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REVIEW ARTICLE

Motor asynchrony in students with high abilities/giftedness and twice exceptionality: Identification and holistic interventions in the school environment: Scoping review

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Abstract

Background: The education of students with Giftedness/High Abilities (G/HA) and Twice Exceptionality (2e) represents a challenge in the Brazilian context, especially due to the phenomenon of motor asynchrony. This condition, characterized by a mismatch between advanced cognitive development and fine and gross motor skills, manifests as graphomotor difficulties, poor coordination, and low body confidence. Despite the legal framework guaranteeing educational rights for this population, there is a significant gap between legislation and effective identification and intervention practices in the school environment. **Objectives:** This scoping review aimed to map and analyze the scientific literature on motor asynchrony in students with G/HA and 2e, as well as to identify psychomotor, pedagogical, and socio-emotional intervention strategies applied in school settings between 2008 and 2025. **Methods:** The research followed the PRISMA-ScR protocol, covering thirteen national and international databases (PubMed, LILACS, ERIC, Scopus, Web of Science, SciELO, among others). The search yielded 192 initial records, of which 16 articles met the inclusion criteria after screening. Data analysis was based on thematic categorization, yielding three main themes: identification of motor asynchrony, student characteristics, and intervention strategies. **Conclusions:** The analysis revealed that motor asynchrony is an intrinsic manifestation of the development of students with G/HA and 2e, impacting their academic expression, self-image, and engagement. The most effective interventions were holistic and interdisciplinary, integrating psychomotricity, inclusive physical education, occupational therapy, differentiated teaching strategies, and emotional support. The study proposes an Inclusive Educational Model for Body-Cognition Integration (MEICC) with seven interconnected components, aiming to overcome the mind-body fragmentation and promote the holistic development of these students. It is concluded that integrating the body as a dimension of intelligence is essential to reduce underachievement and broaden the participation and well-being of these students in the school environment.

Keywords: Giftedness; twice exceptionality; motor asynchrony; psychomotor intervention; inclusive education.

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BACKGROUND

In the Brazilian context, the education of students with High Abilities/Giftedness (HA/G) represents one of the most challenging and paradoxical aspects of Special Education. The Brazilian legal framework establishes important guidelines for guaranteeing the educational rights of this population, beginning with the Law of Guidelines and Bases of National Education Law No. 9.394/1996[1], which in its article 58 defines students with high abilities as "those who demonstrate high potential in any of

the following aspects, isolated or combined: superior intellectual capacity, specific academic aptitude, creative or productive thinking, leadership capacity, special talent for the arts, and psychomotor capacity". Subsequently, the National Policy on Special Education from the Perspective of Inclusive Education (PNEEPEI)[2] reinforced this commitment, establishing guidelines for educational inclusion.

At the state level, Goiás instituted the State Policy on Special Education Law No. 20.299/2018[3], which ensures specialized educational services for students with HA/G. More recently, Federal Decree No. 11,259/2022[4] established the National Policy for Special and Inclusive Education, expanding the guidelines for identifying and serving this population. Resolution CEE/GO No. 423/2023[5] establishes specific norms for special education in the state education system, including the mandatory provision of specialized educational services for students with high abilities.

Despite these laws, the gap between legislation and effective identification and service practices is significant. The Brazilian educational system still faces a profound lack of teacher training, assessment tools, and intervention strategies capable of addressing the complexity of the developmental profile of these students. This gap has frequently been described as the "talent blackout", a situation in which the absence of institutional and pedagogical recognition compromises the flourishing of potential and, in many cases, leads to psychological suffering and academic underperformance[6].

International literature on giftedness describes a multifaceted field that goes beyond the mere measurement of intelligence to encompass motivational, creative, psychomotor, and sociol-emotional aspects. Theoretical models such as Renzulli's define giftedness as the intersection of three main traits: above-average ability, task commitment, and creativity[7]. This approach has profoundly influenced public policies and school practices in several countries, including Brazil.

The term Twice Exceptionality (2e) emerged in North American and European literature literature to designate students/individuals who exhibit high abilities concomitantly with disorders or disabilitie. This condition, often made invisible in school contexts, highlights the paradoxical nature of these students' experience: intellectual talent can mask difficulties, and difficulties, in turn, can conceal talent. Recent studies reinforce that the identification of 2e requires a multidimensional and interdisciplinary approach, as it involves both the recognition of cognitive potential and attention to emotional, attentional, and motor weaknesses[6].

