THE IMPORTANCE OF MARTIAL ARTS IN EDUCATION: AN INTEGRATIVE LITERATURE REVIEW (2021–2026)

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Juliano Romiatto[1]

Abstract: Introduction: Martial arts occupy different places in educational systems. In Japan, budo has been a compulsory component of junior high school physical education since 2012; in South Korea, taekwondo is embedded in school and family culture; in China, national policies encourage the inclusion of wushu in the curriculum. In countries such as the United States and Brazil, these practices appear mainly as extracurricular activities or as a thematic unit within physical education. Objective: To critically synthesize evidence published between 2021 and 2026 on the effects of educational martial arts programs across three dimensions: cognitive development, character formation, and interdisciplinarity. Method: Integrative literature review with a systematized search of international and national scientific databases and repositories, whose identification, screening, eligibility, and inclusion stages were guided by PRISMA 2020. Randomized controlled trials, quasi-experimental studies, observational studies, systematic reviews, meta-analyses, and curriculum implementation studies were considered. Results: Twenty publications formed the corpus: eleven empirical publications, corresponding to ten independent investigations (two publications analyze the same sample), and nine reviews. School-based randomized trials indicate small but significant effects on

[1] A martial arts athlete and coach with over three decades of experience in taekwondo, Muay Thai, judo, and jiu-jitsu. A black belt in both taekwondo and Muay Thai, he was the Rio Grande do Sul state champion (2009 and 2010), Brazilian champion (2009), and South American champion (2009) in Traditional Muay Thai, and a member of the Brazilian National Team in that discipline. He has worked as a coach and technical leader for teams in Porto Alegre (RS), such as Dream Team, Killer Bees, and Minu Fight Team, and as a technical evaluator for graduation exams of the Brazilian Muay Thai Confederation. He is the author of the JR System, a training methodology that integrates these four disciplines, and currently collaborates in the preparation of MMA athletes at Fusion X-Cel Performance (Florida, USA).

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academic achievement (d = 0.16) and conduct problems (d = −0.28). Effects on executive functions were not homogeneous: a taekwondo trial found gains in executive attention but not in response inhibition; a study with at-risk youths reported improved inhibition and processing speed; and a single bout of Chinese archery produced only acute benefits. Gains in resilience were also observed. A meta-analysis of Korean studies found positive effects of taekwondo on etiquette, character, sociability, and adjustment to school life. However, a randomized trial with 283 adolescents found no reduction in aggression, and reviews point to low methodological quality, heterogeneous protocols, and a scarcity of studies on interdisciplinary integration. Implementation studies in Japan, China, and Brazil reveal common barriers: insufficient teacher training, inadequate facilities, and low institutional priority. Conclusion: When pedagogically structured, martial arts may contribute to self-regulation, discipline, and school coexistence. There is, however, insufficient evidence to claim that countries teaching martial arts in schools show superior cognitive development or educational performance. The decisive factor appears to lie in pedagogical intentionality: using combat as a tool to teach students to think, respect, decide, and overcome difficulties.

Keywords: martial arts; school physical education; executive functions; character education; interdisciplinarity.

INTRODUCTION

The presence of martial arts in schools is not a uniform phenomenon. It expresses distinct cultural, political, and pedagogical projects, which vary according to each country's history and the place assigned to the body in human development. In Japan, budo became a compulsory component of junior high school physical education starting in 2012. A recent national survey of 386 teachers showed that the teaching of judo, kendo, and other disciplines relies heavily on moral and cultural values but faces limitations in teachers' technical competence, equipment costs, and safety (KITAMURA; MAESAKA; NAKAMURA, 2026).

In South Korea, taekwondo holds a singular position: it is a national symbol, a

practice widespread among children and adolescents, and the object of explicit educational expectations on the part of families. Korean parents whose children had trained for more than ten years attributed to the discipline the functions of supporting mental health, stability in school life, social development, and preparation for adulthood (JEON; JANG; JOUNG, 2021). In China, the state has promoted the integration of sport and education and the inclusion of martial arts in the formal curriculum. Even so, a case study of secondary schools in Hangzhou found few schools with compulsory classes and an absence of specialized equipment and certified instructors (SHAO; BASAR, 2025).

