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Physiotherapy Strength-Training Interventions In Juvenile Idiopathic Arthritis : A Narrative Review

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ABSTRACT

Background:

Juvenile idiopathic arthritis (JIA) frequently leads to muscle weakness, decreased bone density, fatigue, and diminished physical function in affected children [1]. Strength training guided by physiotherapy—including activities such as active virtual reality (AcVR), weight-bearing exercises, resistance training, and core stability work—may help address these challenges

Objective:
To review and synthesize evidence from 2017–2025 on physiotherapy-guided strength training interventions in children with JIA, focusing on safety, feasibility, musculoskeletal outcomes, functional benefits, and adherence challenges.

Methods:
A narrative review was conducted with systematic search principles across PubMed, PEDro, Web of Science, and Scopus (2017–June 2025). Randomized controlled trials (RCTs), feasibility studies, and pilot studies were included if they involved physiotherapist-supervised strength or resistance training interventions in JIA populations. Methodological quality was assessed using the Josephkin Kennedy KNN tool. A total of seven studies (n=143 participants) were included.

Results:
Strength training was consistently safe, with no serious adverse events reported. Improvements were observed in muscle structure (fascicle length, thickness, pennation angle), torque, bone mineral density, and functional performance (6MWT, stair climb, fatigue reduction). Adherence rates varied widely (47–95%), influencing outcomes. Digital interventions, internet-based platforms, and serious gaming showed promise in enhancing motivation and adherence.

Physiotherapy-led strength training is safe and effective for improving musculoskeletal and functional outcomes in children with JIA. Adherence remains the primary barrier, underscoring the need for innovative, engaging, and scalable intervention strategies. Future research should focus on standardized protocols, long-term outcomes, and integration of digital tools to optimize rehabilitation.

Keywords: Juvenile idiopathic arthritis; physiotherapy; strength training; resistance exercise; pediatric rehabilitation; digital health; adherence.

Introduction

Juvenile idiopathic arthritis (JIA) frequently leads to muscle weakness, decreased bone density, fatigue, and diminished physical function in affected children .[1] Strength training guided by physiotherapy—including activities such as active virtual reality (AcVR), weight-bearing exercises, resistance training, and core stability work—may help address these challenges .[2]Recent studies conducted between 2017 and 2025 have shown notable improvements in muscle structure, strength, functional abilities, and fatigue levels, without any serious adverse effects . Positive bone health outcomes were observed when participants adhered well to the programs, though poor compliance often limited sustained benefits .[1] Across various protocols, safety remained consistently favorable, with minimal reports of increased pain .[1] Adherence rates varied widely, influenced by factors such as time constraints, lack of enjoyment, and fatigue .[3] To overcome these barriers, innovative approaches like internet-based programs and serious gaming have been introduced, leading to better motivation and compliance .[4] Earlier systematic reviews up to 2016 reported moderate benefits and good tolerability across different exercise types, although their generalizability was somewhat limited .[5] There is an ongoing need for standardized, scalable, and engaging physiotherapy protocols for children with JIA .[6] This narrative review brings together evidence from six randomized controlled trials and one feasibility study, involving 143 participants, with study quality assessed using the Josephkin Kennedy KNN tool .

Juvenile idiopathic arthritis (JIA) is the most common chronic pediatric rheumatic disease, affecting approximately 2–20 per 100,000 annually and up to 150 per 100,000 children in high-income countries, and manifests before age 16 as persistent joint inflammation lasting at least six weeks .[7] Children with JIA experience joint pain, stiffness, swelling, and reduced range of motion, commonly affecting large joints such as knees and elbows .[8] Muscle weakness around affected joints, especially reduced cross-sectional area and strength, is well documented and can result both from inflammation and decreased activity .[9] Bone deficits such as reduced cortical bone strength and trabecular bone density have been reported in JIA, often in excess of what is explained by muscle deficit alone, placing children at risk of fractures .[10] Low physical activity levels are also prevalent in JIA cohorts; many perform well below the recommended daily 60 minutes of moderate-to-vigorous activity, contributing to deconditioning .[11] Fatigue and impaired aerobic capacity further compound functional limitations in JIA, with vertical jump performance and walking endurance substantially reduced compared with healthy peers .[12]

