



# From Motivation to Sustained Engagement: A Dual-Process Framework of Self-Regulation in Physical Literacy. A Systematic Review

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## Abstract

**Background.** Physical literacy (PL) has emerged as a central outcome of contemporary physical education, reflecting a shift toward holistic approaches that integrate physical, cognitive, and affective domains. However, existing research often examines motivational and behavioral factors in isolation, limiting understanding of how sustained engagement in physical activity develops.

**Objectives.** This study aims to provide a thematically grounded synthesis of how non-cognitive attributes and self-regulatory processes interact to shape physical literacy outcomes in educational contexts.

**Materials and Methods.** A systematic review was conducted following PRISMA 2020 guidelines. Literature was retrieved from the Scopus and Web of Science databases using predefined search criteria. A total of 36 studies met the inclusion criteria and were analyzed using thematic synthesis.

**Results.** Four key themes were identified: (1) non-cognitive foundations, (2) self-regulatory mechanisms, (3) pedagogical and social contexts, and (4) digital and hybrid learning pathways. The findings indicate a consistent pattern in which non-cognitive attributes—particularly motivation, confidence, and self-efficacy—function as initiators of engagement, while sustained participation is supported by self-regulatory processes such as goal-setting, self-monitoring, and behavioral adjustment. These processes facilitate the transition from initial intention to more stable participation over time. In addition, pedagogical and digital contexts shape this relationship by structuring and supporting the interaction between motivational and regulatory processes.

**Conclusions.** The findings support a dual-process perspective in which motivation initiates engagement and self-regulation stabilizes behavior over time. This study contributes by clarifying how engagement in physical activity can be both initiated and sustained, providing a basis for designing physical education programs that integrate motivational and self-regulatory development.

**Keywords:** physical literacy, self-regulation, motivation, physical education, systematic review, student engagement, digital learning.

## Introduction

Physical literacy (PL) has increasingly been recognized as a central outcome of contemporary physical education (PE), reflecting a shift from performance-oriented approaches toward a more holistic understanding of human movement.

As a multidimensional construct, PL encompasses motivation, confidence, physical competence, knowledge, and understanding that collectively support lifelong engagement in physical activity (Dlugonski et al., 2022; Mota et al., 2021). This perspective positions PL not only as an educational objective but also as a foundation for sustained health, well-being, and active lifestyles across the lifespan (Edwards et al., 2016; Stoddart & Humbert, 2021; van Wyk et al., 2022).

A growing body of literature highlights that the development of PL is shaped by the interaction of cognitive,

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affective, and social domains. Early engagement in meaningful physical experiences contributes to long-term participation and psychological well-being (Cornish et al., 2020; Edwards et al., 2016; Lloyd et al., 2024). Within this framework, non-cognitive attributes—such as motivation, self-efficacy, confidence, and emotional resilience—play a critical role in initiating engagement and shaping individuals' willingness to participate in physical activity (Houser & Kriellaars, 2023; Ma et al., 2021). However, while these attributes are consistently associated with increased participation, existing research rarely explains how motivational states are translated into sustained behavioral engagement over time.

This limitation points to the importance of self-regulatory processes as mechanisms that enable individuals to convert motivation into consistent action. Skills such as goal setting, self-monitoring, and behavioral planning support learners in regulating their participation and maintaining engagement across contexts (Jefferies et al., 2019; Liu & Chen, 2022; Quitério, 2018). Importantly, motivation alone does not necessarily lead to sustained participation, highlighting the need for regulatory capacities that stabilize behavior beyond initial engagement.

Despite these advances, research on physical literacy remains conceptually fragmented. Existing studies have typically examined pedagogical approaches, psychological constructs, or behavioral outcomes in isolation, resulting in a limited understanding of how these dimensions interact within authentic educational settings. In particular, insufficient attention has been given to how non-cognitive attributes and self-regulatory processes function as interconnected mechanisms that shape sustained participation in physical activity. This gap constrains both theoretical development and the design of integrated pedagogical models in physical education.

This limitation becomes increasingly relevant in the context of digital and hybrid learning environments, where learners are required to regulate their engagement more independently. While technology-enhanced PE has been associated with increased accessibility and engagement (Bond et al., 2020; Estevan et al., 2023), limited research has examined how digital environments influence the interplay between motivation and self-regulation in supporting long-term participation.