In the United States and Brazil, martial arts generally appear as an extracurricular activity, an offering of private gyms, or content within school physical education. In Brazil, combat sports (lutas) constitute a thematic unit of physical education in the Base Nacional Comum Curricular (BNCC), the national curriculum framework. A recent systematic review, however, found that a significant share of schools do not include them in their classes, chiefly because of a lack of teacher training, inadequate infrastructure, and a shortage of specialized professionals (ANDREATO et al., 2024). This situation is tied to pre-service teacher education: 61.4% of the faculty responsible for combat-sports courses in Brazilian public teacher-education programs have no academic training in the field, and 35.7% of the required courses run 45 hours or fewer (ANDREATO et al., 2026).

At the same time, scientific interest in the effects of martial arts on children and adolescents is growing. The literature has investigated physical outcomes (STAMENKOVIĆ et al., 2022), cognitive outcomes (HARWOOD-GROSS et al., 2021; NG-KNIGHT et al., 2022), psychosocial outcomes (KIM et al., 2021; MOORE; WOODCOCK; DUDLEY, 2021), and academic outcomes (PINTO-ESCALONA et al., 2024). Nevertheless, public discourse about martial arts tends to go beyond what the evidence supports. It is common to draw a direct association between martial tradition and the educational excellence of Asian countries, without considering the other determinants of those results.

Against this backdrop, this article starts from three research questions. First: What are the effects of educational martial arts programs on the cognitive development of children and adolescents, considering concentration, memory, reasoning, attention, and self-control?

Second: What evidence supports their contribution to character formation, including discipline, respect, responsibility, perseverance, and the ability to cope with defeat and frustration? Third: To what extent does the literature document the integration of martial arts with other areas of knowledge, such as mathematics, history, science, culture, and emotional education?

The general objective is to critically synthesize the scientific literature published between 2021 and 2026 on the importance of martial arts in education. As a complementary objective, the article discusses whether the literature allows us to claim that countries with a strong tradition of martial arts in schools gain cognitive or educational advantages over others.

THEORETICAL FRAMEWORK

MARTIAL ARTS AS AN EDUCATIONAL PRACTICE

Martial arts are distinguished from other bodily practices by combining three elements: a technical repertoire of attack and defense, a set of rituals and norms of conduct, and a cultural matrix that assigns moral meaning to the practice. In Japanese budo, the bow, care for one's partner, and control of force are part of the content, not accessories to training. Japanese teachers with less technical mastery tend to compensate for this limitation by emphasizing precisely the moral and cultural values of the discipline, which reveals the weight placed on the formative dimension in the school context (KITAMURA; MAESAKA; NAKAMURA, 2026).

This ritual dimension also appears in Western contexts. In a judo intervention at a public school in Porto Alegre, the ritsu-rei bow and the mokuso meditation posture were treated as pedagogical content, and the homeroom teacher reported that these behaviors transferred to the classroom (TRUSZ; BALBINOTTI, 2024). Ritual, in this sense, works as a self-regulation device: it interrupts impulse, marks the beginning and end of an action, and reaffirms respect for others.

EXECUTIVE FUNCTIONS AND SELF-REGULATION

Executive functions comprise inhibitory control, working memory, and cognitive flexibility. They underpin attention, planning, and self-control, capacities that are decisive for school learning. Inhibitory control, in turn, is not a single capacity: it includes interference control, which makes it possible to keep attention on the relevant stimulus and ignore distractors (measured, for example, by the flanker task), and response inhibition, which consists of suspending a motor action that has already been prepared (measured, for example, by go/no-go or stop-signal tasks). This distinction matters for interpreting the studies, because they do not always measure the same component. The hypothesis guiding much of the research is that martial arts demand, simultaneously, physical effort and high cognitive demand. Practitioners must memorize sequences, inhibit inappropriate responses, anticipate the opponent's actions, and switch rapidly between attack and defense.

Ng-Knight et al. (2022) added a motivational component to this hypothesis. In their taekwondo trial, the improvements observed were partly explained by increases in the children's expectations and in the value they placed on using self-regulation. This suggests that the effect does not stem from exercise alone but from the meaning the practice gives to self-control. In adults, the review by Ciaccioni et al. (2024) found consistent associations between martial arts and perceptual and inhibitory skills, but limited evidence for attention and memory, which indicates that cognitive effects tend to be specific rather than global.

CHARACTER EDUCATION AND SOCIAL-EMOTIONAL LEARNING

Character education seeks to develop virtues such as respect, responsibility, perseverance, and justice. Social-emotional learning, in turn, emphasizes competencies such as emotional regulation, empathy, and responsible decision-making. Martial arts offer a favorable environment for both, because they expose students to controlled situations of confrontation, error, defeat, and starting over.