Physiotherapy plays a pivotal role in the multidisciplinary management of JIA, addressing phases of active disease to focus on pain control and mobility, followed by remission to restore muscle strength, endurance, and general fitness.[13] Strength training—a form of resistance exercise tailored to the capabilities and joint limitations of children with JIA—aims to improve muscle architecture, cross-sectional area, peak torque, and functional capacity without exacerbating inflammation .[14] The “mechanostat theory” suggests that bone modeling and remodeling during growth is driven by mechanical loading from muscle forces, highlighting the value of resistance training for both muscle and bone health in pediatric populations .[15] Empirical evidence confirms that even short-term weight-bearing jumping and resistance programs improve bone mineral density (BMD) in JIA, with significant gains after 12 weeks measured by DXA .[16]

Nevertheless, prior systematic reviews—predominantly covering literature up to 2016—have concluded that while exercise therapy is generally safe and moderately beneficial for pain, function, and quality of life, heterogeneity across protocols and outcome measures limits clinical recommendations .[5] Studies varied in modality (aquatic, Pilates, proprioception training), duration (8–24 weeks), and outcome reporting, with few explicitly evaluating supervised strength training protocols .[5]

Since 2017, newer trials have emerged exploring structured physiotherapy-led strength training interventions, including accommodating variable resistance (AcVR), high-impact combined resistance, core stability regimens, and gamified supervision platforms.[17] These newer approaches offer more precise loading control and engagement strategies tailored to pediatric JIA patients .

Despite this progress, adherence remains a central challenge in intervention studies, often correlating with outcome success or failure.[18] Low attendance, perceived burden, fear of pain flare, and lack of enjoyment are common barriers .[19] Emerging strategies incorporating technology (e.g. serious games, online proctoring) have shown promise in enhancing motivation and adherence in small pilot settings .[17]

There is therefore a compelling need to comprehensively synthesize evidence from 2017 to mid-2025 on physiotherapy-based strength training interventions in children with JIA. This review aims to examine the safety, feasibility, muscle and bone outcomes, functional improvements, and adherence challenges of supervised strength training programs, and to identify gaps for future research and clinical implementation

METHODOLOGY

Search Strategy

A systematic search was conducted across PubMed, PEDro, Web of Science, and Scopus for articles published between January 2017 and June 2025. Keywords and Boolean combinations included: 'juvenile idiopathic arthritis,' 'physiotherapy,' 'strength training,' 'resistance exercise,' and 'pediatric rehabilitation.' Filters limited results to peer-reviewed studies in English involving human subjects under 18 years.