Given these gaps, there is a need for a systematic synthesis that integrates non-cognitive attributes, self-regulatory processes, and pedagogical contexts within a coherent analytical framework. Therefore, this study aims to examine how these dimensions interact to shape physical literacy outcomes in physical education settings. Specifically, the review explores how non-cognitive attributes and self-regulatory processes are conceptualized and operationalized, how pedagogical and learning environments influence these mechanisms, and which contextual conditions strengthen or constrain these relationships.

This study addresses this gap by advancing a theoretically grounded synthesis that integrates non-cognitive and self-regulatory constructs within established frameworks, particularly Self-Determination Theory (SDT) and Social Cognitive Theory (SCT). Building on this integration, the review proposes a dual-process perspective in which motivation functions as an initiator of engagement, while self-regulation acts as a stabilizing mechanism that sustains behavior over time. Accordingly, this study conceptualizes

physical literacy as the result of dynamic interactions between affective, behavioral, and contextual processes, rather than isolated components.

## Materials and Methods

### Study Design

This study employed a systematic review design with thematic synthesis to integrate empirical and conceptually relevant evidence on the role of non-cognitive attributes and self-regulatory processes in shaping physical literacy outcomes in educational contexts. The review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines to ensure transparency and methodological rigor.

### Information Sources and Search Strategy

The literature search was performed using two major electronic databases, Scopus and Web of Science, to ensure comprehensive coverage of peer-reviewed publications in physical education, health, and educational psychology.

The search strategy was developed iteratively to identify studies examining physical literacy in relation to non-cognitive and self-regulatory constructs within educational settings. The primary search query included terms such as: (“physical literacy” OR “physical activity participation”) AND (“grit” OR “perseverance” OR “self-regulated learning” OR “self-regulation”) AND (“physical education”)

To ensure broader coverage, the search process was supplemented by iterative refinement of keywords and citation tracking, allowing inclusion of studies addressing related constructs such as motivation, self-efficacy, confidence, and autonomy support. An expanded set of related terms was considered during refinement, although the core query structure remained consistent across databases.

Searches were conducted in Scopus and Web of Science on 12 March 2026. The strategy was adapted to the syntax requirements of each database. In Scopus, the search was conducted within title, abstract, and keywords fields, whereas a comparable topic-based strategy was applied in Web of Science. The search was limited to peer-reviewed journal articles published in English between 2015 and 2025. Backward and forward citation tracking was also conducted to identify additional relevant studies.

### Eligibility Criteria

Studies were included if they:

1. Examined physical literacy or physical activity participation within educational settings;
2. Addressed non-cognitive attributes such as motivation, self-efficacy, confidence, grit, or perseverance and/or self-regulatory processes such as goal setting, self-monitoring, and self-regulated learning;
3. Employed empirical quantitative, qualitative, or mixed-methods designs;
4. Were published in peer-reviewed journals.

Studies were excluded if they lacked clear relevance to physical literacy outcomes, were not situated in educational

or pedagogical contexts, were not written in English, or did not report empirical findings.

Although the primary analytical focus was on empirical studies, a limited number of conceptually relevant review-based studies were retained to support theoretical interpretation and contextualize patterns emerging from the empirical evidence. These studies were not treated as primary analytical units.

### Study Selection

The study selection process followed the PRISMA 2020 framework. The initial search identified 1,167 records, including 1,063 from Scopus and 104 from Web of Science. After duplicate removal, 1,000 unique records remained.

Title and abstract screening resulted in the exclusion of 780 records, leaving 220 articles for full-text assessment. Following full-text review, 184 articles were excluded because of insufficient relevance to physical literacy outcomes, lack of alignment with the educational focus of the review, or insufficient conceptual fit with the review objectives. A total of 36 studies met the inclusion criteria and were retained for the final synthesis. The study selection process is illustrated in Figure 1.

