THE STRAIN OF SCHOOL LIFE ON GIRLS DURING THE EARLY MENSTRUAL PERIOD

BY

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The following is a condensed account of an inquiry, carried out at the request of an education authority, to determine the effect of the strain of school life on the physical welfare of girls during the somewhat critical period of the early menstrual years, with special reference to home lessons. Home lessons are almost universally condemned by parents, and as strenuously upheld by teachers, so it seems advisable to determine, if possible, the medical aspect of the question.

The subject of fitness is very complex, and is influenced by so many factors that it is extremely difficult to assign loss of physical or mental fitness to any one cause. Good health is so delicately balanced that in certain individuals a comparatively small mental worry or psychological disturbance may have a far-reaching effect on the physical welfare, and prepare the way for the onset of definite disease. If two people of apparently equal physical and mental fitness are given a certain task, requiring the expenditure of considerable energy, either physical or mental or both, one will complete the task with comparative ease and the other will fail. The successful one has something that the other lacks. This something may be called stamina or vital force.

Stamina and Sensitiveness

Stamina is influenced by heredity as well as by pre-natal and post-natal conditions. The health of the parents, the character and suitability of the food, and the general hygienic conditions of the home, especially during the first few years of life, play an important part in determining physical fitness. A child brought up in a good home, surrounded by the love and care of kind and considerate parents, who exercise a wise discipline, is more likely to maintain sound health of body and mind than a child who lacks these advantages.

Children are very sensitive, and can be made unhappy by petty annoyances and rebuffs, and a child reared in an atmosphere of this kind is apt to be reserved and lacking in self-confidence, which will render the school life more difficult and trying. Again, a keen, over-anxious, rather sensitive child is apt to feel the strain of school life, but that in itself must not be regarded as proof that the school work is harder than it should be; the fault may lie with the child rather than with the school. If the child is mentally dull or slow, as well as of an anxious and nervous disposition, the effect on the health is correspondingly greater. Girls of from 12½ to 14½ years of age have to contend with the added disturbing effect of commencing menstruation, which renders this period somewhat critical, as many influences, of which very little of a definite nature is known, are at work during this particular time, and those with an unstable nervous system are apt to suffer. It seems reasonable to suppose that during this period any extra strain and worry will influence the health of the child.

Comparison Between Boys and Girls

As compared with boys of approximately the same chronological age the examinations clearly demonstrated that the physical fitness of girls depreciated more during the school session. It is of interest to quote two passages from the report of the Consultative Committee on Differentiation of Curricula between the Sexes in Secondary Schools:

1. "There was evidence that girls are much less able to protect themselves against over-pressure than boys, who have, as a rule, a habit of healthy idleness, whereas girls are more conscientious." As one witness expressed it: "If you give a girl too much to do she breaks down; if you give a boy too much to do he doesn't do it."

2. "It is now certain that physiological age bears no direct relation to chronological age. Anatomically girls are in advance of boys by six months at 5 years of age, and about one year at 15 years of age. There are material differences in the blood content—the percentage of haemoglobin is less in the female after puberty; the male is better prepared for a more abundant liberation of energy with less exhaustion or fatigue."

These conclusions are very interesting, and, as will be shown later, they bear a close resemblance to those arrived at as the result of this inquiry. There can be little doubt that the mental development of some children, just as the physical development, is more advanced than in others. The precocious child is not necessarily, or even generally, possessed of a real intrinsic intellectual superiority, but has a mental development one or more years in advance, an advantage which is lost in later years and the precocious child finds its proper level. Some such explanation is necessary to show why so many of the more brilliant pupils fail to maintain the higher standard.

In this investigation an attempt was made to obtain information regarding all the factors which would be likely to have any influence on the physical and mental welfare of the child. Nurses were asked to visit the homes and obtain information regarding the general hygienic condition, histories of abnormalities of health, including menstruation and any other points worthy of note. Information was also obtained regarding what amount of work was done out of school hours; whether the home lessons were done in privacy or in the general living-room; whether they were regarded as excessive; and, if the child lived in the country, what was the distance from school, mode of travel, and the time absent from school.

