

The effects of rhythm-focused psychomotor intervention on the skills of waiting and self-control

An explorative study in Italy with preschool children

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Introduction

Psychomotor intervention intends to support the growth of the person in developmental age based on a global vision of the child and using play and movement as preferential tools in interaction (Cittone, Villani, 2019). Pre-school psychomotor preventive-educational intervention is widespread in Italy and Europe, but there are few experimental studies that testify its effectiveness. In our country, psychomotor prevention is in a poorly defined and often confused territory. A limbo between educational psychomotor skills, aimed at fostering the person's skills and potential and preventing critical behaviors, and clinical psychomotor skills, promoted mainly in care settings.

In this study, preventive intervention is considered in a global sense, without any distinction, with a view to the bio-psycho-social well-being of the population. It can be addressed both to a population that presents specific risk factors and with greater possibility, due to its intrinsic characteristics, to develop specific problems, and to subjects with clear symptomatic signs.

This article presents a research developed within the Biennial International Master of Psychomotricity of the School of Medicine and Surgery of the University of Verona, within the transnational education program dedicated to psychomotor intervention of ISRP, Higher Institute of Psychomotor Rehabilitation of Paris (France), the University of Murcia (Spain) and Ciserpp, Italian Center for Studies and Research in Psychology and Psychomotricity (Italy).

The exploratory work made it possible to identify the positive effect of psychomotor intervention focused on rhythm on specific skills, such as the ability to wait and self-control, highlighted by the literature as predictors of better behavior at school and, consequently, of a more facilitated learning. (Albaret, 2006, Crò et al., 2011b; Jidovtseff et al., 2016; Kambas, Fatouros, Christoforidis, Venetsanou, Papageorgiou, Giannakidou and Aggeloussis, 2010; Kouli et al., 2010; Marouli, Glykeria-Erato, Aspasia and Fotini, 2016; Mas and Castellà, 2016; Pasetto, 2011, Pescari and Popescu, 2012; Spanaki, Grekioti and Skordilis, 2016; Zimmer et al., 2008). The interpretation of the results, while taking into account the objective limits of the study, offers interesting insights for future studies.

Abstract

The article presents an explorative study on the impact of rhythmic psychomotor intervention on the skills of waiting and self-control in pre-scholar age children in Italy. The focus skills are investigated through the analysis of psychomotor indicators, on one side, such as tonic-emotional availability and waiting times and external indicators, and on the other side, such as the knowledge of time concept and the analysis of behaviors at school and home, investigated through teachers and parents. The exploratory work made it possible to identify the positive effect of the rhythmic psychomotor intervention on the body calm, the deferral of satisfaction and the ability to anticipate, highlighted by the literature as predictors of better behavior at school and, consequently, of a more facilitated learning. The study shows that there is a close correlation between the mentioned components and opens a longitudinal research scenario aimed at analyzing the effects that such an intervention can have in preventing behavioral and scholastic difficulties.

Key words: Prevention, psychomotor intervention, rhythm, tonic-emotional balance, cognitive skills, pre-school age

The first part of this article is a brief description of the theoretical establishment that gave impetus to the research.

The second part is dedicated to the presentation of the problem, the objectives of the study and the research methodology: the characteristics of the sample studied, the reference framework in the choice of protocol, the tools and methods of data collection. Being a humanistic approach in a multidisciplinary field, the research uses a mixed methodology, quantitative and qualitative, with a control group. An attempt is made to respect the criteria of scientific rigor while respecting the psychomotor perspective. The third part reports the results obtained through the tests presented and through the questionnaires. Descriptive analysis of data and relationships between variables highlights how rhythm-centered psychomotor intervention affects the ability to wait and self-control and how the two elements are related.

