

L-11-1236
No. 61

THE RELATION OF PHYSICAL DEFECTS TO SCHOOL PROGRESS

LEONARD P. AYRES

ASSOCIATE DIRECTOR, DEPARTMENT OF CHILD HYGIENE, RUSSELL SAGE FOUNDATION

REPRINTED FROM

THE ELEVENTH ANNUAL REPORT OF THE CITY
SUPERINTENDENT OF SCHOOLS, NEW YORK CITY, 1909

DEPARTMENT OF CHILD HYGIENE
RUSSELL SAGE FOUNDATION
1 MADISON AVENUE, NEW YORK CITY

Q10
Printer
SEP 30 1911

Q1

LC4231
. A8

The Relation of Physical Defects to School Progress

In a study of retardation in the New York public schools conducted last year a careful tabulation was made of the records of the physical examinations of 7,608 children who had been examined by school physicians. When these records were tabulated the astonishing condition was brought to light that nearly 80 per cent of the children who were of normal age for their grades were found to have physical defects, while only about 75 per cent of the retarded children were defective.

Another noteworthy point was that the percentage of defective children in the lower grades was decidedly greater than in the upper grades. The discovery of these unlooked-for results led to further study of the figures. The data were retabulated by ages, and the results showed a very marked and consistent falling off of children having each sort of defect from the age of six up to the age of fifteen. Defective vision alone increases slowly but steadily with advancing age.

Moreover, these decreases were not due to the falling out or leaving school of children suffering from defects. This might be put forward as an explanation if we had to do with children above the age of compulsory attendance, or if the characteristic decrease did not take place until the age of fourteen or fifteen; but such is not the case. The children were of from six to fifteen years of age, and the marked increase began with the seven, eight, nine and ten year old children and continued steadily.

Were further data not available, it would certainly be difficult to explain the seeming anomaly that retarded children have fewer defects than do children of normal age; but the data showing the decrease of physical defects with increasing age are illuminating. It is evident that here age is the important factor. The importance of this on all investigations into the influence of physical defects on school progress is at once evident.

Whether the term "retarded" is used to express a condition or an explanation, it will always follow from the definition itself that retarded children will be older than their fellow pupils in the same grades. In all cases it will always be true that the "backward" pupils will be the older pupils. Now, the older pupils are found to have fewer defects. This is true whether they are behind their grades or well up in their studies. Therefore, it is not surprising that we find 80 per cent of all children of normal age have physical defects more or less serious, while 75 per cent of the retarded children are found to be defective. This does not mean that pupils with more physical defects are brighter mentally. It simply means that those who are above normal age are older, and that older pupils have fewer defects.

In order to ascertain what correlation may exist between physical defects and school progress, the records of the children have recently been retabulated, using as a basis age instead of grade, so that the results should not be vitiated by the heterogeneous age composition of the grades.

The children were arbitrarily divided into dull, normal and bright groups using, as a standard, age in grade. For instance, it was considered that the eleven year old child in the first grade may as a rule be safely classed as dull, whereas the ten year old child in the sixth or seventh grade may safely be considered bright. Using the age in grade criterion as a basis the records of the ten, eleven, twelve, thirteen and fourteen year old children were retabulated and assigned to the dull, normal and bright classes. Results are shown in the following table:

PER CENT OF DULL, NORMAL AND BRIGHT PUPILS SUFFERING FROM EACH
SORT OF DEFECT. AGES TEN TO FOURTEEN, INCLUSIVE.
ALL GRADES

DEFECTS	DULL	NORMAL	BRIGHT
Enlarged glands.....	20	13	6
Defective vision.....	24	25	29
Defective breathing.....	15	11	9
Defective teeth.....	42	40	34
Hypertrophied tonsils.....	26	19	12
Adenoids.....	15	10	6

Here we have for the first time figures which conclusively demonstrate that there is a real relation between physical de-

fectiveness and school progress. In each case, save that of vision, a larger per cent of the dull pupils is found to be defective than is the case among the normal pupils, and these again are more defective than the bright pupils. The fact that defective vision does not follow this same rule is somewhat difficult of explanation. There can be no question that seriously defective vision constitutes a real handicap to the progress of the child. On the other hand it has long been a matter of common observation that the brightest and most studious pupils are often afflicted with defective eyesight. It may very well be that these two factors somewhat more than counter-balance each other. That is to say, while defective vision is undoubtedly a real handicap and is the cause of backwardness among some children, there are found in these same classes unusually bright children who have so injured their eyesight through undue strain and use that they too have very defective vision. This explanation cannot be put forward as conclusive for there is no data to substantiate it. It seems, however, a reasonable explanation and one which coincides with the known facts in the case.

