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Research Material

The Relationship of the Pulse-Respiration Rhythm to the Head Size of School Children

by

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When a child is taken to the school physician for the first time there are special expectations linked to that visit. The class teacher is concerned that he or she understands the child's constitution and the parents want to better understand the needs of their child. The doctors' observation and advice are wished for. The physician's knowledge of human nature can affect insights into the psychological/physical makeup of the growing child.

The Anthroposophical view of humanity is an inexhaustible source because it doesn't collapse into the un-bridged cleft between psychological and physiological observation. The vivid grasp of organic processes in the scope of time, even a spiritual/creative process, always places organ functions in connection with the non-physical aspect of human beings. Rudolf Steiner's teaching on the three-fold human being is a practical guide for us to understand the etheric body as a bridge between the physical and the higher life bodies. Rudolf Steiner required that for healthy leadership of school children the concept of the three-fold nature of the human organism must pass into our "flesh and blood."

As an example he pointed to the differences in the constitutions of large-headed and small-headed children. Physical symptoms like blushing or paling in the school child already indicate a too strongly or too weakly functioning metabolic-limb system in the "whole person." A too strong or too weak intervention of the nerve-sense system stands in opposite relationship to that. Grasping the polarity of the constitutions of large-headed and small-headed children opens up a holistic understanding of the emotional, intellectual and physical development of a child. With that the basis for a healthy curriculum design as well as medical treatment was given as presented by Rudolf Steiner at the teacher's conference on February 6, 1923.

A few months before, Rudolf Steiner spoke to medical doctors about the materialization of the central rhythm of pulse and breathing in a 4:1 ratio. "To a certain extent, the metabolic system sends its' effects

up to the rhythmic being; that is the third body of the human organization goes into the second body which expresses itself through the rhythm of blood circulation during daily life. The nerve/sense system sends its' effects into the respiratory system and that expresses itself through the rhythm of breathing." (*Trans. note: This quote can be found in the Complete Works of Rudolf Steiner #314*) The stages of child development as well as the prerequisites for the various illnesses become clear when one takes into consideration the polar predominance of the metabolic system or the nerve/sense system. "One can always say that a certain measure of balance is present whether a person is organized one way or the other. It's true, isn't it, that it is never exactly 1:4, but rather every conceivable ratio; people individualize themselves with this ratio variance. However, for each human individual there is a certain ratio present. If that is disturbed, let us say if a person has a normal ratio of 1:4 at a certain age and conditions appear which alter that ratio to 1:4 and 1/7th -then the disintegrating force is working too powerfully; then the person cannot become upstanding enough." (See *The Complete Works of Rudolf Steiner #218*)

During the last 30 years, my work as a school physician led me to a number of Waldorf Schools in the Northeastern United States. Observations came about during the respective examinations that were always especially helpful in getting closer to the essence of the being of the child concerned. The examinations included painting or drawing of a human figure, measuring head circumference, frequency of pulse and breathing, determining the dominate side of the hands, eyes, ears and feet, as well as noting the color of eyes and hair. These determinations were a part of the observation of the child within the context of his or her entire manner. During the weekly teacher's conference, they were valuable clues in our common effort at envisioning the physical-mental contouring of the growing human being.

Much documentation has accumulated over the years that lends itself to numerical evaluation. The connection that Rudolf Steiner named between head circumference and the predominance of the metabolic-limb system or the nerve-sense system is just as simple as it is convincing in individual experience. According to that connection, a large-headed child would incline toward a quicker pulse and a slower respiration by reason of a more active metabolism and, with the small-headed child, the opposite could be expected. Can such differences be numerically demonstrated or do they go under in the flood of other influences upon circulation and breathing?

Table 1 contains numerical results of 363 measurements on 326 school children divided into three groups: Children with large, medium and small head circumferences. The divisions were based upon the growth curve of head size for boys and girls published in 1968 by G. Nellhaus and still today the most predominantly used in American textbooks. These values concur to a large extent with the tables from G. Fanconi and other European authors. I have inserted a middle group between the large-headed and the small-headed whose head circumference lies plus or minus 0.5 centimeters of the average for the respective ages and sex.

