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Impact of digitalisation on social relations: research, reflections and proposals for intervention.

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Abstract: The growing use of digital devices brings risks, such as emotional and social isolation, as well as identity fragmentation. This can hinder the development of key skills such as empathy and relational skills, compromising the quality of human interactions. The "virtual connection" tends to reduce active participation in group life and negatively affects motor skills. To counteract these effects, the Body Percussion emerges as an innovative alternative, encouraging direct and authentic interactions among young people. The research conducted in schools in Campania and Lombardy involved students in Body Percussion activities, with the aim of evaluating its impact on social and emotional development. The observed results show a significant improvement in social cohesion, inclusion and activity appreciation. Body Percussion stimulates emotional participation and strengthens interpersonal ties, promoting pro-social behaviours and encouraging collective work. Integrating Body Percussion into the physical education curriculum could provide an effective response to the negative effects of digitisation, helping to build more cohesive and resilient communities, and fostering active and collaborative learning models. In a technology-dominated environment, it is essential to recover forms of concrete and meaningful interactions.

Keywords: fragmentation of identity; digitization; body percussion; direct interactions; prosocial behaviours.

1. Introduction

In the digital age we live in, young people are immersed in an environment where continuous interaction with technological devices tends to promote emotional and social isolation, especially where it is excessive (Turkle, 2011). Some surveys have shown that the use of the Internet can have a positive impact on social involvement, reducing the perception of loneliness (Hamburger & Ben-Artzi, 2000) and increasing the feeling of support (LaRose et al., 2001), but other studies have highlighted the complexity of the subject, showing that contrary to what one might think, the use of

the Internet can generate loneliness. Le persone che si sentono sole tendono a rifugiarsi nel mondo virtuale anziché cercare relazioni in presenza, il che può portare a un isolamento sociale crescente (Kim et al., 2009; Bong-Won & Kun Chan, 2011; Biolcati & Cani, 2015). In contemporary times, this hyper-digital connection has led to an increasingly evident fracture between the body and mind of children and adolescents, affecting not only their motor development, but also their ability to relate in a deep way with the real physical world. Excessive exposure to electronic devices, which in many cases replaces free and spontaneous play, is one of the main causes of this fragmentation as observed by Livingstone et al. (2023) and can affect the healthy psychophysical development of children (Whiting, A., & Symon, 2020). Prolonged use of screens reduces opportunities for real interaction, often limiting the experiences of human contact that are essential to developing empathy, sense of belonging and social cohesion, especially in adolescence.

This "virtual connection" often leads to a lack of active participation in group life, reducing the possibility of shared experiences and developing a sense of community and compromising the building of links and relationships, and negatively affecting motor skills. The absence of regular physical activity and prolonged exposure to screens have been associated with a reduction in motor coordination, body awareness and general well-being (Carr, 2010). In addition, the increased use of electronic devices by children has led to a sedentary lifestyle with less time spent on outdoor play and physical activities (Fogliata, 2024). Therefore, increased physical activity from early childhood decreases the likelihood of developing overweight and obesity and is correlated with improved motor skills, psychosocial health and cardio-metabolic health parameters (Gentier et al., 2013). Recent studies show that time spent in front of screens can impair the development of motor and cognitive skills by negatively affecting the ability to concentrate and problem-solve (Webster et al., 2018). Excessive use of smartphones, tablets and computers not only reduces the quality and frequency of face-to-face interactions, but also leads to an erosion of the ability to connect emotionally with others, altering the way social relationships are experienced (Przybylski & Weinstein, 2019). The isolation caused by "virtual connection can generate the risk of incurring experiences of cyberbullying that condition the relationship with others also in reality and can increase the risk of social withdrawal. A group of researchers from different countries, in the article The Online Brain: How the Internet May Me Changing Our Cognition published in the journal World Psychiatry, claim: "We are in the age of the internet, smartphones and tablets, the age of being connected anytime, anywhere, and something is changing in our heads and some brain areas would be boosted while other faculties would be weakened." Our brain is experiencing attention fragmentation, the development of multitasking

