Behavior of pediatric dental patients throughout the course of restorative dental treatment in a private pediatric dental practice

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The purpose of this study was to describe and quantify patient behavior patterns observed throughout restorative dentistry appointments in a private pediatric dental practice. Patient behavior throughout the course of the first restorative dental visit was recorded using the Sarnat Behavior Scale. Behavior of patients in age groups 0 to 5 (0 to 60 months), 5 to 8 (61 to 96 months) and 8 to 12 (97 to 144 months) was noted at the start of the visit, during the procedure and when the patient was dismissed. Socio-demographic variables such as sex and method of payment as an indicator of socio-economic status were also considered. In addition, it was also noted whether, the child was referred by a general dentist. The results showed that the percentage of patients having Sarnat scores of 3, 4 or 5 (S345), which is indicative of negative behavior, increased after the start of the visit and then decreased to a lower level when the patient was dismissed. This observation was the same for all age groups, although the percentage of patients exhibiting negative behavior during all phases of the restorative appointment decreased with increasing age.

In conclusion, pediatric dental patient behavior changes throughout the course of restorative dental treatment. There is an increase in negative behavior, while the teeth are being restored, which then decreases to levels below those observed at the start of the visit. This is related to age more than socio-economic or other factors confirming that as the child ages, the incidence of negative behavior decreases, but the pattern of change during the course of the restorative visit is the same regardless of age.
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INTRODUCTION

Physiological and psychological responses of children during dental procedures have been investigated in several studies where behavior has been noted to vary with the type of dental procedure, the frequency of visits and during the process of a visit itself.[1–6]

Venham and Quatrocelli recorded physiological and behavioral changes, while patients underwent preventive and restorative dental procedures.[6] They observed that that the greatest negative response was to the dental injection, which did not ameliorate over successive visits. The response to cavity preparation was unchanged during the 4 treatment visits. The negative reaction to injection, however, did not carry over to the remainder of each individual visit.

Koenigsberg and Johnson found a positive relationship between maternal anxiety and the behavior of the child at the initial oral examination visit, but this relationship did not continue on successive visits when restorative dental procedures were performed.[5] Additionally, no consistent behavioral responses of the patients were observed in a dental school setting over the course of three dental visits.[2]

In a private practice setting, Brill found that the younger the patient and the more threatening the procedure, the more often negative behavior was noted. Socio-economic status may be a factor in behavior, as children enrolled in Medicaid dental programs more often exhibited negative behavior compared to the fee-for-service counterparts.[7]

Brill also found that there was no difference in the behavior of children undergoing restorative dentistry at the first visit versus the second after an initial non-threatening introduction to dental procedures in a private practice setting.[8]

There have been no reports of changes in behavior of children undergoing restorative dental procedures in

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a private practice environment during the course of restorative dental procedures. The purpose of this study was to document the change in patient behavior during the course of visits for restorative dental procedures in a private practice setting in relation to variables such as age, sex, method of payment, i.e., fee for service vs. Medicaid and referral status.

MATERIALS AND METHODS

During a 3 month period, patients up to the age of 12 presenting for the first restorative dentistry visit, who were not given medication to influence behavior, nor needed passive restraint in order to accomplish the treatment were included in the study (n=235). Restorative dentistry, for the purpose of this study, was defined as any invasive procedure requiring the use of a local anesthetic, a cutting procedure on a tooth with or without the use of a local anesthetic, a dental extraction or placement of an occlusal sealant. If a local anesthetic was used during any other type of procedure, this was also considered a restorative procedure.

Behavior was rated using the scale proposed by Sarnat *et. al*.[9] Recordings were made at the start of the visit as the patient was seated in the dental chair (start), during the procedure commencing with the administration of a local anesthetic (during), if utilized, and at dismissal (end). All ratings were made by the author, who also was the sole provider of restorative services.

The Sarnat scale is as follows:

1. Active cooperation: smiles, offers information, initiates light conversation, gives positive responses.
2. Passive cooperation: indifferent, but obedient, follows instructions, quiet.
3. Neutral, indifferent: needs convincing, mild crying, follows instructions under pressure.
4. Opposed: disturbs work, seizes hands of the dentist, not relaxed, sits and stands alternatively.
5. Completely uncooperative, strongly opposed: cries, refuses to sit or to enter office.

For each patient visit, the age, sex and method of payment and if the child had been referred by a general dentist was recorded, along with the Sarnat score.

The children were assigned to one of 3 groups by age: 0 to 60 months (age 0 to 5), 61 to 96 months (age 5 to 8) and 97 to 144 months (age 8 to 12).

