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Bridging Movement and Cognition Using Rabindra Nritya: Interdisciplinary Dance Approaches in the Psychomotor Development of Indian Deaf Children

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Abstract

Indian deaf and hard-of-hearing (DHH) children are exposed to severe psychomotor, cognitive, and socio-emotional disabilities because of deficits in auditory perception and systemic educational disabilities. Studies have shown that there are impairments in the processing of the vestibular, balance, and rhythmic synchronization of this population. This paper discusses Rabindra Nritya, a holistic dance tradition by Rabindranath Tagore, as an interdisciplinary intervention of psychomotor development. Rabindra Nritya focuses on natural expressiveness, flowing hasta mudras, and visual-gestural communication, and as such, it harmonizes with the visual-gestural and sensory capabilities of DHH learners. The study is based on embodied cognition and neuroscience, and how cross-modal plasticity enables deaf children to use visual and tactile senses to play with rhythm, which boosts executive functions and their spatial awareness. The paper is a review of evidence of Dance-Movement Therapy (DMT) supporting movement-based learning as an emotional regulation and social integration learning method. In turn, we suggest the Nritya-Bodh (Movement-Cognition) Model, which is a theoretical basis that combines the notions of kinesthetic anchoring, multi-sensory rhythmic integration, narrative-gestural mediation, communal co-regulation, and cultural rootedness. This model intersects movement and cognition, making Rabindra Nritya a cultural art not just of cultural art but also as a therapeutic pedagogical practice. This methodology has provided a culturally-relevant and culturally-specific strategy to facilitate motor and cognitive development in Indian DHH children and establish inclusion via special education, a vital gap in special education.

Keywords: Rabindra Nritya, deaf education, psychomotor development, dance-movement therapy, embodied cognition, inclusive education, Tagore pedagogy, special education in India, hearing impairment, Sangit Bhavana

1. Introduction

One of the most common sensory impairments in the world is deafness and hard-of-hearing (DHH). According to the WHO, over 1.5 billion people have some degree of hearing loss, and it is estimated that in India alone, 63 million people have disabling hearing impairment (Sharma & Rao, 2017). In children, early onset hearing loss has implications with far-reaching impacts that run far beyond the auditory sphere and that cut across language acquisition, social cognition, motor development, and academic performance. In the Indian context, these issues have been complicated by the lack of infrastructural barriers in the educational system, stigmatization of cultures, and the fact that the inclusion practices of pedagogy are underrepresented (Chaudhary & Chaudhary, 2025).

Psychomotor development- the combined development of physical movement, coordination, and cognitive control is severely impaired in DHH children. The failure of the auditory scaffolding is not only in the speech-language development, but also in the learning of rhythmic timing, spatial orientation, postural equilibrium, and fine-motor sequencing, which hearing children learn, in part, via auditory-motor entrainment (Hidalgo et al., 2020). Deficits in the ability to process vestibular, proprioceptive, and balance, and gross motor coordination have been reported in children with congenital or early-onset deafness.

It is against this background that the embodied and movement-based learning is an attractive alternative and complementary intervention. Dance, specifically, has been identified as a multimodal tool that combines sensorimotor processing, expression of emotions, socialization, and symbolic expression- and these are exactly the functions that deaf children must be capable of (Schiavio, 2013). The classical and semi-classical form of dance in India is deeply rooted in cultural, religious, and educational life; however, there is an extraordinary and, to a large extent, unexploited pedagogical resource, Rabindra Nritya.

One dance form, Rabindra Nritya, created in the school at Santiniketan by Rabindranath Tagore (1861-1941), is unusual in its combination of vocabulary of the classical movement with the expressiveness of nature, with the lyricism of the vernacular, and the entire educational philosophy (Mandal, 2023). Tagore openly envisaged dance as an instrument of the cultivation of the entire child, body, mind, and spirit, via what he called Ananda Dharma (the law of joy). It is important to point out that Tagore was a non-hierarchical and inclusive educational thinker who opposed the dogmatism of the elite classics in favour of the unconditional inclusion of all people. This renders Rabindra Nritya not only an artistic relic of culture but a possibly useful paradigm of inclusive, therapeutic, and mentally stimulating education (Chakravorty, 2013).