The review by Herdiansyah et al. (2025) showed that the most effective programs in

elementary school combine structured practice, reflective or mindfulness activities, cooperative learning, and teaching that fosters autonomy. Short or extracurricular programs without explicit social-emotional components showed limited or inconsistent effects. This finding supports the central argument of this article: the formative potential of martial arts depends on pedagogical mediation, not on the discipline itself.

METHOD

DESIGN

This is an integrative literature review, with a systematized search and narrative synthesis (WHITTEMORE; KNAFL, 2005). This design was chosen because it allows experimental trials, observational studies, curriculum implementation studies, and reviews to be brought together in a single analysis, a combination necessary to answer the three research questions. The stages of identification, screening, eligibility, and inclusion were guided by the PRISMA 2020 recommendations (PAGE et al., 2021). Narrative synthesis was adopted because the heterogeneity of designs, disciplines, age groups, and measurement instruments made statistical aggregation of the results unfeasible.

SEARCH STRATEGY

The searches were conducted in PubMed/PMC, the Directory of Open Access Journals (DOAJ), SciELO, J-STAGE, and the portals of the publishers Frontiers, MDPI, Elsevier, and Wiley, in addition to institutional repositories and specialized journals such as Revista de Artes Marciales Asiáticas and Martial Arts Studies. Descriptors in English, Portuguese, and Spanish were combined using Boolean operators: (“martial arts” OR “combat sports” OR karate OR judo OR taekwondo OR wushu OR budo OR lutas) AND (school OR education OR “physical education” OR children OR adolescents) AND (“executive function” OR cognition OR attention OR “self-regulation” OR character OR resilience OR aggression OR “social skills” OR curriculum OR interdisciplinary). The search covered publications

from January 2021 to October 2026.

The syntax was adapted to the features of each database (title, abstract, and keyword fields; date and language filters), keeping the three blocks of descriptors. The searches ended in October 2026.

ELIGIBILITY CRITERIA

Studies were included if they met four criteria: publication in a peer-reviewed journal between 2021 and 2026; a population of school-age children or adolescents, or of teachers and families involved in teaching martial arts; an intervention, exposure, or object of analysis related to martial arts or combat sports in an educational context; and cognitive, academic, psychosocial, moral, or curriculum-implementation outcomes. Randomized trials, quasi-experimental studies, intervention-research studies, cross-sectional studies, systematic reviews, scoping reviews, and meta-analyses were admitted.

Protocols without results, conference abstracts, general-audience texts, dissertations and theses not published in a journal, and studies focused exclusively on the competitive performance of adult athletes were excluded. Studies of adults or of physical activity in general were retained only as contextual evidence, when necessary to interpret the mechanisms discussed.

SELECTION STAGES

Selection followed the four stages proposed by PRISMA 2020, summarized in Table 1.

Identification. The records retrieved from the databases were pooled, and duplicates were removed by comparing DOI, title, and authorship.

Screening. The titles and abstracts of the remaining records were read in light of the eligibility criteria. Records clearly outside the topic, population, or period were excluded at this stage. Screening and the subsequent stages were conducted by the author.

Eligibility. The full texts of the preselected records were read in their entirety. The reasons for exclusion considered at this stage were: population outside the scope, absence of a martial arts or combat sports component, irrelevant outcome, excluded publication type, or full text unavailable.

Inclusion. The review gathered twenty publications, of which eighteen met all the eligibility criteria and made up the main scope: eleven empirical publications, corresponding to ten independent investigations, and seven reviews. The other two, Ciaccioni et al. (2024), which addresses adults, and Cheng, Song, and Hong (2025), which addresses physical activity in general among children with ADHD, were retained solely as contextual support, under the exception provided in Section 3.3. Because some publications analyze the same sample or revisit studies already synthesized in reviews, the relationship among them is detailed in Section 3.6 and Table 2.

Table 1. Stages of identification, screening, eligibility, and inclusion of studies

Stage	Procedure	Criterion and result
Identification	Search in PubMed/PMC; DOAJ; SciELO; J-STAGE; Frontiers, MDPI,Elsevier, and Wiley portals; institutional repositories and specialized journals	Pooling of retrieved records and removal of duplicates by DOI, title, andauthorship
Screening	Reading of titles and abstracts	Exclusion of records outside the topic, population, or period
Eligibility	Full-text reading of preselected texts	Exclusion by population, absence of martial arts or combat sports, outcome,publication type, or unavailable text

Inclusion	Composition of the corpus	20 publications gathered: 18 in the main scope (11 empirical, corresponding to 10 independent investigations, and 7reviews) and 2 as contextual support (reviews)

Source: Prepared by the author based on Page et al. (2021).

