Effects of psychological behaviour management programme on dental fear and anxiety in children: A randomised controlled clinical trial

J.-S. Song[1], H.-C. Chung[2], S. Sohn[3], Y.-J. Kim[4]

[1]DDS, PhD, Assistant professor of the department of Paediatric Dentistry, Dental Research Institute, School of Dentistry, Seoul National University, Seoul, Republic of Korea
[2]MS, Computer scientist in the Culture Technology, Korea Advanced Institute of Science and Technology, Daejeon, Republic of Korea
[3]MA, Computer-mediated communication researcher in graduate school of Communication and Arts, Yonsei University, Seoul, Republic of Korea
[4]DDS, PhD, Professor and Chair of the department of Paediatric Dentistry, Dental Research Institute, School of Dentistry, Seoul National University, Seoul, Republic of Korea

DOI 10.23804/ejpd.2020.21.04.6

e-mail: pedosong@snu.ac.kr

Abstract

Aim A psychological behaviour management programme with information and communications technology was developed that includes symbolic modelling, tell-show-do, positive reinforcement and distraction, and provides real-time treatment information. We hypothesised that the programme would help patients feel less stressed and show less uncooperative behaviours and subjective pain.

Methods Forty-eight paediatric patients were recruited from May 2016 to January 2017, and randomly divided into a control group and an experimental group. In the control, patients watched cartoon animations during the first and second treatments. The experimental group watched cartoon animations during the first treatment, and they used the programme during the second treatment. To measure stress, uncooperative behaviour and subjective pain, we recorded the heart rate, Procedure Behaviour Checklist (PBCL) and Wong and Baker's Faces Pain Rating Scale (FPRS).

Results The experimental group resulted in a significantly lower mean heart rate, uncooperative behaviour and subjective pain in the second treatment than did the control group ($p<0.001$). The differences in heart rate and uncooperative behaviour between the treatments were also significantly greater in the experimental group than in the control group ($p<0.001$).

Conclusion The programme was effective in relieving fear and anxiety as well as learning cooperative behaviour.

KEYWORDS Psychological behaviour management programme, Dental fear and anxiety, Information and communications technology.

Introduction

Dental fear is defined as fear from particular stimuli that subjects may experience during dental treatment, and dental anxiety is related to the uncertainty that comes from dental treatment. The methods for controlling negative psychological reactions and behaviours caused by dental fear and anxiety can be classified in two ways: Basic behaviour guidance and advanced behaviour guidance [de Castro et al., 2013]. Advanced behaviour guidance includes physical and pharmacological methods such as protective stabilisation, sedation, and general anaesthesia [Goumans et al., 2004]. These methods may be effective in immediately controlling children's behaviour for treatment procedures, but require advanced paediatric dental training, additional personnel to monitor the patients, and additional dental costs. Also, they are not ultimately effective in relieving fear and anxiety, and have negative effects on the parents' mental state and satisfaction, which restricts dentists from choosing these behaviour control methods [Wright et al., 1973]. Actually, Eton et al. and Patel et al. [2016] found that the less aggressive the method is, the more likely it is to be accepted by parents.

Basic behaviour guidance includes psychological behaviour control methods such as positive pre-visit imagery, direct observation, tell-show-do (TSD), positive reinforcement and descriptive praise, and distraction. This guidance is based on communication between patients, dentists, and parents, and was shown to be effective in reducing the fear of paediatric patients [Oliver and Manton, 2015; Folayan and Fatusi, 2005]. However, these traditional methods are overly dependent on clinical knowledge and experience of individual dentists, and it is unrealistic for all dentists to use these methods consistently in all actual situations.

With the advancement of computer and display technologies, tools are available to develop a programme that can result in stimuli equivalent to those induced by dentists' behavioural intervention methodologies and improve the efficiency of psychological behaviour management [Ryu et al., 2017]. Currently, there is an increased interest in dental research that applies technology to control the patients' fear and anxiety. In this regard, Al-Khotani et al. [2016] showed that audiovisual approaches are more effective for controlling dental phobia, and Asl Aminabadi et al. [2012] reported that using virtual reality in dental treatment led to a decrease in pain and anxiety. The application of these studies is limited in that they only used distraction intervention and audiovisual contents for distraction were unrelated to the actual treatment.