Framework and background of the research

From a psychomotor perspective, instability is seen as the disharmony of and between the constituent areas of the person: motor, cognitive, affective and communicative. An imbalance that is highlighted in terms of tonic regulation (Abramson, 1940; Boscaini, 2000; De Ajuriaguerra, Soubiran, 1959; Wallon, 1959). The unstable child has a very labile modality of interaction, seeks immediate satisfaction, moves continuously and at a higher speed than the context, in which he often has undifferentiated, disturbing behaviors that annoy those who attend (Albaret 1996, 2001; De Ajuriaguerra, 1994). It is difficult to adapt to new environments where exploration is usually chaotic and confusing, not always finalized and appropriate. Families speak of unmanageable children, with sleeping difficulties, in being picked up, in managing daily practices such as getting dressed or rearranging their belongings. These behaviors often lead to conflicts with the school environment (Albaret, 2001; Soppelsa, Marquet-Doléac, Albaret, 2006), and can cause learning difficulties. The unstable child struggles to listen, to concentrate and to persevere in the realization of his schoolwork or to finish his games. He is easily distracted even by non-primary elements and often focuses his attention on irrelevant elements of the task he is doing, losing sight of the main focus of his work. This leads to the impulsiveness of response and action (Albaret, 2006; Russo, 2000): without considering all the information at his disposal, he intervenes by reacting to a first stimulus both at a motor and social or cognitive level. He often makes intrusive or unfiltered interventions at school or in the family and has difficulty waiting his turn in games with peers or adults.

The term psychomotor instability translates a basic disorganization consisting in the individual's inability to maintain an harmonious psychic and motor relationship between his intentions and environmental stimuli (Russo, 2000). The psychological characteristics of the disorder refer to the child's difficulty in emotional-affective regulation (Bergés, 1996; De Ajuriaguerra, 1974; Wallon, 1925) and such emotional experiences of the child are highlighted in body models in which the difficulty of self-regulation is evident: explosive motor skills, difficulties with inhibition and self-control, attention disorders (Boscaini, Saint Cast, 2009).

If the characteristics outlined have always been found to be physiological in some phases of life (Apter, Jaricot, 2004; Boscaini, Saint Cast, 2009; Duchè, 1996; Russo, 2000), today the deficiencies in the ability to wait and self-control are often found more frequently in the population of kindergarten children and may be associated with behavior and learning difficulties (Soppelsa, Marquet-Doléac, Albaret, 2006). Children unable to stop, to listen, to look (Albaret, 1996), always on the move and impulsive are

today about 6-7% of school-age children (Willcutt, 2012) and the difficulty is more frequently if related to the male gender (Elmond, Joyal, Poissant, 2009).

Psychomotor intervention has for long been proposed as a preventive approach to this kind of behavioral and learning difficulties, starting from the assumption that, before coming into contact with reading, writing, and calculation, the child experiences the fundamental concepts of space, time and rhythm in the body and playful dimension. The experience of the body is therefore the basis of the construction of the personality, of the emergence of one's psychomotor identity (Boscaini, Saint Cast, 2012; Cittone, Villani, 2019; Posada et al., 2013) and of the ability to regulate, interpret and express emotions. These elements will influence behaviors and learning, directly connected to emotional exchanges (Boscaini, Saint Cast, 2012). This assumption finds coherence with other new works that recognize a further correlation between the ability to anticipate and defer the satisfaction of the child's needs, strictly dependent on the concepts of time and rhythm, with the concept of attachment, considering the temporal and rhythmic dimensions as necessary elements for controlled and well-regulated behavior (Balleyguier, 1998; Gergely, Unoka, 2010; Parent, Moss, 1995).

According to the scientific literature and the more modern literature about attachment, the infant's ways of relating and interacting seem to be closely related to the infant's early links with the environment (Ainsworth, 1978; Bowlby, 1969, 1973, 1980; Fonagy 2001; Gergely, Unoka 2010; Grossmann, 1999, Vaughn et al. 1992; Trevarthen and Aitken, 2001; Winnicott, 1994). A fundamental concept in the evolution of the person and in psychomotor intervention is therefore the tonic-emotional dialogue (Wallon, 1984). Since birth, the child has a wide range of emotional states and expressions and is subject to continuous swings and tonic fluctuations. It is the responsibility of parents, and of the mother in particular in the first months of life, to offer a firm containment to internal and external changes (Ainsworth, 1978; Balleyguier, 1998; Boscaini, Saint Cast, 2009; Cattafesta, 2018; Vecchiato, 2017). Parent-child bodily exchanges are full of affections and emotions that are expressed in a continuous unconscious dialogue made up of tension and relaxation, approaches and distances, of looks, sounds, beats, which the child's body feeds on and imbues (Boscaini, 2004, 2005; Boscaini, Saint Cast, 2009; De Ajuriaguerra, 1980, 1989; Delion, 2007; Golse, 2009; Gratier, Trevarthen, 2006; Stern, 1977; Wallon, 1925), a dialogue not present in other species (Brazelton, Tronick 1980; Brazelton et al. 1974; Sander 1988; Stern 1985; Trevarthen 1979; Trevarthen and Aitken 2001; Tronick 1989; Tronick 1989; Tronick and Cohn 1989). The innate tendency to seek and maintain relationships organizes the infant's psychological experience and constitutes a motivational force, an experience shared with another human being (Trevarthen, 1998) through the continuous search for stimuli (Bigelow 1999; Bigelow, De Coste 2003; Bigelow, Rochat 2006; Watson 1972, 1985, 1994; Bahrnick, Watson 1985; Rochat, Morgan 1995; Lewis et al. 1990), eye contact (Farroni et al. al. 2002), vocalizations with the mother (Fernald 1985, 1992; Cooper, Aslin 1990), contingent reactivity (Floccia et al. 1997; Johnson et al. 1998; Movellan and Watson 2002; Watson 1994, 1995, 2001), sharing of basic emotional expressions (Bennett et al. 2004, 2005; Camras 1992; Cohn, Tronick 1988; Gergely 2002, 2007a; Gergerly, Unoka, 2010; Gergely, Watson 1996, 1999; Izard, Malatesta 1987; Malatesta et al. 1989; Sroufe 1996; Tronick 1989). These exchanges, inserted in a space-time dimension, favor the mental representation of the body, the body scheme and the image of it.