In a prior study reported by Brill, patients with Sarnat scores of 3, 4 or 5 (S345) were grouped together for analysis, as it was felt that patients receiving these scores exhibited what general dentists consider to be negative behavior necessitating referral to a specialist.[8] These same criteria were used in this investigation, with patient scores of S345 being grouped together for purposes of data analysis.

Table 1. Characteristics of the Patient Population, n=235.

	Number	Percentage
Males	121	52
Females	113	48
Fee-for-Service	104	44
Medicaid	131	56
Age 0-5	75	32
Age 5-8	99	42
Age 8-12	61	26
Dentist Referred	65	28

The data was recorded manually on customized data recording forms and transcribed to a computerized database program for storage and analysis. The chi-square statistic, $p<0.05$, $df=2$ was used for tests of significance.

RESULTS

During the period of observation, there were 235 children up to the age of 12, who underwent the first restorative visit in the practice. Table 1 shows the sociodemographic distribution of patients. There were 121 males and 113 females (52% vs. 48%); 131 children were covered by Medicaid (56%) and 65 (28%) were referred by general dentists; 32% (75) of the children were in age group 0 to 5, 42% (99) in age group 5 to 8 and 26% (61) were in age group 8 to 12.

Figure 1 presents the response of all children by age group. It can be seen that the younger the child, the more often negative behavior was observed at each observation period. In addition, it can be noted that there was more negative behavior during the procedure than at the start or end. These differences were significant for all comparisons ($p<0.05$).

Figure 2 shows the response of all patients throughout the restorative dental visit by interval of the visit, i.e., start, during and the end of the visit. For all age groups, the percentage of children exhibiting negative behavior increased after they were seated in the dental chair as the treatment progressed and then decreased to levels below the start when the treatment was completed. Comparing behavior either across an age group (e.g., age 0 to 5 throughout the course of the visit) or each age group at the same stage during the visit (e.g., behavior at the start for all ages), there was difference in behavior in all instances ($p<0.05$).

Figure 3 presents the response of males and females. The differences in response for males was significant comparing the various ages throughout the visit and each interval per age ($p<0.05$). For females, only in age group 0 to 5 was the difference in behavior throughout the appointment significant ($p< 0.05$). While the treatment was being delivered (during), there was a difference in behavior of females across the age groups, i.e.,

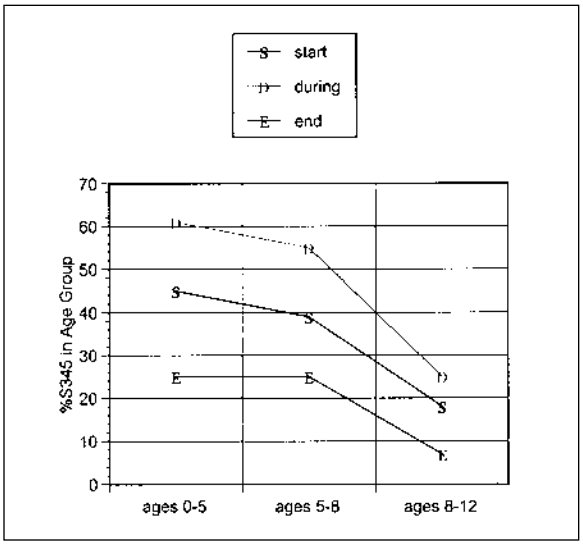

Figure 1. All patients (A) with Sarnat Scores of 3, 4 or 5 (S345) at the start (S), during (D) and the end (E) of the restorative visit – by age group.

		#S345 / # in Age Group		
Appointment Interval	S	34/75	39/99	11/61
	D	46/75	54/99	15/61
	E	19/75	25/75	4/61