Therefore, we developed a psychological behaviour management programme that supplemented the traditional

methods with information and communications technology (ICT). This programme not only benefits from distraction by audiovisual materials, but it also provides real-time information about the treatment, and extends the effects of audiovisual materials by providing positive feedback with cooperation. Accordingly, we hypothesised that the group that used the programme would feel less stressed, show less uncooperative behaviours and subjective pain than a control group.

Materials and Method

Participants

The study was conducted under the review of the Seoul National University Dental Hospital (SNUDH) Institutional Review Board (IRB NO: CRI16007). It involved the paediatric patients who visited the SNUDH Department of Paediatric Dentistry from May 2016 to January 2017. During the first visit, the experimental procedures were fully explained to the parents and participants with written parental consent were enrolled in the study. The inclusion criteria were as follows: patients aged three to seven years of age who showed level 2 cooperation in the Frankl scale and required restorative treatment with a composite resin or a preformed stainless steel crown under local anaesthesia at least twice within a month. The age range of the participants corresponds to the operational period of cognitive stages, defined by Piaget [1946], during which children can develop concepts of the world, and express themselves verbally. The exclusion criteria were as follows: patients who were scheduled to receive dental treatment with nitrous oxide inhalation sedation and had had previous dental treatment within the past two years.

Interventions

In this experiment, we developed a psychological behaviour management programme with ICT. The stimuli of the programme were comprised of video contents that were developed with Adobe flash professional cs6 and Adobe Photoshop cs6.

As shown in Figure 1, the programme was divided into two scenarios: the waiting room and treatment room. In the waiting room scenario, the programme library contained nine videos (11 mins 10 secs) that applied positive imagery and symbolic modelling, and the extracted video from the web server were streamed on the display before treatment. Cocomong, a cartoon character familiar to Korean children, explained the treatment devices, method, process and expected sensory stimuli during treatment. In these videos, Cocomong was anxious about receiving dental treatment at first, but finished the treatment successfully, which motivated the patients by explaining why they should receive treatment and how their teeth would change after treatment.

The treatment room programme included 34 videos (17 mins) that applied systematic desensitisation, and 12 videos (1 min 22 secs) that applied positive reinforcement. Real-time treatment situational data was automatically collected by a sensor situational system during treatment, and the programme output video based on the data. The sensor situational system was composed of IR (Infrared Radiation) sensors that detected the high and low speed handpieces, an air-water three-way syringe and a PPG (Photo-Plethysmography) sensor that measured the patients' heart rate. Therefore, the treatment room programme did not need researcher intervention. In the systematic desensitisation video, Cocomong explained the shapes, sounds, and sensations of treatment devices according to the treatment progress. In the video regarding positive reinforcement, Cocomong complimented the patient when he or she successfully received uncomfortable procedures, and gave encouragement when the patient showed a high heart rate.

Measures

In this experiment, patient response was assessed in three ways to measure fear and anxiety, which may not be shown by the behaviour [Liau et al., 2008]. As a measure of stress, the participant's heart rate (HR) was measured (i.e., every minute) with a pulse oximeter beginning when patient laid down on the dental chair to when the treatment was finished.

To monitor for uncooperative behaviour during restorative treatment, the Procedure Behaviour Checklist (PBCL) by Lebaron and Zeltzer [1984] was used. Behaviour was defined as muscle tension, screaming, crying, restraint used, pain verbalised, anxiety verbalised, verbal stalling and physical resistance, and each behaviour was rated on a four-point Likert scale, ranging from one (not at all) to four (very strong).