DATA EXTRACTION AND APPRAISAL

For each study, the following were extracted: authorship, year, country, design, sample, discipline, intervention duration, outcomes, and main results, including effect sizes when available. It was also recorded whether the publication presented its own sample, reanalyzed an already published sample, or synthesized studies by other authors.

Methodological quality was appraised qualitatively, considering randomization, the existence and nature of the control group, sample size, blinding of assessors, use of validated instruments, and post-intervention follow-up. The bibliographic reference of each study was checked on the journal's official page or in a recognized index, with verification of the digital object identifier (DOI) when available.

FINAL CORPUS

Twenty publications formed the corpus: six trials or experimental and quasi-experimental studies with students; one intervention-research study; three studies of curriculum implementation or teacher training; one study of family perceptions; and nine systematic reviews, scoping reviews, or meta-analyses. The studies span Japan, South Korea, China, Australia, the United Kingdom, Israel, five European countries participating in a multicenter trial, and Brazil. The synthesis was organized along the three axes defined in the research questions, plus a fourth axis on the international overview of implementation.

Twenty publications, however, are not equivalent to twenty independent studies.

Three situations deserve attention. First: the six experimental publications correspond to five distinct samples, because Moore, Woodcock, and Dudley (2024) analyze the aggression outcome in the same sample of 283 Australian adolescents whose effect on resilience was reported in Moore, Woodcock, and Dudley (2021). Thus, the eleven empirical publications represent ten independent investigations. Second: the nine reviews produce no new data but gather primary studies by other authors, mostly published before 2021; when a primary study in the corpus is also included in a review, the results must not be counted twice. Checking the lists of studies included in the reviews identified two overlaps: Harwood-Gross et al. (2021) is included in the review by Lee et al. (2025), which is the source of the effect sizes cited in Section 4.1, and Pinto-Escalona et al. (2024), published online in 2021, is included in the review by Stamenković et al. (2022). The review by Andreato et al. (2024) includes none of the primary studies in the corpus, and that of Kim et al. (2021) is restricted to Korean studies. In the remaining reviews, the findings were treated as complementary evidence, and the conclusions rested primarily on the primary studies. Third: two reviews, Ciaccioni et al. (2024), which addresses adults, and Cheng, Song, and Hong (2025), which addresses physical activity in general among children with ADHD, were retained only as contextual evidence and do not, on their own, support conclusions about martial arts in schools. Table 2 presents this relationship.

Table 2. Publications in the corpus, type of evidence, and relationship among samples

No.	Publication	Design	Sample and relationship to other publications
1	Pinto-Escalona et al. (2024)	Cluster randomized trial	Own sample: 721 children, 20 schools, 5 European countries. Also included in the review by Stamenković et al. (2022)
2	Ng-Knight et al. (2022)	Randomized field trial	Own sample: 240 children, United Kingdom

3	Harwood-Gross et al. (2021)	Controlled study with active comparison group	Own sample: at-risk boys, Israel. Also included in the review by Lee et al. (2025)
4	Liu et al. (2023)	Experimental, acute effect	Own sample: preadolescents, Shanghai
5	Moore, Woodcock, and Dudley (2021)	Randomized trial	Own sample: 283 students aged12 to 14, Australia (outcome:resilience)
6	Moore, Woodcock, and Dudley (2024)	Analysis of a randomized trial	Same sample as publication 5(outcome: aggression); not an independent study
7	Trusz and Balbinotti (2024)	Intervention research	Own sample: 26 fourth-graders, Brazil
8	Kitamura, Maesaka, and Nakamura (2026)	Survey (implementation)	Own sample: 386 teachers, Japan
9	Shao and Basar(2025)	Case study (implementatio n)	Own sample: 200 studentsand 15 teachers, China
10	Andreato et al. (2026)	Curriculum analysis (teacher education)	Public physical education teacher-education programs, Brazil
11	Jeon, Jang, and Joung (2021)	Q methodology (family perceptions)	Own sample: Korean parents
12	Kim et al. (2021)	Meta-analysis	28 Korean studies (24 cross-sectional, 4 intervention)
13	Stamenković et al. (2022)	Systematic review	16 studies; 1,615 participants; includes publication 1

14	Sevilla-Sanchez et al. (2025)	Scoping review	10 studies; 683 participants aged 6 to 17
15	Lee et al. (2025)	Systematic review of controlled trials	12 trials; 436 participants with disabilities; includes publication 3
16	Herdiansyah et al. (2025)	Systematic review	9 empirical studies; children aged 6 to 12
17	Gemin Vidal, Pinheiro, and Pilatti (2026)	Scoping review	22 studies of wushu interventions, 11 countries
18	Andreato et al. (2024)	Systematic review	16 articles on combat sports in schools, Brazil; includes no primary studies from the corpus
19	Ciaccioni et al. (2024)	Systematic review	Contextual evidence: adults
20	Cheng, Song, and Hong (2025)	Meta-analysis	Contextual evidence: physicalactivity in general, children withADHD

Source: Prepared by the author.