Thus, for the child's body the notion of time is highly concrete and linked to experience. Time is at the center of every action and every behavior requires a temporal adaptation (Boscaini, 2011). Since being a fetus, the individual has inherited in his own experience time, in its primary meanings of rhythm, presence and absence, waiting. Having already at six months of life hearing capacity, the fetus

is accompanied in its growth by a set of internal noises such as the maternal heartbeat, intestinal and vascular noises, the mother's breathing (Beebe, Jaffe, 2000). With the birth the experimentation of significant rhythmic and temporal activities begins: the newborn that feeds from the mother's breast, the alternation between sleep and wakefulness, the waiting in the satisfaction of a need, the heart and respiratory rhythm. In the temporal experience of the newborn there is therefore only the present, which coincides with the birth of a primary need: hunger, sleep, heat, cold, the need to be contained. From the emergence of any one of these needs to the satisfaction of it, everything passes through the experimentation of waiting, frustration and distress, aspects that will become an integral part of everyone's life and the basis of habits, learning and memory (Boscaini, Saint Cast, 2009; De Ajuriaguerra, 1980, 1989; Fraisse, 1956; Golse, 2009). Everything is captured and internalized by the newborn and forms the basis of the temporal experience.

Rhythm is therefore evident from birth in the alternation between contraction and relaxation of the tonic-emotional dialogue. If the adult responds to the needs of the newborn regularly and in a syntonic way, it will allow the child to remember them, to internalize them and to anticipate them: the rhythmic movement, repeated with regular intervals of pauses, favors the ability to imagine what will happen next (Boscaini, 1997; Boscaini, Saint Cast, 2012; Pasetto, 2011). It is a regular and periodic change in physiological functions (Testu, 1989). The alternation of presence-absence, beat-upbeat, strong and weak accents, full and empty moments, noise and silence, allows the birth of thought, imagination, representation. Rhythm contains all the elements of dialogue and thought (Boscaini, 1995; Pasetto, 2011).

On the basis of these theoretical establishments some fundamental questions arise. Can a psychomotor intervention at kindergarten age as a preventive measure on the temporal and rhythmic dimension, help children to be calm and have self-control? Can a condition of greater calm and self-control improve the child's predisposition to appropriate behavior at school and encourage learning? To answer these questions the study on the effects of rhythm-centered psychomotor intervention on the ability to wait and self-control in children between the ages of 3 and 5 is described below.

