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MOUTH HYGIENE AND BACKWARD CHILDREN

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Substance of an Address
Delivered Before the
Academy of Science and
Art, Pittsburgh, Penn'a.
February the 14th, 1913

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Reprint from "Oral Hygiene," November Issue, 1913

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My interest in the oral hygiene movement springs largely from my interest in race melioration and conservation. There are two fundamental methods by means of which we shall be able to conserve the best interests of the race:

(1) By improving breeding, or eugenical mating. This is the more important of the two classes of measures, but it is likewise the more difficult to put into practical operation. We cannot escape the fact that there is a very wide chasm between theoretical and practical eugenics.

(2) By improved bringing up, or the efficient control of euthenical factors. Among these factors I include not only improved methods of child training and education, but also improved hygienic and sanitary nurture and corrective and remedial care. While the problem is essentially one of prevention rather than one of cure, we cannot blind ourselves to the existence of defects already established but must proceed to correct or remove these.

Now, there is a general conviction that the application of the above two classes of preventives and corrective measures will improve the bi-

ological capital of the race, and thus make race melioration. Among other things, there are those who believe that by the removal of the physical handicaps which afflict our children we shall be able to elevate not only their health standard, but also their mental standard. This is a question in which I have taken considerable interest for a number of years. I have been particularly interested in obtaining demonstrated or demonstrable facts which would either prove or disprove the claim that the removal of physical handicaps will increase the mental efficiency of school children; for, fundamentally, in a state of civilization we cannot hope to fashion a higher type of humanity without elevating the mental index of childhood—not, to be sure, at the expense of the body—for success in a state of civilized society depends more on strength of mental action than on force of muscular power.

In looking through the literature, however, I found little direct or incontrovertible evidence that the mentation of school children could be elevated by correcting physical defects (I am not

now speaking of diseases). To this general statement there is one conspicuous exception, namely: thyroid treatment in the case of cretins or persons suffering from thyroid insufficiency. To be sure, there were numerous observations on record of the marvelous improvement made in individual instances from proper nose, throat, eye and ear treatment, particularly to the improvement resulting from the removal of adenoids. But this was not what I wanted. Instead of observation and opinion, I wanted *experimental evidence of a quantitative nature*. But there was no such evidence available; no attempt had been made to measure by definite controlled objective tests the degree of mental improvement resulting from the correction of various kinds of physical handicaps. The nearest approach to such an investigation was the gross statistical study made by the Russell Sage Foundation of the retarding force of various physical defects. The Foundation found that the normal child (assuredly the child without physical defects, though very few such children exist) required a given amount of time to finish a certain number of the elementary grades. It then ascertained the amount of time required to finish those same grades by various types of physically defective children, and concluded that the average physically defective child required 8.8 per cent. more

time to finish the grades in question (the loss for children having teeth defects amounted to 5.9 per cent). These gross statistical studies, while, to be sure, they have a considerable suggestiveness, do not possess very much scientific value because of the fact that it is impossible to determine precisely the nature of the defects which are being measured in these statistical surveys. They offer no control of conditions. Children suffering from one kind of defect very often simultaneously suffer from a number of other defects. The method is particularly defective because *it makes no attempt to measure the improvement which actually follows the correction of any kind of physical defect*.

Some such considerations as the above led me to undertake an experimental inquiry, by which I hoped to measure by controlled objective tests the influence of the removal of physical defects on the working capacity of school children. It seemed to me that the best point of attack for such an investigation was the diseased and unhygienic cavity of the mouth, for two reasons: first, because there is no disease of childhood which is so prevalent as dental caries; in fact this defect is so common that it has been appropriately called "the disease of the people;" second, because, in accordance with the statement accredited to Osler, "There is not any one single thing more important in the whole range of hygiene

