

THE BODY SCHEME IN PEOPLE OF DEVELOPMENTAL AGE: DISORDERS AND RE-EDUCATION STRATEGIES THROUGH MOTOR ACTIVITY

LO SCHEMA CORPOREO NELLE PERSONE IN ETÀ EVOLUTIVA: DISTURBI E STRATEGIE DI RIEDUCAZIONE ATTRAVERSO L'ATTIVITÀ MOTORIA

R.Minino¹

¹ Department of Motor Sciences and Wellness, University of Naples "Parthenope", Naples, Italy
Roberta.minino90@uniparthenope.it

Abstract

The body schema is defined as an internal representation of the body and its orientation in space. It is often confused with the concept of body image, which is defined as the representation of the image of one's own body. The development of the body schema starts already in the prenatal phase and ends around the age of twelve. A well-structured body schema leads to a good awareness of one's own body and allows an excellent organisation of the motor scheme. However, an incorrect or partial structure of the body schema can cause a series of dysfunctions, which lead to an altered perception of one's own body. These disorders induce a series of alterations in movement, such as coordination, balance, and awareness and orientation of one's body in space. One of the most important strategies for improving body schema disorders is psychomotor re-education. Psychomotor rehabilitation uses movement and play activities, to improve children's psychophysical abilities. The present study shows the importance of a motor activity program that may be included in the school environment from a very early age, in order to promote the development of body structure and self-awareness in both able-bodied and disabled children.

Lo schema corporeo è definito come una rappresentazione interna del corpo e del suo orientamento nello spazio. Esso viene spesso confuso con il concetto dell'immagine corporea, che è invece definito come la rappresentazione dell'immagine del proprio corpo. Lo sviluppo dello schema corporeo inizia già in fase prenatale e termina verso i dodici anni circa. Uno schema corporeo ben strutturato comporta una buona consapevolezza del proprio corpo e permette un'ottima organizzazione dello schema motorio. Tuttavia, un'errata o parziale struttura dello schema corporeo può causare una serie di disturbi, che comportano un'alterata percezione del proprio corpo. Questi disturbi inducono una serie di alterazioni del movimento, come coordinazione, equilibrio, e consapevolezza ed orientamento del proprio corpo nello spazio. Tra le strategie volte a migliorare i disturbi dello schema motorio, una di rilevante importanza è quella della rieducazione psicomotoria. La psicomotricità sfrutta il movimento e l'attività ludica per migliorare le capacità psico-fisiche del bambino. Dal presente study si evince l'importanza di un programma di attività motoria che dovrebbe essere inserita in ambito scolastico già dall'infanzia, al fine di incentivare lo sviluppo dello schema corporeo e la consapevolezza di sé, sia nei bambini normodotati che con disabilità

Keywords: Schema Corporeo; disabilità; attività motoria; età evolutiva; psicomotricità

Body Schema; disability, motor activity, developmental age, psychomotricity

1. Introduction

Body image was initially defined as the image of one's body in one's mind, or, in other words, the way the body appears to oneself (Schilder, 1950). Over the years, many researchers have explored this topic, and this concept has undergone modifications, deepening the definition of body perception. About 50 years later, Slade et al. pointed out that body image consists of a perceptual, attitudinal, affective and behavioural component. Therefore, according to this definition, it is clear that each individual has a body image that includes not only purely aesthetic and external aspects (such as hair colour, complexion and height), but also those related to a more emotional and inner aspect.

The motor image is often confused with the body schema, which is defined as the "overall intuition or immediate knowledge that one has of one's own body, both in a static position and in movement, in relation to the different parts among themselves, and especially in relation to space and the objects that surround it" (Le Boulch, 1966). The first who used the expression 'body schema' was Bonnier, who identified it as the topographic and spatial representation of the body, which allows orientation with respect to the external environment (Bonnier, 1905). It is nothing more than a sensorimotor model that allows postural adjustments and movement. The body schema is the product of the syncretic action of feelings and perceptions of experiences and knowledge, guaranteeing a constant reference to abilities such as the temporal order of events, or the spatio-temporal organisation, that determines an awareness of the known space (Mitchell, 1998). The birth of the body schema concept has been attributed to a document written by Head and Holmes, in which the difference between body schema and body image is specified, defining them respectively as "postural schema" and "superficial schema" (Head & Holmes, 1911). Children with a correct perception of their body schema have a good organisation of the motor schemes, through which they carry out movements in the external environment. However, at the same time, they must have an awareness of their own image, in order not to incur in behavioural disorders linked to a distorted self-image (Simmel, 1966).