Methods

Methodology, problem and objectives

The question of the effectiveness of psychomotor intervention and its demonstrability is definitely an issue that all the founders of psychomotricity posed. The younger generations of European researchers are also facing this problem (Vetter, 2013): attention is mainly aimed at studies based on quantitative methods or at research from other related disciplines exploring psychomotricity as a collateral intervention. The methodology of this study is a mixed one: psychomotor tests and cognitive investigations have the purpose of photographing the initial and subsequent situation of 108 children at school and at home in the psychomotor dimension. Facing with an imbalance that is highlighted in terms of tonic regulation (Abramson, 1940; Ajuriaguerra and Soubiran, 1959, Boscaini, 2000; Wallon, 1959) but also evident in the family and at school (Boscaini, Saint Cast, 2009; Russo, 2000; Soppelsa, Marquet-Doléac, Albaret, 2006) the research uses tools that allow us to find purely psychomotor information on the one hand and external information on the other. The observation during psychomotor intervention allowed the collection of more qualitative information that completed the numerical data

collected. A control group was necessary to isolate the effectiveness of psychomotor intervention by factors of physiological development of the child at this age as far as the notion of time and capacity to wait and self-control is concerned. It was chosen on a random basis. The criterion of blindness was possible for all the figures involved except for those who processed the data (Chiari, 2014; Valagussa, Bonadonna 1999; Zamagni, 2014). The ethical protocol of this study provides that all the steps are clearly defined and known by the actors, including teachers and parents, and that they are formalized in specific documents. The documents rigorously report the objectives of the study, the phases of the study, the procedures, the characteristics in terms of actions, use of space, time (Comunello, Berti, Savini, 2000), the protection of the privacy of the involved minors and clear written consent of the family (Commission for Pediatric Rehabilitation D. Ministry of Health of 26 May 1997).

It is hypothesized that a specific psychomotor intervention focused on rhythm and time helps the child to have a calm body and allows the deferral of the satisfaction of needs and the ability to anticipate, acting on the normal trajectory of development and improvement typical of this age. It is also hypothesized that the ability to wait and anticipate favors the reinforcement of cognitive actions, and a greater harmony between cognitive and affective-bodily skills.

The study is conducted with short and long term objectives:

- (I) Identify a profile of normal-gifted children with common psychomotor characteristics within the framework of psychomotor instability, differentiating themselves from children with ADHD and analyze the effects of rhythm-centered psychomotor intervention on their ability to wait and self-control;
- (II) Outline a precise psychomotor intervention protocol focused on rhythm and time, demonstrating its effects on the elements related to them such as waiting and self-control;
- (III) Verify in an adequate time of at least three years if the effects outlined in the short term study are more evident and any correlation between the considered variables;
- (IV) Verify if constant and continuous psychomotor intervention, in the long term, can be valid in terms of prevention of behavioral and learning difficulties;
- (V) Verify in the long term whether this intervention can be also useful as a preventive measure to the diagnostic process of ADHD.

To answer the first question, an analysis of parameters such as the knowledge of temporal notions, the ability to adapt to time, the ability to self-control and tonic-emotional regulation before and after the psychomotor intervention is provided

As far as the second issue is concerned, it should be noted that the research took place over a period of one year, a period not sufficient to evaluate the secondary effects on learning, but sufficiently valid for the purpose of analyzing the effects of psychomotor intervention on waiting capacity and self-control.

Data collection took place through the use of data tables created especially for the study and a video camera to measure times as faithfully to reality as possible.

The data analysis is carried out by studying the correlation between psychomotor variables such as the knowledge of temporal notions and the ability to spontaneously relax with the analysis of behaviors at home and at school before and after psychomotor intervention. The statistical tools used are the descriptive statistics and the independent sample T-test.

Sample and protocol

The study focuses on a sample of 108 children from northern Italy, boys and girls aged between 3 and 5, attending the first and second year of kindergarten, divided into four groups, two treating and two control units structured as follows:

1. Working group 2014: made up of 28 participants aged between 4 and 5 at the time of the study, of which 17 were females and 11 were males. The children are Italian. One male belongs to a family of Brazilian origin, two females belong to families of Eastern European origin;
2. Control group 2014: made up of 28 participants aged between 4 and 5 years at the time of the study, 17 were females and 11 males. The children are Italian. A male and a female belong to families of Eastern European origin;
3. Working group 2015: made up of 26 participants aged between 3 and 4 at the time of the study, 15 females and 11 males. The children are Italian. A female belongs to a family of Eastern European origin;
4. Control group 2015: made up of 26 participants aged between 3 and 4 years at the time of the study, 15 females and 11 males. The children are Italian. A male belongs to a family of Eastern European origin.

Children with 104/92¹ certification or related diagnoses were excluded from the study. Children who already followed a continuous and structured path linked to the musical and rhythmic area did not participate in the study.

