Abstract

The purpose of this study was to document whether there was a significant difference in the number and severity of generalized fears and dental fears between patients who did and patients who did not experience hand-over-mouth and/or restraint as children. Patient records in a dental school children's clinic and a private pediatric dental practice were examined to identify patients who had experienced hand-over-mouth and/or restraint. A set of verbal questions was designed, tested, and used to ascertain the differences between the HOM/restraint group and the comparison group. One hundred twenty-two subjects were interviewed, 61 who had experienced HOM/restraint and 61 who had not. When compared for generalized fears and specific dental fears, the two groups showed no statistically significant differences ($P = 0.86$ and $P = 0.36$ respectively). No statistically significant difference appeared between the two groups when asked how they felt about visiting the dental office ($P = 0.41$). When three different formats were used to question the subjects relative to their early dental memories, the two groups showed no statistical difference in negative or positive responses ($P = 0.38$, 0.75, and 0.25 respectively). More than two times as many HOM/restraint subjects as comparison subjects described negative experiences in a physician's office or hospital. This difference was statistically significant ($P < 0.01$). (Pediatr Dent: 15:13–19, 1993)

Dental attitudes and memories: a study of the effects of hand over mouth/restraint

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Introduction

Nonpharmacologic behavior management techniques in pediatric dentistry allow the performance of dental treatment for a child without the potential risk that drugs for behavior management carry. Included in this area of behavior management are techniques such as hand-over-mouth (HOM) and physical restraint.

HOM is a behavior modification technique described by many authors, including Craig.[1] The technique involves the operator placing his/her hand over the mouth of the disruptive child. Physical restraint includes physically holding the child in place or placing the child in a Papoose Board.®

Authors differ regarding the long-term effects of specific behavior management techniques such as HOM and restraint. Giangrego[2] suggests that early negative dental experiences can color the young patient's dental perception for life. Weinstein[3] stated that HOM/restraint may result in fear-related avoidance of dental treatment in the future. Schuman[4] stated that the use of HOM/restraint is inappropriate and may contribute to life long dental fears in patients. Hartmann[5] reported that behavior management techniques such as HOM are used most often on 3- to 4-year-old children and are safe and effective. Chambers[6] stated that the use of HOM can have a positive, long-term effect on the child/dentist relationship. Melamed[7] reported that females between the ages of 4 and 12 displayed more fears than males of the same ages. A study by Agras[8] reported that 22% of the female subjects as compared to 17% of the male subjects were fearful of dentists.

The purpose of this study was to document whether there was a significant difference in the number and severity of generalized fears and dental fears between patients who experienced hand-over-mouth/restraint as children (experimental) and those children (comparison) who did not.

The following questions were addressed:

- Do the experimental patients have a greater number of generalized and dental fears than the control patients
- Do they recall the HOM/restraint experience as traumatic
- Has their attitude toward dentistry been altered by this experience
- Does the time span since the use of HOM/restraint affect their recall
- Will our study show a difference between male and female subjects relative to the number of remembered fears
- Do fearful medical experiences translate into negative dental behavior? In short, do children who have experienced aversive behavior management techniques differ in any significant way when compared to the comparison group?

Methods

Patients were selected for the study after review of charts in a private pediatric dentistry practice and at a

school of dentistry children's clinic. Chart review also involved identifying patients who had no documented HOM and/or restraint charted and those who had this documentation, then placing them in two groups. Patients 10 years of age or older were selected for the study (Table 1). There was no minimum length of time since the HOM/restraint used as a criterion for selection. A minimum of 50 patients in each group was the established goal and 61 were interviewed for each group. The interview questionnaire was developed by two independent researchers and an individual with a doctorate in instructional development. A pilot study was conducted to identify problems with questions and interview techniques and to test for reliability between the two interviewers. The study was approved by the Indiana University Institutional Review Board (IRB). An informed consent form was signed by both the parent/guardian and the child. The children involved in the study had essentially negative past medical histories. There was no remuneration for participation in the study.

Over a four-month period subjects were interviewed by a pediatric dentist and a trained staff member prior to or following a normally scheduled appointment. The gender, current age, and the age of the child when the HOM/restraint occurred were recorded. The elapsed time between the HOM/restraint experience and the study was calculated.