Among the most recurrent combinations of dual exceptionality are associations between giftedness and attention deficit hyperactivity disorder (ADHD), dyslexia, autism spectrum disorder (ASD), and psychomotor deficits. The phenomenon of motor asynchrony stands out as one of the most subtle and, at the same time, most impactful manifestations of asynchronous development in students with high abilities/giftedness and developmental delays.

As demonstrated in the literature, many students with high cognitive abilities present delays in fine and gross motor skills, resulting in difficulties in writing, postural control, and the execution of tasks that demand coordination. This dissociation between advanced thinking and motor dexterity is frequently interpreted by teachers as inattention, laziness, or lack of effort, when in reality it reflects a neurodevelopmental mismatch [8].

The research demonstrates that these children, despite presenting superior cognitive performance, show significant weaknesses in coordination and fine motor control tasks, which directly interferes with their academic expression.

Motor asynchrony can be understood as the concrete expression of a functional imbalance between the cognitive and motor systems, resulting in a fragmented performance profile. A child may exhibit advanced logical reasoning and excellent verbal comprehension, but have difficulty with simple tasks such as copying from the board, writing fluently, or participating in games involving physical dexterity.

This discrepancy was described in the pioneering studies, which observed that gifted children with very high IQs frequently presented more immature motor behaviors than expected for their chronological age, resulting in challenges in socialization and school adjustment [9]. Decades later, with his Theory of Positive Disintegration, explained that superior human development occurs through psychoneurological intensities called overexcitabilities (OEs)[10]. Psychomotor overexcitability, in particular, is characterized by high motor energy, a need for movement, and difficulty with self-regulation, often confused with symptoms of ADHD. The contemporary consolidation of the concept of asynchrony was further developed by the Columbus Group, who defined asynchrony as the core trait of giftedness. For these authors, asynchronous development creates a discrepancy between the subject's internal experience and the external expectations of the school and social environment [8].

The school, by prioritizing the linearity of the curriculum and the homogeneity of pace, tends to penalize the student whose developmental trajectory does not follow the chronological norm. This tension produces feelings of inadequacy, anxiety, and isolation, which compromises academic engagement and emotional well-being [6].

Beyond motor aspects, asynchrony also manifests in socio-emotional dimensions. Neihart (2000) describes how the discrepancy between intellectual and emotional maturity can generate psychological vulnerability, leading to a fragmented self-image: the child perceives themselves as "intelligent but clumsy," "brilliant but misunderstood."

This perception is reinforced by the difficulty of acceptance among peers, which can culminate in social withdrawal. Beljan et al [11] observes that teachers often lack the conceptual tools to distinguish typical asynchrony behaviors from pathological symptoms, resulting in misdiagnoses and inappropriate referrals.

In the literature reviewed, significant advances are observed in the understanding of motor asynchrony as an educational and psychomotor phenomenon, but a gap remains in the articulation between identification and intervention. Consequently, many gifted/high-achieving students remain invisible to support policies, especially those whose psychomotor difficulties mask their intellectual potential. This pedagogical invisibility reinforces the cycle of underachievement and compromises academic and personal self-realization.

Given this scenario, the present study proposes to systematically map the scientific evidence regarding the identification of, and interventions aimed at, motor asynchrony in students with high abilities/giftedness and developmental delays, with the goal of constructing an inclusive educational model that integrates cognitive, emotional, and motor development. The central premise is that inclusive education, to be truly comprehensive, must recognize the body as a space for the expression of intelligence and identity.

Movement, coordination, and psychomotor skills are not peripheral elements, but constitutive of the learning and human development process. Thus, understanding and intervening in motor asynchrony is an essential step in transforming the paradigm of Brazilian special education, replacing the compensatory logic with a logic of empowerment – an education that not only embraces difference, but recognizes it as a source of uniqueness and creativity.

METHODS

This research adopted the Scoping Review model, whose purpose is to systematically map the extent, nature, and gaps in the literature on a given topic, offering a comprehensive synthesis of the available evidence. This approach was chosen because it deals with an interdisciplinary field in consolidation – motor asynchrony in students with HA/G and 2e – in which empirical studies, theoretical reviews, and reports of educational experiences coexist.

Unlike systematic reviews, scoping reviews allow the inclusion of studies of diverse methodological and epistemological natures, prioritizing the breadth of the analysis over the homogeneity of research designs.

The methodological protocol was conducted according to the recommendations of PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews), as outlined by Tricco et al.[12]. The process comprised five main stages: formulation of the research question; identification of information sources; study selection; data extraction and categorization; and a narrative synthesis of the results. The guiding question was: 'How does motor asynchrony manifest in students with high abilities/giftedness and developmental delays, and what identification and intervention strategies are described in the scientific literature between 2008 and 2025?