The territorial context of the groups is a medium-sized town with an industrial and agricultural economy, with a notable development of a tertiary sector, even of an advanced type. As far as socio-cultural characteristics are concerned, families see, in 92% of cases, the work commitment of both parents. They belong to an upper-middle socio-economic class with a monthly family income between 2500 and 5000 euros. 68% belong to the categories of freelancers or entrepreneurs, the remaining 32% to the categories of employees. 83% of parents have a degree. The remaining 17% have a secondary school or professional school diploma.

Being rhythm an element inherent and widely used as mediator in psychomotor intervention (Oliosio, Boscaini, Moro, 2015; Pasetto, 2011), it was necessary to have an intervention protocol deeply centered on rhythm, not only in the experiences proposed but also in the approach and setting (Albaret, Soppelsa, 2006). The protocol is described hereafter in its general outlines:

- the psychomotor intervention is carried out by a single operator;
- the work session is oriented to the cadenced repetition of short-term experiences. Both succession and the time spent on each one are determined in advance and objectified by a large clock or a time measuring instrument visible to children;

¹ Law 104/92 identifies in Italy a person with disability who shows a physical, psychic, sensorial, stabilized or progressive handicap, which makes troubles in learning, in relationships, working integration and at the same time such as to determine a social disadvantage process or exclusion.

- the operator has the task of anticipating and explaining in a rhythmic way the alternation between listening and playing moments. The listening moment is proposed as an independent experience, necessary to allow children to fully go through the next playing moment;
- the material necessary for each experience is shown only shortly before use, in order to facilitate attention and limit distractions;
- experiences are repetitive in the general frame. To avoid getting used to and favor the ability to listen, the situations are regularly renewed through to the use of various colors, different sizes of objects and the introduction of further playing elements or instruction;
- rhythm must be kept regular during the session: the psychomotor therapist must actively participate, know how to manage the group, constantly reinforce the indications on the listening-play alternation, more than is usually done in the session;
- a balance between activity with a predominant perceptual component and activity with a strong motor component is sought (Albaret, Soppelsa, 2006);
- at the beginning of the session children are asked to explain their favorite experience of the previous time and the rules that allow the meeting to run smoothly are repeated.
- the proposed experiences follow a general structure: welcoming game, listening, sense-motor experience, listening, music/inhibition-movement experience, listening, relaxation experience, listening, motor experience, listening, rhythmic structure, listening, rhythmic processing, closing greeting;
- The closing greeting is a rhythmic ritual that is repeated at each session.

The work with an intern and the use of a video camera offer the opportunity to observe the behavior of children and to collect valuable information and qualitative data on the relationship with the psychomotor therapist and on the latter's approach, which will thus constantly monitor times, rhythms and methods of instructions, in order to proceed correctly.

Field of work

The study was carried out in four steps using different tools. The study period lasted one year, from September 2018 to September 2019.

Phase one: sample and test administration

The first phase began in September 2018, a period in which the study sample was chosen and divided into a working group and a control group. The two groups were divided into four groups of intervention of about 12/13 children each, for a total of eight groups. In this phase, the first tests were administered to assess the current state of the following indicators: knowledge of temporal notions, temporal adaptability, ability to self-control, tonic-emotional regulation.

The tools described below were used.

Cognitive survey reserved for parents

A questionnaire where questions focused on the child's behavior at home (Conners, 1997; Vanderbilt, 2002). Created specifically for this study to investigate expectancy and self-regulation behaviors between the ages of 3 and 5, it is based on three specific areas: the area of daily behaviors, the play and activity area, the emotional and adaptation area. Parents were asked to answer each question by reporting the frequency with which the behaviors appeared in their child.

Cognitive survey reserved for teachers

A questionnaire where questions focused on the child's behavior at school (Conners, 1997; Vanderbilt, 2002). Created specifically for this study to investigate waiting and self-regulating behaviors between the ages of 3 and 5, it is based on three specific areas: the area of daily behaviors, the play and activity

area, the emotional area and of adaptation. The educators were asked to answer the questions for each child indicating the frequency with which the behaviors appeared.

Knowledge of temporal notions

A table was created for this study in which the main temporal concepts typical of the age between 2.6 and 4.6 years were inserted (Vaivre-Douret, 2006). In this table it was noted for each child whether the concepts were present or absent at the time of administration of the test.