Finally, the Faces Pain Rating Scale (FPRS) by Wong and Baker [1988] was used to record signs of subjective pain after restorative treatment. The six-point scale ranged from zero (not at all painful) and two (a little painful) to 10 (very painful). When conducting the survey on the patients, semi-open questions were repeated (i.e., How much did it hurt? Let's pick a face that is similar to the pain you felt.) at least twice,

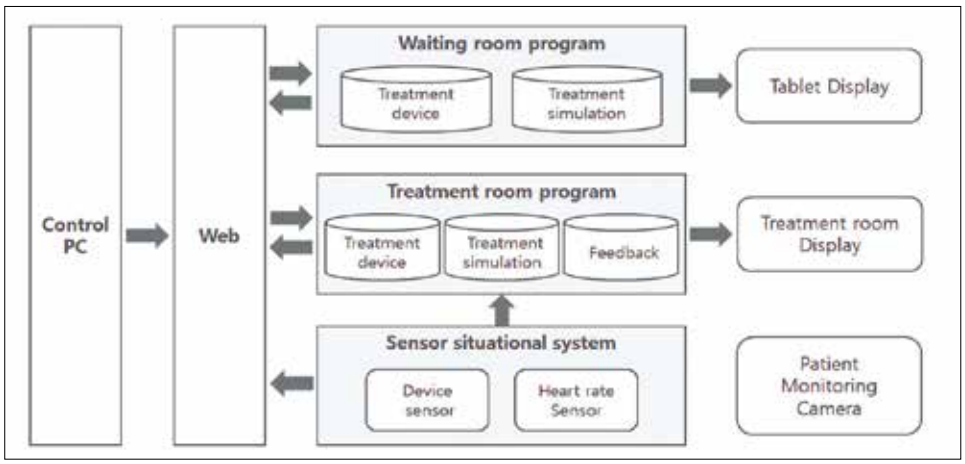

FIG. 1 Real-time situational data-sensing and treatment information system.

considering the age and intellect of the participants, so that the patients could express their state.

Experimental design/procedure

In this randomised clinical trial, the patients visited one dentist (J.S.) three times. The parents were in the treatment room during all visits, but did not have direct contact with their child.

In the first visit, the patient received clinical and radiological examination to establish a treatment plan, and the patient's cooperation level was evaluated.

In the second visit (first restorative treatment), all patients were informed of the treatment using the usual TSD without researcher intervention, and they watched cartoon animations from a ceiling television during treatment. The researcher (H.C.) did not have any contact with the patient during treatment, and performed HR measurements and conducted PBCL evaluations during treatment, and surveyed FPRS after treatment.

In the third visit (second restorative treatment), the patients were randomly assigned to either an experimental or control group [Paludan-Müller, 2016]. For allocation sequence generation, a random assignment table was created by Block Random Assignment Methods (block size of four) with SAS 9.4. For allocation sequence concealment, sequentially numbered, sealed and opaque envelopes were opened by the researcher (H.C.) just before the third visit. The experimental group experienced the waiting room programme with a Tablet PC, and the treatment room programme followed. In contrast, the control group received treatment under the same conditions as the first visit. The data collection was conducted in the same way as in the first visit (Fig. 2).

The main dependent variables (HR, PBCL, and FPRS) were assessed by two researchers, with one researcher (H.C.) passively observing patients without direct contact, and the other researcher (S.S.) watching the video recording of the treatment process to make assessments.

Sample size determination

The sample size was determined based on data from the first 20 participants of the experimental and control groups (10 each). Specifically, comparing the effect of programme on the HR, the PBCL and the FPRS between the groups during the second treatment revealed that the minimum numbers of participants were 19, 9 and 6 respectively. When comparing between the first and second treatments within the experimental group showed that the minimal sample sizes were 9, 7 and 15 respectively. The effect sizes, obtained using Cohen's d, were 1.3, 1.9 and 2.5 for between-group comparison, and 1.5, 1.8, and 1.0 for within-group comparison. Therefore, the inclusion of 24 patients in each group would be sufficient to account for a 20% dropout rate at a 5% significance level and 95% statistical power, and 48 patients were recruited for the research.

Statistical analysis

Pearson coefficient was used to confirm the inter-rater reliability. To determine statistical methods for analysing PBCL results, we conducted a split-half reliability analysis (Cronbach's alpha coefficient) and factor analysis (Correlation test, KMO and Barlett S test, Communalities test).