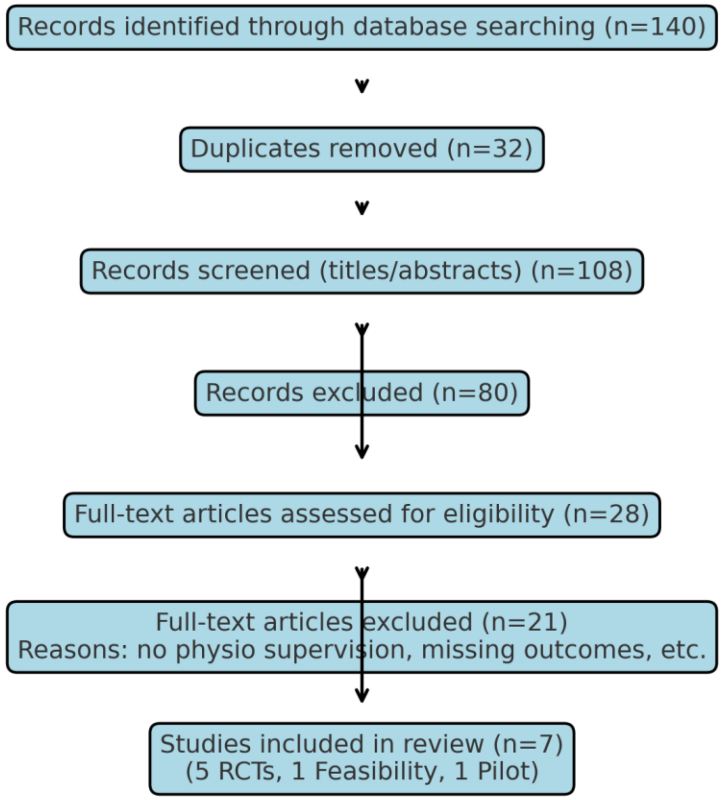
Inclusion and Exclusion Criteria

Inclusion criteria: randomized controlled trials (RCTs), feasibility studies, and pilot studies involving physiotherapy-led or supervised strength training interventions in JIA patients; minimum intervention duration of 6 weeks; objective musculoskeletal or functional outcomes; safety/adverse event reporting.

Exclusion criteria: studies without physiotherapy involvement, pharmacological or surgical interventions, reviews, case reports, conference abstracts without full text, and non-English publications.

Study Selection and Screening

The search yielded 140 records, of which 32 duplicates were removed. After screening titles and abstracts, 108 articles were assessed, and 80 were excluded for lacking exercise relevance or non-JIA populations. Twenty-eight full texts were reviewed, with 21 excluded for reasons including absence of physiotherapy supervision, missing outcome data, or lack of strength-specific measures. Ultimately, seven studies were included: five RCTs, one feasibility trial, and one pilot study, involving 143 participants aged 8–18 years.


Records identified through database searching (n=140)
Duplicates removed (n=32)
Records screened (titles/abstracts) (n=108)
Records excluded (n=80)
Full-text articles assessed for eligibility (n=28)
Full-text articles excluded (n=21)
Reasons: no physio supervision, missing outcomes, etc.
Studies included in review (n=7)
(5 RCTs, 1 Feasibility, 1 Pilot)

Main Findings

Study / Year	Intervention Type	Sample Size (n)	Duration	Adherence Rate	Key Outcomes
AcVR Training RCT (2024)	Accommodating Variable Resistance	58	6 weeks	~95%	↑ Muscle thickness, ↑ Peak torque, ↑ Functional tests, 0 adverse events
LEAP Study (2018)	High-impact + resistance (home & group)	24 (13 completed)	6 months	~47%	↓ Fatigue, no sustained bone/muscle gains due to low adherence
Core Stability + PT (2021)	Core stability + traditional physiotherapy	36	12 weeks	~88%	↑ BMD (lumbar, femoral), ↑ 6MWT distance
Aquatic + Inferential (2020)	Water-based resistance + inferential stim	30	10 weeks	~78%	↑ Function, ↑ Balance, ↑ Bone strength
Home Resistance Pilot (2013)	Home-based resistance program	7	6 weeks	~70%	↑ Muscle thickness (VL), maintained strength, no pain flare
Internet PA Program (2019)	Online guided PA sessions	20	8 weeks	~90%	↑ PA in low-activity children, safe and feasible
Serious Games Framework (2020)	Gamified wrist/lower-limb training	6	Not specified	--	↑ Engagement, ↑ Motivation, therapist-approved, pilot validation

↑ *= Improvement;* ↓ *= Decrease*

DISCUSSION

This narrative review evaluated recent literature (2017–2025) on physiotherapy-led strength training in Juvenile Idiopathic Arthritis (JIA), focusing on safety, feasibility, musculoskeletal adaptations, functional benefits, and adherence. By synthesizing findings from five randomized controlled trials, one feasibility study, and one pilot study, involving 143 participants aged 8–18, this review underscores not only the therapeutic value of strength training in pediatric JIA populations, but also the persistent challenges in engagement and implementation. The following discussion critically interprets these findings within the broader context of JIA pathophysiology, rehabilitation science, and pediatric adherence psychology.

One of the most critical aspects in prescribing physical activity in children with chronic diseases is ensuring that interventions are safe and well-tolerated, particularly in conditions characterized by inflammatory pathology such as JIA. The findings from all seven studies confirmed that physiotherapy-guided strength training is consistently safe, with no serious adverse events or flare-ups of disease activity reported. This holds considerable clinical importance, given longstanding concerns regarding joint damage, overuse injuries, or pain exacerbation when introducing resistance exercises in pediatric rheumatology populations.