The bibliographic search was conducted between August and October 2025 in thirteen national and international databases: PubMed, LILACS, ERIC, EDUBASE, SciELO, BDTD, SAGE Journals, Taylor & Francis Online, Epistemonikos, Scopus, EBSCO, Web of Science, and Google Scholar. The choice of these databases was guided by the need to cover publications in the biomedical and psychomotor fields, as well as in education and the humanities. The following descriptors were used, combined with Boolean operators (AND/OR): "giftedness", "high abilities", "twice exceptionality", "psychomotricity", "motor skills", "motor coordination", "education", "inclusion", "motor asynchrony", and "psychomotricity".

Studies published between 2000 and 2025, written in English, Spanish, or Portuguese, that addressed at least one of the following themes were included: (a) identification of motor asynchrony in students with high abilities/giftedness or developmental disabilities; (b) psychomotor, cognitive, and socio-emotional characteristics of this population; or (c) educational, therapeutic, or psychomotor interventions applied in the school environment. Repeated articles, texts without peer review, purely theoretical essays without a direct relationship to the motor component, and studies whose focus was exclusively affective or cognitive, without mention of aspects of physical or psychomotor development, were excluded.

The identification process resulted in 192 records, of which 38 duplicates were removed manually or using the RAYYAN tool. In the initial screening, based on titles and abstracts, 83 studies were considered potentially relevant. After full reading and application of the inclusion and exclusion criteria, 16 articles comprised the final sample. This sample included quantitative, qualitative, and mixed-methods studies, with methodologies ranging from observational studies and systematic reviews to empirical investigations in school settings and reports of intervention programs.

Data extraction was conducted independently, ensuring the reliability of the information. For each article, information was collected regarding: author, year of publication, country, type of study, population/sample, age of participants, assessment instruments used, manifestations of motor asynchrony, type of intervention proposed, and main results.

The data categorization stage was based on the thematic analysis of from which three major analytical axes of emerged: (1) Identification of Motor Asynchrony and Diagnostic Criteria; (2) Cognitive, Emotional, and Psychosocial Characteristics of Students with HA/G and D2e; and (3) Holistic and Interdisciplinary Intervention Strategies in the School Context. These axes were defined inductively based on the recurrence and thematic convergence among the findings of the reviewed studies [13].

To ensure methodological rigor, the research followed best practices for scoping reviews, prioritizing transparency of procedures. The search and selection process was synthesized in a PRISMA-ScR diagram, which illustrates the path of the records from identification to the final inclusion of the articles. The identification process resulted in 192 records. After removing 38 duplicates, 154 studies proceeded to screening. In the analysis of titles and abstracts, 71 were excluded for not presenting a relationship with HA/G, D2e, or a motor component, leaving 83 articles eligible for full reading. Of these, 67 were excluded for not meeting the inclusion criteria (absence of a motor component, exclusively affective focus, or thematic duplication), thus composing a final sample of 16 studies.

Table 1. Summary search and selection strategy (PRISMA-ScR)

Steps	Description	Nº Records
Identification	Total number of records found across the 13 platforms.	192
Duplicate removal	Between databases and repositories	−38
Records after de-duplication	Number of items that proceeded to screening.	154
Screening (titles and abstracts)	Records evaluated for relevance	154
Excluded in the screening process	Studies without a motor component, focusing solely on the affective component.	−71
Eligible records	Potentially relevant articles	83
Excluded after reading	They did not meet the inclusion criteria.	−67
Total included	Studies analyzed in the review	16

The synthesis of results was carried out in a descriptive and interpretive manner, prioritizing the comparison between studies and the identification of convergences, contradictions, and gaps. The analysis was presented in a narrative format, articulating the empirical review with the theoretical framework of classic authors on giftedness. This theoretical-empirical integration sought to construct an interpretive framework that reflected both the conceptual evolution of the topic and its practical implications for contemporary inclusive education.

In summary, this methodology ensured the objective validity of the review, allowing the results presented in the following sections to accurately represent the current state of knowledge on motor asynchrony in students with high abilities/giftedness and dual exceptionality. This solid methodological basis enabled not only the identification of existing gaps, but also the formulation of a proposal for an inclusive educational model applicable to the Brazilian context.

RESULTS AND DISCUSSION

The analysis of the eighteen selected articles reveals an expanding theoretical and empirical field, in which motor asynchrony emerges as one of the most consistent and challenging manifestations of the development of students with HA/G and D2e. The review shows that, although the literature on giftedness has developed in recent decades around cognitive and emotional aspects, only recently have studies emerged that treat the motor component as a constitutive dimension of integral development.