2. Psychomotor Development in Deaf and Hard-of-Hearing Indian Children

2.1 Scope of Hearing Impairment in India

The deaf and hard-of-hearing (DHH) community in India is very heterogeneous with respect to the causes, the degree of disability, the age of onset, and the use of other intervention measures, such as hearing aids or cochlear implants. The Rehabilitation Council of India (2022) estimates that about 5.36 million children under the age of 14 years have a serious hearing impairment, most of whom live in rural and peri-urban areas that do not have many facilities that provide audiological and educational services (Ansari et al., 2021). Despite the fact that the concept of inclusive education is an obligatory measure in the Rights of Persons with disabilities (RPWD) Act, 2016, there are still gaps in its implementation. Also, a number of deaf children are born to hearing parents who have low knowledge about Indian Sign Language (ISL), which limits communication and results in delays in the cognitive, social, and psychomotor development (Ansari, 2021).

2.2 Motor Development Deficits

Studies have shown that DHH children are generally challenged in terms of motor development because of the combined effect of auditory, vestibular, and cognitive aspects. They also have an inadequate balance and postural control that is caused by vestibular impairment. Losses in gross motor coordination, such as slower development in motor skills, increased chances of developmental coordination disorder, are also experienced (Cushing & Papsin, 2021). The academic activities that might experience the effects of the fine motor deficits include writing due to poor hand-eye coordination and dexterity. Besides, rhythmic movement and synchronization cannot take place as auditory rhythm is missing, albeit with the help of visual and tactile information (O'Kelly & Fourie, 2023). Dual-task scenarios also pose challenges to DHH children, since concentrating on more cognitive tasks requires a decrease in the balance needs, which decreases the capability of performing simultaneous tasks. Indian studies also point to other lags in the cultural as well as related physical activities like dance, yoga, and traditional games.

2.3 Cognitive and Socio-Emotional Aspects

The process of psychomotor development of DHH children is tightly connected with cognitive and socio-emotional functioning. Even though phonological working memory is frequently damaged, visuo-spatial skills can be enhanced, particularly in response to early exposure to sign language (Wong et al., 2016). Socio-emotional issues such as poor emotional regulation, limited social interaction, and delayed theory of mind are prevalent, especially in environments that are limited in their communication. These influences will lead to low engagement in collaborative and imitative motor activities, which eventually will influence the overall psychomotor development (Worku et al., 2018).

3. Rabindra Nritya: Cultural, Historical, and Pedagogical Foundations

3.1 Tagore's Educational Philosophy: Ananda Dharma and the Embodied Curriculum

The education ideology of Rabindranath Tagore, which was expressed throughout his essays, lectures, and the experimental school at Santiniketan (founded 1901, extended to Visva-Bharati University in 1921), is one of the most complex native pedagogies in the South Asian intellectual tradition (Lesar, 2023). The most important aspect of this philosophy is the very notion of Ananda Dharma, which is education as the practice of joyful self-actualization, which combines body, mind, and nature. The Cartesian dualism that Tagore explicitly criticized in colonial education gave cognitive-verbal knowledge more advantage than embodied, aesthetic, relational knowledge (Lesar, 2023).

Tagore established a curriculum at Sangit Bhavana (the School of Music and Dance at Visva-Bharati), which created a unified programme of development based on movement, music, poetry, drama, and the visual arts. In his conception dance was not ornamental but constitutive, it is in the rigorous yet exultant gesture of the body that the child was able to cognize the world, give expression to inner life and to relate themselves to community and cosmos (Salomone, 2017).