The results shown in the foregoing table show plainly enough that there is a distinct relation between progress and physical defects. They do not, however, show what the relation is in terms of any given units. They do not show how many more grades are completed by the non-defective than by the defective child. In order to arrive at such a measure new computations were made showing the average number of grades completed by the ten year old pupils, by the eleven year old pupils, and so on for each of the other ages. The central tendency of all of these sets of results was then computed. The results are shown in the following table and diagram:

AVERAGE NUMBER OF GRADES COMPLETED BY PUPILS HAVING NO PHYSICAL DEFECTS COMPARED WITH NUMBER COMPLETED BY THOSE SUFFERING FROM DIFFERENT DEFECTS. CENTRAL TENDENCY AMONG 3,304 CHILDREN, AGES TEN TO FOURTEEN YEARS, IN GRADES ONE TO EIGHT

	AVERAGE NUMBER OF GRADES COMPLETED
Children having no physical defects.....	4.94
Children having defective vision.....	4.94
Children having defective teeth.....	4.65
Children having defective breathing.....	4.58
Children having hypertrophied tonsils.....	4.50
Children having adenoids.....	4.24
Children having enlarged glands.....	4.20

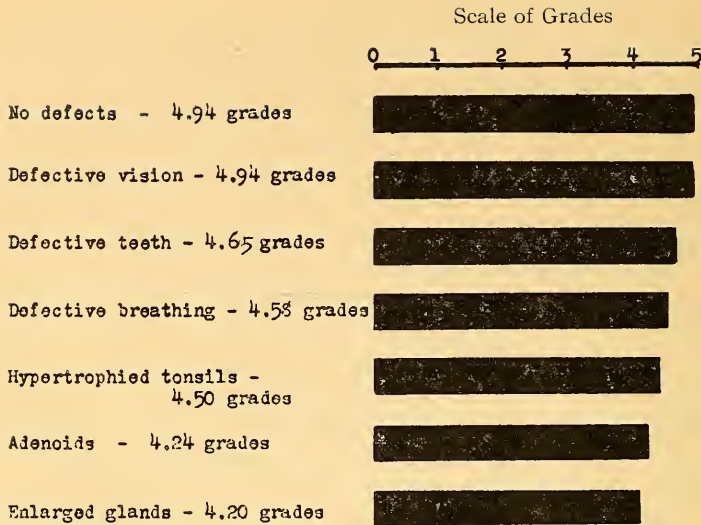


DIAGRAM SHOWING AVERAGE NUMBER OF GRADES COMPLETED BY PUPILS HAVING NO PHYSICAL DEFECTS COMPARED WITH THE NUMBER COMPLETED BY THOSE SUFFERING FROM DIFFERENT DEFECTS

The notable feature of the table is the fact that in every case, except that of defective vision, the children suffering from each sort of physical defect made less progress in their school work than did those not so handicapped. The seriousness of these handicaps in terms of percentages is shown in the next table:

TABLE SHOWING THE EXTENT TO WHICH CHILDREN SUFFERING FROM EACH SORT OF PHYSICAL DEFECT PROGRESS MORE SLOWLY THAN DO CHILDREN WITH NO DEFECTS

KINDS OF DEFECTS	PER CENT OF LOSS IN PROGRESS
Defective vision.....	..
Defective teeth.....	6
Defective breathing.....	7
Hypertrophied tonsils.....	9
Adenoids.....	14
Enlarged glands.....	15
Average.....	9

In this table the average loss of 9 per cent which appears in the last line is not, of course, the numerical average of the percentages of loss corresponding to the different sorts of defects, but rather the general loss of progress discovered among all the children having physical defects. In other words, the children suffering

from physical defects made on the whole 9 per cent less progress than did those having no physical defects.

In order to show more definitely in terms of school progress just what these handicaps mean we may apply them to the cases of supposititious non-defective and defective children. If we assume that the average child without physical defects of any kind will complete the eight grades in just eight years, how long will it take defective children to complete eight grades? The answer to this question may be found in the following table and diagram:

NUMBER OF YEARS NECESSARY FOR DEFECTIVE AND NON-DEFECTIVE CHILDREN TO COMPLETE THE EIGHT GRADES

KINDS OF DEFECTS	TIME FOR EIGHT GRADES
No defects.....	8 years
Defective vision.....	8 years
Defective teeth.....	8.5 years
Defective breathing.....	8.6 years
Hypertrophied tonsils.....	8.7 years
Adenoids.....	9.1 years
Enlarged glands.....	9.2 years

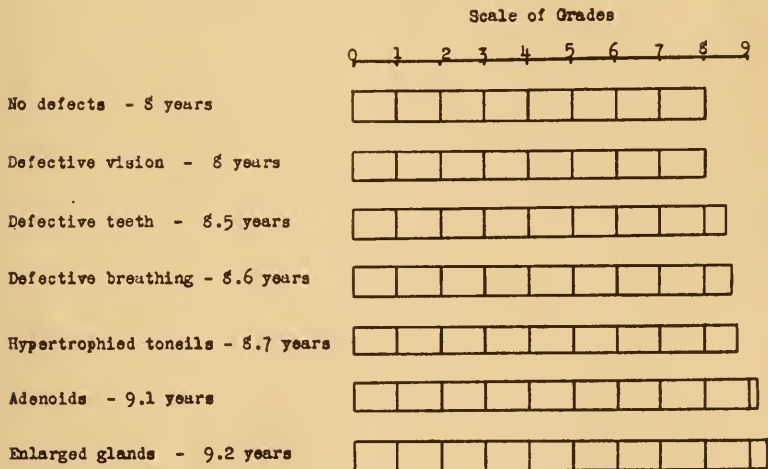


DIAGRAM SHOWING NUMBER OF YEARS REQUIRED BY DEFECTIVE AND NON-DEFECTIVE CHILDREN TO COMPLETE THE EIGHT GRADES

If these figures are substantially significant for all of New York City school children, their educational and economic import is great. According to the data, the child with seriously defective