Table 2. General characteristics of the included studies

Author/Year	Ctry	Population/Age	Main Focus	Type of Study
Augustsson et al. (2025)[14]	Sweden	Students with AH/SD/ aged 8–17 years	Physical activity and giftedness/high abilities	Review
Çakiroğlu (2017) [15]	Turkey	Highly gifted/skilled students aged 9–12 years	Motor comparison between groups	Empirical
Coutinho-Souto & Fleith (2022) [16]	Brazil	Highly gifted/skilled students aged 8–16 years	2nd generation and ADHD	Review
David. (2025) [17]	Israel	Highly gifted/skilled students aged 7–11 years	Final motor skills	Experimental
Ferriz-Valero et al. (2023) [18]	Spain	Students with AH/SD/ aged 12–16 years	Inclusive physical education	Intervention
Infantes-Paniagua et al. (2021) [19]	Spain	Students with AH/SD/ aged 9–15 years	Self-image and physical activity	Quantitative
Kontokou (2023) [20]	Greece	2e (Highly gifted/skilled + ASD)	Motor and social relationships	Review
Kuznetsova et al. (2024) [21]	Russia	Children and students/ aged 0–14 years	Cognition and motor skills	Mixed approach
Mullet & Rinn (2015) [22]	USA	2e (AH/SD + ADHD)	Differential diagnosis	Review
Prokhorenko (2022) [23]	Russia	Highly gifted/skilled students with	Asynchronous development	Theoretical
Razak et al. (2022) [24]	Malaysia	Highly gifted/skilled students aged 13–17 years	Physical activity and isolation	Cross-sectional
Rosenberg (2012) [25]	USA	Teachers in a Highly gifted/skilled context	Experience with asynchrony	Qualitative
Stoeger, Ziegler & Martzog (2008) [26]	Germany	Students with AH/SD/ aged 7–10 years	Fine motor deficits	Experimental study
Vaivre-Douret (2011) [27]	France	Students with AH/SD aged 6–12 years	Motor and cognitive development	Empirical study
Valadez et al. (2020) [28]	Mexico	Highly gifted/skilled students aged 10–16 years	Physical activity and well-being	Quantitative
Wood & Laycraft (2020) [31]	Canada	Students with AH/SD/ aged 8–13 years	Asynchrony and well-being	Qualitative

In the studies analyzed, the identification of asynchrony was described as the result of a mismatch between intellectual maturity and micromotor and macromotor development. This difference manifests itself from childhood and can be expressed in difficulties in handwriting, slowness in copying from the board, inadequate body posture, difficulty manipulating small objects, frequent stumbling, or aversion to sports and motor activities. The work of Vaivre-Douret [27] was one of the first to empirically document this phenomenon, comparing the cognitive and psychomotor development of gifted French children. The study showed that, despite exceptional cognitive performance (IQ above 130), there was a delay of up to two years in micromotor skills and visual-motor coordination. The author termed this dissociation heterogeneous development, characterizing it as an "internal asynchrony of human potential" [27] [p. 4].

Similarly, Stoeger, Ziegler, and Martzog [26], in a study conducted in Germany, identified that 67% of gifted students assessed presented some type of graphomotor difficulty, even when their verbal and mathematical performance was significantly superior. The authors hypothesized that the absence of adequate motor challenges and the excess of early cognitive activities may contribute to the lag in motor skills.

The comparative analysis between the studies confirms that motor and cognitive development follow interdependent, but not necessarily synchronized, trajectories. While the first emphasizes that giftedness is a neurodevelopmental phenomenon marked by "peaks of excellence amidst maturational plains", the second proposes that asynchronies are a product of "imbalances in connectivity between brain networks of attention and motor control"[21,23]. Both studies converge in recognizing that asynchrony is not a deficit in itself, but a manifestation of heterochrony—that is, the coexistence of different developmental rhythms within the same individual. This contemporary reading distances itself from pathologizing perspectives and approaches a biopsychosocial understanding of neurological diversity.

In educational contexts, identifying motor asynchrony remains a challenge. In educational contexts, identifying motor asynchrony remains a challenge. In a systematic review on giftedness and ADHD, the authors highlight that most teachers associate restless and impulsive behaviors with disorders, neglecting the possibility of associated giftedness[9]. This diagnostic difficulty results in a double invisibility: intellectual talent is

not recognized, and motor difficulties are treated as indiscipline. Similarly, authors reviewing studies on the correlation between giftedness and autism observed that children with autism spectrum disorder (2e) tend to be under-identified precisely because they present a mixed profile – simultaneously brilliant and disorganized. This duality reinforces the importance of screening protocols that include both cognitive measures and qualitative psychomotor observations[20].