RESULTS

COGNITIVE DEVELOPMENT

The cluster randomized controlled trial by Pinto-Escalona et al. (2024) is, to date, the most robust evidence on martial arts in the school curriculum. The study involved 721 children aged 7 to 8 (mean age 7.4 years), distributed across 20 schools in five European countries. The intervention group replaced regular physical education classes, for one school year, with the Karate Mind and Movement program. Compared with the control group, there was an improvement in academic achievement (d = 0.16; p = 0.003), a reduction in

parent-reported conduct problems (d = −0.28; p = 0.003), and a gain in cardiorespiratory fitness (d = 0.36). The authors themselves characterize these benefits as small but significant. It should be noted that this trial did not administer inhibitory control tests; the reduction in conduct problems is a behavioral indicator reported by parents, not a direct measure of that executive function.

In the United Kingdom, Ng-Knight et al. (2022) randomized 240 children aged 7 to 11 from a nonselective primary school to a standard 11-week taekwondo course. Teachers reported improved attentional control and reduced conduct problems. On the cognitive tasks, there was a gain in executive attention, measured by the flanker test. No effects were observed on response inhibition, verbal working memory, flexibility, impulsivity, or prosocial behavior. In other words, the gain appeared in interference control (ignoring distractors), not in the ability to brake a motor response. The authors also reported that "Taekwondo was rated very positively by children" (NG-KNIGHT et al., 2022).

In Israel, Harwood-Gross et al. (2021) compared boys in specialized institutions for at-risk youths who underwent six months of martial arts training, twice a week, with peers who took regular sports classes. The martial arts group showed improvement in inhibition, cognitive flexibility, and processing speed. Baseline hormonal reactivity predicted later changes: oxytocin reactivity was associated with greater processing speed and lower aggression, and cortisol reactivity with higher self-esteem. In the synthesis by Lee et al. (2025), the effects of this study were estimated at d = 1.02 for inhibition and d = 1.09 for processing speed. Unlike the British trial, here inhibition improved, but in a specific population (at-risk youths), with a longer intervention (six months) and a comparison with another sports activity; for this reason, the result cannot be directly generalized to schoolchildren in general.

In China, Liu et al. (2023) investigated the acute effect of a single session of traditional Chinese archery, a practice tied to martial culture, on the executive functions of preadolescent children in Shanghai. The authors concluded that "a single bout of Chinese archery benefited three subdomains of core EFs in healthy preadolescent children" (LIU et al., 2023). Because the effect was acute, the result does not allow inferences about chronic

effects.

The reviews confirm the positive direction but with methodological caveats. The scoping review by Sevilla-Sanchez et al. (2025) identified 1,368 records and included 10 studies on judo and Olympic wrestling, totaling 683 participants aged 6 to 17. The studies consistently associated the practice with positive behavioral and neurocognitive variables, but the overall quality was considered suboptimal. Lee et al. (2025) analyzed 12 controlled trials with 436 children and adolescents with disabilities and observed significant improvements in stereotypies, communication, social-emotional functioning, and executive function. As contextual evidence, the meta-analysis by Cheng, Song, and Hong (2025) of children with ADHD showed a moderate effect of physical activity on working memory (SMD = 0.51; 95% CI: 0.34 to 0.69), with more stable results in sessions of 45 to 60 minutes over 8 to 12 weeks.

Table 3. Results of primary studies on inhibitory control and executive attention

Study	Population and intervention	What was measured	Result
Ng-Knight et al. (2022)	240 children aged 7 to 11; taekwondo, 11 weeks; randomized trial	Executive attention (flanker); response inhibition; teacher ratings	Gain in executive attention and in teacher- reported attentional control; no effect on response inhibition
Harwood-Gross et al. (2021)	At-risk boys; martial arts, 6 months; comparison with regular sport	Inhibition, flexibility, processing speed	Improvement in inhibition(d = 1.02, according to Lee et al., 2025) and in processing speed
Liu et al. (2023)	Preadolescents in Shanghai; single session of Chinese archery	Three executive function subdomains, including inhibition	Acute benefit only; no information on lasting effect

Pinto-Escalona et al. (2024)	721 children aged 7 to 8; karate, 1 school year; cluster trial	Academic achievement, conduct problems (parents), physical fitness	Inhibitory control not measured; reduction in conduct problems (d = −0.28) as a behavioral indicator

Source: Prepared by the author based on the studies cited.