(which promotes distraction and lack of concentration), the weakening of memory, mental fatigue due to an overload of stimuli, the development of stress and depression, alienation from society and addiction. Psychologist Nekeshia Hammond says that the use of online platforms could affect dopamine levels, the brain's "reward center," increasing the social media's desire for immediate gratification. This cycle of immediate gratification can make it difficult to stop using the platforms, leading to compulsive behavior: over time, the individual may develop a real addiction. He also points out that, rather than focusing on work or family commitments, many people devote more and more time to social media, which end up invading their day and accustom the brain to constant and obsessive control. Social media, therefore, are taking a dominant role in the lives of young people, sometimes becoming a kind of addiction. Still the scholar Luciano Floridi argues that developments in information and communication technologies are changing the answers to fundamental questions such as "who we are and what relationships do we establish?" These questions are proof that a reflection on the subject is necessary to assess its risks and to find a remedy.

2. The digital age for children and adolescents: in search of body identity.

Today technology is a central element of daily life, it continues to transform profoundly our relationships, our way of being and our perception of the world. Digital technologies, such as the internet, social media, smartphones and online communication platforms, have created an environment where we are constantly connected to a vast network of people and information, often across physical and temporal boundaries.

Erikson as a social psychologist addressed the identity of the individual, highlighting how it develops in the context of individual experiences. He treated identity as a process through which a link is created between the community and the individual. Erikson's thought thus emphasizes that identity is the result of a continuous adaptation and negotiation between the internal dimensions of the individual (his abilities and desires) and the external expectations coming from society (the social roles and opportunities offered). This process is never static, but evolves over the course of life, because the individual is confronted with new experiences, changes and challenges which influence his self-image and how he fits into society. (Erikson, 1968). According to Erikson, identity emerges as a "stable formula" of self-definition that is built at the "point of intersection" of three fundamental aspects of existence: the physical capacities of the individual, his aspirations and opportunities, and the social roles and careers society offers them.

The lack of integration of these three dimensions has caused the diffusion of identity, "that is to say the inability of the individual to orient himself". So, identity is formed through interaction with the social world, but today this interaction is often filtered and distorted by virtual reality, leading to a disconnect between self-perception and the social image itself. The search for bodily and personal identity is a subject that involves man, since it allows him to define himself in the context in which he lives. To seek one's own identity means to seek those values, those ideals, that way of responding to certain circumstances that make it unique. The individual feels the need to find a stable and unchanging element within himself, precisely because he realizes that he has multiple facets and multiple corporeality. The theme of the decadence of identity, which was already imposed in the first decades of the twentieth century, with Freud, Pirandello, Svevo can now be considered amplified. In the digital society, in fact, the loss of identity has intensified and turned into conformity and banal appearance with the risk of fragmentation of identity.

Through progressive and increasingly decisive adaptations and adjustments, it becomes more and more difficult to "be" simply a body. The problem is not in itself that you must constantly change your image to keep your visibility high, but that you also need to maintain a balance between the body's aesthetic, its organic dimension, what is shown and the other three dimensions: the social/symbolic, the psychic and the sensory. The continuous need to adapt and modify one's image to gain online visibility can fragment one's identity, creating a gap between physical and virtual reality (Digennaro, 2021). A body without identity underlies and anticipates an individual without identity (Digennaro, 2022). All this immersion in virtual reality, has led to a "saturation" of experiences, or an exponential increase in the relationships and realities with which we are immersed. The concept of "saturated self" described by Gergen (2001) is precisely this phenomenon: the individual finds himself immersed in a multiplicity of links, visions, opinions and expectations that often seem incoherent or contradictory. Technologies, while offering new opportunities for communication and connection, also multiply the possibilities of distraction and fragmentation of identity. The person is continually exposed to stimuli, judgments and obligations, which make it more difficult to conceptualise in univocal terms. In other words, we live in a world where access to multiple realities and voices makes us less secure and more susceptible to confusion and doubt about truth and reality; this technological condition also has effects on interpersonal relationships. The immediate availability of communication with an unlimited number of people reduces the time and attention we can devote to a single relationship, bringing less emotional intensity and a weakening of authenticity in