The data collected in the review also reveal a correlation between motor asynchrony and difficulties in written expression, a phenomenon consistently addressed in several studies, demonstrating that gifted/high-ability students who exhibit low motor coordination tend to develop negative perceptions about their own physical and academic performance[1]. The work, conducted in Spain with 160 gifted students, identified that body image and physical self-concept are directly associated with the frequency of physical activity. Conversely, the absence of inclusive motor opportunities exacerbates social isolation and reduces motivation for participation in school contexts that demand physical skills[19].

The results of the studies reinforce the importance of physical education as a space for identification and inclusion. These studies, conducted in basic education contexts, showed that gifted/high-ability students frequently experience frustration in physical education classes due to the rigidity of performance criteria and the lack of curricular adaptation. When included in psychomotor programs that value the process rather than the result, these students demonstrated greater engagement, cooperation, and emotional self-regulation. Proposed that movement and the body should be recognized as dimensions of cognition, expanding the concept of intelligence beyond logical-mathematical rationality[18].

Motor asynchrony also presents relevant emotional and social implications. Already pointed out that the discrepancy between the dimensions of development generates feelings of inadequacy and low self-esteem, especially in standardized school contexts. This condition is confirmed in more recent studies, such as that, who analyzed 82 highly gifted students and identified that 46% of them reported anxiety related to physical performance or comparison with peers. This anxiety, often internalized, manifests itself through withdrawal and self-criticism, interfering with school engagement and interpersonal relationships[23].

Complements this view by analyzing teachers' perceptions of gifted students. In his study, most teachers reported difficulty in understanding the motor and emotional behavior of these students, describing them as "brilliant but disorganized" or "very intelligent but unfocused." These stereotypes reveal the persistence of a fragmented view of giftedness, which disregards the body as part of the learning process[25].

Among the studies analyzed, a recurring aspect is the finding that motor asynchrony directly influences academic trajectory. Observed that students with dual exceptionality frequently present a history of school failure, even in contexts of high cognitive potential. This paradox, according to the authors, stems from the incompatibility between the student's learning style and the traditional pedagogical model, which prioritizes linearity, speed, and behavioral conformity. Similarly, in a scoping review on the relationship between gifted students and physical activity, concluded that there is an underrepresentation of this population in school sports programs, due to both the low availability of differentiated practices and the absence of specific inclusion policies[14].

In the cognitive field, the reviewed studies indicate that gifted/high-ability students tend to exhibit high levels of metacognition, divergent thinking, and intellectual curiosity, but also demonstrate low frustration tolerance and high self-criticism. This combination produces profiles of great emotional complexity, in which academic performance can fluctuate according to the context of stimulus and recognition[21,23].

When the school environment values only cognitive output and neglects motor and emotional differences, the gifted/high-ability student experiences a process of maladjustment that can culminate in anxiety, perfectionism, and social withdrawal.

The reviewed literature reinforces the importance of understanding giftedness as a multidimensional phenomenon, and not just as an intellectual trait. The studies theoretically underpin this understanding by arguing that the development of gifted individuals is inherently asynchronous, involving psychomotor, cognitive, and affective intensities that need to be recognized in an integrated way[23,8].

With his theory of overexcitabilities, anticipated this notion by proposing that superior development is accompanied by internal tensions and positive disintegrations, which drive psychological and moral growth. In the context of this review, psychomotor and intellectual overexcitabilities are the most frequently observed, and their coexistence explains the energy, restlessness, and behavioral adaptation difficulties of many gifted/high-ability students[30].

Despite theoretical advances, the review reveals a persistent gap: the lack of validated diagnostic instruments to identify motor asynchrony in students with high abilities/giftedness. None of the reviewed studies presented standardized protocols that integrate cognitive, psychomotor, and socio-emotional assessment. The instruments used vary widely—from IQ tests and creativity scales to qualitative observations and field diaries—which limits comparability between research and hinders the formulation of evidence-based educational policies. This methodological fragmentation reflects the distance between the fields of Education, Psychology, and Human Movement Sciences, which still operate in isolation regarding this topic.

The results also point to the need to expand teacher training in the area of psychomotor skills and high abilities. In countries such as Spain and Germany, some pilot programs have already demonstrated progress in this direction. However, in Brazil, public policies are still incipient and rarely articulate motor development as the central axis of inclusive education. The lack of integration between curricular, psychomotor, and emotional components results in the maintenance of a school model that recognizes giftedness as a cognitive difference, but not as a complex form of human development[18].

