



THE DETERMINING FACTORS IN THE FORMATION OF THE THREE BODY TYPES (ECTOMORPH, MESOMORPH AND ENDOMORPH)

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Abstract

The total of human body systems (bone, muscle, nervous, endocrine etc.), through their basic structures, are common to all humans, but through genetic inheritance each individual bears specific peculiarities in physical, functional and psychological terms.

The emergence and development of a certain body type is the result of a cause-effect interaction where the cause resides in genetic imprinting and the effect is the emergence of a body type bearing certain somatic proportions, psychological, mental, metabolic and hormonal manifestations, according to the gene and which are to be modeled by other factors that determine a body type.

The importance of factors in the family and social environment has an overwhelming impact on the phenotype, producing major changes even among members of the same family.

The somatic type represents a genetic inheritance and it cannot be changed. Physical exercise and aging can lead to changes, but not essential ones.

Keywords: *body types, ectomorph, mesomorph, endomorph*

JEL classification: I1, I19, I20

1. Introduction

Throughout the time there have been several classifications made according to biotypology criteria. Classifications that are seen today as more or less debatable use several terms to denote morphological, functional or psychological individual traits (typological constitution, constitutional biotype, body type).

Irrespective of the term chosen, body type is the mutual conditioning between genotype and phenotype.

After Cordun M. (2009, p. 127) "the genotype represents an individual's gene total that forms one's genetic heritage and give hereditary peculiarities that are transmitted from parents to descendants."

Cordun M. (2009, p. 127) pointed out that "the phenotype represents the total of morphologic and physiologic, biochemical (enzymatic) and behavioral traits that

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result from the interaction between genotype and environment and, as a consequence, it is constantly changing under the action of physical and social environments.”

A body's reaction (genetically imprinted) to environmental factors is the most efficient psychosomatic configuration that it can produce at a certain moment. Thus, all traits that are visibly manifested generate that which is called phenotype.

The phenotype, even if apparently stable, can very easily break its balance under the effect of disturbances and influences from the environment.

An individual's traits (morphologic, physiologic, biochemical, psychological), which have a high stability and are mutually dependant, form the object of study in human typology, that is body type.

Physical and psychological traits are hereditary, transmitted by observing the species, through a series of traits bearing a general nature (specific to members of the species, valid for all humans), family traits for blood related individuals and individual traits that result from the gene combination of parents (via the maternal line and the paternal line).

The emergence of several ideas on genetic heritage throughout time as regards physical and psychological traits and the conclusions resulted from the study of these ideas have shown that there is a relationship of interdependence between the physical and the psychological and that psychological traits can be associated to certain physical traits, that they are genetically inherited and can also be more important than those acquired through education.

The total of human body systems (bone, muscle, nervous, endocrine etc.), through their basic structures, are common to all humans, but through genetic inheritance each individual bears specific peculiarities in physical, functional and psychological terms.

What makes people different are the chromosomes (discovered by the German anatomist Wilhelm Gottfred Waldezer-Hartz, who facilitated the emergence of genetics). Genetics explains the fact that cells have imprinted within, in the form of a genetic code, the fundamentals of the main physical traits and even biases toward certain secondary traits. It brings along a series of clarifications and, at the same time, it opens the door for new questions.

The development or regression of traits depends on the environment in which a body lives.



2. Topics addressed

The process of individual development, which includes morphologic and functional changes from the very beginning and down to the end of existence, represents the body type ontogenesis. The influence of environmental factors and hereditary configurations throughout personal history create the human constitution.

The periods of ontogenesis are:

- Prenatal (between fertilization and birth);
- Postnatal (childhood, puberty, adolescence, adulthood, maturity, senescence).

Glavce C., Iancu E.E. (2008, p. 54) demonstrated that “the processes of growth and development take place following strict standards that can be organized in five laws and they are:

- The law of unequal and asymmetric growth of tissues and organs;
- The law of a different growth and development rate;
- The law of proportions;
- The law of alternation;
- The law of pubertal maturity.”

2.1. Determining factors in body type formation

2.1.1. Genetic factors

The emergence and development of a certain body type is the result of a cause-effect interaction where the cause resides in genetic imprinting and the effect is the emergence of a body type bearing certain somatic proportions, psychological, mental, metabolic and hormonal manifestations, according to the gene and which are to be modeled by other factors that determine a body type.