Gender distribution between the experimental and control groups was compared with the Pearson Chi-square test. If the values of HR and PBCL in each group followed a normal distribution after checking with the Kolmogorov-Smirnov test and the Shapiro-Wilk test, they were compared with the t-test; otherwise, the Mann-Whitney U test was used. We treated FPRS as a reference indicator using the ordinal scale; the Mann-Whitney U test was used for FPRS.

Results

Among the 48 participants with written consents, four were excluded from analysis as they either did not receive local anaesthesia or their restorative treatments were more than one month apart. These four participants were in the control group. The 44 remaining participants were analysed, of which 19 were male and 25 were female; the mean age was 5.6 years (Table 1). The mean time interval between the first and second restorative treatments was 12.68 days. There were no statistically significant differences in gender, age and time interval between the control and experimental groups (p=0.804, 0.667 and 0.867).

Pearson coefficient between the data of two researchers was over 0.97, indicating high inter-rater reliability. Therefore, the mean value was used.

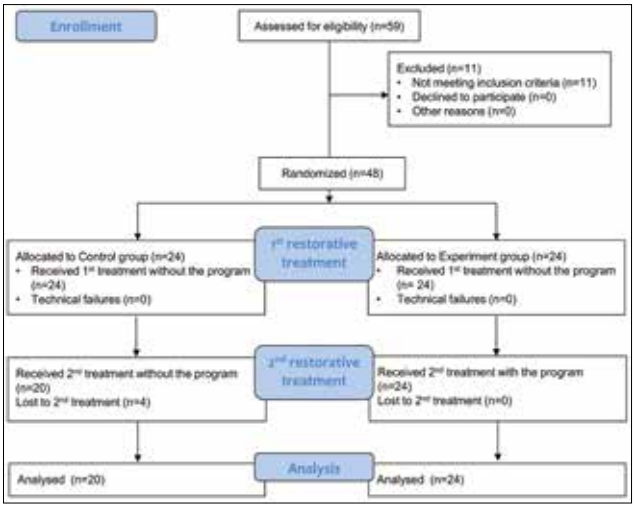

FIG.2 CONSORT flow diagram for the experimental design.

	Control group[a]	Experimental group[b]	Total	p-value
Individuals	20 (45.5%)	24 (54.5%)	44 (100%)	
Gender				
Female	10 (50.0%)	15 (62.5%)	25 (56.8%)	0.804[c]
Male	10 (50.0%)	9 (37.5%)	19 (43.2%)	
Age (years)				
Mean (SD)	5.63 (1.25)	5.66 (0.92)	5.64 (1.08)	0.667[d]
Min-Max	3.9 - 7.7	3.9 - 7.5	3.9 - 7.7	
Time interval (days)[e]				
Mean (SD)	12.70 (4.29)	12.67 (4.11)	12.68 (4.15)	0.867[d]

[a]Patients watched cartoon animations during both treatments.
[b]Patients watched cartoon animations during the first treatment, and used the programme during the second treatment. - [c]Pearson Chi-square test
[d]t-test - [e]Time interval between the first and second restorative treatments

TABLE 1 Participant characteristics, sub-grouped by use of paediatric behaviour management program.

There was highly significant internal consistency over the eight items of PBCL (Cronbach's alpha coefficient = 0.921). And there were high correlations between items, ranged from 0.455 to 0.804, and a significant homogeneity for items in the KMO and Bartlett S tests (p<0.001). Communalities are higher than 0.4 over all items. Based on these results, PBCL was confirmed as a valid scale that can be considered an interval scale. So we used the composite mean of PBCL items as representative data of PBCL.

The results of the normality test on HR and PBCL are shown in Table 2. It can be seen that HR and PBCL in the first treatment followed a normal distribution, but others did not.

The descriptive results of HR, PBCL and FPRS are as shown in Table 3. The mean HR collected in the treatment room was used. There were no significant differences in HR, PBCL and FPRS between the experimental and control groups in the first treatment (p=0.327, 0.574 and 0.971). Therefore, the data from the first treatment were used as statistical baseline to clarify the effect of the program. Statistically significant differences on the reduction of both HR and PBCL values in the second treatment were found when the experimental and control groups were compared. Specifically, in the experimental group both HR and PBCL variables showed a wider decrease than in the control group (p<0.001). Furthermore, during the second treatment, comparing all three variables between the two groups, those in the experimental group showed significantly lower scores than in the control group (p <0.001).