Obviously a single medical examination would give no useful information, so that three examinations were made: one at the beginning, one at the middle, and one at the end of the winter session. A thorough examination was made in every case, each child being stripped to the waist and the heart and lungs systematically examined, as well as the nose, throat, teeth, and the special senses.

The Unit of Fitness

The degree of physical fitness was obtained from the tables supplied by the late Professor Dreyer in his book *Assessment of Physical Fitness*. These tables are founded on the recognition that there is a definite relationship between the weight of the human body and the length of the trunk (height sitting), the circumference of the chest, and the vital capacity of the lungs.

The unit of fitness was obtained from the results of three distinct observations—namely:

1. By comparing the *observed* weight with the average weight *calculated* from the trunk and chest measurements.
2. By comparing the *observed* vital capacity with the average vital capacity *calculated* from the weight.
3. By comparing the *observed* vital capacity with the average vital capacity *calculated* from the trunk and chest measurements.

The difference between the observed results as obtained from the examinations and the calculated results from the tables were added together and divided by three.

This method of arriving at the unit of fitness is possibly open to criticism, but the strict accuracy of the unit of fitness is, in this investigation, of secondary importance. The essential point is to discover whether the physical fitness has undergone any change, and to what degree,

during the period under observation, and from this point of view the method adopted seems satisfactory.

The children examined were divided into four groups, as follows:

1. Girls given home lessons requiring 10 hours per week.
2. " " " " 7½ " "
3. Boys " " " " 10 " "
4. " " " " 7½ " "

Before considering the tables dealing with the physical fitness of the groups under review, it is interesting to study the average measurements obtained from the examinations.

Height of Trunk.—In comparing boys and girls of approximately 13½ years of age, the girls were found to be taller by two inches. At 14½ years the girls were taller by one inch. These observations demonstrate that at some period earlier than 13½ years the girls had been growing at a much greater rate than the boys, but that during this period—13½ to 14½ years—the growth rate of boys had quickened, and was rapidly overtaking the girls.

Weight.—It was found that at 13½ years the girls were only 4 lb. heavier than the boys, but at 14½ years the difference in favour of the girls was 14½ lb. Over 15 years of age the rate of increase was in favour of the boys. This observation shows that girls developed much more rapidly than boys between 13 and 15 years of age, at which age the advantage was passing to the boys.

Chest Measurements.—Anatomically the chest of the female differs in some important details from that of the male. In the female there is a lessened general capacity and a greater mobility in the upper part. It is, then, of interest to note that at 14½ years of age the chest measurements are equal, but that the increase between 13½ and 14½ years of age is almost twice as great in girls as compared with boys. The boys showed an increase of 0.6 inch and the girls 1.1 inches during this period.

In comparing the heights and weights of children at 6, 9, and 13 years of age it was found that at 6 years of age the boys had a slight advantage, at 9 years of age there was almost equality, but at 13 years of age the girls were taller by 1 inch and heavier by 11 lb.

A Critical Period for Girls

The conclusion to be drawn from these various facts is that from 11 years of age, approximately, the superiority of girls rapidly increased up to 14 years of age, about which time the advantage is beginning to pass to the boys. The superiority of the girls in height reaches the highest point at about 13½ years, and in weight at about 14½ years. It is evident that between 13 and 14 years girls develop at a very rapid rate, and are almost adult when the boys are still adolescent; it is during this period that menstruation generally commences.

The period 12–14 years of age, especially the year 13–14, must therefore be regarded as a somewhat critical one for girls, as the rapid physical development coincides with a serious educational effort, to which is added the disturbing effect of menstruation.