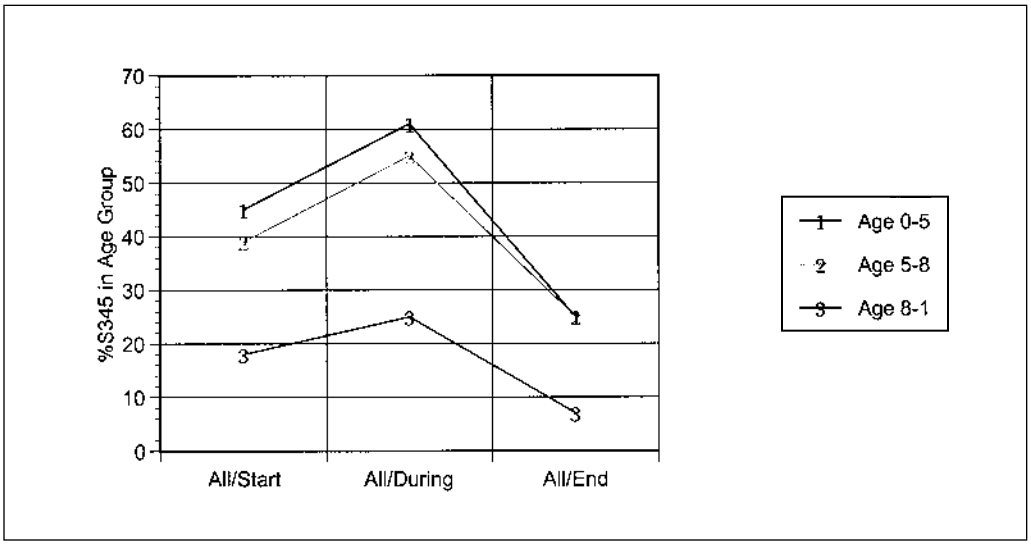

Figure 2. All patients with Sarnat Scores of 3, 4 or 5 (S345) by interval of the restorative visit– start, during, end.

	#S345 / # in Age Group		
Age Group			
0-5(1)	34/75	46/75	1/75
5- 8(2)	39/99	54/99	25/99
8-12(3)	11/61	15/61	4/61

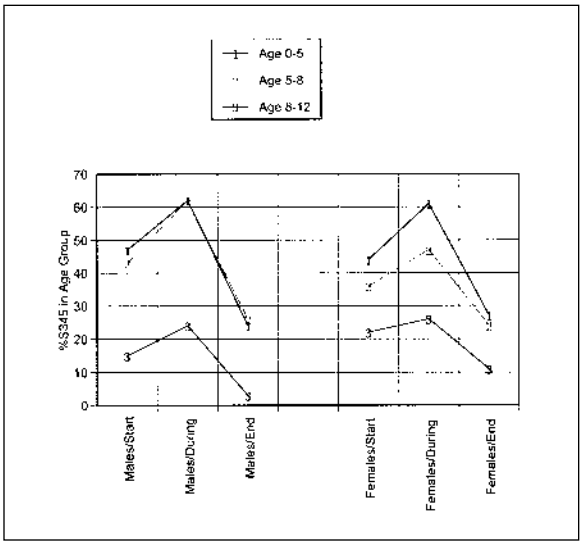

Figure 3. Male and female patients with Sarnat Scores of 3, 4 or 5 (S345) by interval of the restorative visit – start, during, end

	#S345 / # in Age Group					
Age Group						
0-5(1)	16	21	8	18	25	11
	34	34	34	41	41	41
5-8(2)	23	33	14	16	21	11
	53	53	53	45	45	45
8-12(3)	5	8	1	6	7	3
	34	34	34	27	27	27

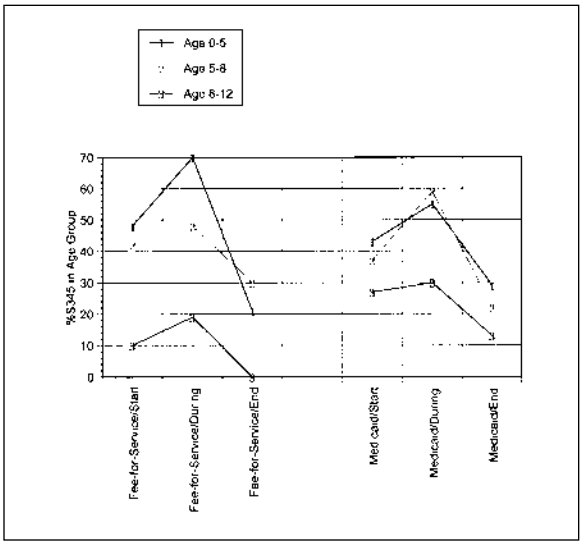

Figure 4. Fee-for-Service and Medicaid patients with Sarnat Scores of 3, 4 or 5 (S345) by interval of the restorative visit-start, during, end.

	#S345 / #in Age Group					
Age Group						
0-5(1)	16	23	7	81	23	12
	33	33	33	42	42	42
5-8(2)	17	19	12	22	35	13
	40	40	40	59	59	59
8-12(3)	3	6	0	8	9	4
	31	31	31	30	30	30