teeth requires half a year more than a non-defective child to complete the eight grades. About one-half of the children have seriously defective teeth. The handicap imposed by defective breathing means six-tenths of a year. About one child in seven has defective breathing. The child with hypertrophied tonsils takes about seven-tenths of a year more than he should. About one child in every four has hypertrophied tonsils. The extra time required by the child with adenoids is about one and one-tenth years. About one child in eight has adenoids. The pupil with enlarged glands requires one and two-tenths years extra. Nearly half of the children have enlarged glands.

The sums of money spent annually by New York City for public education reach high into the millions. It would be a very simple matter to compute how many dollars are wasted each year in the futile attempt to impart instruction to pupils whose mental faculties are dulled through perfectly remediable physical defects. Roughly speaking, about sixty per cent of all the children suffer from such defects. If, then, we should show that the instruction given these children suffers a loss in effectiveness of nearly ten per cent because of remediable physical defects, it is at once evident that the direct financial bearing of the problem is of great significance.

Such a computation, while it would undoubtedly prove interesting, is perhaps better left unmade because we do not know that the data discussed are either truly reliable or generally representative. They are a comparatively small number of cases in one city, in one year, and could similar data be secured for longer periods of time and in more localities it is not only possible but most probable that they would show different results.

The examination is important because it establishes the principle that, except in the case of vision, older children have fewer defects. It shows that when children who are badly retarded are compared with normal and very bright children in the same age groups the children rated as "dull" are found to have higher percentages of each sort of defect than the normal and bright children. In this generalization defective vision must be expected.

Moreover, the investigation gives us quantitative measures of the retarding forces of the different kinds of defects. In general, children suffering from physical defects are found to make about nine per cent less progress than do children having

no physical defects. The figures do not really show the retarding influence of each sort of defect separately for the reason that the same child is often suffering from several sorts of defects.

Because of the reasons that have been mentioned, the figures may be accepted as having distinct value in revealing general tendencies, but must not be interpreted as showing with exact precision the relative retarding force of each separate sort of defect, or even of physical defectiveness in general.

Russell Sage Foundation Publications

MEDICAL INSPECTION OF SCHOOLS

BY LUTHER HALSEY GULICK, M. D.

DIRECTOR OF PHYSICAL TRAINING OF THE NEW YORK PUBLIC SCHOOLS; AND

LEONARD P. AYRES, A. M.

FORMERLY GENERAL SUPERINTENDENT OF SCHOOLS FOR PORTO RICO

Some Opinions

"Lucidly exhaustive and admirably arranged."—*The Nation*.

"A notable contribution both to medicine and to school administration."—*Erie Dispatch*.

"Of large practical utility."—*Rochester Times*.

"The book is most complete and valuable."—*S. W. Newmayer, M. D.*

"An important contribution to the cause of Education."—*Journal of Education*.

"The appearance of this most timely book is cause for genuine satisfaction."—*Charities and the Commons*.

Third Edition. Price postpaid, \$1.00

LAGGARDS IN OUR SCHOOLS

A Study of Retardation and Elimination in City School Systems

BY LEONARD P. AYRES, A. M.

FORMERLY GENERAL SUPERINTENDENT OF SCHOOLS FOR PORTO RICO AND CHIEF OF THE DIVISION OF STATISTICS OF THE INSULAR DEPARTMENT OF EDUCATION, SECRETARY OF THE BACKWARD CHILDREN INVESTIGATION OF THE RUSSELL SAGE FOUNDATION. CO-AUTHOR OF MEDICAL INSPECTION OF SCHOOLS, ETC.

"I shall use it in my course in child psychology in the University of Pennsylvania next winter and expect to make it the basis of the statistical side of the work for some years to come."—Lightner Witmer, Professor of Psychology, University of Pennsylvania.

"The work is marked by logical sanity and absence of the hasty and extravagant generalization that one so often finds in sociological discussions."—Borden P. Bowne, Dean of the Graduate School, Boston University.

"I have read the book with increasing satisfaction, and shall have still more satisfaction in using it in my classes during the coming year as an illustration of what an investigation in school administration really means."—Paul H. Hanus, Director Division of Education, Harvard University.

"Mr. Ayres has given life to his figures and character to his diagrams."—*American Industries*.

"Such a book, at once readable and scholarly, scientific and popular, critical and constructive, is typical of the best in educational literature."—*The Independent*.

"It is the most important specific study of school conditions that has been made by any one."—*Journal of Education*.

Second Edition. Price postpaid, \$1.50

CHARITIES PUBLICATION COMMITTEE

105 East 22d Street,
New York City, N. Y.