Among the groups of traits that are genetically inherited, the most important ones are:

- physical traits (height, lengths, width, muscles, fat tissue);
- temperamental traits (activism, emotionality and sociability);
- sexual orientation;
- mental disorders.

2.1.2. Endocrine factors

The endocrine system, through glands of internal secretion (direct effusion of hormones into the blood) are responsible for maintaining a homeostatic balance which allows a body's adaptation to sudden or less sudden changes in the



surrounding environment.

Up to endocrine stability (after the age of 20), the endocrine system makes its presence felt ever since embryonic life and its actions are, at the beginning, conveyed through anabolic hormones and the thymus and then through the thyroid (CNS development, psychomotor development, inception of speech) and parathyroids (bone system development, neuromuscular tone, upkeep of the **phosphocalcic balance**).

Glavce C., Iancu E.E. (2008, p. 61) demonstrated that around the age of seven, “under the action of the somatotrope and the thyroidal hormones, there occurs a quality leap in height, an enhancement in the process of primary teeth replacement, an accentuation of gender differences due to the secretion of sexual hormones from the adrenal gland.”

Such body constitution peculiarities are part of a whole and their determination is decided by the CNS and the endocrine system.

2.1.3. External factors

The direct or indirect action of the environment on the traits that characterize a body produces more or less visible changes.

After Glavce C., Iancu E.E. (2008, p. 64) the environmental factors that change morphological, physiologic and mental traits can be grouped as:

- „1. Geographical conditions, altitude, latitude and longitude, the nature of soil, water, air and climate (temperature, wind, rain, humidity), seasons, atmospheric pressure;
2. Nutrition, toxic agents, infectious agents and mechanical agents, light and radiation etc.;
3. Environments: social, familiar, school, military, professional, urban or rural, economic, moral, legal, religious, aesthetics, cultural and national etc.”

Nutrition bears a core importance in all periods of life. A healthy physical and mental development can only be secondary to proper nutrition.

The worst way to prevent a correct development is insufficient and poor nutrition.

Ever since pregnancy, protein deficiency or poor nutrition influences brain development and child vitality upon birth. In the first two years of life, lack of proteins hinders proper growth and it can result in weakness of mind.

Insufficient food or a diet lacking in nutrients reduces a body's resistance to infections and thus an infant's diseases can lead to a permanent affectation of the brain's functions.



A genotype affected by hormonal disorders (hormone deficiency, enzyme deficiency) can bear severe consequences for the phenotype, and positive changes in the effects an environment has over the phenotype can change the latter.

The importance of factors in the family and social environment has an overwhelming impact on the phenotype, producing major changes even among members of the same family.

Because an individual's development has a cumulative character of certain stages, each stage is based on the previous one and advantages gained in one stage promote development in the following stage.

The formation of structures related to perception during the first two years of life is the foundation of conceptual thinking.

If sensory stimulation is of quality, then the generalized reflection of reality and conveying theory into concepts will also be of a superior nature, an aspect also influenced by the parents' level of education as regards language or correct reasoning and judgment. Thus, the correlation between genotype, phenotype and environment is extremely important and how the genotype manifests itself depends on interacting with the environment.

2.2. Classification of body types

W. H. Sheldon built his own typology starting from the three primary germ layers (ectoderm, mesoderm and endoderm). Depending on the prevalence of one or the other of the 3 layers, he proposed 3 body types:

- After Neveanu-Popescu, P. (1978, p. 739) “cerebrotonic type – the ectomorph type (body development prevalently external) is characterized by: restrained posture, attitude and movement, affectation and inhibition, hermetism, mental activity, social phobia, introvert, inhibited in public, childish presentation, need to be alone, avoid noise, restrained voice, secrecy of feelings.”

In terms of structure and physiology, it is characterized by thin bones, they are longilineal individuals, thin, with low muscular mass and low body fat.

Chirazi, M., Ciorbă, P., (2006, p. 73) pointed out that “for an ectomorph, it is as hard to gain weight as it is for an obese individual to lose unwanted fat.”

An ectomorph built shows a fast metabolism with high calorie burning.

Muscular mass build-up is difficult, frustrating for an ectomorph young individual. Even if training with weights, progress in terms of muscular mass is slow and difficult, which makes them resort to excessive work-out and the immediate consequence is over-training.