Table 1: 326 School Children with an Average Age of 9 Years

	Measurements	Pulse Respiration		P/R P/R = > 4.3 P/R < 4.3		
Large	198	85.1	19.3	4.40	54.0%	46.0%
Medium	88	83.2	19.2	4.34	48.9%	51.1%
Small	77	81.3	19.7	4.12	33.8%	66.2%
All	363	83.8	19.4	4.33	48.5%	51.5%

The average pulse-respiration quotients were obtained by dividing the total of all pulse frequencies by the total of all respiration frequencies (because of the rounding off of the last decimal, this is a little more exact than the division of the values of pulse and respiration appearing in the table). The measurements from ten children who were being treated with Ritalin and other circulation stimulants were left out as well as two children whose breathing was visibly hindered by a cold. A group of eight children or adolescents with developmental handicaps was included.

Table 1 shows a clear correlation between head circumference and pulse/respiration. The children with a large head circumference had, on average, a quicker pulse and a somewhat slower respiration compared to those with a smaller head circumference. The result is a larger average pulse/respiration ratio (pulse-respiration quotient) for the “large-headed” as opposed to a smaller pulse-respiration quotient for the “small-headed.” In between are the values for the children and adolescents with a medium head circumference and also, very similar, the average values for all. The last two columns in the table show only if the pulse-respiration quotients were higher or lower than the average of 4.3; they show, for instance, how many measurements of large-headed children had a higher or lower pulse-respiration quotient. Here, also, the same result appears.

My examinations led to the same affirmation that appeared in the *Beitraegen* little over thirty years ago. At that time there were 433 measurements taken from students at a Waldorf school for special education and a Waldorf School for the developmentally handicapped in Germany. The pulse-respiration quotient of the students with a larger head circumference was clearly higher compared to those students with a smaller head circumference.

It would be interesting to know if other research already exists about the relationship of head circumference to the pulse-respiration quotient. In his post-doctoral thesis, G. Hildebrandt came to the conclusion, founded on explicit detail, that during sleep and the convalescing phase of a course of treatment, adult pulse and respiration strived for the whole number ratio of 4:1.

The ratio measurements of children presented here are, on average, higher than 4:1. I evaluated the data of the younger students compared to the older ones in order to find a dependence upon age-related development. Table 2 shows that the pulse and respiration of younger school children is faster than that of their older comrades so that their pulse frequency is still dominant and thereby raises the pulse-respiration quotient.

Table 2: 355 School Children

	Measurements	Pulse	Respiration	P/R Quotient	P/R =>4.3	PR <4.3
Younger*	201	87.6	19.8	4.41	54.7%	45.3%
Old**	193	79.6	18.8	4.23	41.5%	58.5%
All	394	83.6	19.3	4.33	48.2%	51.8%

***Age 4 until almost 9: average age – 7.2 years.**

****Age 9 to 17: average age – 13.8 years.**

This reminds us of the morphological relationship between the younger child and the large-headed child. The ratio of head circumference to height in children becomes less and less with each passing year. Large-headed school children are often more child-like and dreamy than their same-age companions with a smaller head circumference. “In the lower grades, a large-headed atmosphere reigns, while with the older students, because of their changed proportions, the small-headed type seems to dominate.” The question arises, in what way the metabolic processes dominate in the younger child when they appear to be more strongly formed in the older child.

Rudolf Steiner’s statements about the threefold nature of the human organism are not only an intellectual volume for the interpretation of much research data; they point out physiological laws that until today have gone unexplored. The goal of this work cannot consist of “hardening” numerical “facts.” If one is occupied with the three-fold growth dynamic, then within the context of a larger group, further wide-ranging questions arise, but it always leads back to direct human encounter. In any case, bearing this in mind, an attentive perception of the pulse-respiration rhythm can lead to new avenues of therapeutic understanding.

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— translated from German by Nina Kuettel