



Role of Breathing Exercises in the Management of Dental Anxiety in Children: A Narrative Review

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ABSTRACT

Dental anxiety is a common challenge in pediatric dentistry and may negatively affect children's cooperation and dental care. Breathing exercises offer a simple, non-invasive, and inexpensive approach to anxiety management. This narrative review discusses the role of deep breathing, diaphragmatic breathing, bubble breathing, pinwheel breathing, and technology-assisted breathing in children undergoing dental treatment. Available evidence suggests that breathing exercises can reduce dental anxiety and pain perception and may improve physiological and behavioral responses during dental procedures. Bubble breathing appears particularly promising because of its engaging and child-friendly nature. These techniques can also complement established behavior-management strategies. However, variations in study designs, intervention protocols, and outcome measures limit direct comparisons. Further well-designed clinical studies are required to establish standardized protocols and long-term effectiveness. Overall, breathing exercises represent a practical adjunct for managing dental anxiety in pediatric dental practice.

INTRODUCTION

Dental anxiety is a common concern in pediatric dentistry and can significantly influence a child's behavior, cooperation, and willingness to undergo dental treatment.¹ Fear of pain, previous unpleasant dental experiences, and the unfamiliar dental environment are important factors contributing to anxiety in children. Untreated dental anxiety may lead to avoidance of dental care, deterioration of oral health, and the need for more complex treatment in the future. Therefore, effective management of anxiety is an important component of successful pediatric dental

practice.^{2,3}

Various pharmacological and non-pharmacological approaches have been used to manage dental anxiety in children. Non-pharmacological techniques are particularly attractive because they are simple, inexpensive, minimally invasive, and can often be incorporated into routine dental care. Breathing exercises have gained attention as a relaxation-based intervention that may help reduce physiological arousal and promote a sense of calmness. Slow and controlled breathing has been associated with reductions in heart rate, muscle tension, and stress

responses, providing a potential physiological basis for its use in anxious children.^{4,5}

Several breathing techniques have been adapted for use in pediatric dental settings. These include deep breathing, diaphragmatic breathing, bubble breathing, and pinwheel breathing. Bubble and pinwheel breathing are particularly suitable for children because they transform controlled breathing into a playful activity while providing visual feedback and distraction. Diaphragmatic breathing encourages deeper abdominal breathing, whereas conventional deep breathing involves slow inhalation and prolonged exhalation.

The available clinical evidence suggests that breathing exercises may reduce dental anxiety and pain perception while improving physiological and behavioral responses during dental procedures. A recent systematic review identified seven clinical studies involving children aged 6–12 years and reported beneficial effects of bubble breathing, diaphragmatic breathing, and deep breathing, with bubble breathing showing particularly consistent results. However, differences in intervention protocols, anxiety assessment methods, sample sizes, and study populations make direct comparison between techniques difficult.^{6,7}

Considering the need for simple and child-friendly approaches to anxiety control, breathing exercises may serve as a useful adjunct to established behavior-management techniques in pediatric dentistry. Therefore, this narrative review aims to discuss the rationale, types, mechanisms, clinical applications, available evidence, advantages, limitations, and future perspectives of breathing exercises in the management of dental anxiety in children.

UNDERSTANDING DENTAL ANXIETY IN CHILDREN

Dental anxiety in children is a complex emotional response that can influence their behavior and cooperation during dental treatment. It may arise from fear of pain, previous unpleasant dental experiences, unfamiliar surroundings, or anticipation of dental procedures. The dental environment itself may be perceived as intimidating by children, particularly when they encounter unfamiliar instruments, sounds, or procedures.⁸

Dental anxiety can have consequences beyond the immediate dental appointment. An anxious child may show reluctance or avoidance toward dental care, which can contribute to delayed treatment and deterioration of oral health. Avoidance may subsequently result in the need for more invasive or complex treatment, potentially reinforcing the child's negative perception of dental care.^{1,2}

The physiological response to anxiety may include increased autonomic arousal, which can manifest as changes in pulse rate and respiratory patterns. Therefore, assessment of dental anxiety commonly involves both subjective and objective measures. In the studies reviewed in the uploaded article, subjective measures included the Facial Image Scale (FIS), Face, Legs, Activity, Cry, Consolability (FLACC) scale, Wong-Baker FACES Pain Rating Scale (WBFPS), and Visual Analog Scale (VAS), while pulse rate and respiratory rate were used as objective indicators.^{6,7}

Children between 6 and 12 years represent an important group for behavioral interventions because they are generally capable of understanding and following instructions for simple relaxation and breathing techniques. Introducing positive coping strategies during this developmental period may help create a more comfortable dental experience and encourage favorable attitudes toward future dental visits.