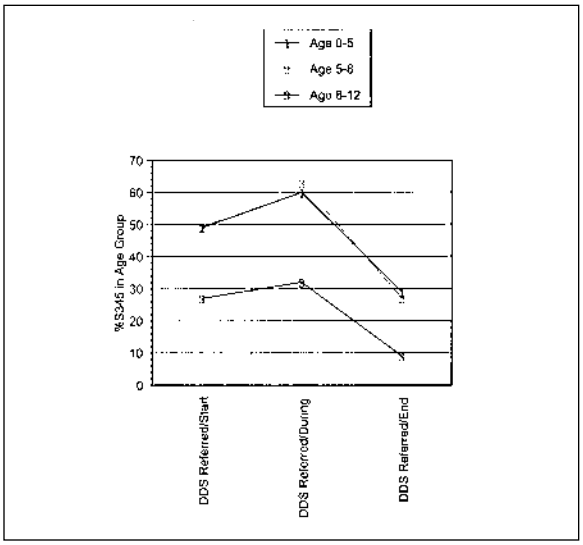

Figure 5. Dentist Referred Patients with Sarnat Scores of 3, 4 or 5(S345) by Interval of the Restorative Visit – Start, During, End

Age Group	#S345 / # in Age Group		
0-5(1)	17/35	21/35	10/35
5-8(2)	25/51	32/51	14/51
8-12(3)	6/22	7/22	2/22

the younger the patient, the more often negative behavior was observed ($p<0.05$).

Figure 4 shows the response of the children related to method of payment, i.e., either fee-for-service or Medicaid. Considering fee-for-service patients, for age groups 0 to 5 and 5 to 8, there were significant differences in behavior at the start and during the restorative visit ($p<0.05$). Only for age group 0 to 5 was the difference in behavior significant across the entire visit ($p< 0.05$).

The behavior of children enrolled in Medicaid in age groups 0 to 5 and 5 to 8 was significantly different over the course of the restorative visit ($p<0.05$). The behavior of the children during the procedure itself was significantly different by age group, with the younger children exhibiting more negative behavior.

As can be seen in Figure 5, dentist referred patients had the same pattern of response as Medicaid children. The behavior of age groups 0 to 5 and 5 to 8 over the course of the visit changed significantly ($p<0.05$) and when comparing the behavior of each age group during the procedure itself, the younger the child, the more negative behavior was observed ($p<0.05$).

DISCUSSION

In deciding upon the appropriate statistical test for analysis of a non-parametric sample, the normality of the distribution must be considered. The chi-square test was chosen rather than the Kruskall-Wallis test followed by the Dunn Post test as the sample was larger than 20 subjects and approached a Gaussian distribution; additionally, the Sarnat score was simplified into a dichotomous variable with two independent categories.

The results show that the three patient age groups behaved in a similar fashion. The behavior deteriorated, while the restorative treatment was delivered, and improved to levels indicative of better cooperation at the conclusion of the visit. The pattern was the same for all age groups, but as might be expected, the older the patient, the less likely negative behavior was noted.

Qualitatively, all sub-groups (males, females, fee-for-service, Medicaid, dentist referred patients) also followed this same pattern with the incidence of negative behavior increasing during the restorative procedure and decreasing to levels below when the children were seated in the dental chair. However, within some subgroups or specific age groups, there were times when the differences in behavior was not statistically significant at $p<0.05$, but the differences were still clinically observable.

Socio-economic status also did not appear to be a factor in behavior, as children covered by Medicaid reacted no differently than the fee-for-service counterparts. It is of note that the younger children covered by Medicaid reacted the same way dentist referred patients and almost the same way as their fee-for-service counterparts.

One might expect those children referred to the pediatric dentist by a general dentist to have more sig-

nificant behavior problems, but this also was not the case compared to the entire sample of children studied.

While not all differences were statistically significant, the similar pattern of behavior is helpful when dealing with child patients. Anecdotally, clinicians report that children get anxious when contemplating the first restorative dental experience and then relax as they realize that it is not as stressful or uncomfortable as imagined. The results of this study validate this perception. Thus, when predicting how a child will react during the course of a restorative dental visit, age is the most important variable and not socio-economic status or source of referral.

A limitation of this study may relate to the fact that this was not a random sample of patients scored by independent observers, rather a consecutive set of appointed patients treated by the author who also rated patient behavior. This may have introduced some observer bias, although every effort was made to be consistent with patient ratings.

Given the limitations of this convenience sample, these results can only serve to make conclusions about child patients in this particular dental practice, but one can assume that it is likely not very different in other delivery sites. Further, it is possible that some observer bias may have occurred, as the scorer/observer was not masked towards the "payment type" of each patient when assigning the Sarnat scores. With these limitations in mind, other clinicians can use the findings as a guide for what they might expect in similar situations.

CONCLUSION

Pediatric dental patient behavior changes throughout the course of restorative dental visits. There is an increase in negative behavior, while teeth are being restored, which then decreases to levels below those observed at the start of the visit.

This observation is related to age more than socio-economic or referral status factors, confirming that as the child ages, the incidence of negative behavior decreases, but the pattern of change during the course of the restorative visit is the same regardless of age.

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