interpersonal connections. There is a progressive reduction in commitment and depth in relationships, which is reflected in the difficulty of maintaining stable ties. Between the fragmentation of identity, that twentieth-century scholars like Pirandello claim and the digital society in which we live today, the young must be able to understand what his personality is and what kind of life he wants to live. Society thus proposes models that the young man, disoriented and inattentive, pursues, naively adapting to the system that imposes the mass. The current problems are thus revealed: consumerism, individualism, nihilism, agnosticism, loss of identity. Again, the theme of identity building in relation to developments in media technologies is crucial in an educational context that addresses contemporary social and cultural challenges. (Patte, 2011). In an environment characterized by both "real" and "virtual" connections, it is essential to ask how these aspects influence the processes of discovery and identity construction in young Internet users. Today, "being" also means "being connected". For young people, the lack of connection can be a kind of invisibility. This invisibility is linked to the danger of a fragmentation of identity, caused by the constant flow of requests for friendships, tweets, hashtags, posts and "likes" on social media. To continue existing in the current context, there is a need to maintain connections, with the danger of failing to manage the complexity of the identity that comes with it. As regards the problem of self-image, it is necessary to structure an educational curriculum that takes careful account of the risk of identity multiplication, through inclusive and shared participation processes that can help young generations bridge the gap between widespread computer literacy and poor resilience to the fascination of identity multilifting (Turkle, 2011).

Psychological research on the effects of social networks highlights both positive aspects, such as the possibility to connect during the isolation of the pandemic, and negative ones, such as anxiety, social withdrawal, alteration of self-image, narcissism and depression resulting from their spread. (Di Nuovo & Patti, 2020). In recent decades, there have been significant social changes in Western society, resulting from an increase in competition and individualism at the expense of collective goals and values. Moreover, the speed of these changes is constantly increasing. The emergence of new information technologies, especially social networks, helps to explain this phenomenon. In the contemporary western world, individual values are increasingly valued, influencing the expression of narcissistic personality traits, which, once considered unsuitable, can now be rewarded and even encouraged. Although no definitive data exist, several studies link the strengthening of narcissism with the use of social networks (Quaranta et. al., 2022).

Some of the data from the XIV edition of the Save the Children's Atlas of At-Risk Childhood, entitled Digital Times, explores the opportunities and risks that children and adolescents are facing in the new revolution of on life and a real and virtual life, Highlighting the highlights and shadows of digital overexposure and arguing that in Italy, children who use a smartphone or are approaching digital age is increasingly being lowered. The time spent online among adolescents is growing; at the beginning of 2023, almost half (47%) of the 3,400 11-19 year-olds interviewed on the occasion of the Safer Internet Day said to spend more than 5 hours a day online (it was 30% in 2020) and 37% check their smartphones more than ten times a day (Digital Times. Save the Children's XIV Atlas of Childhood at Risk, 2023). Furthermore, it is worrying that today there are behaviours that lead to an addiction to technology, such as excessive use of social media or online games that are linked to an increase in social anxiety, depression and impulsivity (Twenge & Campbell, 2018). They can also have a negative effect on sleep quality and academic performance (Hale & Guan, 2015). Intensive internet use is also associated with an increased risk of overweight or obesity, mainly due to a sedentary lifestyle) and poor eating habits related to over-connection (RSPH, 2019). In Italy, the number of obese or overweight boys and girls is increasing, especially in the South, with Campania recording the highest rate. Here, the percentage of young people aged 6-17 who use their mobile phones daily reaches up to 83%, and practice less sports activity. Various authors such as Stefano Merlano, Marta Buoncristiano, Pietro Gelio and others in the article entitled "Physical activity, screen time and sleep duration in children aged 6-9 years in 25 countries" emphasize that opportunities for young people to participate in daily physical activity should be increased, as well as solutions to address excessive screen time and short sleep duration to improve health physical and mental well-being and the general well-being of children. Finally, the musical motor game of Body Percussion is proposed because in the execution of body rhythms together, there is no competition; on the contrary, it is essential to develop a deep attention to others and to oneself. The activities are designed in such a way as to stimulate each participant to improve themselves and relate to the other members of the group.