Quantitative and qualitative tone analysis

The passive mobilization test was administered to individual children to verify the tonic dialogue and the capacity for emotional self-control and expectation (Soubiran, Coste, 2009). The table for the quantitative analysis of the tone is divided by indicators such as availability, extensibility, paratonia of action and background, synkinesias. Each indicator was assigned values based on the answers received from 0 to 3 whereby 3 indicated total immobility and complete block and 0 indicated maximum fluidity.

Measurement of waiting times

Waiting times were measured through the use of a video camera. The initial moment of the session was resumed. The children formed in a circle were required to participate in a simple dialogue passing an object: the holder of the object could respond. The time in which each child tolerated waiting for their turn to speak was measured. The following were considered indicators of impatience: the maintenance of the required posture, the failure to respect the turn by intervening without the possession of the object and the dismissal from the game.

Phase two: psychomotor intervention

The second phase of the study took place in the period between January 2019 and June 2019 for a total of six months. The intervention project took place once a week with sessions lasting 45 minutes, each for a total of 50 days and 25 sessions for each group.

Phase three: re-administration of tests

The third phase began in July 2019, a period in which the tests to evaluate the indicators were administered again: knowledge of temporal notions, capacity for temporal adaptation, capacity for self-control and tonic-emotional regulation.

Phase Four: Statistical Analysis of Data and Results

The analytical approach was divided into different phases in order to provide a photograph of the ability to wait and self-control of the children before and after the preventive-educational psychomotor intervention that was as objective as possible: descriptive data analysis and descriptive analysis of relationships between variables. Given the limited time and resources available for research, the simplification of data and variables became necessary.

Results

The data collected through the questionnaire administered to parents provided information on the growth rate resulting from the psychomotor intervention for each child. If the two different ages are compared, regardless of the placement in the two groups, it can be stated that psychomotor intervention had a greater influence on the behavior at home of 4-year-olds compared to 3-year-olds. However, the data showed that, for both ages, there is no statistically significant difference between the work group and the control group.

The data collected through the questionnaire administered to the teachers is informative about the growth rate resulting from the psychomotor intervention for each child. With regard to both 3-year-olds and 4-year-olds, there was a significant improvement in behavior at school with a statistically significant difference between the working group and the control group: the teachers noted that the psychomotor management of the work was more effective than the control group (figures 1 and 2).

Figure 1
Distribution treat and control group 3 yrs
before and after intervention according to teachers

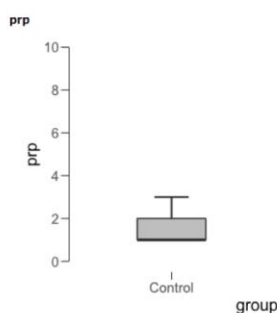
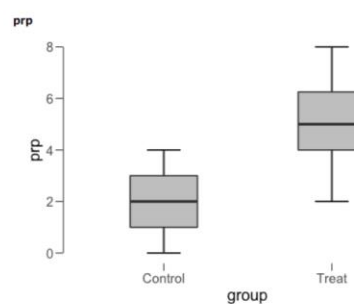
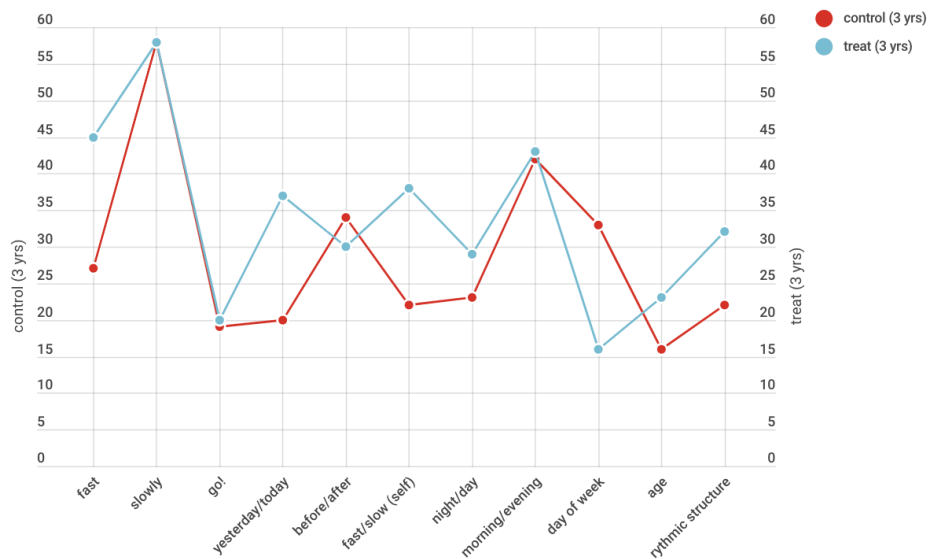