than the hygiene of the mouth." Accordingly I suggested to the then chairman of the Oral Hygiene Committee of the National Dental Association that a series of psychological tests be carried out on a squad of school children suffering from very bad conditions of the mouth, with a view to arrive at a definite objective impersonal measurement of the orthophrenic effects which must be assumed to follow the application of various oral hygienic measures. It was arranged to put twenty-seven boys and girls in the Marion Elementary School of Cleveland, Ohio, through a thorough course in oral hygiene, which consisted not only in the carpentry of the teeth (that is, the filling of tooth cavities, extraction of decayed roots and polishing of teeth), but also in teaching children proper mouth sanitation and thorough mastication of food. A nurse was employed to train these children, both in the school and in the home, to properly brush their teeth, harden their gums and to masticate their food. In order to measure the mental improvement which might result from the application of this scheme of oral treatment, it was necessary to devise a series of psychological tests so arranged that they would correctly measure such improvement. It was, therefore, necessary to conduct a series of successive tests, all of which would be equal in difficulty, and a series of five such tests were constructed.

These tests included the capacity to memorize three place digits, the rapidity of writing free word associates opposite supplied antecedents (rapidity of thought), the rapidity of writing antonyms opposite a series of supplied key words, the ability to add one-place digits arranged in columns of ten figures, and the ability to draw a stroke through the A's that were distributed promiscuously in successive lines of capitals. These tests thus served to measure the influence of proper mouth treatment on the strength of memory, the power of spontaneous and controlled associations, the ability to add and the rapidity of perception. Each of these five tests was arranged in a series of six successive tests equal in difficulty. Two sittings were held before any treatment was given the children, and the remaining four sittings were conducted during the course of the treatment or after its conclusion. The averages of the scores in the two sittings before treatment thus gives the *normal* standard of performance for these children, and the difference between the average of these two sittings and the average of the last four, or the average of the last two, indicates the amount of improvement made by the children in the course of the experimental year, which extended from May, 1910, to May, 1911.

The complete description of this experiment may be found in the following papers: Ex-

perimental Oral Euthenics, Dental Cosmos, Philadelphia, April and May, 1912; Experimental Oral Orthogenics, The Journal of Philosophy, Psychology and Scientific Methods, New York, May 23, 1912; Aspects of Infant and Child Orthogenesis, Psychological Clinic, Philadelphia, November 15, 1912; Methods of Measuring the Orthophrenic Effects of the Correction of Physical Handicaps, Proceedings of the National Association for the Study and Care of Exceptional Children, Plainfield, New Jersey, 1912. The test blanks, with instructions for their administration, are now for sale by C. H. Stoelting Co., 121 N. Green St., Chicago. Here there is time merely to point out in the briefest manner the most general results.

The amount of average improvement in the various tests was as follows: In ability to memorize, 19 per cent.; in spontaneous association, 42 per cent.; in adding, 35 per cent.; in associating antonyms, 129 per cent.; and in the capacity to perceive, attend, and react, 60 per cent. The average improvement in all the tests thus amounts to about 57 per cent.—truly a very significant gain. Even if we concede that one-half this gain—and that is, I believe, a sufficiently liberal concession—is due to a number of extrinsic factors, such as familiarity, practice and increased maturity, the gain solely attributable to the

heightened mentation resulting from the physical improvement of the pupils would still be very considerable. There is corroborative evidence to show that there was a general improvement in the mental functioning of these pupils. This evidence is supplied by the examination of the pedagogical records of scholarship, attendance and deportment. Most of the members of this experimental squad were pedagogically retarded in their school work from one to four years, but during the experimental year only one pupil failed of promotion, while six did thirty-eight weeks of work in twenty-four weeks and one boy finished two years of work within the experimental year. During the preceding year many pupils were quite irregular in their attendance owing to toothache, bodily indispositions, irritability or distaste for school work, and five pupils were obliged to carry truancy cards; but during the experimental year the attendance was materially improved, the cases of truancy entirely disappeared, while certain boys considered formerly as incorrigible now established new records for deportment.