The only established criterion for exclusion from the study was age; subjects had to be 10 years of age or older. It was felt that a child with a minimum age of 10 would be able to express experiences and feelings more thoroughly than a younger child. Subjects were given the opportunity to ask for clarification of questions as well as the opportunity to elaborate on answers. Subjects were asked to respond yes, sometimes, or no to the specific questions on general and dental fears. Children were allowed to answer the remaining questions in a manner they felt comfortable with; i.e. simply "yes" or "no" or a lengthy response (Fig 1).

All response data were keyed onto computer disks and

Table 1. Age and gender demographics

	Age at Time of Interview		
	Range	*Mean*	
	Years	*Years*	*Months*
Combined	10–29	13	0
HOM/restraint	10–29	12	8
Comparison	10–27	13	4

	Gender	
	Male	*Female*
Combined	50	72
HOM/restraint	25	36
Comparison	25	36

All of us have some fears. Which ones do you have?

Y	S	N	1. The dark
Y	S	N	2. Sudden, loud noises
Y	S	N	3. Being left alone
Y	S	N	4. Thunder and lightening
Y	S	N	5. Snakes
Y	S	N	6. Dogs and cats
Y	S	N	7. Places I haven't been to before
Y	S	N	8. Water
Y	S	N	9. Masks
Y	S	N	10. Scary movies
Y	S	N	Other: _____

Dental offices scare some people. What scares you?

Y	S	N	11. The dentist
Y	S	N	12. What the dentist will do to your teeth
Y	S	N	13. The dentist might scold you for not doing a good job
Y	S	N	14. Any other people in the dental office
Y	S	N	15. If so, why _____
Y	S	N	16. The needle
Y	S	N	17. The sound of the drill
Y	S	N	18. Losing a tooth
Y	S	N	19. Choking

Y = Yes S= Sometimes N = No

20. Has anything ever happened in the dental office that makes you especially afraid or not want to bo back? What?
21. Does anything stand out in your early memories regarding your dental experiences?
22. How old were you when this happened?
23. How often do you go to the dentist?
24. How do you feel about going to a dentist? A) Like to... B) It's OK... C) Don't like to... D) Hate it.
25. What can you remember from your early dental appointments? How would you describe it?
26. Has anything that happened in a doctor's office or hospital made you afraid? ❑ Yes ❑ No If so, What?
27. How old were you when this happened?

Subject Coding

__HOM/R
__Control
__Age
__Male
__Female
__Age when fearful incident took place

Fig 1. Attitudes toward dentistry based on early dental experiences questionnaire.

edited. The SAS9 software through the IBM mainframe computers at the Indiana University Computing Network was used for data analysis. Frequencies and percentages were calculated for responses to each interview item. Either the Chi-square test or the binomial test for nominal response data was used whenever appropriate to determine statistically significant differences between the behavior and comparison groups.

Results

When examined for actual age of occurrence of HOM/restraints, 30 of the 61 subjects had HOM/restraints before the age of 4; 12 between ages 5 and 6; seven between ages 7 and 8; seven between ages 9 and 10; and five at 11 years or older (Table 2). The age at the time of the HOM/restraint experience ranged from 2–13 years old. The mean age of the HOM/Restraint experience was 5 years 6 months (Table 2). The age at the time of the interview ranged from 10 to 29 years. The mean interview age for all subjects was 13 years 0 months (Table 1). The mean time elapsed since the HOM/Restraint experience was 8 years, 7 months for females and 6 years, 8 months for males (Table 2). The time since the HOM/restraint event ranged from at least 2 years to more than 15 years (as taken from patient records, Table 3). The average length of time since the HOM/restraint occurrence was nine years for the private practice subjects and five years for the dental school subjects. The average for both groups was seven years, four months.

The subjects were asked to answer *yes*, *sometimes*, or *no* to questions concerning generalized and dental fears. The first series of questions was designed to determine any differences in generalized fears between the HOM/restraint and the comparison group. No statistically significant difference (P= 0.86) was found between the HOM/restraint and comparison subjects when the chi-square analysis was used to determine fear of the dark, loud noises, being left alone, thunder or lightning, snakes, dogs, cats, unknown places, water, masks, and scary movies (Table 3a).

Subjects then were asked if they were afraid of the following: what the dentist would do to their teeth, being scolded by the dentist, the needle, the drill, losing a tooth, or choking in the chair. Whether the fear responses were analyzed independently or together, we found no statistically significant difference (P = 0.36) between the two groups when tested by chi-square (Table 3b).

