supplementary Fig. 1** |
| 20d | Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results. | Results, Fig. 4 |
| Reporting biases | 21 | Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed. | Fig. 2, Table 2 |
| Certainty of evidence  | 22 | Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed. | Nil |
| DISCUSSION |
| Discussion | 23a | Provide a general interpretation of the results in the context of other evidence. | Discussion |
| 23b | Discuss any limitations of the evidence included in the review. | Discussion |
| 23c | Discuss any limitations of the review processes used. | Discussion |
| 23d | Discuss implications of the results for practice, policy, and future research. | Discussion |
| OTHER INFORMATION |
| Registration and protocol | 24a | Provide registration information for the review, including register name and registration number, or state that the review was not registered. | Methods |
| 24b | Indicate where the review protocol can be accessed, or state that a protocol was not prepared. | Methods, **Supplementary Tables 2,3** |
| 24c | Describe and explain any amendments to information provided at registration or in the protocol. | Methods, **Supplementary Tables 2,3** |
| Support | 25 | Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review. | Funding |
| Competing interests | 26 | Declare any competing interests of review authors. | Conflicts of Interest |
| Availability of data, code and other materials | 27 | Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review. | Results, **Supplementary Tables 2,3** |

Supplementary Table 2. Search strategy in different databases.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Database | # | Keyword | Date | Results |
| Embase | 1 | (child\* OR kid OR kids OR boy OR boys OR girl\* OR pediatric\* OR paediatric\* OR preschool\* OR pre-school\* OR school-age\* OR schoolchild\* OR pupil\* OR school-going OR schoolboy\* OR schoolgirl\* OR toddler\* OR teen\* OR preteen\* OR kindergarten\* OR ((primary OR elementary OR junior OR intermediate OR secondary OR middle OR high OR senior) NEAR/3 (student\* OR school\*))):ti,ab,kw,de | 22 Feb 2024 | 3,934,171 |
| 2 | ‘child’/exp OR ‘pediatrics’/exp OR ‘elementary student’/exp OR ‘middle school student’/exp OR ‘high school student’/exp OR ‘primary school’/exp OR ‘middle school’/exp OR ‘high school’/exp | 22 Feb 2024 | 3,537,254 |
| 3 | (dent\* OR orthodonti\* OR periodonti\* OR prosthodonti\* endodonti\* OR oralogy OR stomatology OR tooth OR teeth OR sealant\* OR (fluorid\* NEAR/3 varnish\*)):ti,ab,kw,de,jt | 22 Feb 2024 | 464,218 |
| 4 | ‘dental procedure’/exp OR ‘dental anxiety’/exp OR ‘dentistry’/exp OR ‘dentist’/exp OR ‘stomatology’/exp | 22 Feb 2024 | 392,118 |
| 5 | (pedodonti\* OR paedodonti\*):ti,ab,kw,de,jt | 22 Feb 2024 | 5062 |
| 6 | ‘pediatric dentistry’/exp OR ‘pediatric dentist’/exp | 22 Feb 2024 | 769 |
| 7 | (magic\* OR illusion\* OR conjur\* OR thaumaturg\*):ti,ab,kw | 22 Feb 2024 | 29,965 |
| 8 | ‘magic’/exp | 22 Feb 2024 | 2123 |
| 9 | (#1 OR #2) AND (#3 OR #4) AND (#7 OR #8) | 22 Feb 2024 | 44 |
| 10 | (#5 OR #6) AND (#7 OR #8) | 22 Feb 2024 | 6 |
|  | 11 | (#9 OR #10) AND [embase]/lim | 22 Feb 2024 | 10 |
| MEDLINE (Ovid) | 1 | (child\* OR kid OR kids OR boy OR boys OR girl\* OR pediatric\* OR paediatric\* OR preschool\* OR pre-school\* OR school-age\* OR schoolchild\* OR pupil\* OR school-going OR schoolboy\* OR schoolgirl\* OR toddler\* OR teen\* OR preteen\* OR kindergarten\* OR ((primary OR elementary OR junior OR intermediate OR secondary OR middle OR high OR senior) ADJ3 (student\* OR school\*))).mp | 22 Feb 2024 | 3,107,774 |
| 2 | exp “child”/ OR exp “pediatrics”/ OR “students” OR “schools”/ | 22 Feb 2024 | 2,565,913 |
| 3 | (dent\* OR orthodonti\* OR periodonti\* OR prosthodonti\* endodonti\* OR oralogy OR stomatology OR tooth OR teeth OR sealant\* OR (fluorid\* ADJ3 varnish\*)).mp,jn | 22 Feb 2024 | 804,395 |