No phase of the modern child conservation movement merits deeper scientific study than the relation between the normal, physical, mental and pedagogical development of school children and a community plan of physical and mental orthogenesis. The results which we have arrived

at in this experiment by controlled objective quantity methods emphasizes anew the paramount importance of teaching the pupils in our schools proper dental prophylaxis and supplying free dental treatment in the schools to all certified indigent cases. It should be specially emphasized that owing to the enormous number of children suffering from diseased teeth, it is not sufficient merely to establish school dental clinics. There are not enough dentists in any community to treat the teeth of all the children who have oral defects. It is, therefore, imperatively necessary that the work of dental hygiene be so organized on a community basis that children may be systematically *taught to care for their teeth and sanitize their mouths* from the day that, as members of the schools, they become wards of the state or of the community.

Among the fruits which would accrue from the introduction of mouth hygiene instruction and the establishment of dental clinics in the schools may be mentioned the following:

1. *Value to the afflicted pupils themselves.* Dental hygiene is a means of ridding the suffering pupil from the exciting cause of pain, disease, mental stagnation, moral deviation and irregular school attendance. It is one of the effective means available for raising the child's actual efficiency a little nearer to its maximal potential. Dental

hygiene is a God-send to the individual child.

2. *Benefits the school system.* Dental hygiene is one of a number of effective means of combatting the evils of pedagogical retardation, repetition, elimination, non-attendance and delinquency. It is a practical means of increasing the efficiency of the school system.

3. *Financial value to the taxpayers.* The greater the return on the investment, the cheaper will be the cost of maintaining the schools; and, obviously, the more proficient the pupils are, the greater will be the returns on the investment. In terms of dollars and cents, the annual saving in any school system would amount to a very considerable sum. For example, let us assume that those pupils who suffer from the very worst mouth conditions would improve only 15 per cent. in working efficiency as a result of the application of a judicious system of mouth hygiene. This is a very conservative estimate; the improvement would probably be at least above 25 per cent. Now let us assume that at least 20 per cent. of the 65,000 pupils enrolled in the elementary schools of Pittsburgh suffer from very bad oral conditions, and that these pupils are in such impoverished circumstances financially that they would not obtain any dental treatment unless school clinics were established. The approximate cost of *instruction* for the elementary pupils

in the public schools of Pittsburgh amounts to \$30.00 per year, therefore if each of these 13,000 pupils gained 15 per cent. in working efficiency as a result of dental treatment there would accrue a saving of \$4.50 per year for each one of these pupils, or \$58,000.00 a year for these 13,000 cases. This estimate, however, probably fails to do full justice to the benefits to be derived, because it is an undoubted fact that a very large number of this group of children who suffer from very bad dental conditions would fail in their school work and thus have to be educated at least twice in the same grade. That would mean an additional cost of \$30.00 per year for every repeater. Dental treatment would save very many of these cases from failure to make their grade, and thus save the cost of repetition to the taxpayer.

4. *Benefits accruing to race conservation.* Dental hygiene will improve the mental and physical health of the individual child, and this, in time, will lay the basis not only for a more efficient citizenship,

but also for a more efficient *parenthood*; for by elevating the health index of children we shall not only increase the health, happiness and productive capacity of adults but also elevate the genescic or reproductive index of the race. The application of the best *euthenical* principles of race melioration will probably also produce the highest *eugenical* results. This argument is perhaps one of the strongest arguments for developing community plans of child orthogenesis. (Elsewhere I have indicated that there are two fundamental aspects to a program of race orthogenesis, namely: orthophrenics and orthosomatics. See Individual and Group Efficiency, Psychological Bulletin, Baltimore, Oct., 1912.) Our most sacred duty is to the race, to posterity. Most of what we have we owe to our ancestry and the best that we possess we should strive to bequeath to our posterity; and the most precious gift which we can bestow upon posterity is a normal health progeny and an uncontaminated heredity.