When asked if "anything had ever happened in the dental office that made them especially afraid or not want to go back," the chi-square test results again showed no statistically significant difference between the HOM/restraint and the comparison groups (P = 0.38). In fact, negative experience responses were given by 34% (21 out of 61) of the HOM/restraint group as compared to 36% (22 out of 61) for the comparison group. Using different phrasing to elicit additional responses, the subjects were asked a second and a third time to describe any early dental experiences, positive or negative, that stood out in their memories. Again, the test for Chi-square showed no statistical difference between the HOM/restraint and the comparison groups (P = 0.75 and 0.25 respectively).

Although each subject was given three opportunities to report and describe past dental experiences, only 1 of 61 subjects described "being held down." Subjects identifying early dental experiences (positive or negative) were asked if these experiences affected how they felt about dental visits. The majority of respondents, 72% of the HOM/restraint and 77% of the comparison group, said the early memories did not affect how they felt about visiting the dentist. Chi-square analysis showed no statistical significance between the two groups (P = 0.69).

Subjects were asked how they felt about going to the dentist; did they like to go to the dentist; was it okay; did they not like to go; or did they hate to visit the dentist. Eighty-four per cent of the HOM/restraint group and 88% of the comparison group gave positive responses. Negative responses were given by 16% of the HOM/restraint group compared to 12% of the comparison group. The chi-square statistic again showed no significant difference between the two groups (P= 0.41). Gender and age were further analyzed for differences in negative response to the three different phrasings used during the interview to facilitate recall of negative memories. When the three phrasings were analyzed separately, gender and age groups did not show significant differences (P= 0.16, 0.65, and 0.15 respectively), probably due to the small cell sizes from finer divisions into gender and age groups. When the negative responses to the three phrasings were combined (Table 4), results were significant at P < 0.025. The limitations of chi-square by combining responses, however, should be recognized. In general, over the separate and combined phrasings, females reported more negative memories (42) than males (22), and more negative memories the further away in time from the experience. The males showed an opposite trend in eliciting fewer negative responses with time. Thus, fe-

Table 2. HOM/restraint: age at time of and elapsed time between interview and HOM/restraint experience

Age at Time of HOM/Restraint Experience	
< 4 years	30
5–6	12
7–8	7
9–10	7
> 11 years	5
Mean	5 years 6 months
Range	2–13 years

Elapsed Time Between HOM/Restraint and Interview		
< 3 years	6	
4–6	15	
7–9	19	
10–12	9	
> 13 years	12	
	Male	*Female*
Mean	6 yrs. 8 mos.	8 yrs. 7 mos.
Range	1–15 years	1–23 years

males had more memories, they remembered longer, and made more negative comments (Table 4).

Subjects were then asked if they could recall fearful experiences in a physician's office or in a hospital. Forty-six per cent (28 of 61) of the HOM/restraint subjects and 21% (13 of 61) of the comparison group responded "yes." More than twice as many behavior as comparison subjects reported "negative" health care experiences outside the dental office. Again, females reported more negative experiences than males whether they were in the HOM/restraint or the comparison group (Fig 5). The binomial test showed this difference to be significant ($P < 0.01$). The specific traumatic experience in a physician's office or hospital could be described by 27 of the 28 HOM/restraint subjects and by 12 of the 13 comparison subjects. The binomial test again showed this difference to be statistically significant ($P < 0.01$).

Table 3. Generalized and dental fears

	Comparison			*HOM/Restraint*		
	Y	*S*	*N*	*Y*	*S*	*N*
Table 3a. Generalized fears*						
1. The dark	2	12	47	2	11	48
2. Sudden loud noises	16	29	16	9	26	26
3. Being left alone	13	17	31	12	17	32
4. Thunder and lightning	4	16	41	4	12	45
5. Snakes	20	10	31	27	13	21
6. Dogs and cats	1	12	48	5	9	47
7. Places haven't been to before	9	28	24	8	17	36
8. Water	3	3	55	4	2	55
9. Masks	2	9	50	3	5	53
10. Scary movies	13	20	28	11	22	28
Table 3b. Dental fears†						
11. The dentist	3	8	50	2	5	54
12. What the dentist will do to your teeth	11	23	27	8	18	35
13. The dentist might scold you for not doing a good job	3	5	53	6	11	44
14. Other people in the dental office	1	3	57	8	2	51
15. The needle	23	12	26	33	7	21
16. The sound of the drill	13	11	37	17	9	35
17. Losing a tooth	15	8	38	15	1	45
18. Choking	15	10	36	17	10	34

* Responses to questions about generalized fears; † Responses to questions about dental fears.
Y = Yes, S = Sometimes, N = No.

