Virtual Reality Vs Nitrous Oxide During Pediatric Dental Procedures

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Purpose

To compare the use of virtual reality (VR) to nitrous oxide, for dental anxiety and pain during a dental procedure.

Background

Virtual reality (VR) headsets have demonstrated effectiveness as an alternative behavior management tool (1). The extent of which however needs more research.

Standardized scales such as FLACC, Wong-Baker FACES, and Houpt Behavior have been studied and validated, for assessing behavior, pain and distress(2-4). As VR is becoming much more accessible, affordable and is more familiar to the general public, it potentially has a place in the dental office.

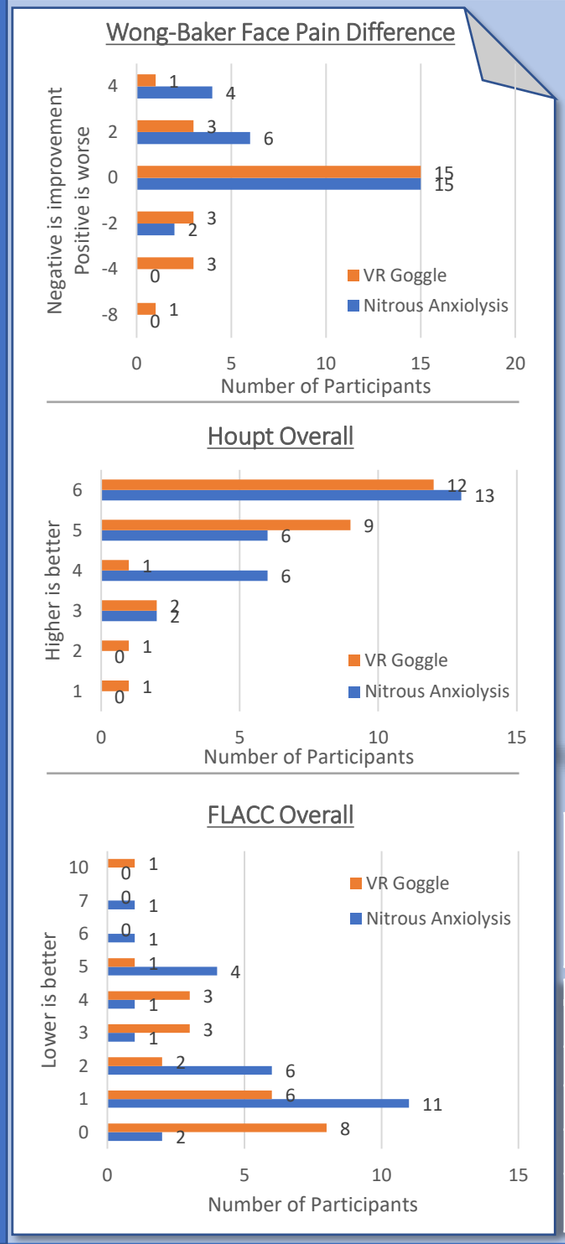
Methods

Participants from the age of 5-12 years were randomized in two groups. Group 1 received dental treatment using nitrous oxide. Group 2 received dental treatment while wearing virtual reality headsets, which played a video giving a virtual reality experience. Restorative treatment was performed in both groups that required the use of an intraoral anesthetic injection.

Procedures ranged from placing dental fillings, crowns, removal of distal shoes, and the extraction of teeth. Patients were graded during the delivery of anesthesia using FLACC Scale (Face Leg Activity Crying Consolability). Behavior was assessed using the Houpt behavior scale. The participants were asked to rate their pain using the Wong-Baker Faces scale before and after the procedure to compare pre and post op pain.

Results

53 patients were assessed, 27 in group 1 or nitrous oxide, and 26 in group 2 or virtual reality. Mean age of participant was 8 years old. Comparing virtual reality and nitrous oxide treatment modalities, Houpt, FLACC, and Faces scores did not demonstrate any statistical difference. Data showed virtual reality had a tendency for better scores in post op perceived pain.



HOUPT Overall Behavior (2)	1) Aborted, No treatment
	2) Poor: treatment interrupted only partial treatment completed
	3) Regular, Treatment interrupted but eventually completed continuous crying and movement
	4) Good, Difficult, but all treatment performed with either continuous movement OR crying
	5) Very good: some limited crying OR movement
	6) Excellent, no crying or movement

FLACC (3)	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant quivering chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting, back and forth, tense	Arched, rigid or jerking
Cry	No cry (awake or asleep)	Moans or whimpers; occasional complaint	Crying steadily, screams, sobs, frequent complaints
Consolability	Content, relaxed	Reassured by touching, hugging or being talked to, distractible	Difficult to console or comfort

Discussion

Benefits of VR: 1) Participant was able to remain distracted with less intervention form dentist **2)** The goggles prevented the participant from seeing objects usually perceived as "scary" **Drawbacks of VR**: **1)** Participant occasionally required commands repeated to them as they were distracted **2)** If a participant became disengaged or began to cry it was noted that VR no longer remained effective due to tears in their eyes or eye closure.

Benefits of Nitrous: 1) Several years of iteration with research and knowledge of most effective use **2)** Nitrous effectiveness can be tailored to the participant through titration **3)** If participant becomes distressed nitrous concentration can increase, or child can resettle more effectively after a few moments of breathing it in.

Drawbacks of Nitrous: **1) R**equirement of constant distraction and behavior management techniques **2)** Necessity of hiding of "scary" objects **3)** Some children cannot tolerate or may have a contraindication to the use of nitrous oxide.

Conclusion

Virtual Realty may be a viable, non-pharmacologic alternative treatment modality to nitrous oxide. Data also suggests that post op experience may be better with virtual reality in comparison to nitrous.

Further research is recommended.

Sources

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