Clinical research has shown that there can be modifications or alterations in the body's perception in relation to experiences, memories and emotions, even though the physical knowledge of our body remains unchanged (Minino et al., 2020). Indeed, in the case of the phantom limb, the patient continues to perceive himself as a whole, despite the amputation of a limb, demonstrating a substantial difference between the 'real' and the 'experienced' body (Gurfinkel et al., 1988).

The aim of this work was to analyse the development of the body schema throughout the developmental age, and its disorders. A further purpose of the work was to evaluate the positive effects of certain activities used to improve the perception of the body schema, such as psychomotricity and motor activity.

2. Body schema in developmental age

The body schema begins to form already during the prenatal period, but develops as a result of everyday experiences during the entire developmental period(Scott, 1948).

Through exploration, infants and children learn what their body parts are, how they can control them and how they perceive them during movement. With experiences, the body scheme is able to become more and more identifiable and controllable. The age range in which the body schema develops is from zero to about 12 years, but there are different theories of body schema development. The two main theories are those of Piaget and Wallon-Ajuriaguerra. According to Piaget(Piaget & Gorla, 1979), in his Law of Equilibrium, the development of the body schema occurs due to both the development and, above all, the interaction between the body and its environment. According to Piaget, this occurs essentially through two processes: Accomodation (a process through which the body adapts to what happens in the environment and reacts to events) and Assimilation (through which the body learns a series of information, which are useful for its development). According to Wallon and Ajuriaguerra(Wallon, 1959), the structuring of the body schema occurs in three stages: Lived Body, Perceived Body and Represented Body. Only later, in 1983, Le Bouche adds to the three previous stages a further stage, the Body Affected, which refers to the first months of life, and therefore an earlier stage than the others(Le Boulch, 1966). The first stage, the Corpus Affected, refers to the first three months of life, and refers to the stage in which the child is totally dependent on the mother, and its activities are linked to primitive innate movements (sucking, breathing and archaic reflexes). The Living Body phase runs from 3 months to 3 years. The child begins to use his or her body as a tool for exploring space, through throwing objects, autonomous walking, and acquiring an awareness of self and body. In fact, it is during this period that the child learns the main parts of the body and postures. If the phase of the Lived Body is mainly based on the perception of the external world, the next phase, the Perceived Body, focuses on perceiving one's own body. In short, during this phase, which runs from 3 to 6 years old, there is an in-depth study of one's own body in its entirety and its more complex parts, and orientation in space. Moreover, during motor activity a child shows greater postural control and an improvement in movements aimed at specific purposes. During the last phase, the Represented Body phase, which lasts from 7 to 12 years of age, the perception of the body is developed and becomes a reference point for orientation, and above all for the perception of space, thanks to the assimilation of the concept of three-dimensionality. This consciousness allows a mental representation of the body that is no longer just static, but in movement as well. A greater coordination and precision of movement is evident.

It is clearly a long process that occurs naturally, and is closely related to a variety of factors, called factors of body structuring, which are: space-time structuring of balance (static and dynamic), definition and coordination of laterality, education and control of breathing, tone control, psychosomatic relaxation and sensory-motor coordination(Denes, 1990).

3. Body schema disorders

The physiological auxological processes, during growth, can incur deviations or slowdowns that affect the status that is usually defined as 'normal', creating inadaptations and impairments. In these cases, it often happens that the appropriation of one's body schema is immature in relation to one's age. Many of them do not manage to have a representation of what their body is, or in some cases this representation is altered or distorted (Dolto, 1984).

Bonnier, as previously pointed out, was one of the proponents of the concept of body schema and its differentiation from the concept of body image (Bonnier, 1905). He distinguished and classified a number of conditions in which the body schema could be compromised. These include Hyperschematia, the ability to perceive one's own body parts as larger than their mental representation; Hiposchematia, on the other hand, is the ability to perceive limited space; Paraschematia is the feeling that body parts are distorted, dislocated or separated from the body; and Aschematia is the complete loss of perception of one's own body segments. It is precisely from aschematia that the opposite concept of 'coenesthesia' was born, understood as the general perception, which comes from the totality of bodily impressions (Bonnier, 1905). A few years later, another neurologist, Pick, documented another disorder related to the body schema, Autotopagnosia, which consists of the inability to indicate the individual parts of one's body (Pick, 1908), although later studies led him to attribute this disorder to an alteration of the visual image (Pick, 1922). Subsequently, Autotopagnosia has been given several definitions. De Renzi and Scotti defined it as the inability to integrate different parts of the body into a whole (De Renzi & Scotti, 1970). Semenza and Goodglass, on the other hand, identify it as a disorder of the internal and conceptual organisation of body parts, driven by their frequency of use in language (Semenza & Goodglass, 1985). A further disturbance of the body schema is Anosognosia, defined by Babinski as the ability of a patient to ignore bodily paralysis following brain injury, convinced that he still has the cognitive and motor skills that he has actually lost (Babinski, 1918). All these disorders, according to Russo (Russo, 2000), belong to a broader category, namely disorders of body consciousness, in which there is a distorted perception of the body (Russo, 2000). The phantom limb disorder is included in this category as well.