Discussion

While some authors believe the use of HOM/restraint does not leave long-lasting fears, others suggest it produces dental phobias. According to Rovee-Collier[10] one definition of a remembered event is one that has an impact on later behavior. Does the subject act differently because of the event? Analysis of the data in this study shows that early HOM/restraint experience had no detectable impact on later dental behavior.

Do children who have had negative dental experiences have more dental fears as well as a greater number of generalized fears? This study does not show a statistically significant difference between the HOM/restraint group and the comparison group to generalized fears nor between the two groups in terms of specific dental fears.

While no difference appears between the two groups in generalized or dental fears, differences could appear in attitudes and/or behavior. Do children's dental experiences have an effect on their attitudes later in life? Specifically, does a novel episodic and "traumatic" dental experience alter future behavior and attitudes toward dentistry? The answer in this study appears to be "no."

Our study showed that early dental experiences did not affect attitude or alter future behavior of those children who had negative experiences. However, Melamed[7] believes that early experience is an important component in the development of dental fears and anxiety. Other findings contradict these points of view. Many researchers have shown that two parallel phenomena occur: 1) adults recall few — if any — specific events from early life, and 2) preschoolers unsuccessfully recall past events, even from the previous day.[11-15]

Table 4. *Reported negative experiences by age and gender

	<3 years	*4–6 years*	*7–9 years*	*10–12 years*	*> 13 years*	*Total*
Male	8	1	3	6	4	22
Female	4	6	12	7	13	42

* Combined responses from three different questions used to elicit memories of negative dental experiences.

Table 5. Reported fearful hospital or medical experience

	HOM/Restraint	*Comparison*
Combined	46 of 61	13 of 61
Male	15 of 25	5 of 25
Female	31 of 36	8 of 36

In Winograd's[14] study on "flash-back" memories, those singular events that one would expect to remain in a child's memory could not be recalled. He states that few if any memories before the age of 4 are retrievable. In our study, when asked three different times whether anything stood out in their early memories about the dental experience, again, there was no statistically significant difference between the two groups.

Wetzler,[15] Pillemer,[16] and Piaget[17] stated that event-recall decreases as a function of time. The average time elapsed since the traumatic event in our study was 7.4 years. Wetzler's study also indicated that forgetting is accelerated for events occurring before five years of age. This "accelerated forgetting" is often referred to as infantile amnesia, a phenomenon that has long been studied. In this view, Bower[13] states that as infants mature their brains gradually change state so that early memories become inaccessible in the more mature state. This theory would explain why few people can recall experiences from their first four years of life.

In a review of the literature, Pillemer,[16] gives Freud credit for the first explanation of childhood amnesia. Freud hypothesized that amnesia occurs up to the 6th to 8th year of life because young children do not create fully formed narrative memories. Early experiences are not recalled due to an immature memory system. Piaget[17] stated, "There are no memories of early childhood for the reason that at that state, there was no evocative mechanism capable of organizing them." The subjects in our study demonstrated no significant memory of early events and, thus, substantiate the childhood amnesia theory.

Bower[13] and Fivush[18] believe that, in order to facilitate recall, one must "cue" the memory during the interview by recreating the atmosphere of the original event. All of our interviews were conducted in a dental setting, and we attempted to elicit early memories by asking each subject three times about their earliest dental memories. However, we did not try to cue their "traumatic" dental event by mentioning any specific HOM/restraint experience.

Kihlstrom's[19] study of early memory also demonstrated that few subjects could recall events before age 4, and that females appeared to remember earlier events slightly better than males. In our study females reported more negative experiences.