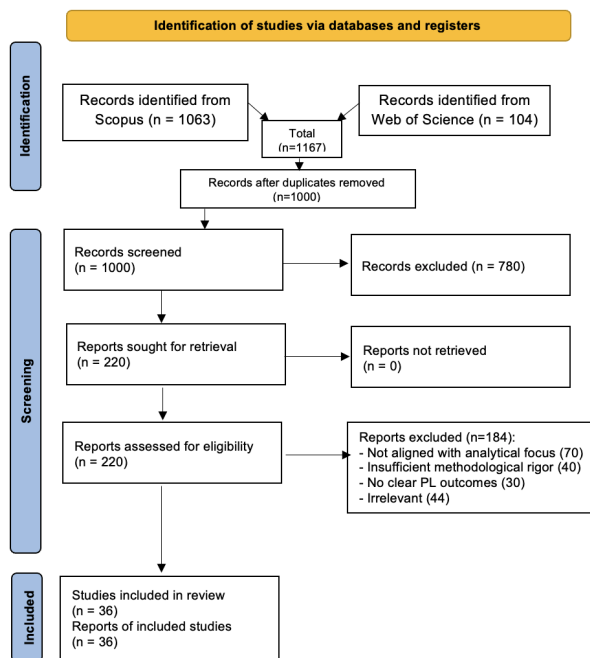


Fig. 1. The PRISMA flow diagram detailing the screening and selection process of literature

Selection was conducted in two stages: (1) title and abstract screening and (2) full-text assessment. The screening process was conducted by the author using predefined eligibility criteria.

### Data Extraction

Data from the included studies were extracted using a standardized extraction form capturing study design, sample characteristics, key variables, measurement approaches, and principal findings.

To ensure analytical consistency, an additional verification step was conducted during extraction and synthesis by re-checking consistency between extracted data and thematic categorization. Studies that did not provide sufficient alignment with the analytical framework or lacked extractable data relevant to the identified themes were not emphasized in the tabular presentation.

Accordingly, Tables 1–4 present the most analytically salient studies grouped by thematic categories, while all included studies informed the overall synthesis and interpretation.

### Quality Considerations

Because the review aimed to synthesize conceptually heterogeneous evidence across multiple study designs, no formal critical appraisal tool was applied. Instead, studies were evaluated based on relevance to the review questions, clarity of methodological reporting, and contribution to the thematic synthesis. This approach was considered appropriate for the interpretive purpose of the review and the diversity of the included evidence.

### Data Synthesis

The analysis was conducted using thematic synthesis. Through iterative coding and categorization, four overarching themes were identified:

1. Non-cognitive foundations of physical literacy;
2. Self-regulatory mechanisms;
3. Pedagogical and social contexts;
4. Digital and hybrid learning pathways.

These themes guided the organization of the results and supported the development of a conceptual framework integrating affective and behavioral dimensions of physical literacy.

## Result

### Non-Cognitive Foundations of Physical Literacy

The review of the literature demonstrates that non-cognitive attributes play a central role in the development of physical literacy (PL), particularly through motivation, confidence, and affective engagement. As summarized in Table 1, these constructs are consistently positioned as foundational drivers of participation across diverse educational contexts.

The reviewed literature indicates that non-cognitive attributes play an important role in the development of physical literacy (PL), particularly through motivation, confidence, and affective engagement. As summarized in Table 1, these constructs were consistently emphasized across diverse educational contexts, suggesting that affective readiness remains a central concern in current PL research.

Motivation and confidence emerged as the most consistently reported PL-related domains, each appearing in 100% (9 out of 9) of the studies summarized in Table 1. In contrast, knowledge and understanding were identified in only 22% (2 out of 9) of the studies, typically in conjunction with affective dimensions. This distribution indicates that current PL research remains strongly oriented toward