Figure 2
Distribution treat and control group 4 yrs
before and after intervention according to teachers



The data collected relating to knowledge of temporal notions refer to the presence (1) or absence (0) of the single notions in the group. The percentage growth index of the single concept was calculated for each group by comparing the number of children who acquired the concept before the psychomotor intervention with the number of children who acquired the concept later. The average percentage of the totality of notions is also calculated. The working groups and the control groups divided by age were then compared. The comparison between the groups shows that over all the working group has acquired more time notions both for the three years (34.90%) and for the 4 years (28.45%) compared to the respective control groups (22, 22%; 27.12%). While for 4-year-olds the trend is similar and there are no major differences, a substantial difference emerges in the acquisition of some concepts for 3-year-olds: fast (in movement), yesterday / today and fast / slow (object and self) seem to be the concepts in which the psychomotor intervention had a greater impact than the control group. In fact, it is between the ages of 3 and 4 that these notions begin to be understood. The data shows that intervening in psychomotor skills in such a targeted way has favored the acquisition, from a conceptual point of view, beyond the normal trajectory of development and improvement typical of this age (figure 3).

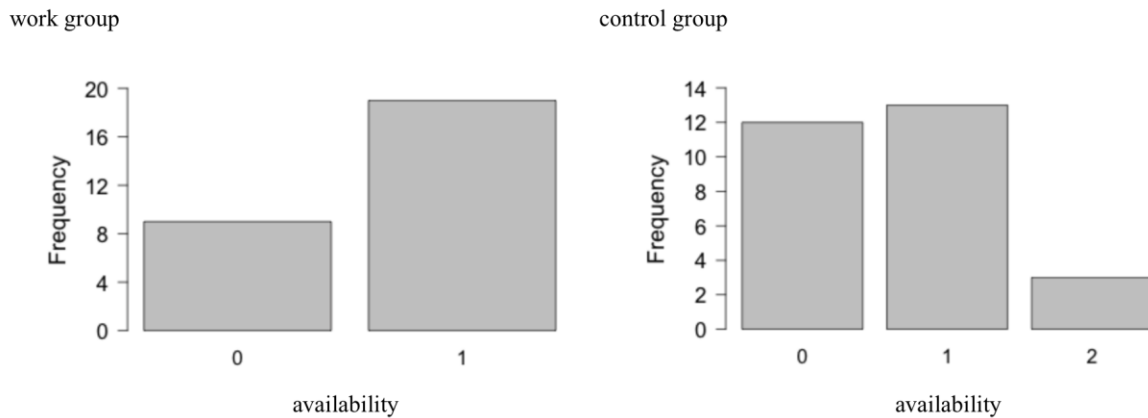
Figure 3
Comparison percentage index of growth 3 yrs



In the quantitative and qualitative tone analysis the data collected through the passive mobilization test were divided and analyzed for single indicators: availability, extensibility, action paratonia, background paratonia, synkinesis.

With regard to the availability and extensibility indicators: there is a generalized improvement both in the treat group and in the control group, with particular evidence in 4-year-old children, which is confirmed by the data relating to the difference in the average score (mean) of the groups before and after intervention. The pre-intervention mean is significantly higher than the post-intervention mean, demonstrating that the intervention had the effect of improving the fluidity of the children's tone. Another significant data, which confirms the hypothesis of a greater internal change in the working groups compared to the control groups, is the frequency of the minimum and maximum score obtained in the two different periods by the members of the groups, with particular relevance for the availability indicator (figure 4).

