

Does Virtual Reality Support Dental Professionals in Managing Pain and Anxiety in the Pediatric Population?

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AIM

This study examined potential differences in pain perception and clinical anxiety during dental anesthesia in pediatric patients utilizing three different types of distraction techniques, one of which was a virtual reality device.

BACKGROUND

- Dental anxiety in pediatric patients is common and its management can be challenging for the treating clinician.
- Distraction techniques are a common strategy practiced by pediatric dentists. There are several pharmacological (nitrous, sedation, etc.) and non-pharmacological (behavioral and cognitive) techniques.¹
- Common non-pharmacological interventions are further divided into **passive**, which includes watching videos, movies, listening to music, and **active** which includes but is not limited to practicing breathing techniques, singing songs, playing with electronic devise such as iPads, mobile devices, and now virtual reality (VR) headsets.
- The use of VR to control patient anxiety and pain perception has been studied with initial positive outcomes. Immersive VR has been linked to reports of reductions in discomfort and pain during dental procedures in both adults and children.



Figure 1. Types of Active and Passive Distraction techniques



Figure 2. Image of the VR distraction eyeglass goggle in a clinical setting



Figure 3. VR Oculus Eye Wear

METHODS

- Thirty ASA I pediatric patients (6 – 10 years old) requiring local anesthetic injection for dental treatment on the maxillary arch were recruited.
- Participants were randomly assigned to three groups:
 - Control (Coloring book)
 - iPad (Video distraction)
 - Virtual Reality (Oculus VR immersion distraction)
- Four physiological response variables (BP, pulse, respiration, temperature) and two behavioral perceptions (anxiety, using the Modified Child Anxiety Scale and pain, using the Wong-Baker Faces Pain Rating Scale) were quantified at four steps during the appointment.

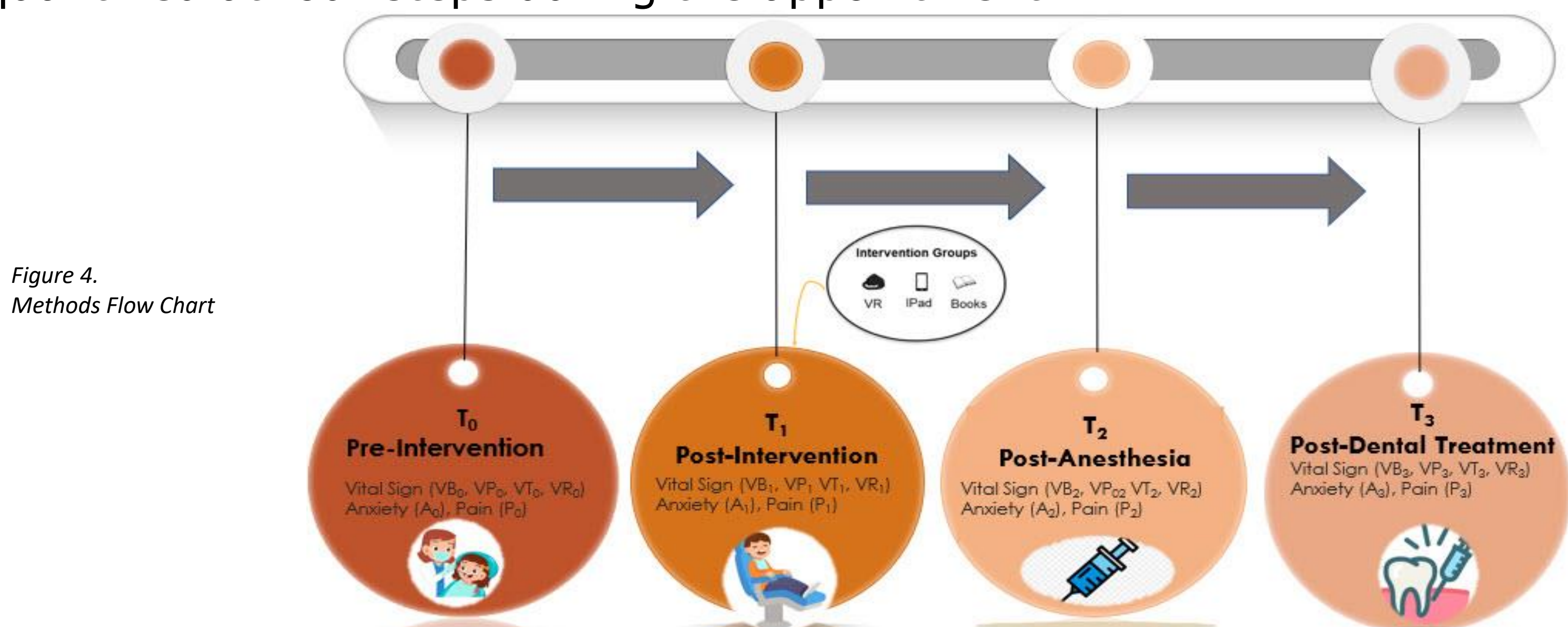


Figure 4. Methods Flow Chart

RESULTS

- In **group 1** (coloring), the average pre-treatment anxiety and post-treatment score was 0.500, and 1.056 respectively.
- In **group 2** (iPad), the average pre-treatment and post-treatment anxiety score among participants remained the same, at 0.333.
- In **group 3** (VR) the average pre-treatment anxiety was 1.150 while the average post-treatment anxiety scores were 0.625.
- This data illustrates that **anxiety scores decreased** for the **VR** group, compared to the **increase** noted in the **coloring group**, although the distribution revealed no statistically significant difference.