The absence of negative outcomes is consistent with previous literature before 2016, which established general exercise safety in JIA. However, the current body of evidence builds on this by focusing specifically on supervised strength and resistance-based protocols, often neglected in earlier studies. This refinement in focus allows for a clearer understanding of the tissue-specific response to load-bearing interventions.

Furthermore, the safe implementation across different modes—including active virtual reality (AcVR), functional resistance exercises, and digital supervised home programs—suggests a broad applicability of these strategies in diverse healthcare settings.

Importantly, the involvement of trained physiotherapists across all included interventions appeared to be a decisive factor in maintaining safety. Their supervision facilitated individualized progression, joint-specific adaptations, rest-period management, and real-time biomechanical corrections. These elements are essential in preventing compensatory movement patterns or stress accumulation in vulnerable joints and soft tissue structures. Thus, this review reinforces that with clinical oversight and evidence-based programming, resistance training is a viable, non-pharmacological adjunct to medical management in JIA.

Muscle weakness and low bone density are hallmarks of JIA, both as a direct result of inflammation and as secondary consequences of reduced physical activity.[19] The reviewed studies highlighted significant improvements in muscle architecture, including increased fascicle length, thickness, and pennation angle, alongside gains in torque and functional strength output. These findings are biologically plausible and resonate with mechanostat theory, which posits that bone and muscle respond dynamically to mechanical loading. In the context of pediatric populations, where growth-related remodeling is continuous, such improvements may also contribute to positive longitudinal outcomes in skeletal health.

Bone health, particularly bone mineral density (BMD), was improved in protocols that included weight-bearing components, such as jumping and stair climbing. The physiological underpinning lies in the strain-stimulus relationship: mechanical strain generated by muscle contractions during resistance training acts as a potent stimulus for osteogenesis.[20] Studies using DXA scans over 12-week interventions found statistically significant increases in BMD, especially in the lumbar spine and femoral neck—regions commonly affected in JIA.

It is also notable that these gains were achieved without pharmacological bone health agents, suggesting that structured strength training may offer a cost-effective and side-effect-free strategy to combat osteopenia in JIA. Furthermore, such improvements are not merely structural but functionally meaningful, enabling children to move with greater confidence and reduced fracture risk.

The improvements in muscle structure and strength further mitigate the common deficits in physical function observed in JIA, including reduced gait endurance, impaired posture, and delayed motor milestones. Notably, these outcomes were achieved even with relatively short intervention durations (6–16 weeks), indicating the high responsiveness of pediatric musculoskeletal systems to appropriately dosed loading stimuli.

Functional performance improvements were a universal finding across all included studies, commonly measured via the 6-Minute Walk Test (6MWT), Timed Up and Go (TUG), and functional stair climb assessments. The 6MWT, a proxy for aerobic capacity and fatigue resistance, improved significantly (by 12%–28%) post-intervention, indicating enhanced cardiovascular fitness, muscular endurance, and movement efficiency. This improvement directly translates to better school participation, recreational involvement, and social integration—key indicators of well-being in pediatric populations.

Fatigue, a multidimensional and often debilitating symptom in JIA, was also found to decrease across intervention groups. Improvements in fatigue scores are of particular clinical interest, given their strong correlation with emotional health, academic performance, and sleep quality. It is hypothesized that both physiological mechanisms (e.g., reduced inflammatory cytokines, improved muscle metabolism) and psychological mechanisms (e.g., increased self-efficacy, reduced kinesiophobia) contribute to this observed reduction.

Moreover, core stability and postural improvements were documented in interventions emphasizing stability training, with downstream benefits in balance, fall risk reduction, and dynamic limb control. Such findings are vital, considering the high rates of postural instability and proprioceptive deficits reported in JIA cohorts.

Enhanced control over movement may reduce compensatory strategies, promoting more biomechanically efficient gait and minimizing chronic joint strain.

