

Occlusal Relations in Children Born and Reared in an Optimally Fluoridated Community

III. Social-Psychological Findings

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A clinical and social-psychological study was done in Chattanooga, Tennessee in January 1967 to describe the occlusal relations of children born and reared in an optimally fluoridated community and to determine if there were differences in the occlusal relations of Caucasian and Negro children in such a community. This paper presents the children's perception of various occlusal conditions.

The specific objective of this paper is to explore whether or not there exists among children a pattern of preference for various facial appearances associated with different types of occlusion. Such a pattern may serve as a subjective frame of reference for the dental patient and thereby may influence his or her motivation to seek treatment or to cooperate with treatment. Knowing these preferences may be an aid to administrators of dental public health clinical programs in determining who should receive orthodontic treatment. Although dentists may determine clinical standards for proper or functional occlusion, it is frequently a child's or his parents' awareness of an occlusal disharmony which results in the child being brought for orthodontic consultation. The subjective standards that

are relevant to the patient may or may not be coincident with clinical norms.¹

Previous research suggests that, among children, the perception of facial disfigurement may be extremely relevant to social relationships, even more so than are perceptions of other physical handicaps.² Among adults, there is evidence that personal appearance is important in making friends, seeking public offices, getting a job, and achieving companionship with the opposite sex.³ When adults were asked in a national interview survey specifically about straightening the crooked teeth of a child, a large majority thought corrective action should be taken because of the child's sensitivity, embarrassment, or self-consciousness. There seemed to be a greater concern about appearance in social relations than about health or economic reasons for orthodontic care. Because it is primarily the mother who seeks orthodontic treatment for her child and who shares in the preparation of that child for social relationships in adult life, information on adult attitudes may provide significant clues as to how the child would cooperate with treatment.⁴

The child acquires through others a frame of reference for judging his own and the appearance of others. The research intention, therefore, was to see if there is a frame of reference for occlusal conditions. In simple terms, the question asked was, "Do children perceive variations in facial appearance as-

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sociated with different occlusal relations?" If they do, then how do children associate such differences with their own appearance?

HYPOTHESES

Because little similar research related to occlusal relations has been done, there was no strong basis upon which to predict preference patterns for various facial appearances related to occlusion. Social-psychological literature dealing with physical stigma and with nonverbal cues in face-to-face interaction suggested that there are social and cultural pressures to conform to the physical appearance of the dominant culture.⁵ By eliminating visible physical differences which set an individual apart from others, a person may be acting out processes of assimilation, stereotyping, social mobility, identification and conformity.⁶

Thus, it might be expected that the subjects of this study, regardless of race, sex, age or intelligence, would prefer the looks of a person who has, by clinical definitions, an ideal occlusion and would least prefer the looks of someone with the most severely disfiguring condition. Such a pattern of preference for appearance would be expected to resemble self-perception. That is to say, children who perceive themselves as having a particular occlusal condition would tend to rank that condition higher on the preference hierarchy than those who do not perceive themselves with that condition, in an effort to reduce the degree of stigma associated with the self.

METHODOLOGY

The evaluation of perception was done in conjunction with an ongoing study in Chattanooga, Tennessee to evaluate topical applications of stannous fluoride on teeth of children born and reared in an optimally fluoridated

community.⁷ At the time of the examinations, January 1967, the City of Chattanooga had been optimally controlling the fluoride of its water supply for more than fourteen years. The study population comprised all children participating in the topical fluoride study. Occlusal relations and social-psychological responses were obtained for 759 children, ages nine through fourteen, in grades four through seven. The composition of this population is presented in Table 1. The children were relatively even in their distribution by sex and race.

Most children were between ten and twelve years of age and in grades five, six and seven in school. Stanford-Binet intelligence scores, taken five months previous to the present study, resemble the shape of a normal distribution with not much variation between language and nonlanguage components.