In sum, the results on executive functions are not homogeneous. Executive attention (interference control) improved in the only randomized trial that measured it in schoolchildren (NG-KNIGHT et al., 2022). Response inhibition, by contrast, did not change in that same trial, and the improvement in inhibition appeared only in at-risk youths after six months of practice (HARWOOD-GROSS et al., 2021) and as an acute effect of a single session (LIU et al., 2023). Processing speed improved in the Israeli study. Therefore, the data support an effect on executive attention in schoolchildren, but not yet a generalizable effect on inhibitory control. For working memory and reasoning, the findings are scarce or null in the trials specific to martial arts. Effects on academic achievement exist but are small in magnitude.

CHARACTER FORMATION

The meta-analysis by Kim et al. (2021), covering 28 Korean studies (24 cross-sectional and 4 intervention), identified positive effects of taekwondo on etiquette (mean difference of 0.562), character (0.446), adjustment to school life (0.308), and sociability (0.266). The authors concluded that "Taekwondo can have a positive impact on the psychosocial factors of trainees" (KIM et al., 2021). The predominance of cross-sectional studies, however, precludes causal inference, and adjustment for publication bias reduced the estimate for sociability to 0.138.

In Australia, Moore, Woodcock, and Dudley (2021) conducted a randomized trial with 283 students aged 12 to 14, who took part in a 10-week martial arts program as a mental

health intervention. The program had a significant effect on resilience, more evident immediately after the intervention than at the 12-week follow-up. With the same sample, the authors found that the program "did not reduce, nor increase aggressive behaviour" (MOORE; WOODCOCK; DUDLEY, 2024). These are, therefore, two outcomes of a single trial, not two independent studies. This null result, produced by a rigorous design, contrasts with the widespread belief that martial arts automatically reduce school violence.

In Brazil, the intervention-research study by Trusz and Balbinotti (2024), with 26 fourth-graders at a public school, showed that 24 judo lessons, combining playful activities and traditional practices, fostered the incorporation of rituals of respect, the transfer of those behaviors to the classroom, and an increase in self-confidence. In South Korea, the parents interviewed by Jeon, Jang, and Joung (2021) converged in perceiving positive changes in attitudes at home, in the organization of life habits, and in learning good manners and etiquette.

The review by Herdiansyah et al. (2025), with nine empirical studies on children aged 6 to 12, associated school martial arts programs with improvements in emotional regulation, executive functions, and empathy. The ability to cope with defeat and frustration, although frequently cited as a benefit, is rarely measured directly. It appears indirectly in studies on resilience (MOORE; WOODCOCK; DUDLEY, 2021) and emotional regulation (HERDIANSYAH et al., 2025; CIACCIONI et al., 2024).

INTERDISCIPLINARITY

This axis presents the largest gap in the literature. None of the included studies systematically assessed the integration of martial arts with mathematics or science as a learning outcome. Interdisciplinarity appears in three indirect ways. The first is integration with emotional education, present in programs that combine martial practice, meditation, and reflection (HERDIANSYAH et al., 2025; TRUSZ; BALBINOTTI, 2024). The second is the historical-cultural dimension, evident in Japanese budo, whose teachers emphasize cultural values (KITAMURA; MAESAKA; NAKAMURA, 2026), and in the culturally oriented

wushu interventions mapped by Gemin Vidal, Pinheiro, and Pilatti (2026). The third is overall academic achievement, observed in the trial by Pinto-Escalona et al. (2024), which does not stem from explicit curriculum integration.

The scoping review by Gemin Vidal, Pinheiro, and Pilatti (2026) identified 2,671 records and included 22 studies of wushu interventions from 11 countries, organized into four domains: educational, clinical, psychological-motor, and cultural. The authors reported physical and psychosocial gains but pointed to methodological heterogeneity, lack of standardization, and sociological gaps. Integration with mathematics, physics, or biology, although pedagogically plausible, remains in the realm of proposals.