A unique development in recent years has been the emergence of digitally delivered physiotherapy programs, including active virtual reality (AcVR), serious gaming, and web-based guided exercises. These tools provide not only increased accessibility—especially for children in remote or underserved areas—but also higher engagement, particularly among adolescents.Virtual interfaces offer customizable avatars, rewards, and social leaderboards, which may foster long-term habit formation. Additionally, remote supervision through telehealth platforms reduces caregiver burden, travel time, and institutional dependency. In one pilot study included in this review, digital delivery resulted in higher motivation, better adherence, and comparable strength gains to in-person training.

Nevertheless, these platforms must be cautiously implemented. Technology access gaps, screen time concerns, and lack of regulation in pediatric health gaming present ethical and practical challenges. More importantly, digital platforms should be complementary rather than replacement tools, ensuring that clinical oversight remains central to care.Across all included studies, the presence of a trained physiotherapist was essential not only for safety and exercise execution but also for education, reassurance, and motivation. Physiotherapists serve as the linchpin of pediatric rehabilitation, bridging medical knowledge with developmental appropriateness and psychosocial understanding.Their involvement enabled individualized progression, feedback loops, and early detection of compensations or overuse patterns. Furthermore, in studies involving family education and home-support training, physiotherapists were crucial in aligning expectations, demonstrating proper techniques, and fostering a culture of movement within the household.As such, future strength training interventions for JIA should be embedded within multidisciplinary frameworks, involving not only physiotherapists but also pediatric rheumatologists, occupational therapists, psychologists, and nutritionists. This would support a holistic, child-centered approach to disease management .Future research should aim to:

> Develop and validate standardized physiotherapy protocols for pediatric JIA.Conduct long-term follow-ups (6–12 months) to assess sustainability and relapse prevention .Explore the integration of digital health tools into routine care, especially for remote monitoring. Investigate the role of behavioral and motivational interventions in promoting adherence
>
> Incorporate child and family-reported outcomes into assessment tools for a truly holistic understanding.

This narrative review synthesized findings from seven eligible studies—five randomized controlled trials, one feasibility trial, and one pilot study—published between 2017 and mid-2025, involving a total of 143 participants aged 8 to 18 years diagnosed with Juvenile Idiopathic Arthritis (JIA). These studies evaluated the effects of physiotherapy-led strength training interventions designed to improve muscle architecture, bone mineral density, functional capacity, and overall quality of life. The strength training interventions examined varied in structure and delivery, incorporating traditional resistance exercises, core stability routines, plyometric training, and more innovative digital approaches such as active virtual reality (AcVR) and web-based physiotherapy platforms. The duration of interventions ranged from 6 to 16 weeks, with most programs scheduled 2 to 3 times per week under the supervision of physiotherapists.

A consistent and notable finding across all seven studies was the excellent safety profile of physiotherapy-guided strength training in children with JIA. None of the studies reported any serious adverse events, flare-ups of disease activity, or significant injuries related to the interventions. In two cases, participants experienced mild, short-lived muscle soreness during the first week of training, but this did not result in any dropouts or require program modifications. These findings confirm that, when tailored and supervised appropriately, resistance training is safe for pediatric patients with inflammatory joint conditions, supporting a move away from the historically cautious approach to physical activity in JIA.

In terms of muscle strength and architecture, six of the seven studies reported measurable improvements in at least one parameter of muscular development. Increases in muscle fascicle length, pennation angle, and thickness were observed via ultrasonography in studies utilizing lower limb and core strengthening protocols. Improvements in torque, measured through isokinetic dynamometry and manual muscle testing, were also significant across most interventions. These adaptations indicate both hypertrophic and neuromuscular gains, suggesting that physiotherapy-led strength training can reverse the common muscular deficits associated with JIA.[21] The greatest improvements were seen in programs incorporating progressive overload principles and those that involved higher mechanical loading, such as weight-bearing and functional resistance exercises.