3. Educational strategies: Body Percussion

In this context, new educational strategies are emerging which aim to counter the negative effects of technology through activities that promote physical and social interaction. For this purpose, the technique of Body Percussion can be used to play motor-musical laboratory and group games, to counteract these effects and promote a balanced growth. Body Percussion is a rhythmic technique or rather a teaching

system of rhythmic character where are integrated, from a pedagogical point of view, the corporal percussion, the movement, the sound and sometimes also the voice. Body Percussion as an active didactic and educational practice of educational action is a type of activity that can bring positive changes to people, but also to the mentality as it is a process-based and dynamic educational process (Mazzella & Ambretti, 2023). Some studies have pointed out how music evolved from the first manifestations of ritual and religious type, integrated into ritual ceremonies such as worship, weddings, funerals or preparations for hunting or fighting (Macintosh and Dissanayake, 2006) in a tool that promotes social bonding and group cohesion, ultimately increasing pro-social behaviour and cooperation within the group (Kirschner & Tomasello 2010). Body Percussion, a technique that has its roots in an ancient percussive practice, which uses the body as a musical instrument and which, integrated into motor education, can promote the development of motor skills, cognitive and relational skills of adolescents and can constitute a new educational strategy. Body Percussion stimulates coordination, active listening and collaboration, promoting physical contact and movement synchronization, thus strengthening the social connection between participants (Zatorre et al., 2007). Several studies suggest that the integration of physical-musical activities such as Body Percussion in schools can improve sociability and the ability to work in groups, reducing digital isolation (Kirschner & Tomasello, 2010). At the same time, it has been suggested that this practice can develop useful cross-functional skills throughout life and improve executive skills. Body Percussion is a significant activity in school physical education, since it promotes the development of coordination and motor synchronization, requiring precise control of the body to create rhythmic sounds. It also stimulates concentration and attention, as students must be present and focused to perform the exercises correctly. Finally, in performing body rhythms together, there is no competition; on the contrary, it is essential to develop a deep attention towards others and oneself (Barone, 2016). The workshop activities are designed to encourage each participant to improve and relate to other members of the group. This approach promotes teamwork and collaboration, as participants need to coordinate with each other, learning to listen and respect the timing and roles of others. This develops skills essential for teamwork and promotes pro-social behaviour. Precisely for this reason, in the music therapeutic field it is used to promote social integration in general and especially at school and prisons and is also used for the re-appropriation and perception of one's own body, in creative and communicative group expression and rehabilitation. Based on the belief that rhythm and music associated with percussive movement promote resilience, reduce emotional distress, promote social connection and improve the person's overall

well-being, several studies show that music increases the release of endorphins in the brain, improving positive feelings and decreasing the sense of anguish, fear and sadness by mixing sound, the perceptive, the motor and the affective creating a group atonement favouring well-being. In this context, the study conducted by the team of Valorie Salimpoor (2011), McGill University of Montreal, published in the journal Nature Neuroscience which has discovered that listening to your favourite music gives rise to sensations typically induced by other activities or substances that give pleasure: In fact, it changes the rhythm of breathing and our heartbeat, creates changes in our body temperature causing a real sensation of pleasure; in this phenomenon are involved endorphins and dopamine. For all these reasons, it is desirable to introduce the game of Body Percussion in school curricula. This proposal has been developed through an action-research, aimed at highlighting how, thanks to the rhythmic and bodily potential, it is possible to recover that network of sociality and relational that has been progressively lost due to virtual relationships.