Thus, understanding the psychological and physiological components of dental anxiety is essential when selecting appropriate behavior-management strategies. Breathing exercises provide one potential approach by combining controlled respiration with relaxation, distraction, and active participation of the child during dental care.^{9,10}

PHYSIOLOGICAL BASIS OF BREATHING EXERCISES

Breathing exercises are based on the principle that controlled and slow respiration can influence physiological arousal associated with anxiety. Anxiety is accompanied by activation of the stress response, which may result in increased autonomic activity and physiological changes such as an elevated pulse rate and altered respiratory pattern. Breathing exercises aim to counteract this response by promoting slower, deeper, and more controlled respiration.

Slow breathing may promote relaxation by influencing autonomic nervous system activity and facilitating a shift toward parasympathetic predominance. The resulting reduction in physiological arousal may contribute to a calmer emotional state. The reviewed literature describes activation of the parasympathetic nervous system as an important physiological basis for the anxiolytic effects of breathing techniques.

Different breathing techniques may achieve this response through slightly different approaches. Diaphragmatic breathing emphasizes abdominal movement and deeper respiratory excursions, whereas deep breathing involves slow inhalation followed by controlled exhalation. Bubble and pinwheel breathing additionally provide children with

a visual and playful target for regulating their breathing, which may combine relaxation with distraction from anxiety-provoking dental stimuli.⁶

The physiological effects of breathing exercises can be assessed using objective parameters such as pulse rate and respiratory rate. In the studies included in the reviewed evidence, most investigators used pulse rate as an objective indicator of anxiety, while some also assessed respiratory rate. The observed reductions in pulse rate alongside improvements in subjective anxiety measures provide supportive evidence of reduced physiological arousal following breathing interventions.⁷

Thus, the potential benefit of breathing exercises in pediatric dentistry may result from a combination of controlled respiration, reduction of physiological arousal, parasympathetic activation, and distraction. These mechanisms make breathing exercises particularly attractive as a simple adjunctive approach to behavioral management during dental treatment.^{11,12}

TYPES OF BREATHING EXERCISES USED IN PEDIATRIC DENTISTRY

Several breathing techniques have been adapted for use in pediatric dentistry to help children regulate anxiety and physiological arousal. The techniques described in the available literature include deep breathing, diaphragmatic breathing, bubble breathing, pinwheel breathing, and technology-assisted breathing. Their child-friendly nature allows breathing exercises to be incorporated into routine behavior management during dental procedures.

DEEP BREATHING

Deep breathing involves slow, controlled inhalation followed by gradual exhalation. Children may be guided to breathe slowly through the nose and exhale through the mouth. One approach described in the literature involves inhaling, holding the breath briefly, and then slowly exhaling in a controlled sequence. This technique aims to promote relaxation and reduce physiological arousal during dental treatment.

DIAPHRAGMATIC BREATHING

Diaphragmatic breathing, also referred to as abdominal or belly breathing, emphasizes the use of the diaphragm to achieve deeper respiratory movements. The technique encourages full and controlled breathing and has been associated with reductions in physiological arousal, including heart rate. Its relatively simple instructions make it suitable for children who can understand and follow basic breathing commands.⁶

BUBBLE BREATHING

Bubble breathing is a playful breathing technique in which children blow bubbles using controlled exhalation. It combines breathing regulation with visual distraction, making the exercise engaging and easier for children to participate in. Among the techniques evaluated in the available clinical literature, bubble breathing has been particularly prominent. Four of the seven studies included in the reviewed evidence used bubble breathing, and several reported reductions in anxiety and pain perception, lower pulse rates, and improved behavior during dental procedures.¹³

PINWHEEL BREATHING

Pinwheel breathing uses a pinwheel as a visual aid to guide controlled exhalation. The child is encouraged to blow gently on the pinwheel, causing it to rotate with each breath. The visible movement provides immediate feedback and can encourage slower and deeper breathing while simultaneously engaging the child's attention.

TECHNOLOGY-ASSISTED BREATHING

Technology-assisted breathing represents a more contemporary approach in which digital devices can guide or monitor breathing. The available review identified a clinical study involving deep breathing assisted by a smartwatch. This approach was associated with reductions in anxiety, pain, and pulse rate during dental procedures and may be particularly appealing to children who respond positively to technology-based interventions.