After consultation with personnel of the U.S. Public Health Service, an artist was commissioned to execute a series of drawings which would be used as the experimental stimulus. Drawings were used because it was thought that standardized pictorial cues would overcome literacy or language barriers that might be encountered if it were necessary to explain to children what is meant by various orthodontic conditions. Two series (male and female) of nine halftone line drawings were made depicting heads of children of approximately the same age as those to be interviewed. The halftone line technique was adopted for the drawings in order to obviate the necessity of having to illustrate separately white and Negro children. There was an attempt to make everything about the heads, except for the oral area, identical. (There may be slight variations because each picture was individually drawn by the artist.) To hold constant the relationship between the sex of the subject and

Table 1. Profile of 759 Chattanooga, Tennessee children given a social-psychological and occlusal relations assessment

<u>Sex</u>	<u>Age at Last Birthday</u>	<u>Grade at Examination</u>	
Female ----- 52%	9 years ----- <01%	4 ----- 01%	
Male ----- 48	10 years ----- 28	5 ----- 31	
100%	11 years ----- 32	6 ----- 33	
	12 years ----- 34	7 ----- 33	
	13 years ----- 05	Other (special -- 02	
	14 years ----- <01	students usually 100%	
	100%	in remedial pro-	
		grams)	
<u>Race</u>			
Negro ----- 52%			
White ----- 48			
100%			
<u>Stanford-Benet Intelligence Scores</u>	<u>Language</u>	<u>Non-Language</u>	<u>Average</u>
Mentally deficient ----- (70) ----- 03%	----- 07%	----- 06%	
Borderline ----- (70-79) ----- 11	----- 12	----- 13	
Low Average ----- (80-89) ----- 22	----- 16	----- 19	
Average ----- (90-109) ----- 34	----- 35	----- 34	
High Average ----- (110-119) ----- 14	----- 13	----- 13	
Superior ----- (120+) ----- 09	----- 10	----- 08	
Unknown ----- ----- 07	----- 07	----- 07	
	100%	100%	100%

that of the child in the illustration, a series of male and female drawings were prepared so that each subject could be shown pictures of children of his (or her) own sex. (Both male and female heads were drawn alike except for the hair to differentiate sex.)

In order to obtain preferential rank ordering, the untitled 11" by 14½" pictures were placed in the following random order from left to right in front of each subject:

1. Excess spacing
2. Crowded teeth
3. Ideal occlusion
4. Maxillary protrusion
5. Mandibular protrusion
6. Repaired cleft lip
7. Anterior openbite
8. Midline deviation
9. Bimaxillary protrusion

Identification numbers for the benefit

of the recording interviewer were placed inconspicuously behind the picture.

Each child was asked to look very closely at all the pictures (Figs. 1 and 2). After sufficient time for his perusal of the drawings had elapsed (thirty seconds were found adequate without prodding from the interviewer), the child was asked, "Tell me which boy (or girl) do you think looks the best?" After the subject pointed to a drawing, it was turned face down. Then, the interviewer asked, "Which boy (or girl) do you think looks next best?" A second drawing was selected and turned face down. This procedure was continued until a complete rank order was obtained. Then, all pictures were turned face-up again and the child was asked to choose the one which looked most like himself (or herself), so that a measure of self-perception could be obtained. The average time of the total



1. EXCESS SPACING



2. CROWDED TEETH



3. IDEAL OCCLUSION



4. MAXILLARY PROTRUSION



5. MANDIBULAR PROTRUSION



6. REPAIRED CLEFT LIP



7. ANTERIOR OPEN BITE



8. MIDLINE DEVIATION



9. BIMAXILLARY PROTRUSION

Fig. 1



1. EXCESS SPACING



2. CROWDED TEETH



3. IDEAL OCCLUSION



4. MAXILLARY PROTRUSION



5. MANDIBULAR PROTRUSION



6. REPAIRED CLEFT LIP



7. ANTERIOR OPEN BITE



8. MIDLINE DEVIATION



9. BIMAXILLARY PROTRUSION

Fig. 2

interview was three minutes which enabled the interviewers to keep pace with dentists who were examining the same children for dental caries.

The examination for occlusal relations took place on another day within the same eight-day period so that the children would not realize explicitly that the interviewers were concerned with their reaction to occlusion. The dentists measuring occlusion were careful not to indicate to any child that a malocclusion was detected. Five subjects were eliminated from the study because they were wearing orthodontic appliances.