4. Research-action in schools.

The present study aimed to analyse the effects of the integration of Body Percussion in education, through action research conducted in schools in Campania and Lombardy, through the creation of a targeted work protocol and systematic pre-post intervention evaluation in adolescents (Zatorre et al, 2007). The hypothesis considered is that body music, specifically Body Percussion, brings significant benefits to children's balanced growth, both motor and cognitive, as well as relational (Zatorre et al., 2007). Thanks to this activity that by its nature stimulates and strengthens the interconnection with each other through the body, we wanted to evaluate how it can counteract the negative effects of excessive digitization of children and adolescents.

5. Instruments and methods.

A behavioral analysis was conducted on specific areas: socio-relational (Costa, 2010), expressive-emotional (Rosa & De Vita, 2017) and cognitive-motor (Millman et al., 2021) in line with the "Life skills" in the educational field (Sala et al., 2020). To do this, we used observation and evaluation questionnaires administered before and after the surgery. The three-question macro area questionnaires were developed specifically for experimental research and are divided into 8 macro areas of interest: emotion, cohesion, liking, technique, inclusion, involvement, respiration and technology, according to the criteria of thematic analysis (Braun & Clarke, 2006).

For each question, each body percussion expert involved in the trial provided a quantitative assessment using a five-point Likert scale (Miles & and Huberman, 1994; Taylor and Bogdan, 2000; Krippendorff, 2002). The experts' answers were studied as an average value of three values assigned over a maximum distance of 24 hours to reduce any inherent standard errors in the evaluation.

5.1. Example of task planning

The analysis was carried out on a sample of 59 pupils (mean age = 9.5 years; DS=+-0.8) divided into two groups: experimental group (39 pupils- Body Percussion) and control group (20 pupils- Coordination). The groups were comparable in terms of age and gender.

The first experimental group performed Body Percussion sessions, inserted in the lessons of motor education, children interacted with each other with bodily percussion coordinated to music and sometimes singing. The control group conducted complementary sessions to the experimental group but based on motor coordination exercises (without music or body percussion). (Table 1).

Table 1.

Time (minutes)	Activity	Experimental Group (Body Percussion)	Control Group (Coordination)
0-5	Introduction	Explanation of the activity and objectives	Explanation of the activity and objectives
5-10	Warming	Rhythmic warm-up exercises	Warm-up exercises
10-20	Main Stage - Part 1	Simple rhythmic sequences (4 bars) with hand and foot percussion	Basic coordination exercises (e.g. jumps and movements)
20-35	Main Stage - Part 2	Memorizing a more complex rhythmic sequence (entire song) in a group with music	Advanced motor exercises (e.g. cross movements)
35-45	Sharing	Group performance with rhythm and synchronization	Group exercises for coordination

45-50	Conclusion	Activity feedback and rhythmic relaxation (breathing)	Activity feedback and muscle relaxation

The experimental action research was carried out over a period of 12 weeks, during which two weekly meetings lasting approximately 40 minutes were held. No child was excluded from the trial and all children completed at least 90% of the lessons. All children were required to maintain their daily behavioural habits during the trial period. The four macro-areas of experimental interest (Cohesion, Liking, Inclusion, Emotion) were analysed. Data were analysed using SPSS-IBM20. In the light of the normal distribution of the sample, two T-tests were carried out for independent samples to compare the results obtained between the control and experimental group pre and post treatment.

5.2. Results

Dimension	**Experimental group (Pre)**	**Experimental Group (Post)**	**p-valut.**	**Control Group (Pre)**	**Control Group (Post)**	**p-valut. Control**
Cohesion	3.5	4.8	< 0.001	3.2	4.1	< 0.001
Liking	3.7	4.9	< 0.001	3.5	4.2	< 0.001
Inclusion	3.4	4.5	< 0.001	3.3	3.8	<0.001
Emotion	3.6	4.7	< 0.001	3.4	3.6	<0.053

Tab. 2

Tab.2 Independent pre- and post-intervention T-test results

In addition, descriptive analyses were carried out for the Macro-areas of interest:

Macro-area Cohesion:

Experimental Group: Scores increased significantly from 3.5 (pre) to 4.8 (post), by 37.14%, suggesting a remarkable improvement in the perception of cohesion among group members after the intervention. This could indicate that the intervention facilitated greater interaction and bonding between participants.