INTERNATIONAL OVERVIEW OF IMPLEMENTATION

The implementation studies show that legal mandates do not guarantee pedagogical quality. In Japan, the survey of 386 teachers showed a relationship between rank (dan) and teacher confidence, with especially low self-assessment among kendo teachers, in addition to barriers of cost, time, and safety (KITAMURA; MAESAKA; NAKAMURA, 2026). In China, the study of 200 students and 15 teachers in four schools in Xiaoshan, a district of Hangzhou, pointed to a lack of leadership, funding, and family involvement as obstacles cited by more than half of the educators (SHAO; BASAR, 2025).

In Brazil, the difficulties are concentrated in teacher preparation. The review by Andreato et al. (2024), with 16 articles, identified lack of teacher training, inadequate infrastructure, and the absence of specialists as the main reasons for the exclusion of combat sports.

The analysis of public teacher-education programs showed that 94.6% of institutions offer combat-sports courses, but 24.3% concentrate on a single discipline and 24.3% have no modules devoted to teaching combat sports (ANDREATO et al., 2026). The contexts differ, but the obstacles converge: teacher competence, material resources, and institutional priority.

DISCUSSION

WHAT THE EVIDENCE SUPPORTS

The results indicate that martial arts, when embedded in structured school programs, produce real benefits, albeit specific ones of generally small to moderate magnitude. The most favored domain is self-regulation, but by different routes in each study. The reduction in conduct problems appears in two independent randomized trials, with karate and taekwondo (PINTO-ESCALONA et al., 2024; NG-KNIGHT et al., 2022). Executive attention improved in the taekwondo trial, but response inhibition did not (NG-KNIGHT et al., 2022), and the karate trial did not measure that function. Improvement in inhibition was recorded in at-risk youths (HARWOOD-GROSS et al., 2021) and as the acute effect of a single session (LIU et al., 2023). The convergence is therefore clearer at the behavioral level (conduct) than at the level of specific executive functions, where inhibitory control still lacks confirmation in general-population schoolchildren.

Physical benefits are also well established. The review by Stamenković et al. (2022), with 16 studies and 1,615 participants, concluded that martial arts programs are "helpful for improving the physical fitness of preschool and school children," with emphasis on cardiorespiratory fitness, speed, agility, strength, flexibility, coordination, and balance. This finding is relevant because physical fitness is one plausible pathway to cognitive effects, as the broader literature on physical activity and working memory suggests (CHENG; SONG; HONG, 2025).

WHAT THE EVIDENCE DOES NOT SUPPORT

Three limits deserve emphasis. The first concerns the generalization of cognitive effects. Ng-Knight et al. (2022) found no effects on working memory, flexibility, or response inhibition, and Ciaccioni et al. (2024) observed limited evidence for attention and memory in adults. Even within inhibitory control, results diverge depending on the component measured, the population, and the duration of practice (Table 3). The idea that martial arts broadly improve cognition is not supported by current data.

The second limit involves aggression. The trial by Moore, Woodcock, and Dudley (2024)—an analysis of the same sample as the 2021 study—detected neither a reduction nor an increase in aggression among adolescents, contradicting earlier, less rigorous studies.

This does not negate the reduction in conduct problems observed in younger children, but it suggests that age, program duration, and pedagogical emphasis moderate the results.

The third limit, and the most important for the public debate, concerns comparisons between countries. No study in the corpus compared the cognitive development or educational performance of countries that teach martial arts in schools with countries that do not. The strong performance of education systems such as those of Japan, South Korea, and China results from multiple factors, including the value placed on teachers, curricular organization, public investment, and a family culture of study. Attributing that performance to martial tradition would be a causal inference with no empirical basis.

Moreover, the implementation studies show that, even in those countries, school-based martial arts instruction faces significant quality limitations (KITAMURA; MAESAKA; NAKAMURA, 2026; SHAO; BASAR, 2025).

METHODOLOGICAL QUALITY OF THE LITERATURE

The literature shows progress, with multicenter, registered randomized trials, but heterogeneity still predominates. The reviews included point to suboptimal quality of primary studies (SEVILLA-SANCHEZ et al., 2025), a predominance of cross-sectional designs (KIM et al., 2021), a lack of protocol standardization (GEMIN VIDAL; PINHEIRO; PILATTI, 2026), and a need for longitudinal follow-up (HERDIANSYAH et al., 2025). The absence of active control groups in several studies is also noteworthy, which makes it difficult to separate the specific effect of the martial art from the generic effect of physical activity or the novelty of the intervention.