The analysis of the 16 studies allows us to affirm that motor asynchrony is an intrinsic manifestation of the asynchronous development characteristic of students with high abilities/giftedness and developmental delays. This asynchrony transcends the motor dimension and should be understood as a global marker of neuropsychological diversity. The lack of adequate identification perpetuates the underutilization of these students' potential and reinforces symbolic and pedagogical barriers in the school environment. The evidence gathered indicates that only a holistic approach, which simultaneously considers cognitive, psychomotor, and affective aspects, is capable of promoting the integral development and effective inclusion of this population.

The synthesis of the 16 studies reveals a consensus that cuts across different academic traditions: effective interventions for students with HA/G and D2e are, by definition, multicomponent and interdisciplinary, combining psychomotor skills, adapted physical education, occupational therapy, pedagogical adjustments, and socio-emotional support[18]. This consensus does not emerge from methodological homogeneity—on the contrary, studies vary in design, sample, and instruments—but from the convergence of effects observed when the body is integrated into the curriculum: improved coordination and balance, reduction of graphomotor complaints, increased physical self-concept, greater academic and social engagement, and decreased performance anxiety[19,28].

In European studies, especially in Spain, there is a tradition of inclusive physical education focused on fundamental motor competence and participation metrics. In a real school context, report gains in motivation for practice, cooperation skills, and perception of self-efficacy when the teacher reorganizes motor tasks by levels of progression and explicitly states the success criterion as individual improvement, not comparison between peers[18].

The No Limits Project documents the potential of pilot programs aimed at gifted students where curricular adaptation in Physical Education—through variation in rules, spaces, times, and materials—reduces barriers to access and reinforces a sense of belonging, especially in students with global asynchrony[18]. In both cases, the teaching design is less focused on performance and more on bodily learning pathways; this shift produces measurable educational effects, such as increased attendance and reduced dropout rates in practical classes.

In recent Nordic literature, show that the relationship between academically gifted students and physical activity is affected by lower physical self-concept, even when overall participation does not differ from peers[14]. The practical implication is unequivocal: affirming motor competence as an intrinsic objective of the curriculum, with descriptive feedback and gradual goals, tends to produce affective and motivational gains even without dramatic changes in the volume of practice. This argument converges with Spanish findings and with the psychopedagogical thesis that criterion-guided self-assessment and pedagogical differentiation constitute the main mechanism for reversing the "paradox of the brilliant and clumsy student"[19].

In contrast, studies anchored in developmental clinical practice emphasize the psychomotor profile and heterochrony. Demonstrates that highly gifted children may present specific delays in fine motor skills and visual-motor integration, supporting interventions in relational psychomotor skills and training in grasping, pressure, postural alignment, and graphic rhythm[27]. The work, in turn, associates graphomotor deficits with academic underachievement in gifted students and recommends early graphomotor training protocols coordinated with the teaching of metacognitive strategies[26]. In students with 2e, evidenced weaknesses in bimanual coordination and tonic-postural control, indicating the need for individualized plans that combine occupational therapy (adaptations of utensils, inclined boards, high-friction pencils, temporary block letters) with body composition and proprioception tasks. In summary, clinical experience reinforces that asynchrony does not disappear with cognitive maturation; it requires targeted care and explicit motor goals.

Another body of evidence relates to interventions in contexts of constraint. During the pandemic, showed that remote routines of structured physical activity, even if of low intensity and short duration, preserved well-being and routine in highly gifted students, mitigating withdrawal and worsening of physical self-concept[24]. The effect depended not only on the exercise itself, but also on the pedagogical bond and the predictability of the sessions, elements that the literature on giftedness associates with greater engagement and less anxious rumination[28]. These findings support the thesis that hybrid models—face-to-face sessions and remote monitoring with short videos, motor checklists, and asynchronous feedback—are a viable alternative for networks with infrastructure constraints, a recurring scenario in Brazilian public schools.

The literature on identification and diagnosis directly relates to the design of interventions. In reviewing giftedness/high abilities and ADHD, warn of the symptomatic overlap between psychomotor overexcitability and hyperactivity and recommend batteries that integrate motor measures with attentional scales and indicators of creativity[16].

Reach convergent conclusions, suggesting a two-stage screening: a broad screening (cognition, creativity, teacher) followed by a focused assessment when there are signs of asynchrony (graphomotor, postural, coordination). Draws attention to 2e with ASD, in which differences in motor planning and rigidity require visual aids, task decomposition, and anticipation routines, otherwise performance anxiety may intensify. In terms of school policy, these conclusions point to identification protocols that are not limited to grades and IQ, but incorporate brief psychomotor checks and functional observation in physical education[20].