| 4 | exp “dental care”/ OR exp “dental anxiety”/OR exp “dentistry”/ OR exp “dentists”/ | 22 Feb 2024 | 451,895 |
| 5 | (pedodonti\* OR paedodonti\*).mp,jn | 22 Feb 2024 | 1951 |
| 6 | exp “pediatric dentistry”/ | 22 Feb 2024 | 4835 |
| 7 | (magic\* OR illusion\* OR conjur\* OR thaumaturg\*).ti,ab,kf | 22 Feb 2024 | 26,887 |
| 8 | exp “magic”/ | 22 Feb 2024 | 2016 |
| 9 | (1 OR 2) AND (3 OR 4) AND (7 OR 8) | 22 Feb 2024 | 55 |
| 10 | (5 OR 6) AND (7 OR 8) | 22 Feb 2024 | 4 |
| 11 | 9 OR 10 | 22 Feb 2024 | 55 |
| Cochrane Library: Trials (CENTRAL) | 1 | (child\* OR kid OR kids OR boy OR boys OR girl\* OR pediatric\* OR paediatric\* OR preschool\* OR pre-school\* OR school-age\* OR schoolchild\* OR pupil\* OR school-going OR schoolboy\* OR schoolgirl\* OR toddler\* OR teen\* OR preteen\* OR kindergarten\* OR ((primary OR elementary OR junior OR intermediate OR secondary OR middle OR high OR senior) NEAR/3 (student\* OR school\*))):ti,ab,kw | 22 Feb 2024 | 225,527 |
| 2 | [mh “child”] OR [mh “pediatrics”] OR [mh “students”] OR [mh “schools”] | 22 Feb 2024 | 89,423 |
| 3 | (dent\* OR orthodonti\* OR periodonti\* OR prosthodonti\* endodonti\* OR oralogy OR stomatology OR tooth OR teeth OR sealant\* OR (fluorid\* NEAR/3 varnish\*)):ti,ab,kw | 22 Feb 2024 | 59,953 |
| 4 | [mh “dental care”] OR [mh “dental anxiety”] OR [mh “dentistry”] OR [mh “dentists”] | 22 Feb 2024 | 24,789 |
| 5 | (pedodonti\* OR paedodonti\*):ti,ab,kw | 22 Feb 2024 | 65 |
| 6 | [mh “pediatric dentistry”] | 22 Feb 2024 | 64 |
| 7 | (magic\* OR illusion\* OR conjur\* OR thaumaturg\*):ti,ab,kw | 22 Feb 2024 | 1138 |
| 8 | [mh “magic”] | 22 Feb 2024 | 8 |
| 9 | (#1 OR #2) AND (#3 OR #4) AND (#7 OR #8) | 22 Feb 2024 | 19 |
| 10 | (#5 OR #6) AND (#7 OR #8) | 22 Feb 2024 | 0 |
| 11 | #9 OR #10 in trial | 22 Feb 2024 | 19 |
| CINAHL (EBSCOhost) | 1 | child\* OR kid OR kids OR boy OR boys OR girl\* OR pediatric\* OR paediatric\* OR preschool\* OR pre-school\* OR school-age\* OR schoolchild\* OR pupil\* OR school-going OR schoolboy\* OR schoolgirl\* OR toddler\* OR teen\* OR preteen\* OR kindergarten\* OR ((primary OR elementary OR junior OR intermediate OR secondary OR middle OR high OR senior) N2 (student\* OR school\*)) | 22 Feb 2024 | 3,972,414 |
| 2 | mh (“child+” OR “pediatrics+” OR “students+” OR “ schools+”) | 22 Feb 2024 | 2,446,909 |
| 3 | dent\* OR orthodonti\* OR periodonti\* OR prosthodonti\* endodonti\* OR oralogy OR stomatology OR tooth OR teeth OR sealant\* OR (fluorid\* N2 varnish\*) | 22 Feb 2024 | 1,185,297 |
| 4 | mh (“dental care+” OR “ dental anxiety+” OR “dentistry+” OR “ dentists+”) | 22 Feb 2024 | 451,704 |
| 5 | pedodonti\* OR paedodonti\* | 22 Feb 2024 | 10,330 |
| 6 | mh (“pediatric dentistry+”) | 22 Feb 2024 | 4832 |
| 7 | magic\* OR illusion\* OR conjur\* OR thaumaturg\* | 22 Feb 2024 | 32,601 |
| 8 | mh “magic+” | 22 Feb 2024 | 2016 |
| 9 | (S1 OR S2) AND (S3 OR S4) AND (S7 OR S8) | 22 Feb 2024 | 111 |
| 10 | (S5 OR S6) AND (S7 OR S8) | 22 Feb 2024 | 9 |
| 11 | S9 OR S10 | 22 Feb 2024 | 112 |
| Scopus | 1 | TITLE-ABS-KEY (child\* OR kid OR kids OR boy OR boys OR girl\* OR pediatric\* OR paediatric\* OR preschool\* OR pre-school\* OR school-age\* OR schoolchild\* OR pupil\* OR school-going OR schoolboy\* OR schoolgirl\* OR toddler\* OR teen\* OR preteen\* OR kindergarten\* OR ((primary OR elementary OR junior OR intermediate OR secondary OR middle OR high OR senior) W/2 (student\* OR school\*))) | 22 Feb 2024 | 4,581,732 |
| 2 | TITLE-ABS-KEY (dent\* OR orthodonti\* OR periodonti\* OR prosthodonti\* endodonti\* OR oralogy OR stomatology OR tooth OR teeth OR sealant\* OR (fluorid\* W/2 varnish\*)) | 22 Feb 2024 | 376,954 |
| 3 | TITLE-ABS-KEY (pedodonti\* OR paedodonti\*) | 22 Feb 2024 | 2048 |
| 4 | TITLE-ABS-KEY (magic\* OR illusion\* OR conjur\* OR thaumaturg\*) | 22 Feb 2024 | 104,201 |
| 5 | #1 AND #2 AND #4 | 22 Feb 2024 | 27 |
| 6 | #3 AND #4 | 22 Feb 2024 | 0 |
| 7 | #5 OR #6 | 22 Feb 2024 | 27 |