It was also found that the increase of height and weight during the six months was much greater in some children than in others, and that during one three months the increase was greater than during the other three months. This observation demonstrates the recognized fact that the growth of children does not proceed in a steady, even flow, but rather with alternate periods of rapid and slow growth. Weight cannot, therefore, be regarded as a reliable index in determining progress in a case of illness such as tuberculosis.

It is now recognized that there is a close relationship between the sexual organs and the ductless glands. All those who have had the opportunity of examining large numbers of girls of about 13 years of age must have

noticed the frequency with which enlargement of the thyroid gland was present. This enlargement, although not as a rule very marked, is nevertheless quite obvious, and, as this is the period when menstruation and other signs of rapid sexual development are becoming prominent, it seems reasonable to connect the two conditions as cause and effect.

Increased activity of the thyroid gland influences the nervous system, increasing the excitability and heightening the emotional state. Thyroid enlargement was less frequent among the older girls. This temporary thyroidism may, and probably does, aggravate the mental difficulties of the child, and renders school work more trying.

A consideration of all the factors stated points to the conclusion that it is advisable to avoid putting an undue strain on the physical and mental powers of girls during this period of rapid development. If this theoretical conclusion is sound it should be confirmed by the results obtained from the determination of the physical fitness.

Physical Fitness

The physical fitness of each child was determined at each of the examinations on the lines already indicated. Elaborate tables were drawn up showing the results obtained from the examination of each child at the three separate examinations. The following is a tabular synopsis of the results obtained.

Sex	Average Age (years)	Home Lessons (hours per week)	Unit of Fitness			Average % (inc. or dec.)
			1st Ex.	2nd Ex.	3rd Ex.	
(1) Girls	14½	10	-6.5	-7.4	-9.0	-2.5
(2) ..	13½	7½	-8.6	-9.5	-10.9	-2.3
(3) Boys	14½	10	-1.2	-2.1	-1.2	0
(4) ..	13½	7½	-3.2	-4.0	-3.4	-0.2

The figures with algebraic signs show the variation from the recognized normal (as obtained from Dr. Dreyer's tables). The figures in the last column indicate the difference between the first and third examinations. The extreme ranges were from 12 to 15 years of age, thus comprising the age period considered the most critical, at least for girls. The table demonstrates very clearly that there is a progressive decrease in physical fitness in the case of girls, as well as a lower initial starting-point, as compared with boys. The boys showed a higher initial standard of fitness, which, with the exception of a small mid-term decrease was practically maintained throughout.

To demonstrate further the difference in physical fitness between boys and girls a table was drawn up giving the percentage of children showing a decrease of over 5 per cent., 10 per cent., 15 per cent., and 20 per cent. It was found that 34 per cent. of girls showed a decrease of over 5 per cent.; 13 per cent. showed a decrease of over 10 per cent.; 4 per cent. showed a decrease of over 15 per cent.; and 2 per cent. showed a decrease of over 20 per cent. In the case of boys, 4.5 per cent. showed a decrease of over 5 per cent.; the remainder showed a decrease of less than 5 per cent. This clearly demonstrates that the initial decrease and the progressive decrease during the school winter session is considerably greater among girls.

Home Lessons.—The home lessons given are supposed to occupy a child of average ability a definite number of hours per week. It was found that 59.4 per cent. of girls, but none of the boys, required more than the allotted number of hours; 25.6 per cent. of girls and 28.6 per cent. of boys required the allotted period only; 15 per cent. of girls and 71.4 per cent. of boys required less than the allotted period. Privacy was enjoyed by

51 per cent. of girls, but only 26 per cent. of boys were so favoured.

Medical Examination.—Excluding the lungs, no abnormality worthy of note was found. Experience derived from the examination of many thousands of children has convinced me that the condition of the lungs provides a very useful guide to the degree of physical fitness. The "normal" varies within fairly wide limits, and a close association was found between a decrease in physical fitness and a move to the extreme limits of the normal and beyond.

Menstruation.—Careful note was made of the date of the commencement as well as the character and periodicity of the monthly periods, but no history of any abnormality worthy of record was obtained.

