

Objective assessment of the influence of the parental presence on the fear and behavior of anxious children during their first restorative dental visit

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Abstract

Aims and Objectives: Parents play an important role in the dental behavior of a child patient. This study aimed to assess the effect of parental presence on the behavior of the child and objectively measure the behavior using pulse oximetry. **Materials and Methods:** The study was registered with the clinical trials registry of the National Institutes of Health (NCT02619981). The children were divided into three groups, those who had no accompanying parent, those accompanied by their fathers, and those accompanied by their mothers. The Venham anxiety and behavior scores were used for subjective measurements whereas the objective measurement of fear was done by measuring the heart rate using a portable pulse oximeter at six critical clinical situations. Statistical analysis was carried out using the Statistical Package for the Social Sciences version 21 (IBM corp. Armonk, NY, USA). **Results:** One hundred and twenty two children aged between 6 years and 8 years completed the study. Most of the children accompanied by fathers were males while most of the children accompanied by their mother were females. It was seen that females showed a higher mean heart rate than males at all steps. Children who had their parents outside the operatory exhibited lower anxiety and behavior scores than those whose parents were present; however, they showed a significantly higher pulse rate at all procedures. Boys had higher anxiety and behavior scores than girls, however, these differences were not statistically significant. **Conclusion:** The results of this study suggest that the presence of the parent in the operatory reduces the physiological manifestations of anxiety in children in their first restorative dental visit.

Key words: Behavior management, dental fear, parental presence

INTRODUCTION

The behavior of the child in the first dental visit often shapes the child's behavior in subsequent visits.^[1,2] Knowledge of the child's behavior and the factors influencing that behavior are, therefore, an invaluable

tool to the dentist.^[3,4] Parents play an important role in the dental behavior of a child patient, and it is for this reason that the role of the parent in dental fear remains a topic of interest to pediatric dentists.^[3-6] As early as the 1990s, citing the increased parental participation in

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dental treatment, it was recognized that the traditional approach of keeping the parent out of the operatory may not be feasible or effective in all cases.^[7] Parental desire to be a part of the process, combined with fears of litigation have also played a role in an increased number of dentists opting to keep the parents inside the operatory.^[7,8] The subjective nature of fear has often made the accurate measurement of fear difficult.^[9] Monitoring of heart rate has been shown to offer a valid measure of dental anxiety in children and is sensitive to changes in the level of dental anxiety during the course of treatment.^[10,11] Recently, the use of portable pulse oximeters that measure the heart rate and oxygen saturation of children has found increasing use in research on pediatric dental behavior.^[9]

Fear and behavior, though related, are two distinct entities and the role of parental presence on fear and behavior has received some subjective analysis in literature.^[3,6] However, the role of the accompanying parent and whether there is a difference in the child's behavior with the mother or the father inside the operatory has received little attention in literature. Furthermore, there have been few attempts in literature to objectively analyze the role of parental presence on the fear perceived by a child. Given this gap in the data, the aim of our study is to use oxygen saturation pulse oximetry to evaluate dental fear during the first restorative dental visit of Saudi children aged between 6 and 8 years of age and to evaluate the effect of parental presence on the fear.

MATERIALS AND METHODS

Ethical approval

The study was registered with the research center of the Riyadh Colleges of Dentistry and Pharmacy and was assigned the registration number IRP/2012/48. The study was also registered with the clinical trials registry of the National Institutes of Health and given the protocol number NCT02619981. Informed consent was sought from the parents of all children participating in this study.