3.2 Structural Features of Rabindra Nritya

There is no doubt that Rabindra Nritya is different among the other types of Indian classical dances because of the structural and aesthetic characteristics of this dance, which increase its educational and therapeutic significance. Its gesture language integrates Manipuri, Bharatanatyam, and other folk tradition aspects and still reflects a natural and free movement (Kaipy & Gupta, 2025). In opposition to classical codes of gesture usage, Rabindra Nritya uses hasta mudras (hand movements) and abhinaya (expressive communication), which are flowing and situational. This renders it especially available to deaf children, who are extensively dependent upon visual and gestural forms of communication that permit them to decipher and convey a sense more intuitively (Lüdtke et al., 2012).

This Rabindra Nritya is designed in rhythmic cycles (tala), which were shaped by the traditions of Hindustani and Manipuri traditions, although the Rabindra Nritya is flexible in its interpretation (Chakravorty, 2013). Notably, the rhythm could be presented using visual signals, through the feelings

of touch, like vibration of the floor and the kinaesthetic sense. This multimodal method allows deaf students to feel and coordinate movements without the use of sound and helps the students to maintain rhythmic entrainment via other sensory channels.

Also, Rabindra Nritya has full narrative and emotive material based on dance dramas, which are Tagorean dance dramas (Nritya Natya), which dwell on themes of nature, mythology, and relationships among humans (Purkayastha, 2014). Both movements are symbolic and have a close relationship between gesture and narrative. The integration aids in the development of language and thinking in deaf children due to the visual and bodily form of communication.

Moreover, the dance is communal in nature, where coordination of groups, sense of space, and non-verbal communication are involved. These elements of collaboration help in building socialization, collaboration, and emotive expression, which counter the main development challenges posed to deaf children through the communication-limited setting.

4. Neuroscience of Movement, Rhythm, and Cognition

This idea of embodied cognition basically transforms our perspective on the nature of the interactions between the mind and the body. Instead of seeing cognition as an abstract, brain-based process, according to this school of thought, thinking and learning are entrenched in sensorimotor experience (Joldersma, 2013). Physiological interactions, gestures, and movements are important in the formation of cognitive processes. Movement in a developmental context, especially in children with deaf and hard-of-hearing (DHH), does not simply signal development, but actively facilitates the developmental outcome. Non-verbal cues and body language tend to be used more frequently than verbal ones, and in the case of the deaf as a visual-gestural communicator, the body is made a central source of language (Goldin-Meadow & Mylander, 1983). In this respect, formalized dance systems of the movement may be used as effective instruments that should be implemented to facilitate cognitive and linguistic growth.

The role of rhythm is significant in the combination of both movement and thought. The neuroscientific studies demonstrated that rhythmic processing involves the extensive parts of the brain, such as the supplementary motor area, basal ganglia, cerebellum, and prefrontal cortex (Hallam & Himonides, 2022). These areas are concerned with timing, coordination, and executive functioning. Although the auditory rhythm is a widespread cause of movement synchronization, research has shown that visual and tactile rhythmic cues can also cause a similar network in the brain, even in hearing-impaired people. This is because of the process of cross-modal plasticity in which the brain reacts by redistributing the functions among the senses (Cardin et al., 2020). As one of the examples, the deaf auditory cortex is capable of responding to visual/vibrotactile stimuli. This flexibility enables the DHH children to utilize non-auditory methods of entraining to rhythm, either by watching something or experiencing a vibration, so that rhythm-based movement interventions are very effective.

The other noteworthy process that leads to movement-based learning is the mirror neuron system (MNS), which enables imitation and comprehension of actions. When one sees some motion, one activates the same neural networks that are used to do so (Vanderwert et al., 2012). This system particularly applies to the deaf learners who rely a lot on visual observation in the process of learning. MNS facilitates the learning of complex motor patterns in dance education, especially when the teaching method involves demonstration and imitation, such as in Rabindra Nritya dance education. Such forms of dancing, as they are visually expressive and sequential, contribute to the better efficiency of the learning process based on imitation (Watson & Livingstone, 2018).