RESULTS

Hypothesis No. 1: Preferential rank order of pictures exists and is similar for all parameters of the population.

As Table 2 indicates there was considerable agreement on the rank order of pictures according to each parameter of the population. For each depiction of occlusion, median rank positions were computed for the total population and its subgroups. The median average for grouped data was used because of the skewed nature of the distribution. Rank order position from one to nine was assigned on the basis of computed median.

Accordingly, the first four drawings listed in Table 2, i.e., ideal occlusion, open bite, mandibular protrusion, and midline deviation, cluster toward the top of the continuum. Maxillary protrusion, excess spacing, bimaxillary protrusion and crowding cluster in the middle and cleft lip stands by itself at the bottom of the rank order. Preferential rank order is relatively consistent regardless of differences in race, sex, chronological age or intelligence groupings; correlation coefficients for the various subgroups range from 0.87 to 0.98.

Table 2 shows that all groups, except

for the mentally retarded (I.Q. below 70), ranked ideal occlusion as looking best. Negroes ranked open bite equally as desirable looking as ideal occlusion. The borderline intelligence groups (I.Q. of 70 to 79) gave open bite a similar high rank position. Open bite is a condition which may be difficult for a layman to distinguish from normal because a person with open bite may appear to have his mouth slightly open, a facial posture that is fairly common in persons with an ideal occlusion as well. In fact, the drawing of the child with a normal occlusion was shown with the mouth slightly open in a smile.

The protruding lower jaw was thought by the investigators to give a masculine appearance. Therefore, they anticipated that males would find it better looking than would females. Contrary to expectation, the males ranked this picture lower than did the females. Those with average intelligence scores of less than seventy ranked mandibular protrusion higher than did any other subgroup.

Females ranked maxillary protrusion two steps higher than did males. Perhaps there is something girls consider cute about protruding upper front teeth. Ten year old children, many of whom have not yet erupted all their permanent teeth and who may have missing primary teeth, ranked excess spacing higher than did older children. Bimaxillary protrusion, which was thought to be more common among Negroes than among whites, was ranked higher by the whites. There is a three-step difference by sex in ranking bimaxillary protrusion; males ranked this condition in fifth position whereas females placed it in eighth position. Crowding was almost always placed near the bottom of the ranking. The four conditions in the middle ranks demonstrate more deviation from the median; most of the deviation may be a

Table 2. Preferential rank order of drawings by race, sex, age and average intelligence scores

DRAWINGS	ALL CHILDREN		RACE		SEX		AGE			AVERAGE INTELLIGENCE SCORES						
	Median Rank	Quartile Deviation	N	W	F	M	10	11	12	-70	70-79	80-89	90-109	110-119	120+	Un-known
1. Ideal occlusion	2.0	0.9	1.5	1	1	1	1	1	1	3	1.5	1	1	1	1	1
2. Anterior open bite	2.2	0.8	1.5	2	2	2	2	2	2	2	1.5	2	2	2	2	2
3. Mandibular protrusion	2.9	1.0	3	3	3	4	3	3	3	1	3	3	3	3	3	3
4. Midline deviation	3.7	0.8	4	4	4	3	4	4	4	4	4	4	4	4	4	4
5. Maxillary protrusion	6.1	1.0	5	5	5	7	6	5	5	5	6	5	5	5	7	6
6. Excess spacing	6.4	1.2	6	7	6	6	5	7	7	7	5	6	7	6	5.5	5
7. Bimaxillary protrusion	6.6	1.4	7	6	8	5	7	6	6	6	7	7	6	7.5	5.5	7
8. Crowding	7.0	1.0	8	8	7	8	8	8	8	8	8	8	8	7.5	8	8
9. Repaired cleft lip	8.6	0.7	9	9	9	9	9	9	9	9	9	9	9	9	9	9

Correlation between sub-groups for each parameter

$\rho^{*} = .94$

$\rho^{*} = .87$

$W^{**} = .98$

$W^{**} = .95$

*=Spearman rank-order correlation coefficient (RHO)

**=Kendall's coefficient of concordance (W)

result of their placement on the list, that is, items arranged in the middle of a list evoke more arbitrary placement than those placed at either end. Cleft lip was ranked consistently in ninth place.