**Table 1.** Non-Cognitive Foundations of Physical Literacy in Physical Education

Study / Context	Core Construct / Mechanism	Operationalization / Measure	PL-Related Domain / Outcome	Key Finding
(Malmström & Öqvist, 2025) / Elementary PE teachers	Self-efficacy; social support; motivation	Teacher self-efficacy scale; social support; SEM	Motivation; confidence	Teacher self-efficacy and social support were associated with stronger motivation and leadership behaviors supportive of PL-related environments
(Behzadnia et al., 2025) / High-school PE	Autonomy support; need satisfaction; autonomous motivation	SDT-based questionnaires; gameplay assessment	Motivation; confidence	Autonomy-supportive teaching was associated with need satisfaction and autonomous motivation, alongside improved performance relevant to PL
(Khairani & Zhang, 2025) / Chinese universities	Self-efficacy; outcome expectations; social support	SCT scales; PLS-SEM	Motivation; confidence	Self-efficacy was identified as a strong predictor of physical activity engagement, supporting confidence-related dimensions of PL
(Qiu et al., 2025) / College students	Psychological resilience; self-efficacy	IPAQ-S; CD-RISC; PSES-CS	Motivation; confidence	Physical activity and resilience were linked to enhanced self-efficacy, indicating affective pathways relevant to PL
(Pavlovic et al., 2025) / Youth sport	Emotions; climate perceptions	Survey; focus groups	Motivation; confidence	Positive emotional climates were associated with social-emotional development and affective outcomes relevant to PL
(White et al., 2025) / Informal school PA	Enjoyment; social belonging; confidence	Qualitative interviews	Motivation; confidence	Informal exercise opportunities were associated with improved confidence and social well-being beyond formal PE
(Cashman et al., 2025) / Primary schools	Well-being perceptions; relationships	PhotoVoice; interviews	Motivation; knowledge and understanding	Students highlighted relationships and learning experiences as important to well-being and holistic interpretations of PL
(Frikha et al., 2024) / Female PE students	Enjoyment; need satisfaction	SDT scales; mediation analysis	Motivation; relatedness	Enjoyment and need satisfaction were associated with institutional integration and motivational outcomes relevant to PL
(Costa et al., 2025) / PE empathy review*	Empathy; prosocial emotions	PRISMA scoping review	Motivation; affective domain	Emotional and social learning strategies in PE were reported to support affective dimensions relevant to PL

Note. IPAQ-S = International Physical Activity Questionnaire (Short Form); CD-RISC = Connor-Davidson Resilience Scale; PSES-CS = Physical Self-Efficacy Scale for College Students; SDT = Self-Determination Theory; SEM = Structural Equation Modeling; PLS-SEM = Partial Least Squares Structural Equation Modeling.

affective constructs, with comparatively limited integration of cognitive components.

Among the non-cognitive constructs, self-efficacy and related confidence constructs (5/9), autonomy support (3/9), and emotional factors (3/9) were most frequently identified. Self-efficacy and closely related constructs were frequently reported as important predictors of physical activity engagement, often interacting with social support and motivational processes. However, their effects were rarely presented as independent; rather, they tended to emerge in relation to broader contextual supports.

Motivational processes were commonly linked to autonomy-supportive environments, where instructional practices facilitated intrinsic motivation and engagement.

Emotional and social constructs—such as enjoyment, belonging, and resilience—were particularly evident in informal and primary education contexts, where they were associated with increased confidence and well-being.

Across studies, motivation, confidence, and self-efficacy were rarely reported as isolated attributes. Instead, they appeared most clearly when supported by favorable social and instructional conditions, suggesting that affective readiness for participation is not purely individual but shaped through interaction with the learning environment. Taken together, these findings suggest that non-cognitive attributes primarily function as initiators of engagement, establishing the affective conditions necessary for participation but not, on their own, fully explaining sustained behavior over time.

### Self-Regulation as a Mechanism for Physical Literacy

Building on these affective foundations, the reviewed studies identify self-regulation as a key mechanism that supports sustained engagement over time. As shown in Table 2, self-regulatory processes were identified across diverse contexts, including formal instruction, blended learning, and informal physical activity settings.

Among the identified mechanisms, self-monitoring (3/7) was the most frequently reported, followed by goal-setting (2/7), self-management (2/7), and persistence-related constructs (2/7). These processes were typically supported through pedagogical strategies such as structured reflection, digital feedback, and autonomy-supportive instruction.

Evidence from experimental and quasi-experimental studies suggests that interventions incorporating self-monitoring and goal-setting are associated with increased physical activity engagement and intrinsic motivation. Technology-supported interventions, including pedometer-based programs and fitness applications, were also linked to improved behavioral regulation and participation consistency.