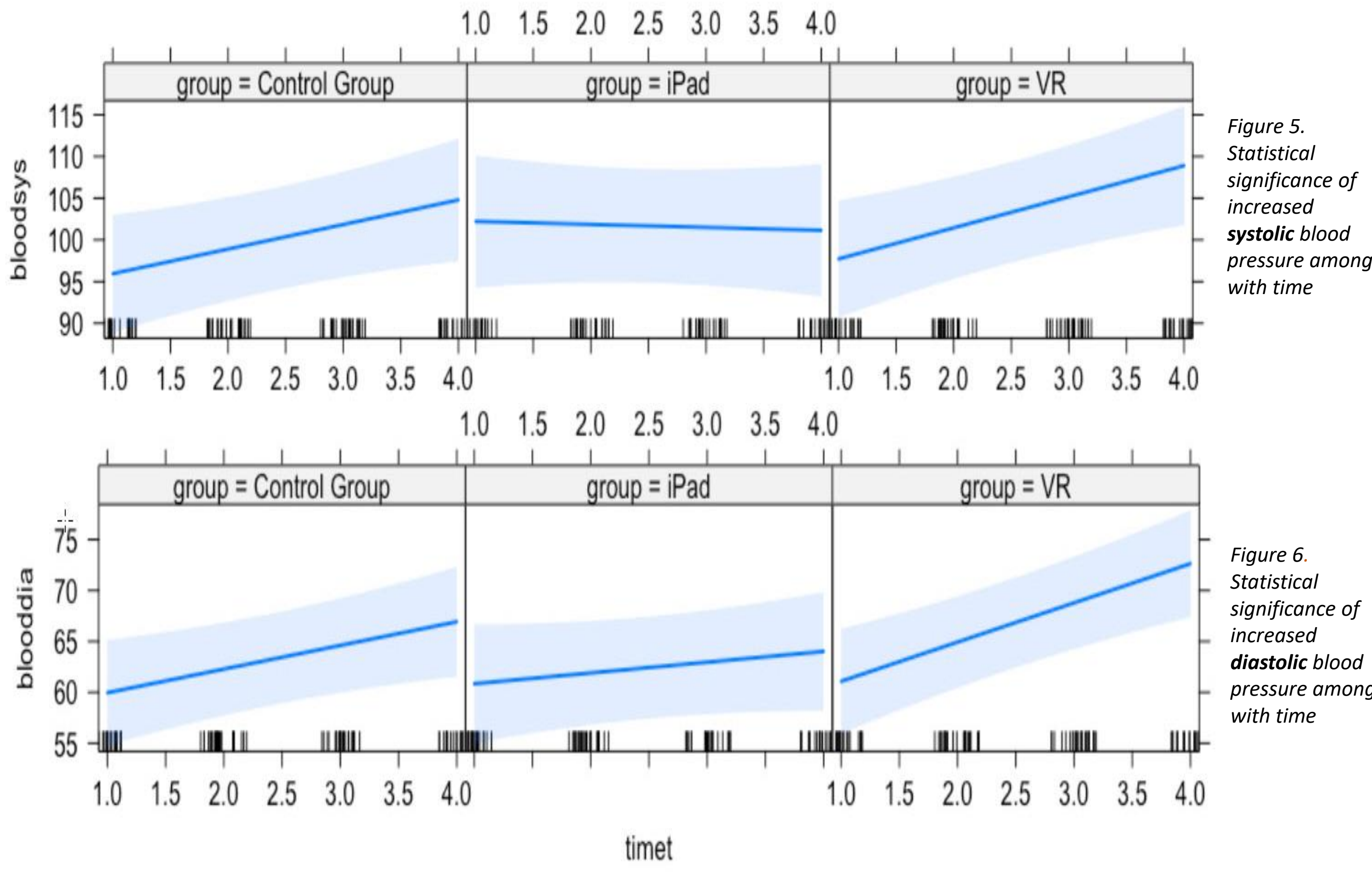


Figure 5. Statistical significance of increased **systolic** blood pressure among with time

Figure 6. Statistical significance of increased **diastolic** blood pressure among with time

- Statistical significance was noted in increased systolic ($P=0.002$) and diastolic ($P=5.003 \times 10^{-6}$) blood pressures with time, but not among different groups.

CONCLUSION

Why this paper is important to pediatric dentists

Based on this study's results, we can make the following conclusions:

- Statistical significance was noted in increased systolic and diastolic blood pressures with time, but not among different groups.
 - This is hypothesized to occur due to: **1)** the stimulation by the actual act of injection/needle penetration and/or **2)** the epinephrine in local anesthetic.
- P-value was not significant for anxiety among the groups.
- There is a need for larger and well-controlled experiments to further study VR's clinical effectiveness.

ACKNOWLEDGMENTS

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References