	Kolmogorov-Smirnova Sig.		Shapiro-Wilk Sig.	
1st treatment	Control group	Experimental group	Control group	Experimental group
HR[b]	0.153	0.200*	0.134	1.000
PBCL[c]	0.200*	0.200*	0.307	0.930
2nd treatment				
HR	0.013**	0.200*	0.085	0.364
PBCL	0.200*	0.002**	0.930	0.001**
Difference[d]				
HR	0.013**	0.200*	0.041**	0.801
PBCL	0.022**	0.042**	0.190	0.091

**This is a lower bound of the true significance - **Reject H0: current variables do not have normality - [a]Lilliefors Significance Correction*
[b]Heart Rate - [c]Procedure Behaviour Checklist by Lebaron and Zeltzer - [d]Differences between the first and the second treatments

TABLE 2 Results of the normality test for HR and PBCL.

	Control group	Experimental group	p-value
1st treatment			
HR (beats/min)	109.50 (12.41)[a]	105.39 (10.61)[a]	0.327[c]
PBCL	2.91 (0.71)[a]	2.79 (0.66)[a]	0.574[c]
FPRS[e]	6 (22.43)[b]	8 (22.56)[b]	0.971[d]
2nd treatment			
HR (beats/min)	111.87 (12.22)[a]	97.39 (9.86)[a]	<0.001[d]
PBCL	2.87 (0.67)[a]	1.39 (0.36)[a]	<0.001[d]
FPRS	8 (38.59)[b]	0 (15.66)[b]	<0.001[d]
Difference[f]			
HR (beats/min)	1.40 (30.65)[b]	-7.10 (15.71)[b]	< 0.001[d]
PBCL	-0.13 (32.03)[b]	-1.63 (14.56)[b]	< 0.001[d]
FPRS	0 (35.76) [b]	-6 (17.98)[b]	<0.001[d]

[a]Mean (SD) - [b]Median (Mean Rank) - [c]t-test - [d]Mann-Whitney U test - [e]Faces Pain Rating Scale by Wong and Baker
[f]Differences between the first and the second treatments

TABLE 3 Results of HR, PBCL and FPRS.

Discussion

The aim of this research was to develop a programme that applies psychological behaviour control theories and demonstrates the effect of the programme on fear and anxiety towards dental treatment. The results support the hypothesis that programme use decreases patient fear and anxiety. The experimental group showed a significantly lower HR, uncooperative behaviour and subjective pain in the second treatment than did the control group. The differences in heart rate, uncooperative behaviour and subjective pain between the treatments were also significantly greater in the experimental groups than in the control group. But unlike HR and PBCL, FPRS is an ordinal scale, so care should be taken not to interpret the results by relying on the its difference results.

The effectiveness of the programme on reducing fear and anxiety can be explained by the potentially additive effect of multiple psychological behaviour control methods. Providing procedural and sensory information about treatment through a familiar character equated with symbolic modelling and systematic desensitisation [Suls and Wan, 1989], and providing feedback based on the patient's anxiety level showed effects of positive reinforcement and praise [Greenbaum et al., 1993]. Considering that the control group also watched TV cartoons during treatment, it can be inferred that the difference resulted from providing information and feedback through video, not from distraction with watching video itself. This is supported by Weinstein, who insisted that distraction is insufficient in controlling patients' behaviours [Weinstein et al., 1982]. Therefore, distraction needs to be applied in addition to other methods. This research maximised the effect of reducing anxiety by providing predictable information during treatment [Wardle, 1983] and by introducing technology. More specifically, it is assumed that providing accurate and timely information about the treatment procedure by collecting real-time data on devices and HR had a positive effect, as shown by Armfield et al. [2013] and Morgan et al. [2017].