Another area that is closely related to movement and dance is spatial cognition. It entails the cognition and manipulation of spatial relationships that are important in navigation, coordination, and problem-solving. Some studies indicate that DHH children, particularly those who experience sign language, can acquire a better sense of the visuo-spatial skills because they have to resort to the visual communication (Hauser et al., 2006). Training in dance also reinforces these skills by having the learners go through movements that require direction change, pattern in space, and body coordination.

The organized, but expressive quality of Rabindra Nritya offers perfect conditions in learning to be able to understand space and learn the skill of mapping thought (Purkayastha, 2014).

5. Dance-Movement Therapy for Deaf Children: A Critical Review

DMT is an official allied health profession internationally recognized by both the European Association of Dance Movement Therapy (EADMT) and the American Dance Therapy Association (ADTA) that employs movement and dance as a psychotherapeutic intervention to facilitate emotional, cognitive, and social assimilation. DMT is based on the principles of body-mind and relies on the psychodynamic, humanistic, developmental, and neuroscientific approaches (Millman et al., 2020).

There is an increasing amount of literature that emphasizes the usefulness of DMT in aiding the development of deaf people. It is stated in the studies that emotional regulation improves, and the internalizing behavior decreases, resulting in perfect body awareness after the organized DMT interventions. Social-communicative skills that have been strengthened by group-based DMT include joint attention, turn-taking, and non-verbal sync, key interacting skills (Gulandanmu & Wang, 2025). Moreover, movement-based systems such as Laban Movement Analysis have proven to bring quantifiable improvements to motor control, balance, and body awareness in deaf children.

6. Theoretical Integration: The Nritya-Bodh Model

The Nritya-Bodh Model is an idea of psychomotor and cognitive development of deaf children that makes use of five interdependent constructs based on the Rabindra Nritya principles. The first construct, kinesthetic anchoring, states that the cognitive and linguistic development is based on the structural patterns of movements (Schiavio, 2013). Without auditory stimuli, deaf children prefer to interpret the world in terms of images and physical actions; therefore, Rabindra Nritya gestures, tracks, and patterns serve as effective kinesthetic kin points, which promote symbolical thinking and expression (Lartillot & Song, 2014). Multi-sensory rhythmic integration is the second construct that emphasizes the role of multiple sensory channels when expressing rhythm. By means of tactile, visual, and kinaesthetic stimulation, i.e., floor vibration, visual design, and active group movement, it is possible to teach rhythmic structures to the deaf learners (Petry et al., 2018). The method utilizes cross-modal neural plasticity, which allows activation of timing and executive function circuits without sound use.

The third construct is narrative-gestural mediation, which is associated with movement as it is closely related to storytelling and the expression of emotions. The richness of the narrative of Rabindra Nritya enables gestures and expressions to be used symbolically, thus sustaining language development, narrative competence, and social understanding in deaf children (Schiavio, 2013). The fourth construct, communal co-regulation, highlights the importance of group-based learning. Coordinated action and joint activity improve interpersonal communication, emotional control, and collaborative abilities, which are naturally underdeveloped in children with communication challenges.

Conclusion

Rabindra Nritya is another untapped pedagogical tool for the psychomotor development of deaf children in India. By integrating the inclusive philosophy of Tagore with neuroscience, this paper will show how cross-modal plasticity, i.e., how movement compensates audio impairments, is achieved through embodied movement. The Nritya-Bodh Model is a complete system that utilizes the power of cognitive and motor improvement by means of kinesthetic anchoring, multi-sensory rhythm, and narrative gesture. This method, in contrast to the traditional treatments, is deeply embedded in culture and lowers cognitive burden, but helps in developing identity and promoting social cohesion. The fluid aesthetics of Rabindra Nritya will agree with the visual-gestic requirements of DHH learners, implying high levels of therapeutic efficacy. Future research should be critical with an emphasis on the validity of the research paradigms in both longitudinal studies and curriculum implementation. Finally, the defiance of the art movement/mind through Rabindra Nritya is holistic and provides a comprehensive approach to inclusive education. It enables DHH children to gain motor coordination, executive

functions, and emotional regulation in a culturally significant framework, promoting indigenous, embodied pedagogies in Indian special education systems in the future.

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