Overall, these techniques differ mainly in the way controlled breathing is introduced to the child. Deep and diaphragmatic breathing emphasize respiratory control, whereas bubble and pinwheel breathing combine breathing with play and visual distraction. Technology-assisted approaches add digital feedback or guidance. Among the available evidence, bubble breathing currently has the most consistent representation in pediatric dental studies.

EVIDENCE FOR BREATHING EXERCISES IN PEDIATRIC DENTAL ANXIETY

Available evidence suggests that breathing exercises can be effective in reducing dental anxiety and improving children's responses during dental treatment. The systematic review by Kharat et al. identified seven clinical studies involving children aged 6–12 years and reported favorable effects of bubble breathing, diaphragmatic breathing, and deep breathing on anxiety, pain perception, pulse rate, and behavior. Bubble breathing was the most frequently studied technique and showed consistent benefits during dental procedures.¹²

More recent studies further support these findings. Levi et

al. (2022) reported that diaphragmatic breathing improved emotional and behavioral responses and reduced pain and autonomic arousal in children undergoing dental treatment.⁶ Yendodu et al. (2023) demonstrated beneficial effects of smartwatch-assisted deep breathing on behavior, anxiety, pain, and pulse rate during buccal infiltration anesthesia.¹⁴ More recently, Vashistha et al. (2026) found that bubble-blower breathing significantly reduced anxiety and pain during inferior alveolar nerve block in children aged 6–10 years.¹³ Similarly, Eid et al. (2026) reported that diaphragmatic breathing improved behavioral and physiological responses, including pulse rate and blood pressure, in children aged 7–13 years⁷

Overall, the available evidence indicates that breathing exercises may positively influence anxiety, pain perception, physiological arousal, and cooperation during pediatric dental procedures. However, differences in age groups, breathing protocols, dental procedures, and assessment methods limit direct comparison between studies. Therefore, larger clinical trials using standardized intervention protocols and outcome measures are needed.

INTEGRATION WITH OTHER BEHAVIOR MANAGEMENT TECHNIQUES

Breathing exercises can be integrated with established non-pharmacological behavior-management techniques to provide a more comprehensive approach to dental anxiety. Tell–Show–Do can be used to explain and demonstrate the breathing exercise before treatment, allowing the child to become familiar with the technique. Distraction can be incorporated through bubble blowing, pinwheels, music, or other engaging activities, helping shift the child's attention away from anxiety-provoking dental stimuli. Positive reinforcement can be provided when the child follows breathing instructions or cooperates during treatment, encouraging repetition of the desired behavior. Modeling may involve demonstrating the breathing technique through a parent, sibling, peer, or dental professional before asking the child to perform it. Breathing exercises may also be combined with other relaxation techniques, providing children with simple coping strategies that can be used before and during dental procedures. Such integration may enhance the effectiveness and acceptability of breathing exercises as an adjunct to routine pediatric behavior management.

ADVANTAGES AND LIMITATIONS

Breathing exercises offer several advantages in pediatric dental practice. They are simple, inexpensive, non-invasive, drug-free, and easy to teach, requiring minimal equipment or clinical resources. Child-friendly techniques such as bubble and pinwheel breathing can also provide

distraction and active participation, potentially improving cooperation during dental procedures. They can be used alongside conventional behavior-management techniques and may be particularly useful during anxiety-provoking procedures such as local anesthetic administration.

However, breathing exercises also have limitations. Their effectiveness may depend on the child's age, understanding, willingness to participate, and ability to follow instructions. Available studies differ considerably in sample size, intervention protocols, dental procedures, and anxiety assessment methods, making direct comparison difficult. Most available evidence also comes from a limited geographical population, and long-term effects remain insufficiently explored.

CONCLUSION

Breathing exercises represent a simple, safe, and child-friendly adjunct for managing dental anxiety in pediatric patients. Evidence from clinical studies suggests that techniques such as bubble breathing, diaphragmatic breathing, and deep breathing can reduce anxiety and pain perception while improving physiological and behavioral responses during dental procedures. Their ease of implementation and compatibility with established behavior-management techniques make them suitable for routine pediatric dental practice. However, differences in intervention protocols and outcome measures highlight the need for standardized, well-designed clinical trials and longer-term evaluation. Overall, incorporating breathing exercises into a multimodal behavior-management approach may contribute to a more comfortable and positive dental experience for children.

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