Previous research has supported the benefits of various psychological behaviour control methods. However, this research demonstrates the benefits in applying such methods in the form of an automated programme in a clinical situation without artificial stimuli and situations. A friendly cartoon character can substitute actual dentists and dental hygienists in aspects of behaviour management. Coxon et al. [2017] showed that it is difficult to expect consistent effects from psychological behaviour control methods due to the dentists' competence and fatigue. The programme used in this research appears to improve the consistency, and dentists can focus more attention on the treatment procedure itself to improve the efficiency and quality of the treatment. Also, these results indicate that the use of the programmes can lead to a better cooperation from children and a decreased need for pharmacologic management of behaviour. Thereby, it can increase patients and caregivers' satisfaction and reduce dental costs [Patel et al., 2016]. Moreover, considering that the programme was developed as a prototype of an actual product, the results of this research are widely applicable. The results are also reliable, as the study measured the physiological reaction, researcher observation, and self-reports.

The fear and anxiety of the control group increased in the physiological reactions (HR) and subjective pain (FPRS), but it marginally decreased in researcher behaviour observation

(PBCL). Although these changes in HR, FPRS, and PBCL are not statistically significant, these opposing results may be explained by the inherent limitations in researcher observation, as there could be patients with high fear and anxiety that do not exhibit emotions in actual behaviours [Liau et al., 2008].

Also, as previously mentioned, HR and subjective pain in the control group increased in the second treatment. These results may be related to the different study design from the research by Al-Khotani et al. [2016] or Ram et al. [2010]. Unlike these previous studies, the present research involved three visits and two restorative treatments to examine the homogeneity between groups, and the control group watched TV cartoons without inhaling nitrous oxide. While statistically insignificant, even the group that used a distraction method showed an increase in HR with the repeated dental visits, as previously reported by Prabhakar et al. [2007].

While the present research contributed to extending previous research, there are limitations. The patients were not able to have sufficient wash-out periods for ethical reasons because they had multiple dental caries. So it is possible that the effects of the programme were exaggerated because of the insufficient wash-out period. Since the independent variable is a combination of various psychological control methods, it is difficult to separate the effect of each method. And we included only children with level 2 cooperation in the Frankl scale, so there is a limitation to generalise these results. Further researches on separate effects of psychological control methods and on children with various degrees of cooperation are needed. Another limitation is the small sample size, due to the difficulty of recruiting paediatric patients for this study. This is because this study was performed at the National Dental Hospital, and some of the potential patients required sedation or general anaesthesia due to poor cooperation. Further, while this research compared the programme with distraction, it would be helpful to compare with nitrous oxide inhalation sedation. Moreover, this research used a TV in the ceiling, which sometimes is obscured by the dentist's movements. It would be interesting to utilise an optical see-through Head Mounted Display (OST-HMD) that allows children to see outside while viewing the audiovisual data. Also, the use of oscillating devices for caries removal or minimally invasive technique such as atraumatic restorative treatment can be considered to have potential positive features in controlling dental fear and anxiety [Cianetti et al., 2018; Aykut-Yetkiner et al., 2014].

Conclusion

The automated psychological behaviour management programme based on ICT technology was effective in relieving fear and anxiety as well as learning cooperative behaviour. The experimental group showed a significantly lower heart rate, uncooperative behaviour and subjective pain in the second treatment with the programme than did the control group. The experimental group showed significantly greater differences in heart rate and uncooperative behaviour between the treatments than did the control group.

Acknowledgements

The authors acknowledge the support of Kai-i Company for developing and providing the programme used in the study.

Conflict of interest

The authors declare no conflicts of interest.