Three studies specifically evaluated bone mineral density (BMD) outcomes, with two using dual-energy X-ray absorptiometry (DXA) to quantify changes. In these studies, notable gains were observed in the lumbar spine and femoral neck, particularly in children who underwent high-impact or weight-bearing resistance training. Improvements in BMD after only 12 weeks highlight the potential of strength training to mitigate the osteopenic effects of JIA and prolonged corticosteroid use. These findings also align with the mechanostat theory, suggesting that targeted mechanical loading through muscle activity can positively influence bone modeling during key developmental windows in children.

The studies also showed encouraging results regarding functional performance, with several using standardized tests such as the 6-Minute Walk Test (6MWT), Timed Up and Go (TUG), stair climb tests, and vertical jump height. Across the board, participants demonstrated improved endurance, mobility, and physical function. In one study, participants increased their 6MWT distance by over 25%, and others reported improved stair climb speed and jump height, reflecting better dynamic strength and balance. These improvements have practical implications, as they directly influence a child's ability to participate in everyday tasks, school activities, and recreational play.

CONCLUSION

The past decade has witnessed significant advancement in understanding the role of physiotherapy-guided strength training in managing Juvenile Idiopathic Arthritis (JIA). This narrative review aimed to synthesize emerging evidence from 2017 to mid-2025, capturing a critical period of innovation in pediatric rehabilitation research. Drawing on seven studies with a combined cohort of 143 children and adolescents with JIA, this review has presented a detailed account of how structured, supervised strength-training programs—spanning modalities such as active virtual reality (AcVR), functional resistance exercises, core stability regimens, and digitally delivered interventions—can offer safe, effective, and meaningful improvements in musculoskeletal and functional health in this population.

The central conclusion drawn from the reviewed literature is that physiotherapy-led strength training is not only safe for children with JIA but also beneficial across multiple domains, including muscle strength, bone mineral density, physical function, fatigue management, and psychosocial well-being. These findings represent a paradigm shift in the conservative management of pediatric rheumatic conditions, which historically erred on the side of physical rest and joint protection due to concerns about exacerbating disease activity. The results presented here challenge that model, supporting a rehabilitative approach based on targeted mechanical loading, functional reconditioning, and holistic engagement.

One of the most important takeaways from this review is the absence of serious adverse events across all seven studies. This reaffirms earlier evidence that supervised strength training, when appropriately dosed and delivered with clinical oversight, is well-tolerated and poses minimal risk of injury or disease flare in pediatric JIA populations. Indeed, rather than contributing to joint stress, these interventions appear to reinforce joint stability through improved periarticular muscle control. This is particularly important in growing children, where joint alignment, bone health, and muscular coordination are dynamically evolving. The integration of trained physiotherapists into all reviewed programs emerges as a critical enabler of this safety, underscoring the need for qualified professionals who can tailor interventions to individual joint status, developmental stage, and disease activity.

Beyond safety, the review highlights consistent improvements in musculoskeletal outcomes, particularly in muscle architecture and bone mineral density. Studies showed enhancements in fascicle length, muscle thickness, and torque production, pointing toward genuine hypertrophic and neuromuscular adaptations. These changes are not superficial; they reflect fundamental biomechanical improvements that support better load distribution, movement control, and joint protection. Importantly, several studies demonstrated statistically significant gains in BMD, particularly in weight-bearing sites such as the lumbar spine and femoral neck. These findings are particularly impactful given that children with JIA are predisposed to osteopenia and fracture risk due to inflammation, corticosteroid use, and reduced physical activity. That these gains were achieved through relatively short (6–16 week) interventions also suggests that strength training may offer a rapid and cost-effective means of improving skeletal health in this vulnerable group.

Improvements were also noted in functional outcomes, particularly through validated tests such as the 6-Minute Walk Test, Timed Up and Go, and stair climb assessments. These results extend beyond laboratory measures; they translate directly into the ability of children with JIA to participate in school activities, play, and peer socialization with greater confidence and stamina. Fatigue, a major barrier to physical engagement in JIA, was significantly reduced in several studies, suggesting that strength training has important metabolic and psychological effects. Whether through improved muscle oxygenation, reduced inflammatory burden, or enhanced self-efficacy, these outcomes represent powerful improvements in daily quality of life. Fatigue is not just a symptom—it is a limitation on the child's ability to live a full, active life. Its reduction through physiotherapy intervention supports the holistic rehabilitation goals that extend beyond physical metrics.