Regarding international comparisons, three axes emerge. First, European countries with a tradition in Physical Education and school psychomotor skills report classroom and playground interventions with fine-tuned task and environment adjustments, and a strong role for the teacher as a designer of motor experiences[18]. Second, in North America and in the Germany–France axis, approaches tend to integrate clinical and school settings, with an emphasis on standardized assessment and individualized intervention plans[27]. Third, in Asian and Latin American countries investigated during and after the pandemic, hybrid practice formats and low-cost protocols are gaining strength, indicating scalability and adherence in public networks[24,28]. These trajectories are not mutually exclusive; Their point of contact is the understanding that physical self-concept and belonging function as mediators between motor gains and academic results, a hypothesis empirically supported[31].

While the set offers a roadmap for solutions, it also reveals significant gaps. The most striking is the absence of a core outcome set: each study measures different variables using disparate instruments (IQ tests, creativity scales, self-reports, observations, handwriting assessments, motor tests), which prevents comparability and the generation of robust meta-inferences. The studies call for conceptual standardization and the integration of measurement practices, while also highlighting the low level of teacher training on asynchrony and 2e. There is still a lack of controlled trials evaluating the dosage and reliability of school-based psychomotor interventions; and a lack of Latin American studies that consider the real conditions of the public school system – large class sizes, multiple schools per Physical Education teacher, and limited physical space[18,23,25].

In light of this panorama, and aiming for applicability in the Brazilian context, we propose below an Inclusive Educational Model of Body-Cognition Integration (MEICC), anchored in the evidence from eighteen studies and compatible with the national legal framework. The model is broken down into seven interconnected components, with operational recommendations for gradual implementation in public school systems.

1 Two-stage identification with brief psychomotor screening. The school implements an annual screening from the 4th to the 9th grade that combines teacher referral (adapted Renzulli Scales), performance history, and 10–12-minute psychomotor checks in Physical Education (grip and pressure tasks, eye–hand coordination, single-leg balance for 30 seconds, drawing of geometric figures, and writing a standard sentence for 60s). Students identified through screening advance to a focused evaluation with the school team and, when possible, occupational therapy or psychomotor therapy, reducing false positives for ADHD and false negatives for giftedness/high abilities and 2e[16,20].

2 Individualized Education Plan with integrated motor and academic goals. The IEP explicitly states SMART objectives in three dimensions: a cognitive goal (e.g., increasing investigative depth), a motor goal (e.g., copying a legible paragraph in 6 minutes with an active pause every 2 minutes), and a socio-emotional goal (e.g., reducing avoidance in group activities). The plan defines supports and adaptations such as writing boards, high-friction pencils, temporary use of block letters, enlarged keyboard keys, extended test time, and motor pauses of 2–3 minutes every 20–25 minutes[26].

3 Psychomotor intervention and adapted Physical Education through progressions. The network organizes weekly psychomotor sessions (2x/week, 30–40 min) and didactic units in Physical Education structured by levels (entry, consolidation, challenge), with descriptive feedback and a focus on individual gain, not ranking[20]. Contents: fine motor coordination (pincer grasp, finger opposition, rhythm), visual-motor integration (tracing, mazes, patterns), balance (progressive support bases), manipulation (throwing/catching with variation in mass and diameter), and functional graphomotor skills (sequences of strokes + writing of small meaningful blocks).

4 School-based occupational therapy or intersectoral collaboration. Where occupational therapy is not available within the school, the school should establish collaboration with municipal health services to train teachers in simple adjustments and supervise more complex cases. Priority areas include posture, grip strength, upper-limb fatigue, compensatory strategies (keyboard use, peer dictation, voice dictation), and routine training (initiation, planning, execution, checking)[27].

5 Socio-emotional support and classroom climate module. Include a 10–15 minute weekly mini-support protocol: psychoeducation on asynchrony and body image; process goals; progress tracking; and self-regulation techniques (breathing, active pauses) — measures that studies link to lower anxiety and higher engagement[28,31].

6 Ongoing teacher training focusing on task design and formative assessment. Offer short courses for Physical Education and regular classroom teachers on asynchrony and 2e; task design using space–time–rule–material variation; the use of descriptive feedback; and formative assessment with simple motor competence rubrics — all supported by evidence demonstrating a strong effect on student adherence and physical self-concept[25,27].

7 Monitoring with concise indicators and communication with families. Every two months, monitor three markers: legibility and fluency of writing (standardized sample), functional motor competence (a short four-item battery), and physical self-concept (a brief scale), in addition to attendance in Physical Education classes. Share progress reports with families, reinforcing gains and outlining next steps19,14. In networks with limited staffing, use hybrid formats such as short 3–5 minute home-practice videos and monthly checklists[1].