Hypothesis No. 2: Children whose self-image resembles a particular occlusal condition tend to rank that condition higher on the preference hierarchy than those who do not perceive themselves with that condition.

Table 3 shows that for the total population the first four pictures and the last were selected in the same order for self-image as they were ranked for preferential responses. The largest proportion of children said that they themselves had ideal occlusion, which also had received the highest rank order position as looking best in the drawings.

Ideal occlusion was chosen as a self-image by more females than males, more whites than Negroes, more twelve year-old than ten or eleven year-old children, and the more intelligent than the less intelligent. It appears that if ideal occlusion was not chosen, then there was tendency for the children to choose open bite as their self-image; as already stated, open bite bore close resemblance in the drawing and in natural posture to normal or ideal occlusion.

Mandibular protrusion was chosen as a self-image by more females than males, more Negroes than whites, the lesser intelligent more than those of higher intelligence. As for midline deviation, more males, more whites, and slightly more children of higher intelligence chose this condition than did their contrasting subgroups. In the case of excess spacing, this self-image was chosen by more males than females, more younger children than older, more of lower intelligence than of higher intelligence.

For the remainder of pictures, the absolute number of responses was small; therefore, differences among the percentages are more difficult to assess.

Examining Table 4 along the diagonal to see the correlation between self-image and the response pattern for picture preferences, it can be observed that, in all instances, children who selected any given self-image ranked that self-image at a level either equal to or higher than did the entire population.

DISCUSSION

Results indicate that for this study population there was a generally uniform hierarchy of preferences for pictures of occlusal relations, regardless of race, sex, age and intelligence. Children who perceived themselves as having a particular occlusal condition tended to rank that condition either as high or a little higher on the preference hierarchy compared with those who did not perceive themselves with that condition.

A forthcoming paper will compare data on perception of occlusion matched with the clinical findings of occlusal relations. By combining a subjective frame of reference with objective occlusal measurements, it is possible that a feasible public health tool or index can be developed for screening children for orthodontic treatment programs. However, a workable index must await considerable additional research. The methods used in this study should be replicated on other representative cross sections of children. The reliability of the pictures needs to be determined, possibly through accumulation of interview data. The validity of the pictures also needs to be ascertained possibly by having them reviewed by panels of experts.⁸ Because attitudes of the mother seem to be related to obtaining orthodontic treatment for the child, parental attitudes, particularly

Table 3. Percentage distribution of children choosing a given occlusal condition as self-image by race, sex, age and average intelligence scores

PREFERENTIAL RANK ORDER OF DRAWINGS	SELF-IMAGE PERCENT DISTRIBUTIONS														
	All Children	Race		Sex		Age			Average Intelligence Scores						
		N	W	F	M	10	11	12	-70	70-79	80-89	90-109	110-119	120+	Un- known
1. Ideal occlusion	31	25	37	33	28	31	23	37	24	26	22	35	38	45	20
2. Anterior open bite	22	28	16	24	20	18	25	22	22	23	25	22	18	14	28
3. Mandibular protrusion	17	19	14	22	11	17	20	14	15	21	21	18	13	8	8
4. Midline deviation	9	8	11	6	13	10	9	10	9	7	9	9	8	17	12
5. Maxillary protrusion	6	5	7	6	5	6	6	5	9	4	7	5	8	3	6
6. Excess spacing	7	8	7	3	12	12	8	4	13	10	8	4	6	5	14
7. Bimaxillary protrusion	2	2	2	2	3	2	3	2	7	4	-	1	3	5	2
8. Crowding	5	4	6	3	7	4	4	6	2	4	7	5	4	2	6
9. Repaired cleft lip	1	1	1	1	2	0	2	1	-	-	1	1	1	2	4
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Percents based on: N=	759	398	361	392	367	216	244	258	46	98	148	255	98	64	50