Another critical point is the fading of effects over time. In the study by Moore, Woodcock, and Dudley (2021), the gains in resilience were larger at the end of the program

than 12 weeks later. Short programs tend to produce effects that dissipate, which strengthens the case for ongoing proposals integrated into the curriculum rather than one-off interventions.

PEDAGOGICAL IMPLICATIONS

The main implication of this review is that the educational effectiveness of martial arts depends on pedagogical design. The programs with the best results combine technical practice, rituals of respect, moments of reflection, cooperation, and support for autonomy (HERDIANSYAH et al., 2025). Teaching students to fight, by itself, does not guarantee character formation. What turns fighting into education is the intention to use controlled confrontation to teach students to think before acting, respect their partner, decide under pressure, and persist in the face of error.

For Brazil, the implications are direct. Pre-service teacher education needs to increase course hours, diversify the disciplines taught, and include specific pedagogy for teaching combat sports (ANDREATO et al., 2026). Continuing education and collaboration with specialists, also recommended in the Japanese context (KITAMURA; MAESAKA; NAKAMURA, 2026), can reduce the teacher insecurity that currently keeps combat sports out of schools (ANDREATO et al., 2024). The experience with judo in a public school shows that playful proposals with simple rituals are feasible even without sophisticated facilities (TRUSZ; BALBINOTTI, 2024).

As for interdisciplinarity, the gap identified is also a research opportunity. Projects that connect martial arts with history (the origins and cultural contexts of the disciplines), science (biomechanics, levers, balance, and physiology), mathematics (angles, counting, and the geometry of movement), and emotional education are pedagogically coherent. They need, however, to be evaluated with controlled designs before being presented as evidence-based practices.

LIMITATIONS OF THIS REVIEW

This review has limitations. The heterogeneity of the studies precluded a meta-analysis. Because this is an integrative review conducted by a single reviewer, record counts at each stage of selection were not documented, and no standardized risk-of-bias instrument was applied, which limits the reproducibility of the process; methodological quality was appraised qualitatively. Restricting the period to 2021–2026 excluded classic studies that underpinned the field. Literature published exclusively in Japanese, Korean, and Chinese may be underrepresented, which limits the analysis of Asian contexts.

Finally, including reviews alongside primary studies may produce partial overlap of evidence, as occurs with the studies by Harwood-Gross et al. (2021) and Pinto-Escalona et al. (2024), which were also analyzed by Lee et al. (2025) and Stamenković et al. (2022), respectively. To reduce the risk of double counting, Table 2 distinguishes publications with their own sample, publications that reanalyze the same sample (MOORE; WOODCOCK; DUDLEY, 2021; 2024), and reviews that synthesize studies by other authors, and the conclusions of this review rested primarily on the ten independent empirical investigations.

CONCLUDING REMARKS

This integrative review analyzed twenty publications from 2021 to 2026 on the importance of martial arts in education, of which eleven are empirical (corresponding to ten independent investigations) and nine are reviews. In cognitive development, the strongest evidence points to improvements in executive attention and behavioral self-control, plus a small effect on academic achievement. Improvement in inhibitory control and processing speed was observed in specific studies (at-risk youths and the acute effect of a single session) but was not confirmed for response inhibition in the main trial with schoolchildren. Effects on working memory and reasoning remain uncertain.

In character formation, there are favorable results for resilience, etiquette, respect, school adjustment, self-confidence, and reduced conduct problems. The reduction of aggression in adolescents, however, was not confirmed by a recent randomized trial. In

interdisciplinarity, integration with emotional education and with the historical-cultural dimension is present in the proposals, but the connection with mathematics and science still lacks empirical evaluation.

It follows that martial arts can contribute to shaping students who are more disciplined, confident, and prepared to face personal and professional challenges. That contribution depends on well-structured, ongoing programs, taught by qualified teachers and guided by explicit formative goals.

However, there is insufficient evidence to claim that countries that teach martial arts in schools show cognitive development or educational performance superior to others. Even in countries with a strong tradition, such as Japan and China, school implementation faces teacher-training and resource problems similar to those observed in Brazil.

The real difference lies not simply in teaching a child to fight but in using fighting as a tool to teach students to think, respect, decide, and overcome difficulties. Future research is recommended to adopt randomized trials with active control groups, longitudinal follow-up, dose–response assessment, direct measures of frustration tolerance, and measures that distinguish the components of inhibitory control (interference control and response inhibition), as well as international comparative studies controlling for socioeconomic and educational variables. Controlled evaluation of interdisciplinary projects that integrate martial arts with other areas of the curriculum is also recommended, as are systematic reviews with two independent reviewers and complete documentation of the selection flow.

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