Damian, Ș., (2006, p. 154) pointed out that “in terms of nutrition, an ectomorph is a



happy man/woman, because they can eat anything, with no worries, not even for fat intake. Their diet will have to be higher in calories than before with the following percentages: 20-25% proteins, 50-55% carbs and 25-30% fat. Basic supplements are protein concentrates, glutamine and creatine.”

- After Neveanu-Popescu, P. (1978, p. 739) „somatotonic type– the mesomorph type (balanced body development) is characterized by: sustained movement and stature, enjoys (physical) movement and sports, energetic traits, enjoys risk, open attitude, assertive, tough, lack of delicacy, brave, combative and competitive, uninhibited, uncontrolled and unrestrained voice, lack of inhibitions.” In terms of structure and physiology, it is characterized by broad shoulders and thin waist, large muscle mass and low body fat.

Although they can control body weight and composition much easier than the other two types, most of all because they have a normal metabolism, if a mesomorph chooses the wrong diet (high calorie diet) and a relatively sedentary behavior, this can make them look like an endomorph or, if the choice is for high exercise and a low calorie diet, they can look like an ectomorph. Mesomorphs can be good athletes, irrespective of the sport and they can also practice professional bodybuilding very well.

Damian, Ș., (2006, p. 155) pointed out that “in terms of nutrition, a mesomorph has the same tendencies as an ectomorph, that is to eat whatever and whenever because their body can cope very well with this type of diet, without a high risk of fattening. Still, a balanced nutrition is important both for keeping their health and most of all for those who want to gain results in sport activities.”

- After Neveanu-Popescu, P. (1978, p. 738) “viscerotonic type – the endomorph type (body development prevalently internal) is characterized by: relaxed movements and stature; physical comfort loving, slow reactions, ceremony loving, inclined to socialization, emotional constancy, tolerance, courtesy toward fellow men, complacency, untempered traits, easy and fast communication and extrovert.”

In terms of structure and physiology, it is characterized by a massive skeleton, with thick and wide bones, large joints, wide waist and hips, no matter the height (tall, medium or short).

The massive built of an endomorph shows they have a slow metabolism, which increases the possibility of body fat additions in comparison to the other somatic types.

All peculiarities listed above make endomorphs to be sedentary individuals, most of them having a soft and round body, with more body fat.

Body fat increase is supplemented by estrogen hormone secretion to the detriment of testosterone secretion, which hinders even more muscle mass growth.



Muscle mass growth is still possible with proper training and proper diet which make an endomorph to be a strong individual, bearing a lot of strength but lacking in definition because of the body fat covering muscular mass.

Damian, Ş., (2006, p. 156) pointed out that “an endomorph must watch what they eat and they must prove more discipline as regards their diet, because calorie excess is rapidly turned into excess weight. A diet rich in refined carbs – sugar and white flour – makes them prone to fattening because they ultimately turn into body fat. The best solution for an endomorph is to resort to a low calorie diet, which is also a low fat, high protein diet and with a lower percentage of carbs. In percentages, their diet could be: 30-35% proteins, 15—20% fat and 40-45% carbs. They can use supplements that speed up metabolism.”

3. Conclusions

The aforesaid traits represent the somatic specifics of the three groups. But an individual does not hold the traits of only one group. Most individuals have traits coming from all the groups, in higher or lower ratios. That is why we say a person is prevalently ectomorph, endomorph or mesomorph.

The somatic type represents a genetic inheritance and it cannot be changed. Physical exercise and aging can lead to changes, but not essential ones.

On one hand, there is genetic inheritance and health and a wish to look in a certain way on the other. Genetic inheritance remains as programmed.

Muscular mass can be increased, body fat can be lowered, force, strength, endurance and other motor skills can be developed. At the same time, the functions of body organs and systems increase in quality.

For an effort to be sustained in an endeavor to change all that can be changed in a body, there is also the need for rest and proper diet. Differences among somatic types prove to appear also at a physiological and nervous level.

4. Suggestions

Knowing oneself, one's own traits, traits that are specific and dominant in one's genetic inheritance and somatic type are the foundation for planning proper exercise program and a proper diet in order to get a positive outcome for a healthy life or for athletic performance;

Structural built or breaking records has a direct impact on mental traits and it accomplishes a certain progress in terms of cognitive, affective and volitional manifestations.



With a careful analysis of somatic types, there emerges a necessity to draw up a work-out specific to each somatic type.

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