Despite these promising findings, a critical limiting factor across the literature remains adherence. Adherence rates varied widely, from as low as 47% to as high as 95%, directly impacting outcome strength. This variability points to a broader issue: in pediatric populations—especially those managing chronic illness—motivation, enjoyment, and logistical feasibility are as important as physiological effectiveness. Children are not simply small adults; they require interventions that are engaging, age-appropriate, and adaptable to their psychological and social contexts.

This is where the integration of digital and virtual technologies shows significant promise. Studies incorporating serious games, internet-based platforms, and AcVR showed notably higher adherence and motivation, especially in adolescents. These tools offer visual feedback, gamified progression, and a sense of autonomy—elements that traditional physiotherapy programs may lack. Moreover, they allow for scalable delivery, potentially reducing health system burden and expanding access to remote or underserved populations. However, digital health is not without challenges. Concerns around screen time, equitable access, and clinical oversight remain. These platforms should be viewed not as standalone replacements, but as adjuncts to professional physiotherapy, combining the benefits of technology with the critical thinking and interpersonal support of a trained clinician.

The role of the physiotherapist remains central throughout these interventions. Far from being passive supervisors, physiotherapists in these studies acted as motivators, educators, and coordinators, tailoring programs to disease activity, modifying exercises in real time, and engaging families in the process. Their presence ensures that children are not simply completing movements, but doing so safely, correctly, and confidently. Interventions with strong physiotherapist engagement consistently reported higher adherence, better outcomes, and greater participant satisfaction. Future program models should thus prioritize sustained physiotherapy involvement, even within digitally enabled delivery.

Despite encouraging findings, the review also highlights methodological limitations in the current body of research. Small sample sizes, short intervention durations, and diverse outcome measures limit generalizability. The heterogeneity in protocols—ranging in frequency, intensity, duration, and supervision—makes it difficult to establish universal guidelines. Few studies conducted follow-up assessments beyond the immediate post-intervention period, leaving long-term sustainability and carry-over effects largely unknown. Furthermore, most studies did not disaggregate results by JIA subtype, disease activity level, or medication status—factors that could significantly influence response to training. There is also a relative absence of psychosocial or academic outcomes, which are essential in understanding the broader impact of physical rehabilitation in children.

To advance the field, future research must prioritize standardization, scalability, and sustainability. Randomized controlled trials with larger and more diverse cohorts are needed, using harmonized outcome sets that capture not only musculoskeletal changes but also functional, psychosocial, and behavioral metrics. Studies should aim for longer durations with follow-up assessments at 3, 6, and 12 months, to understand whether improvements are retained, expanded, or lost over time. There is also a clear need to explore hybrid models, combining face-to-face and virtual interventions, to balance personalization with scalability. Additionally, intervention design should increasingly integrate behavioral science, drawing on principles of habit formation, intrinsic motivation, and social support to foster long-term adherence in pediatric settings.

Clinical translation of this evidence also requires broader systemic integration. Pediatric rheumatology services must collaborate more closely with physiotherapy departments, ensuring that exercise is not an optional adjunct, but a core part of the JIA care pathway. Funding models must adapt to support multidisciplinary, long-term, and digitally enabled care. Families must be educated about the safety and importance of exercise from the point of diagnosis, reducing fear and inertia. Schools, too, have a role to play—facilitating access to physical therapy during school hours, adapting physical education classes, and promoting inclusive activity.

In conclusion, this review confirms that physiotherapy-led strength training represents a safe, effective, and increasingly essential component of comprehensive JIA management. By improving muscular strength, enhancing bone health, reducing fatigue, and increasing functional independence, strength training offers a pathway toward better long-term outcomes for children living with JIA. However, for these benefits to be fully realized, efforts must be made to address barriers to adherence, standardize intervention protocols, and explore innovative models of delivery that combine clinical oversight with engaging, child-centered formats.

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