Russo classifies the disorders of the body image according to their causes. In addition to disorders of body consciousness, he identifies two other categories (Russo, 2000). The first is constituted by disorders of the motor scheme properly so called, the causes of which are related to a lack of afferents (therefore to lesions, cerebral palsies and in blind people), to motor deficits, to information processing deficit disorders (in people with psychomotor delays or mental deficiencies) and finally in specific somatognosic disorders (Digital Agnosia, a disorder of finger recognition and naming, left-right disorientation (DDS), Prosopagnosia, the inability to recognise known people and, in rare cases, even one's own image in the mirror. Another category of disorders identified by Russo, was the one characterized by a dissociation between the neuromotor level and the body experience, which causes coordination deficits, clumsiness, lack of laterality and dyspraxia (difficulty in planning, programming and performing motor acts aimed at a purpose) (Geschwind, 1975).

4. Strategies for re-education of body schema perception

The construction of the perception of one's own body, as previously emphasised, is of a global nature. In fact, if even one of the components is damaged or dysfunctional, this will have significant repercussions, especially if the problems arise during developmental age (Impara, 2019).

In the case of disabilities caused by body schema disorders, there is a need to intervene to try to fill gaps or delays in the children's psychomotor development and to improve their quality of life. Among these, a very valid and widely used methodology is that of Psychomotricity. This therapy, developed by Aucouturier and Lapierre in 1975, consists of a practice that, through movement and play, encourages the genesis of the perception of one's own body, core of the personality, and therefore extremely important for the entire period of development of the body scheme (Aucouturier et al., 1996). Once the very close correlation between mind and body has been learnt, it is intuitive that an improvement in one of the two aspects leads to an improvement in the other (Liparoti, 2021; Wallon, 1959). The objective of psychomotor education is therefore movement management, focusing on different aspects, such as quality, duration, coordination, laterality and position in space (Liparoti et al., 2020; Rucco et al., 2020; Sorrentino et al., 2019). It is through motor skills and through the therapist's instructions that the child will be able to make movements and, above all, that he will learn to be aware of his own body and what he is doing. During the developmental age, however, we cannot overlook the importance of play as a growth and learning factor. Play activity in fact stimulates not only the body, but also brain structures that are in the process of growing (Bechara & Damasio, 2005; LeDoux, 2002; Troisi Lopez et al., 2021). In particular, on the one hand, play promotes children's cognitive, motor and linguistic development (Liparoti & Minino, 2021; Minino et al., 2020), on the other hand it has a social function, improving relationships, cooperation, imagination, memory and motivation (Ciolan, 2013; Lynch, 2015).

A further aspect to be taken into account in order for psychomotricity to have the best results is the environment in which the child grows up and the collaboration between the family, the school environment and the therapist. The network of relationships that is created between the figures surrounding the child is fundamental for observing and assessing the child's needs (Nanetti, 1989).

5. Conclusion

The aim of this work was to analyse the developmental stages of the motor schema in people during their developmental years, and in particular to highlight possible alterations or deficits in the development of self-awareness. Although this topic has been dealt with for several decades, there is still confusion about the difference between body schema and body image. The developmental disorders of the body schema are numerous and each of them presents psychomotor impairments that are now supported and alleviated by psychomotor therapy in childhood. However, since psychomotricity is usually carried out in an age range that goes from the earliest years of life up to about 12-14 years, further studies regarding additional strategies aimed at improving the structuring of the body schema in people with disabilities

may be necessary. One such strategy could be physical exercise, which in addition to inducing countless physical and mental benefits, may be able to improve body perception (Lardone et al., 2018; Liparoti & Lopez, 2021; Montuori et al., 2019; Serra et al., 2021). From this perspective, physical activity can be considered a fundamental ecological strategy that will be included in school contexts from an early age, as it may improve the awareness of one's own body and space circumstances. It also should consider in school setting the adapted and individualised physical activity program for children with disabilities in order to improve their perception of the self-body.

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