Several studies indicate that self-regulation functions as more than an accompanying factor; it appears to connect initial willingness to participate with repeatable action. Psychological constructs such as motivation and resilience may influence participation indirectly through regulatory processes, suggesting that self-regulation links affective drivers with behavioral outcomes.

More specifically, the reviewed evidence suggests that motivation becomes behaviorally sustained when learners are provided with regulatory supports such as goal-setting, self-monitoring, structured feedback, and opportunities for behavioral adjustment. In this sense, self-regulation does not replace motivation, but converts initial willingness into repeatable action. Some studies also suggest potential transferability, with self-regulatory skills developed in informal settings supporting independent engagement beyond structured physical education environments. Overall, self-regulation appears to function as a stabilizing mechanism, complementing the initiating role of non-cognitive attributes.

### Pedagogical and Social Contexts for Physical Literacy

Pedagogical and social contexts were consistently identified as key structural factors shaping both motivational and regulatory processes. As summarized in Table 3, instructional design and environmental support play a central role in influencing physical literacy outcomes.

Autonomy-supportive teaching (3/7) emerged as the most frequently reported approach, followed by social support (2/7) and student-centered pedagogical practices (2/7). These approaches were associated with increased motivation, confidence, engagement, and relatedness.

The reviewed studies indicate that autonomy-supportive teaching practices enhance psychological need satisfaction and

**Table 2.** Self-Regulation as a Mechanism for Physical Literacy Development in Physical Education

Study / Context	Core Self-Regulatory Skill / Mechanism	Operationalization / Intervention	PL-Related Domain / Outcome	Key Finding
(Huang et al., 2025) / School PE	Goal setting; self-monitoring	Cooperative learning and pedometer-based self-management	Behavioral engagement; autonomy	Self-management strategies were associated with increased physical activity engagement and greater autonomy in PE
(Ibragimova et al., 2025) / Blended learning	Self-monitoring; self-organization	Fitness app-supported PA program	Intrinsic motivation; activity habits	App-based feedback and gamification were associated with stronger motivation and more consistent physical activity habits
(Nie et al., 2025) / General PA context	Self-control	General physical activity participation	Self-control; well-being	Physical activity was associated with self-control, which partially explained life satisfaction outcomes relevant to PL
(Qiu et al., 2025) / College students	Resilience; persistence	Regular physical exercise	Confidence; sustained engagement	Psychological resilience mediated the relationship between physical activity and self-efficacy, supporting sustained confidence
White et al. (2025) / Informal PA	Self-regulation transfer	Informal before-school exercise	Confidence; independent engagement	Informal PA settings appeared to support confidence transfer and self-directed engagement beyond PE
(Brown, 2024) / PE curriculum*	Self-management skills	Curriculum-focused PE pedagogy; SRL framework	Lifelong PA; self-management	Self-management was positioned as important for lifelong physical activity
(Zhang & Yun, 2025) / Online PE	Self-regulated engagement	Online gamified learning	Autonomy; learning engagement	Self-regulated engagement was associated with autonomy-supportive motivation and stronger learning engagement

Note. IPAQ-S = International Physical Activity Questionnaire (Short Form); SDT = Self-Determination Theory; SRL = Self-Regulated Learning.

**Table 3.** Pedagogical and Social Contexts Supporting Physical Literacy in Educational Settings

Study / Context	Pedagogical / Social Context	Core Mechanism	PL-Related Domain / Outcome	Key Finding
Behzadnia et al. (2025) / High-school PE	Teacher autonomy support	Need satisfaction leading to motivation	Motivation; confidence	Autonomy-supportive teaching was associated with intrinsic motivation and stronger engagement in PE
Frikha et al. (2024) / Female PE students	Peer and teacher support	Enjoyment; need satisfaction	Relatedness; confidence	Need satisfaction mediated the relationship between enjoyment and institutional integration
(Castillo-Retamal et al., 2024) / Primary school PE	Student-centered pedagogy	Goal-setting; encouragement	Confidence; motivation	Goal-setting and emotional support were associated with increased student confidence and participation in PE
(Rech et al., 2025) / Preschool education	Teacher beliefs	Value of movement; activity provision	Confidence; enjoyment	Teachers' beliefs about movement influenced the frequency and quality of movement opportunities relevant to early PL development
(Saamong et al., 2025) / Early childhood education	Sociocultural values	Community attitudes; norms	Engagement; access	Cultural context shaped norms and expectations related to physical activity opportunities and PL experiences
(Malmström & Öqvist, 2025) / Elementary PE teachers	School climate	Motivational leadership	Confidence; engagement	Teacher self-efficacy and leadership climate were associated with motivational environments supportive of PL
Qiu et al. (2025) / University PE	Social support (peer/ instructor)	Resilience; motivation	Confidence; resilience	Social support was associated with motivation and self-efficacy through psychological resilience