-- Less than 1 percent

Table 4. Preferential rank order of drawings according to self-image choices

PREFERENTIAL RANK ORDER OF DRAWINGS	SELF-IMAGE CHOICES								
	Ideal Occlusion	Anterior Open bite	Mandibular Protrusion	Midline Deviation	Maxillary Protrusion	Excess Spacing	Bimaxillary Protrusion	Crowding	Repaired Cleft lip
1. Ideal occlusion	1	2	1	2	1	2	2	1	2
2. Anterior open bite	2	1	3	1	3	1	1	2	1
3. Mandibular protrusion	3	3	2	4	2	4	3	3	3.5
4. Midline deviation	4	4	4	3	4	3	4	4	3.5
5. Maxillary protrusion	5	5	5	7	5	8	8	5	6
6. Excess spacing	6	6	7	5	8	5	7	6	8
7. Bimaxillary protrusion	7	7	6	6	6	6	5	7	5
8. Crowding	8	8	8	8	7	7	6	8	7
9. Repaired cleft lip	9	9	9	9	9	9	9	9	9

W* = .91

* = Kendall's coefficient of concordance (W)

those of mothers, need to be related to attitudes of their children.⁹

The Eastman Esthetic Index, developed by Howitt, Stricker and Henderson, comes closest to facing the realistic goal of combining both subjective and objective measurements for occlusal relations.¹⁰ Four multiple-choice questions were posed to high school students: How satisfied are you with the general appearance of your teeth? How satisfied are you with the appearance of your smile? Compared to your classmates how do you think your teeth look? How would you consider your teeth as compared to your entire face? Their findings indicated that "Interestingly, approximately one third of those who were not satisfied with their teeth objectively had reasonably esthetic dentition. . . . This would indicate that there is a significant group of children who are dissatisfied with their teeth who would not necessarily benefit from orthodontic treatment . . . since dissatisfaction seems to stem from other than dental problems."

The need to qualify social-psychological aspects of satisfaction or dissatisfaction with characteristics of specific occlusal conditions is paramount in the development of a viable public health orthodontic index. This paper is a small beginning toward that end.

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REFERENCES

1. Fisk, R. O.: Physiological and socio-psychological significance of malocclusion. *Canad. Dent. A.J.*, 29:635-643, Oct. 1963.
2. Richardson, S A., Goodman, N., Has-torf, A. H., and Dornbusch, S. M.: Cultural uniformity in reaction to physical disabilities. *Amer. Sociol. Rev.*, 26:241-247, Apr. 1961.
3. Linn, E. L.: Social meanings of dental appearance. *J. Health and Human Behav.*, 7:289-295, Winter 1966.
4. Baldwin, D. C., Jr., and Barnes, M. L.: Psychosocial factors motivating orthodontic treatment. Paper read before the annual meeting of the International Association for Dental Research, Toronto, Canada, July 1965; and Baldwin, D. C., Jr., Barnes, M. L., Baldwin, M. A., and Papajohn, J. T.: Social and cultural variables in the decision for orthodontic treatment. Paper read at the annual meeting of the International Association for Dental Research, Washington, D. C., March 1967.
5. Goffman, E.: *Stigma: Notes on the management of spoiled identity*. New Jersey, Prentice-Hall, Inc., 1963.
6. Macgregor, F. L.: Social and cultural components in the motivation of persons seeking plastic surgery of the nose. *J. Health and Social Behav.*, 8:125-135, June 1967.
7. Horowitz, H. S., and Heifetz, S. B.: Evaluation of topical applications of stannous fluoride to teeth of children born and reared in a fluoridated community: Interim report. *J. Dent. Child.*, 34:290-295, July 1967.
8. For elaboration of methodological considerations, see: Secord, P. F., and Backman, C. W. Malocclusion and psychological factors, *J.A.D.A.*, 59:931-938, Nov. 1959; and Beier, E. G., Izard, C. E., Smock, C. D., and Tougas, R. R. Response to the human face as a stimulus: A re-evaluation. *J. Consult. Psychol.*, 21:165-170, Apr. 1957.
9. Baldwin, D. C., Jr., and Barnes, M. L.: op. cit.
10. Howitt, J. W., Stricker, G., and Henderson, R.: Eastman esthetic index. *N.Y. State Dent. J.*, 33:215-220, Apr. 1967.