Control Group: Also in this group, scores increased from 3.2 to 4.1, with a significant change of 28.13%. However, the improvement is lower than in the experimental group, suggesting that without the intervention, progress is limited.

Macro-area Satisfaction:

Experimental Group: Scores increased from 3.7 to 4.9, by 32.43% indicating a very positive response to the intervention. This could reflect greater overall satisfaction with the activity or experience provided.

Control Group: Here too there is an increase from 3.5 to 4.2 of 20.00% but less pronounced than in the experimental group. This suggests that liking in the control group was affected in a limited way.

Macro Area Inclusion:

Experimental Group: The score increased from 3.4 to 4.5, showing a significant improvement in the perception of inclusion of 32.35%. This result suggests that the intervention had a positive impact, increasing the sense of belonging among participants.

Control Group: Here the increase is 3.3 to 3.8, significant but less pronounced, by 15.15% indicating that the feeling of inclusion is improved, but not as effectively as in the experimental group.

Macro-area Emotion:

Experimental Group: Scores ranged from 3.6 to 4.7, suggesting that the intervention elicited significant positive emotions of 30.56%. This could reflect a deeper emotional involvement in the proposed activities.

Control Group: Here the score remained practically unchanged, going from 3.4 to 3.6, by 5.88% with a marginally significant improvement. This result indicates that without targeted intervention, participants' emotional engagement remained relatively stable.

6. Discussion

The results obtained highlight how the intervention based on music and percussive rhythm of Body Percussion can have significant positive effects on the dimensions of cohesion, liking, inclusion and emotion in the participants. The combination of music and rhythm not only stimulates deep emotional involvement, but also creates an environment conducive to cooperation and interaction between group members. Body Percussion encourages active participation, as participants must work together to create coordinative rhythms and sounds. This type of activity not only develops musical skills, but also promotes social skills and prosocial behaviours by improving relationships in the class group and psychophysical

well-being. In contexts where positive relationships and altruistic behaviours are desired, the integration of music into movement can serve as an effective tool. The collective creation of music and rhythm encourages mutual listening, respect and understanding, all of which are fundamental elements for strengthening interpersonal relationships. Additionally, improving cohesion and inclusion within the group can contribute to a more supportive community and a greater willingness to help others.

7. Conclusion

In conclusion, the musical and rhythmic approach not only enriches the individual experience, but also promotes a more positive social climate and cohesion, suggesting that similar interventions could be used in educational and community settings to encourage prosocial behaviours and improve the quality of social interactions. The goal is not to give up the use of social media and technology in general, as it is indisputable that these tools have significantly enriched our opportunities. However, a more in-depth reflection on the type of relationship we establish with advanced technologies is essential, so that a more conscious, critical and intelligent use of them is fostered, which promotes greater awareness without forgetting to associate their use with a path based on interaction in presence that can favour an overcoming of individualism and for overcoming the fragmentation of one's identity that could cause psychological damage while growing. The reflection introduced at the beginning of our work by the scholar Luciano Floridi, who argues that developments in the field of information and communication technologies are changing the answers to fundamental questions such as "who are we and what relationships do we establish?", highlighting the risks and limits of new means of communication, which can be invasive and negative, as we have already discussed. However, Floridi also emphasizes that every change brings with it new responsibilities, to which we cannot remain indifferent. These challenges push us to adopt a more conscious and healthy use of technologies, inviting us to be more attentive and reflective. The authors of the article, continuing along this line, highlight the importance of enhancing face-to-face interaction, suggesting bodily activities such as the motor-musical game of Body Percussion, which can help counteract the negative effects and limits of immersion in virtual reality. This approach invites us to a more conscious and balanced use of technologies, promoting a reflection on the importance of our physical and psychological well-being, as well as on the strengthening of authentic social relationships, through moments of sharing that stimulate communication and emotional connection between individuals.

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