References

› Al-Khotani A, Bello LA, Christidis N. Effects of audiovisual distraction on children's behavior during dental treatment: a randomized controlled clinical trial. Acta Odontol Scand 2016;74:494-501.
› Armfield JM, Heaton LJ. Management of fear and anxiety in the dental clinic: a review. Aust Dent J 2013;58:390-407.
› Asl Aminabadi NA, Erfanparast L, Sohrabi A, Ghertasi Oskouei S, Naghili A. The Impact of virtual reality distraction on pain and anxiety during dental treatment in 4-6year-old children: a randomized controlled clinical trial. J Dent Res Dent Clin Dent Prospects 2012;6:117-124.
› Aykut-Yetkiner A, Şimşek D, Eronat C, Ciftçioğlu M. Comparison of the remineralisation effect of a glass ionomer cement versus a resin composite on dentin of primary teeth. Eur J Paediatr Dent 2014;15(2):119-121.
› Cianetti S, Abraha I, Pagano S, Lupatelli E, Lombardo G. Sonic and ultrasonic oscillating devices for the management of pain and dental fear in children or adolescents that require caries removal: a systematic review. BMC Open 2018;8(4):e020840.
› Coxon J, Hosey MT, Newton JT. Knowledge of behavioral management principles amongst specialist paediatric dental practitioners in the United Kingdom. Behav Cogn Psychother 2017;45:185-192.
› de Castro AM, de Oliveira FS, de Paiva Novaes MS, Ferreira DCA. Behavior guidance technique in pediatric dentistry: attitudes of parents of children with disabilities and without disabilities. Spec Care Dentist 2013;33(5):213-217.
› Eaton JJ, McTigue DJ, Fields HW Jr, Beck M. Attitudes of contemporary parents toward behavior management techniques used in pediatric dentistry. Pediatr Dent 2005;27:107-113.
› Folayan MO, Fatusi A. Effect of psychological management techniques on specific item score change during the management of dental fear in children. J Clin Pediatr Dent 2005;29:335-340.
› Goumans C, Veerkamp JSJ, Aartman IHA. Dental anxiety and behavioural problems: what is their influence on the treatment plan? Eur J Paediatr Dent 2004;5(1):15-18.
› Greenbaum PE, Lumley MA, Turner C, Melamed BG. Dentist's reassuring touch: effects on children's behavior. Pediatr Dent 1993;15: 20-24.
› LeBaron S, Zeltzer L. Assessment of acute pain and anxiety in children and adolescents by self-reports, observer reports, and a behavior checklist. J Consult Clin Psychol 1984;52:729-738.
› Liau FL, Kok SH, Lee JJ, et al. Cardiovascular influence of dental anxiety during local anesthesia for tooth extraction. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;105:16-26.
› Morgan AG, Rodd HD, Porritt JM et al. Children's experiences of dental anxiety. Int J Paediatr Dent 2017;27:87-97.
› Oliver K, Manton DJ. Contemporary behavior management techniques in clinical pediatric dentistry: out with the old and in with the new? J Dent Child 2015;82:22-28.
› Paludan-Müller A, Laursen DRT, Hróbjartsson A. Mechanisms and direction of allocation bias in randomised clinical trials. BMC Med Res Methodol 2016;16:133.
› Patel M, McTigue DJ, Thikkurissy S, Fields HW. Parental attitudes toward advanced behavior guidance techniques used in pediatric dentistry. Pediatr Dent 2016;38:30-36.
› Piaget J. The development of children's concept of time. Paris, France: Presses Universitaires de France; 1946.
› Prabhakar AR, Marwah N, Raju OS. A comparison between audio and audiovisual distraction techniques in managing anxious pediatric dental patients. J Indian Soc Pedod Prev Dent 2007;25:177-182.
› Ram D, Shapira J, Holan G, Magora F, Cohen S, Davidovich E. Audiovisual video eyeglass distraction during dental treatment in children. Quintessence Int 2010;41:673-679.
› Ryu JH, Park SJ, Park JW, et al. Randomized clinical trial of immersive virtual reality tour of the operating theatre in children before anaesthesia. Br J Surg 2017;104:1628-1633.
› Suls J, Wan CK. Effects of sensory and procedural information on coping with stressful medical procedures and pain: a meta-analysis. J Consult Clin Psychol 1989;57:372-379.
› Wardle J. Psychological management of anxiety and pain during dental treatment. J Psychosom Res 1983;27:399-402.
› Weinstein P, Getz T, Ratener P, Domoto P. The effect of dentist's behaviors on fear-related behaviors in children. J Am Dent Assoc 1982;104:32-38.
› Wong DL, Baker CM. Pain in children: comparison of assessment scales. Pediatr Nurs 1988;14:9-17.
› Wright GZ, Alpern GD, Leake JL. The modifiability of maternal anxiety as it relates to children's cooperative dental behavior. ASDC J Dent Child 1973;40:265-271.