Note. SDT = Self-Determination Theory; PA = Physical Activity.

intrinsic motivation, reinforcing the importance of learner-centered environments. Positive teacher-student relationships and supportive classroom climates were also associated with increased engagement and confidence, highlighting the role of social interaction in facilitating participation. Furthermore, student-centered approaches—such as goal-setting, personalized instruction, and reflective practices—were linked to both motivational and self-regulatory outcomes.

These findings suggest that pedagogy does more than support participation indirectly. Rather, it appears to structure the conditions under which affective and regulatory processes can operate together. In this sense, pedagogy functions not merely as a delivery mechanism, but as a structuring condition that shapes how motivation, confidence, and self-regulation become behaviorally meaningful in educational settings.

Institutional and sociocultural factors, including school climate, teacher beliefs, and community norms, were also identified as influencing PL development. However, variability across contexts indicates that the effectiveness of pedagogical strategies is contingent upon broader environmental conditions.

#### *Digital and Hybrid Pathways for Physical Literacy*

Extending beyond traditional instructional contexts, digital and hybrid learning environments were identified as emerging pathways supporting physical literacy development. As shown in Table 4, although the number of

studies remains limited, consistent patterns can be observed across the available evidence.

The reviewed studies indicate that digital tools may support motivation, autonomy, and self-regulated engagement, particularly through features such as feedback, gamification, and activity tracking. Fitness applications and structured digital interventions were associated with increased engagement and more consistent participation behaviors.

Hybrid and online learning models were also linked to greater flexibility and opportunities for self-directed participation. These environments appear to facilitate self-monitoring and behavioral regulation, consistent with principles of self-regulated learning.

The reviewed evidence suggests that digital tools are most valuable when they extend pedagogical structure rather than act as independent interventions. Their contribution appears to lie in scaffolding monitoring, feedback, and continuity of participation rather than directly producing physical literacy outcomes on their own. Accordingly, the effectiveness of digital approaches depended on pedagogical alignment. Without structured guidance, digital tools alone were insufficient to sustain engagement, indicating that digital environments function more effectively as supporting mechanisms than as independent drivers of physical literacy.

#### **Discussion**

This systematic review provides a mechanism-based synthesis of how non-cognitive attributes and self-regulatory

**Table 4.** Digital and Hybrid Pathways Supporting Physical Literacy

Study / Context	Digital / Hybrid Strategy	Core Digital Mechanism	PL-Related Domain / Outcome	Key Finding
(Zhang & Yun, 2025)/ Online PE	Gamified online PE	Self-regulated engagement; autonomy support	Motivation; autonomy	Gamified platforms were associated with self-regulated engagement and stronger intrinsic motivation
Brown (2024) / Conceptual*	Online curriculum design	Digital-to-physical integration	Self-management; lifelong PA	Digital curriculum design was positioned as supporting self-management and lifelong physical activity
Ibragimova et al. (2025) / Experimental	Fitness app program	Gamification; feedback loops	Intrinsic motivation; engagement	Fitness app use was associated with stronger motivation and habit formation relevant to PL
Nie et al. (2025) / Digital PA participation	Behavioral feedback; affect tracking	Self-control mediation	Self-control; satisfaction	Self-control mediated the relationship between physical activity and life satisfaction, with implications for digitally supported participation

processes interact to shape physical literacy (PL) outcomes within educational contexts. Across the included studies, a consistent pattern emerges in which motivational constructs and self-regulatory mechanisms function as interdependent processes rather than independent predictors of physical activity engagement. This integrative pattern reflects the dynamic interaction between affective readiness, behavioral regulation, and contextual support observed across diverse learning environments (Huang et al., 2025; Ibragimova et al., 2025; Qiu et al., 2025).