Sample power calculation and sample selection

The sample power calculation was done using the G-Power sample power calculator, and it was determined that the 150 children aged between 6 and 8 years, presenting for their first restorative dental visit, whose parents consented to participate in the study were selected from patients reporting to the

dental clinics of Riyadh Colleges of Dentistry and Pharmacy using convenience sampling. Children were randomly distributed into the accompanied by parent group ($n = 100$) or those with the parent outside the operatory ($n = 50$). The children accompanied by their parents were further classified as those accompanied by their fathers ($n = 50$) and children accompanied by their mothers ($n = 50$). All children included in the sample had successfully completed a preventive dental visit (oral prophylaxis and topical fluoride application) and had no chief complaint of pain. Children with a past history of restorative dentistry, those who had pain as a symptom, and children diagnosed with mental illness were excluded from the study. Children with a past history of surgery or those with chronic illnesses requiring repeated hospitalization were excluded from the study. All children were divided into three groups, those accompanied by the fathers (Group A), those accompanied by the mothers (Group B), and children whose parents were kept out of the operatory (Group C). A total of 122 children successfully completed the recording process and comprised the final sample [Figure 1].

Subjective measurement of behavior and anxiety

The subjective measurement of anxiety was done in the waiting area prior to the commencement of the appointment using the Venham Anxiety Scale, whereas the subjective measurement of behavior was done using the worst score on the Venham Fear Scale during the procedure. To avoid the need for calibration, all fear measurements were performed by a single examiner (SCP).

Objective measurement of fear

The objective measurement of fear was done by measuring the heart rate using a portable pulse

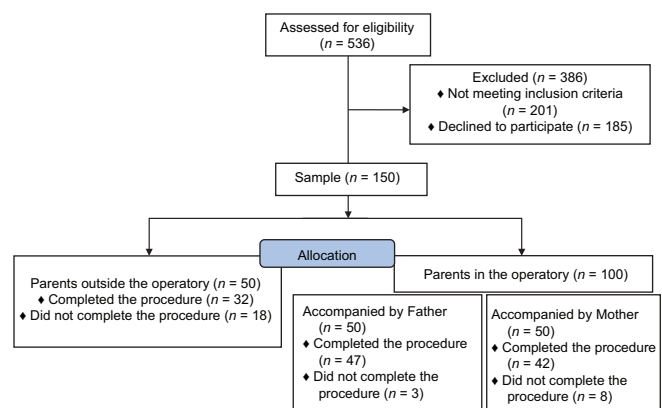


Figure 1: Flow diagram of patient selection process

oximeter (Nelcor™ PMN10, Meditronic Corp. MN, USA). The measurements were made using a single instrument at six critical clinical situations;^[12] (a) Child meets the dentist, (b) Child is seated in the dental chair, (c) Dentist is seated in the chair, (d) Administration of local anesthesia, (e) During the restorative procedure, and (f) at the end of the appointment.

Statistical analyses

The differences in behavior and anxiety scores between groups was compared using the Kruskal–Wallis test while the difference between the heart rates among groups was compared using the one-way analysis of variance (ANOVA) and Scheffe’s *post hoc* test. The differences in responses between males and females were compared using the independent *t*-test. All data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 22 data processing software (IBM corp, Armonk NY, USA).

RESULTS

A total of 122 children (62 males and 60 females) completed the study. The children were aged between 6 years and 8 years with the females (mean age: 6.7 years; SD: ±0.7 years) being older than the males (mean age: 6.2 years; SD: ±0.8 years). Among the children who completed the study, those who were accompanied by their father (*n* = 47) had the greatest rate of completion of recording of data, whereas those whose parents were kept out of the operatory had the lowest rate of completion of recording of data (*n* = 32). Most of the children accompanied by fathers were male while most of the children accompanied by their mothers were females [Figure 2].

When the heart rate at the different critical times were compared using the repeated measures ANOVA, it was noted that the heart rate was significantly higher for the injection (*F* = 28.123; *P* < 0.001). The heart rate was lowest for the group accompanied by the fathers

at all periods and the highest for the group where the parents were kept out of the operatory [Figure 3]. When the differences in heart rate for each stage were studied, significant differences were found between the groups accompanied with parents and those with the parent kept outside the operatory at all steps except that of the injection [Table 1] When gender differences in the heart rate were observed it was seen that females showed a higher mean heart rate than males at all steps. However, the independent samples *t*-test showed these differences to be significant only at the time of the injection, the restorative procedure, and at the end of appointment [Table 2].