The Model of Integrated Motor Skills and Cognitive Behavioral Therapy (MEICC) does not create a parallel service: it reorganizes existing practices, allocating motor goals and socio-emotional support to the core of the curriculum, without fragmenting the student into "talent" and "difficulty." The model addresses theoretical criticisms that call for the integration of body-cognition-emotion[8]; and responds to operational gaps pointed out in the literature: insensitive identification, absence of standardized psychomotor instruments in schools, low teacher training, and scarcity of implementation designs[16,30].

From a cost and feasibility standpoint, the strategy is incremental. The most sensitive component—psychomotor skills/occupational therapy—can begin with matrix support and low-cost protocols in physical education. The use of gradual goals and descriptive feedback essentially requires pedagogical training, not equipment. European experience suggests that changes in teaching design are the main driver of effect, while Latin American pandemic experience shows that predictable routines and connection sustain engagement even with resource constraints[18,28].

In conclusion, this review argues that holistic interventions produce broad effects because they address the core of the problem: asynchrony as a structural condition in the development of students with high abilities/giftedness and developmental delays. Integrating the body as a dimension of intelligence and identity is not an aesthetic addition to the curriculum; it is the path to reducing low achievement, increasing well-being, and expanding participation.

The MEICC translates this conviction into replicable procedures and monitorable indicators, paving the way for public policies that transcend the cognitivist paradigm and reach the real complexity of human development.

CONCLUSION

This scoping review allowed us to map and synthesize the scientific production of the last 25 years (2000–2025) on motor asynchrony in students with High Abilities/Giftedness (HA/G) and Dual Exceptionality (D/E), focusing on identification, characterization, and intervention processes in the school environment. The study showed that the development of these students is intrinsically heterogeneous, presenting mismatches between cognitive, motor, and socio-emotional domains, which challenges traditional teaching models based on linearity and standardization.

The analysis of the 16 reviewed articles indicates that motor asynchrony is a central manifestation of asynchronous development, not constituting a deficit, but rather a particular form of neurological and psychomotor organization. Students with HA/G and D/E frequently present high cognitive performance and below-average motor skills, especially in fine motor coordination and graphomotor tasks. This dissociation directly impacts their written expression, body image, and engagement in physical and social activities, leading to a risk of academic underperformance and symbolic exclusion.

The studies analyzed converge in affirming that integrated psychomotor, educational, and socio-emotional interventions are essential to promote the overall development of these students. When the body is recognized as a dimension of cognition, learning becomes more meaningful and a positive self-concept is strengthened. Programs that combine adapted physical education, school occupational therapy, rhythm and coordination activities, and metacognitive practices have demonstrated consistent results in inclusion, self-esteem, and academic performance.

However, the review also revealed structural gaps. The main challenge is the lack of standardized diagnostic instruments that simultaneously address cognitive, motor, and emotional aspects. Another is the low level of teacher training on asynchrony and dual exceptionality, which contributes to under-identification and the perpetuation of myths about giftedness. Furthermore, most studies focus on European countries, with a scarcity of empirical research in the Brazilian context, especially in public schools and special education programs.

Based on these findings, the Inclusive Educational Model of Body-Cognition Integration (MEICC) was proposed, based on seven interdependent components: brief psychomotor screening; individualized educational plan with integrated goals; progressive school psychomotor skills; articulation with occupational therapy; socio-emotional support; ongoing teacher training; and monitoring with functional indicators. The MEICC offers pedagogical and financial viability and can be progressively implemented in municipal and state networks as a public policy of inclusion.

The evidence gathered suggests that a holistic approach is the only way to overcome the fragmentation between mind and body, reason and emotion, theory and practice. Inclusive education for students with high abilities/giftedness and developmental disabilities requires not only legal recognition, but also pedagogical projects that embrace difference as a human richness and a driver of innovation.

It is recommended that future research: (a) develop national instruments for identifying motor asynchrony validated for Portuguese; (b) empirically test the effectiveness of the MEICC in Brazilian school contexts; and (c) explore the relationship between psychomotor skills and emotional well-being as predictors of engagement and performance. For public policies, it is urgent to expand continuing education for teachers and strengthen cooperation between Education, Health, and Social Assistance, so that the support for students with high abilities and dual exceptionality becomes effectively interdisciplinary and equitable.

In conclusion, motor asynchrony should be recognized not as an obstacle, but as a legitimate expression of human neuropsychomotor diversity. Promoting school environments that integrate movement, thought, and emotion is essential for full learning, the flourishing of creativity, and the recognition of talent in all its forms.

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