Conclusions

1. Between the years 12 and 15 the physical development of girls is much more rapid than that of boys.
2. Sexual development in girls, with all its attendant disturbances, is very active during this period.
3. This rapid physical and sexual development of girls coincides with a strenuous educational effort.
4. The investigation shows that the standard of fitness of girls was less than that of boys, and depreciated more during the session under review.
5. Home lessons required a greater expenditure of energy by girls.
6. This is a period when the health of girls requires to be carefully guarded.

A NOTE ON THE TREATMENT OF BOILS AND CARBUNCLES

BY

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It is the endeavour of this paper to set out the result of a small recent series of boils and carbuncles treated on board H.M.S. *Hood* by the occlusive method. The dressing used was zinc oxide elastic adhesive bandage (elastoplast) applied directly to the shaven skin and extending well beyond the outer limit of the inflamed area. The surrounding skin was sterilized with 1 in 1,000 acriflavine solution, but no preliminary surgery was attempted.

In a large body of men living under industrial or service conditions the loss of "man hours" involved by intensive treatment of septic conditions is considerable. On board this ship in 1934 of a total of 1,496 fresh cases seen, 156 were due solely to boils and carbuncles. The relation of the latter to all fresh attendances from month to month in 1934 is shown diagrammatically in the accompanying chart.

The Moscow school of medicine regards pyodermic lesions as being the third most incapacitating condition after trauma and "la grippe."

Formerly it was the custom to treat these septic conditions by repeated fomentations, antiseptic applications, and even deliberate surgery. This entailed frequent absence from duty, often confinement to hospital, and the continual attention of a medical assistant, while the resulting disfigurement from bulky dressings and operation scars was often considerable. Newman¹, in 1933, found that when the occlusive method was exhibited to impetiginous lesions in school children the course of the condition was cut short by more than half. Incidentally, the occlusive method is now routine for empetigo in London County Council schools. The cost of medicaments under the old method of treatment was considerable, while the eventual cure seems to have been largely despite rather than due to this therapeutic exuberance.

At the historic meeting of the British Medical Association in Dublin in 1867 Lister propounded the view that damaged tissue should be protected from infection, trauma, and chemical irritation. Yet it was only during the great war that these principles were applied to septic bone surgery by Winnett Orr.² The same principles hold good in minor septic conditions.

A superficial infection in the tissues is followed by localization of the infection and, as pointed out by Celsus, immobility. This is Nature's defence. Necrosis with discharge of pus does not take place till this cycle is complete. Incision at an earlier stage is useless, and may do harm by spreading infection into surrounding parts. Donald,³ speaking from a large experience of these conditions, condemns it, and Walton⁴ is similarly opposed to it. Later, when pus has formed, an incision is permissible, remembering always Macewen's maxim, "An exit can also become an entrance." The pain experienced is often due to movement of a part which has become sympathetically immobilized. Dixon⁵ and Robb⁶ have shown what a great part is played by immobilization in septic conditions, and the latter has shown how even deep-seated sepsis may run a painless course when this has been brought about.

From these remarks it will be seen how widely former treatment departed from the principles laid down by Lister at Dublin, and by Hilton in his almost forgotten masterpiece, *Rest and Pain*.

The multitude of medicated dressings in use shows that no one is specific. Oily dressings have been recently advocated, among them flavine emulsion and cod-liver oil,⁷ but their chief merit seems to lie in their harmlessness. Renewal of dressings is painless on account of their non-adhesive nature. Hygroscopic applications have had their day, among them cane sugar syrup and magnesium sulphate paste; but the disadvantages of the former are obvious, while the latter may cause damage to a devitalized skin.⁸ The use of the discharge itself as a dressing may sound heretical, yet in actual practice it proves most satisfactory. The success of the method as applied to varicose ulcers has long been recognized. Under an occlusive dressing the lesion lies bathed in pus