In Goodman's[20] study, 3- to 7-year-old children were questioned about their recall of a potentially stressful blood-drawing experience. Their recall was no different than the comparison group. Thus, in that study, stress or lack of it did not appear to produce any significant difference in what was recalled. In Pillemer's[16] study, young children could not describe a recent fire alarm drill, suggesting that memory content is perhaps influenced by the child's understanding of the to-be-remembered episode. Do preschoolers fail to recall the HOM/restraint experience because they don't understand it? Is it forgotten because it is out of their daily routine and usually not repeated? Does the 3-year-old child not recall the HOM/restraint experience because the causal sequence of events is so unfamiliar and complex that they cannot be understood by the immature brain? Both Fivush[21] and Pillemer[16] state that children have more difficulty sequencing unfamiliar rather than familiar events. Since children have no existing script to organize recall, they locate themselves at the end of the "story" omitting information about prior events. For example, they best remember and describe the playground at the end of the fire drill instead of the fire drill itself, and similarly, as reported to us, the toy at the end of the dental appointment instead of the dental procedure itself.

Neisser[11, 12] offers the suggestion that there are socially induced changes in memory. That is, as children move further away in time from a particular event which is not repeated, early memories become less likely to be recalled. Rovee-Collier[10] studied the phenomenon of infant memory reactivation, specifically asking whether or not an early memory can be sustained for a lifetime. The answer was both yes and no. Yes, if each reminder of the original event presents itself in the same context as the original episode. For our study, this would mean that a HOM/restraint episode would have to be repeated at subsequent appointments to sustain that memory. The answer would be "no" if, at subsequent appointments, the memory of HOM/restraint is modified to incorporate new information. For example, when HOM/restraint is not required at subsequent appointments, it is unlikely to be remembered by the young child. Most pediatric dentists have reported that difficult behavior management appointments are generally followed by good behavior appointments. In fact, Hartmann[5] reported that 89% of his subjects received HOM only at a single appointment.

Thus, over successive memory retrievals, the contents of the memory gradually change and become reorganized with newer attributes becoming more accessible than the older ones. Old memories may be recoded or may incorporate conflicting information, or completely new memories may be formed. Researchers studying this phenomenon also have suggested that remembering infant and early childhood memories and experiences is difficult for another good reason. The probability of encountering identical portions of early experiences, real or perceived, diminishes substantially as time passes, as the environment changes and as growth occurs. This may well be the reason why no significant difference between the two groups was found even though the negative responses increased the third time we asked the subjects to describe anything

that stood out in their early dental memories. When given three chances to describe the traumatic event as recorded in their patient records, only 1 of 61 actually reported being "held down."

The final question in our study asked subjects if anything had ever happened in a physician's office or hospital to make them afraid. Forty-six per cent of the HOM/restraint group reported traumatic experiences compared to only 21% of the comparison group. Twenty-seven of 28 HOM/restraint subjects described the specific experience compared to 12 of 13 in the comparison group. The question remains, why do they seem to remember the negative medical experience but not the traumatic dental episode? While medical trauma might have occurred at an older age, thus facilitating recall, we were not able to ascertain this fact from our study. The relationship between past medical and hospital experiences and the dental experience should be studied further.

Perhaps a follow-up study should also be done with more probing questions. It is possible to design a study that begins by asking generalized questions about past dental experiences and ends by asking about specific HOM/restraint experiences. One could argue that the question is not whether we can make the subjects remember, but do they remember? And in either case, does HOM/restraint affect their attitude or behavior today? Our study appears to suggest that, when used properly, HOM/restraint does not affect dental attitudes or behaviors.

On the basis of this study, children do not remember nor do they seem to be affected by the early HOM/restraint experience. The practitioner should feel comfortable using this behavior modification technique in an appropriate way and with parental consent.

Conclusions

In this sample of HOM/restraint and comparison patients:

1. When compared for *generalized fears*, the two groups showed no statistically significant difference
2. When compared for specific *dental fears* the two groups showed no statistically significant difference
3. There was no statistically significant difference between the two groups when asked how they felt about visiting the dental office
4. When three different formats were used to question the subjects relative to their early dental memories, the two groups showed no statistically significant difference in the negative or positive responses
5. There were more than two times as many HOM/restraint as comparison subjects who described negative experiences in a hospital or physician's office. This difference was statistically significant.

On the basis of this study, children do not remember nor do they seem to be affected by the early HOM/restraint experience. The practitioner should feel comfortable using this behavior modification technique in an appropriate way and with parental consent.

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