When the anxiety and behavior scales were compared across the different groups, it was observed that children who had their parents outside the operatory exhibited lower anxiety and behavior scores than those whose parents were present. The Kruskal–Wallis test showed that, while the differences were significant for the anxiety score, they were not significant for the behavior score [Table 3]. Boys had higher anxiety and behavior scores than girls, however, these differences were not statistically significant [Table 3].

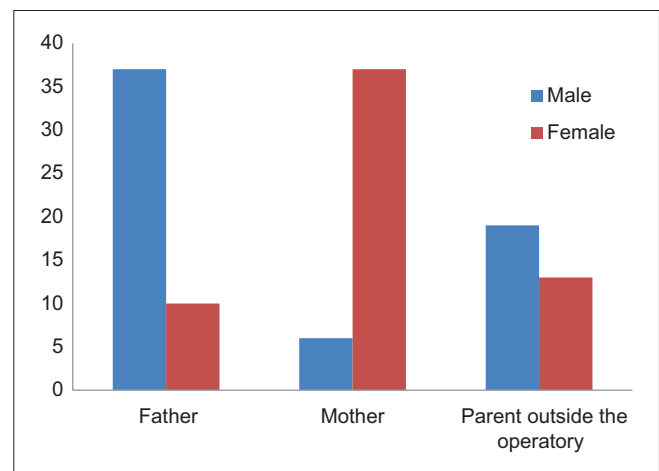


Figure 2: Distribution of the sample

Table 1: The effect of parental presence on the heart rate

	Mean heart rate (±SD)			Significance*
	Father	Mother	Parent outside the operatory	
Child meets dentist	85.06 (±13.1) ^a	87.74(±14.1) ^a	95.91(±8.9) ^b	0.001
Seating in the chair	89.98(±14.4) ^a	93.16(±14.5) ^a	104.28(±13.4) ^b	<0.001
Dentist at chair	95.96(±15.1) ^a	101.49(±13.8) ^a	112.81(±12.9) ^b	<0.001
Injection	113.36(±8.3) ^a	119.23(±16.7) ^a	119.41(±6.3) ^a	0.119
During procedure	97.49(±9.3) ^a	104.79(±8.3) ^b	110.44(±8.7) ^c	<0.001
End of appointment	87.57(±12) ^a	94.88(±12.8) ^b	100.13(±10.8) ^b	<0.001

Table 2: The effect of gender on heart rate

	Mean heart rate (\pm SD)		Significance*
	Male	Female	
Child meets dentist	87.10 (\pm 12.8)	90.67 (\pm 13.5)	0.137
Seating in the chair	93.35 (\pm 16.4)	96.40 (\pm 13.8)	0.271
Dentist at chair	100.39(\pm 17.7)	104.33(\pm 12.7)	0.162
Injection	113.03(\pm 15.2)	121.13(\pm 14.9)	0.004t
During procedure	101.19(\pm 11.5)	105.80(\pm 8.1)	0.012**
End of appointment	89.68(\pm 12.6)	97.33(\pm 12.2)	0.001**

*Calculated using the independent t-test; **Differences significant at $P < 0.05$

Table 3: Impact of gender and parental presence on behavior

	Accompanied by		
	Father	Mother	Parent outside the operatory
	Mean		
Venham Anxiety Scale	2.64 ^a	2.26 ^a	1.34 ^b
Venham Behavior Scale	1.74 ^a	1.49 ^a	1.44 ^a

* Calculated using the Kruskal–Wallis test; *Difference in superscript indicates difference significant at $P < 0.05$ based on the Mann-Whitney U and Bonferroni correction

DISCUSSION

The issue of parental presence in the operatory is critical for pediatric dentists and has been a topic of debate for decades.^[5] While there have been authors who have argued that removal of the parent from the operatory can improve the behavior of the child,^[13-15] others have suggested that it is important to keep parents in the operatory and have even suggested guidelines for keeping parents in the operatory.^[7,16] The primary aim of this study was to objectively evaluate the impact of parent child separation.