A central contribution of this review lies in the refinement of a dual-process conceptualization of physical literacy. The findings indicate that non-cognitive attributes—particularly motivation, confidence, and self-efficacy—function as initiators of engagement, establishing the affective readiness required for participation. However, sustained participation is more consistently associated with self-regulatory processes such as goal-setting, self-monitoring, and behavioral adjustment. This distinction indicates that physical literacy development cannot be fully explained by affective readiness alone, but requires regulatory processes that enable behavioral continuity over time (Huang et al., 2025; Ibragimova et al., 2025).

Importantly, the findings clarify the mechanism underlying this relationship. Rather than functioning as parallel predictors, self-regulation operates as a bridging and stabilizing mechanism that connects psychological readiness with sustained behavioral engagement. In practical terms, this process reflects a sequence in which motivation facilitates intention formation, self-regulation structures behavior through monitoring and feedback, and sustained participation emerges through repeated and regulated action. Evidence across the reviewed studies indicates that individuals with higher levels of self-efficacy and intrinsic motivation are more likely to initiate physical activity; however, continued engagement depends on the presence of structured regulatory supports, including monitoring, feedback, and behavioral adjustment (Huang et al., 2025; Ibragimova et al., 2025). Furthermore, resilience-related constructs have been shown to mediate the relationship between participation and confidence, reinforcing the role of regulatory processes in maintaining behavioral

consistency (Qiu et al., 2025). Taken together, these findings demonstrate that self-regulation is not merely supportive, but is essential in transforming initial engagement into sustained participation.

From a theoretical perspective, these findings reinforce the view that motivational and self-regulatory processes should be understood as interdependent components within the physical literacy framework. Evidence from the reviewed studies indicates that autonomy-supportive environments are associated with enhanced motivation and psychological need satisfaction (Behzadnia et al., 2025; Frikha et al., 2024), while self-efficacy and regulatory skills contribute to sustained behavioral engagement (Khairani & Zhang, 2025). Rather than functioning as separate explanatory domains, these processes operate in a complementary manner, jointly supporting both the initiation and maintenance of physical activity behavior.

The role of pedagogical and social contexts further strengthens this integrative interpretation. Evidence indicates that autonomy-supportive and student-centered instructional approaches are consistently associated with enhanced motivation, confidence, and engagement (Behzadnia et al., 2025; Castillo-Retamal et al., 2024). Similarly, supportive classroom climates and teacher-related factors facilitate both affective and behavioral dimensions of participation (Malmström & Öqvist, 2025; Pavlovic et al., 2025). This positions pedagogy not merely as a contextual influence, but as a critical structuring condition that determines whether psychological processes can be translated into observable and sustained behavior.

At the same time, the findings highlight the importance of contextual variability. Differences across educational levels, age groups, and learning environments indicate that the interaction between motivation and self-regulation is not uniform. Emotional and social constructs such as enjoyment, belonging, and well-being appear to play a more prominent role in informal and primary contexts (White et al., 2025; Cashman et al., 2025), whereas structured regulatory strategies are more evident in formal instructional settings (Huang et al., 2025). This suggests that physical literacy development is shaped by context-dependent interactions rather than fixed or universal relationships.

The emergence of digital and hybrid learning environments introduces an additional layer to this interaction. The reviewed studies indicate that digital tools—such as fitness applications and gamified platforms—can support motivation, self-monitoring, and engagement (Ibragimova et al., 2025; Zhang & Yun, 2025). However, these findings indicate that digital tools are not primary drivers of physical literacy, but are effective when they extend regulatory and pedagogical structures that support sustained engagement. Without such alignment, their contribution remains limited, highlighting that technology alone is insufficient without pedagogically grounded implementation.

Despite these contributions, several limitations of this review should be acknowledged. Variability in the operationalization and measurement of key constructs limits comparability across studies, while the predominance of cross-sectional and short-term designs restricts conclusions regarding long-term development. Differences in cultural and educational contexts may also limit generalizability. These limitations indicate the need for future research to adopt longitudinal and intervention-based designs that better capture the dynamic interaction between motivation and self-regulation over time.