Figure 4
Comparison frequency minimum and maximum score in treat and control group
after intervention for availability in 4 yrs old children



With reference to the action and background paratonia and synkinesis indicators, a generalized slight improvement is highlighted both in the treat group and in the control group, with greater evidence in 4-year-old children, which is confirmed by the data relating to the difference in the average score (mean) of the groups before and after the intervention. The pre-intervention mean is significantly higher than the post-intervention mean, demonstrating that the intervention had the effect by acting on resistance and impediments. This reflects the evolutionary criterion typical of the preschool age. The tone is still in the maturation phase so the data confirms that for the 3-year-old children the improvement is almost imperceptible, more present in the 4-year-old group and especially in the tests post-intervention, a period in which some children had already turned 5, the age in which paratonia and synkinesia should fade. With regards to the measurement of waiting times in children of 3 and 4 years, there is a significant improvement in motor control over time. In both age groups there is a statistically significant difference between the treat group and the control group: the children in the work group were able to wait more seconds than the children in the control group, showing that they acquired greater motor control over time. The average score of the improvement index of waiting times are also relevant (figure 5)

Figure 5

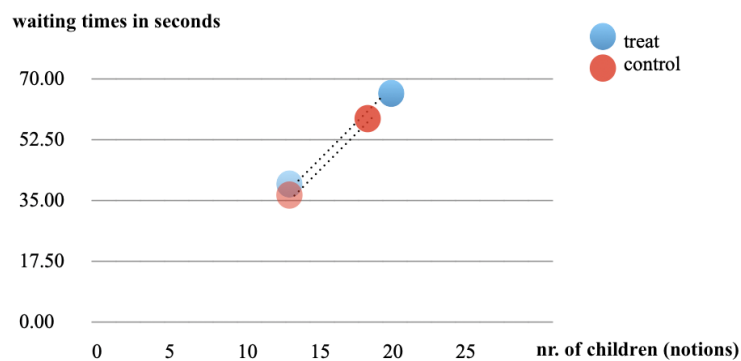
Comparison means treat and working group for improvement index og waiting time in seconds

GROUP	TREAT	CONTROL	DIFFERENCE
3 yrs	28,92	15,81	13,11
4 yrs	93,32	36,42	56,9

The indicators of waiting times and knowledge of temporal notions prove to be closely related. It is shown, by way of explanation, in the following graph (figure 6), that as the body control and ability to wait improve over time, the number of children with knowledge of the temporal notions foreseen by age increases more than proportionally.

Figure 6

Correlation between average of waiting time and average of knowledge of temporal notions in children 3 yrs old in treat and control group



Conclusion

The ability to wait and regulate is a psychomotor and behavioral manifestation of the emotional bond that the child has built with the mother. This emotional bond is closely linked to the experience of rhythm and tonic-emotional dialogue that is established in the first months of life.

In all the samples of this study it is evident how rhythm-centered psychomotor intervention influences the ability to wait and self-control, to a different extent by age and with various intensities in the variables considered. The treat group shows more positive data for each variable than the control group, albeit, in some cases, with a minimal difference, not significant from a statistical point of view. If indicators such as school behavior, knowledge of temporal notions and motor control show relevant evidence of the effects of rhythm-centered psychomotor intervention on waiting and self-control, other indicators appear weaker: behavior at home and muscle tone.

What therefore emerges clearly from this study is that, as a preventive measure, the psychomotor intervention of 6 months is not sufficient to have quantitative data statistically relevant for such profound aspects as the tonic-emotional function and the relationship with the parents. The limited time available certainly affected the results.

The initial questions were partially answered. What impact can rhythmic psychomotor intervention have on waiting and self-control? Does a specific psychomotor work in preschool age on rhythm and time help the child to calm the body and allow the deferral of the satisfaction of needs and the ability to anticipate? Does the ability to wait favor the reinforcement of cognitive actions, a greater harmony between the cognitive and the affective-bodily sphere?

Analyzing the data and the single variables it emerges that the study time, and especially of the intervention, was sufficient to notice some changes, positive for all the groups and significantly for the treat group. It therefore made it possible to positively answer the first two questions.

However, it was not sufficient to fully understand the correlations between all the variables or other relevant aspects such as any gender differences, or which areas of behavior at home and at school where the greatest incidence emerges.

To respond to the secondary hypothesis of harmony between the cognitive and the affective-bodily spheres, it is necessary to analyze the effectiveness of this approach in the long term. Some questions remain open that the author would like to answer in the coming years: can this approach be useful as a prevention for behavioral and learning difficulties? Can it also be used not only in physiological instability but also as a prevention of ADHD and behavioral difficulties?

The data of this study constitutes a solid basis from which to start a longitudinal study on the effects of psychomotor intervention focused on rhythm, on the waiting and self-control skills of preschool children and on the correlation between body calm and cognitive improvement. The research will therefore continue in the next 3 years, accompanying the children to primary school to verify the above hypothesis.

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