Studies have used heart rate, oxygen saturation, blood pressure, and body temperature as objective indicators of fear. However, it has been demonstrated that heart rate is a sensitive and reliable indicator of physiological fear responses. The decision to use only the heart rate in this study was based on the fact that placement of several recording devices on a child can in itself result in an increased physiological fear response. The fact that the heart rate in our findings was the highest just before the injection (a known stressor) validates the sensitivity of the pulse oximeter in a recorder of stress.

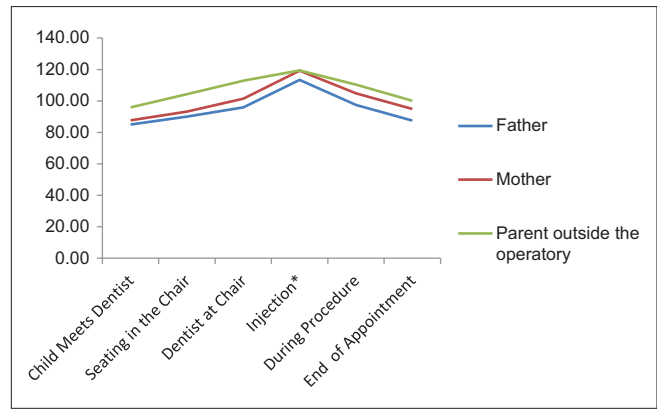


Figure 3: Differences in heart rate among groups for different procedures; *Difference significant at $P < 0.05$ Calculated using the repeated measures ANOVA

Pinkham suggested the six critical points of the dental appointment, and these have been widely accepted as a practical tool for the assessment of fear.^[12,17] Therefore, it was decided to measure the heart rate at each of these situations. The Venham behavior scale and the Venham anxiety scale have been successfully used for recording child’s behavior and were used to have a subjective assessment of the dentist’s perception of the child’s behavior.

The observation that parental presence resulted in significantly lower heart rates across groups suggests that the presence of the parent calms the child and is a form of reassurance. While this would mean that parental presence in the operatory is required, it would also suggest that the removal of the parent could serve as an effective tool of negative reinforcement. This supports the argument of Kostanos *et al.*^[15] who suggest that parental presence or absence could serve as a potent behavior management tool. It is interesting to observe that the dentists recording of the children’s behavior showed that the behavior improved when the parents were outside the operatory. An interesting observation was that the heart rate was lower when the child was accompanied by the father rather than the mother; however, these results must be viewed with caution given the relatively small size of the population studied.

While the difference between anxiety and behavior has been recognized by previous studies there has been little objective proof of the same. The apparent improvement in behavior of children when their parents were outside the operatory would seem to support the work of early pediatric dentists who advocated the separation of the child from the parent.^[6,11] However, it must be remembered that parent separation in this population

led to the failure of 18 patients to complete treatment. Furthermore, the fact that the heart rate increased despite the apparent improvement of behavior suggests that suppression of fear can induce increased anxiety in children. The results of this study tend to favor the theory that parental presence is an essential tool toward creating a good dental patient.

The strengths of this study include a strong study design and strict inclusion criteria. However, the study has certain limitations. The cultural norms of Saudi Arabia meant that the girls were mostly accompanied by their mothers while the boys were mostly accompanied by their fathers. This fact makes it difficult to assess if behavior changes were either due to differences in gender or whether they were due to the presence of a specific parent. Another limitation is that the study design did not allow for the testing of the broader impact of parental presence. The results of this study are, therefore, restricted to the experience of children aged between 6 and 8 years on their first restorative dental visit. Further research is needed to look into the factors that affect the behavior of the child on subsequent dental visits.

CONCLUSION

Within the limitations of this study we can conclude that the presence of the parent in the operatory reduces the physiological manifestations of anxiety of children in their first restorative dental visit.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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