From a practical perspective, the findings underscore the importance of designing physical education programs that explicitly integrate motivational and self-regulatory components. Strategies such as structured goal-setting, reflective practices, autonomy-supportive instruction, and digitally supported self-monitoring should be embedded within curriculum design rather than implemented as isolated interventions. This integrated approach enables the simultaneous development of engagement and behavioral persistence.

## Conclusions

Physical literacy development is best explained through a dual-process model in which motivation, confidence, and self-efficacy initiate participation, while self-regulatory processes sustain long-term engagement.

Self-regulation functions as a key bridging mechanism that transforms initial readiness for participation into stable and repeated physical activity behavior.

Pedagogically supportive environments, particularly autonomy-supportive and student-centered approaches, strengthen both motivational and behavioral dimensions of physical literacy.

Digital tools can enhance engagement and self-monitoring, but their effectiveness depends on integration with sound pedagogical and regulatory frameworks.

Future research should prioritize longitudinal and intervention-based designs to better explain how motivation and self-regulation interact across diverse educational contexts over time.

## Ethics Statement

This study did not involve human participants or animal subjects. Therefore, ethical approval was not required.

## Data Availability Statement

All data analyzed in this study are derived from previously published articles and are available in the public domain. No new datasets were generated.

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This research received no external funding.

## Conflict of Interest

The authors declare no conflict of interest.

## Authors Contributions

Conceptualization, methodology, analysis, and writing were performed by the authors.

## AI Statement

The author used artificial intelligence tools (ChatGPT, OpenAI) to assist in language refinement and structuring of the manuscript. All content was critically reviewed and validated by the author, who takes full responsibility for the final version.

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# Від мотивації до стійкої залученості: двопроектна модель саморегуляції у фізичній грамотності. Систематичний огляд

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; E – збір коштів

Реферат. Стаття: 8 с., 4 табл., 1 рис., 31 джерело.

**Обґрунтування.** Фізична грамотність (PL) стала центральним результатом сучасної фізичної освіти, відображаючи перехід до цілісних підходів, що інтегрують фізичний, когнітивний та афективний компоненти. Однак наявні дослідження часто розглядають мотиваційні та поведінкові чинники ізольовано, що обмежує розуміння того, як формується стале залучення до фізичної активності.

**Мета.** Це дослідження має на меті надати тематично обґрунтований синтез того, як некогнітивні характеристики та процеси саморегуляції взаємодіють у формуванні результатів фізичної грамотності в освітніх контекстах.

**Матеріали і методи.** Систематичний огляд було проведено відповідно до рекомендацій PRISMA 2020. Літературу відібрано з баз даних Scopus та Web of Science за попередньо визначеними критеріями пошуку. Загалом 36 досліджень відповідали критеріям включення та були проаналізовані методом тематичного синтезу.

**Результати.** Визначено чотири ключові теми: (1) некогнітивні основи, (2) механізми саморегуляції, (3) педагогічні та соціальні контексти, (4) цифрові та гібридні траєкторії навчання. Результати свідчать про стійку закономірність, за якої некогнітивні характеристики — насамперед мотивація, впевненість і самоефективність — виступають ініціаторами залучення, тоді як стійка участь підтримується процесами саморегуляції, такими як постановка цілей, самоконтроль і поведінкове коригування. Ці процеси забезпечують перехід від початкового наміру до більш стабільної участі з часом. Крім того, педагогічні та цифрові контексти впливають на цей зв'язок, структуруючи та підтримуючи взаємодію між мотиваційними й регуляторними процесами.

**Висновки.** Отримані результати підтримують dual-process perspective, згідно з якою мотивація ініціює залучення, а саморегуляція стабілізує поведінку з часом. Це дослідження робить внесок у пояснення того, як залучення до фізичної активності може як ініціюватися, так і підтримуватися, створюючи основу для розроблення програм фізичної освіти, що інтегрують розвиток мотивації та саморегуляції.

**Ключові слова:** фізична грамотність, саморегуляція, мотивація, фізична освіта, систематичний огляд, залученість студентів, цифрове навчання.

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