Supplementary Table 3. Excluded studies and reasons for exclusion.

|  |  |
| --- | --- |
| Citations | Reasons |
| Peretz B, Gluck G. Magic trick: a behavioural strategy for the management of strong-willed children. International journal of paediatric dentistry 2005; 15(6): 429–36. | The outcome is not an assessment of anxiety |
| Ctri. Comparison Of magic trick And Bach Flower Therapy In reducing Dental Anxiety Among Children Aged 6–12 Years. <https://trialsearch.who.int/Trial2.aspx?TrialID=CTRI/2022/04/042103> | Ongoing clinical trial registration |
| Ctri. Clinical trail to compare effectiveness of four Behaviour management techniques in 6–8 years old children. <https://trialsearch.who.int/Trial2.aspx?TrialID=CTRI/2023/08/056091> | Ongoing clinical trial registration |
| Rossein K. How is that done, doctor? It’s magic! The New York state dental journal 1978; 44(1): 16. | Not randomised control trial |
| Schwartz S. It’s magic: a unique practice management strategy. The journal of contemporary dental practice. 2003; 4(4): 121–126. | Not randomised control trial |



Supplementary Fig. 1. Funnel plot for assessment of publication bias among the studies included in the meta-analysis.

Supplementary material 1

Instructions for performing the magic thumb light trick.

**Introduction**

The Magic Thumb Light trick is an effective method to reduce dental anxiety in children. Dental professionals can use this simple yet captivating trick to create a positive and engaging atmosphere during dental procedures.

Materials Needed

1. A set of Magic Thumb Lights.

**Preparation**

1. Obtain Thumb Lights: Purchase a set of Magic Thumb Lights, which are inexpensive and widely available. These are small LED lights designed to fit on the thumb and can be turned on and off with a gentle squeeze.

2. Practice the Trick: Familiarize yourself with the thumb lights by practicing turning them on and off seamlessly. Ensure you can perform the trick smoothly before demonstrating it to a child.

**Execution**

1. Show Empty Hands: Begin by casually showing your empty hands to the child to establish a sense of wonder and curiosity.

2. Activate the Light: Using discreet movements, place the thumb light on your thumb. Gently squeeze to turn on the light, making it appear as if your thumb is glowing.

3. Create the Illusion: Move your thumb around, making the light appear and disappear by squeezing and releasing the thumb light. Enhance the illusion by passing the light from one hand to the other.

4. Interaction: Engage the child by asking them to guess how the trick works or invite them to try it themselves under supervision. This interaction helps distract the child and reduces anxiety.

**Engagement Techniques**

1. Maintain Eye Contact: Build trust by maintaining eye contact with the child, ensuring they stay focused on the trick.

2. Use Encouraging Language: Use positive and encouraging language to keep the child engaged. Phrases like, “Isn’t that amazing?” or “Can you guess how I did that?” help maintain their interest.

3. Positive Reinforcement: Praise the child for their participation and curiosity. Positive reinforcement can create a more relaxed and enjoyable experience.

**Tips for Success**

1. Stay Calm and Confident: Your demeanor can greatly influence the child’s response. Stay calm and confident to create a reassuring environment.

2. Adapt to the Child’s Reaction: Be flexible and adapt the trick based on the child’s reaction. If they show particular interest or excitement, prolong the trick. However, if they seem disinterested, wrap it up quickly.

3. Supervise Closely: If you allow the child to try the trick, supervise closely to ensure they perform it safely.

**Conclusion**

The Magic Thumb Light trick is a simple yet effective tool for reducing dental anxiety in children. By incorporating this trick into dental procedures, professionals can create a more positive and engaging experience for young patients, ultimately contributing to better dental outcomes and reduced fear.