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Strategies for Cultivating and Stimulating Non-Cognitive Factors among Secondary School Students in Physical Education from the Perspective of Self-Determination Theory

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Abstract: In the practice of secondary school physical education (PE), problems such as insufficient motivation for sports learning, low participation enthusiasm, and weak persistence in sports-related behaviors are commonly observed among students. These issues are often closely associated with the inadequate development of non-cognitive factors in physical education. As an important psychological foundation influencing students' attitudes toward sports learning, emotional experiences, and behavioral choices, non-cognitive factors play a vital role in enhancing the effectiveness of PE instruction and fostering lifelong engagement in physical activity. Self-Determination Theory (SDT) emphasizes the critical role of autonomy, competence, and relatedness in stimulating intrinsic motivation, thereby providing an important theoretical perspective for understanding and improving secondary school students' motivation in physical education. Based on a systematic review of the core concepts of Self-Determination Theory and considering the practical context of secondary school students' sports learning, this study analyzes the major problems existing in the cultivation of non-cognitive factors in physical education. Furthermore, it proposes corresponding instructional strategies from the perspectives of supporting autonomy, enhancing competence, and satisfying relatedness needs. the aim is to provide theoretical references and practical implications for the cultivation of students' non-cognitive factors and the effective enhancement of learning motivation in secondary school physical education.

Keywords: Self-Determination Theory; Non-Cognitive Factors; Secondary School Students; Physical Education

1. Introduction

In recent years, with the implementation of a series of educational policies, including the Physical Education and Health Curriculum Standards for Compulsory Education (2022 Edition), school physical education has been entrusted with the important mission of promoting students' physical and mental health, cultivating core competencies, and fostering lifelong engagement in physical activity. These policies explicitly emphasize the importance of addressing students' emotional attitudes and values during the learning process, encouraging the development of positive exercise motivation and healthy physical activity habits. Such requirements call for a transformation of secondary school physical education from a results-oriented approach toward one that places greater emphasis on learning processes, experiential engagement, and holistic development [1].

Despite continuous reforms in secondary school physical education under these policy initiatives, problems such as insufficient learning motivation, low participation enthusiasm, and weak persistence in sports-related behaviors remain prevalent among students. Many students demonstrate passive participation in PE classes, relying primarily on external requirements or performance evaluations to complete learning tasks, while struggling to develop stable and enduring intrinsic motivation. This phenomenon not only constrains the effectiveness of physical education instruction but also weakens the role of PE in promoting students' holistic development and fostering healthy behavioral habits.

Previous studies have shown that students' physical education learning behaviors are not solely determined by physical fitness and motor skill proficiency. Non-cognitive factors—including motivation, interest, attitudes, emotional experiences, and volitional qualities—play a crucial role in shaping students' learning outcomes. These factors influence not only

students' perceptions of the value of physical education and their emotional attitudes toward learning but also their initiative, persistence, and level of engagement in sports participation [2]. However, current PE teaching practices in secondary schools continue to prioritize motor skills and physical performance within instructional objectives and assessment systems, while insufficient attention is paid to the systematic cultivation of students' non-cognitive factors. Consequently, issues such as low-quality learning motivation and inadequate intrinsic drive remain widespread.

As one of the most influential theories explaining learning motivation and behavioral regulation, Self-Determination Theory (SDT) highlights the critical role of satisfying individuals' basic psychological needs for autonomy, competence, and relatedness in the development and maintenance of intrinsic motivation [3]. Compared with traditional motivational perspectives that emphasize outcome control, SDT focuses more on learners' subjective experiences and the fulfillment of their psychological needs throughout the learning process. Therefore, it provides a clear and systematic analytical framework for understanding the formation and development of students' motivation in physical education. Introducing SDT into the context of secondary school PE enables educators to reexamine the cultivation of non-cognitive factors from the perspective of psychological need satisfaction and offers a theoretical foundation for stimulating students' intrinsic motivation for sports learning.

Based on this perspective, the present study adopts Self-Determination Theory as its theoretical foundation and examines the practical context of secondary school physical education. It systematically analyzes the significance of non-cognitive factors in PE instruction and identifies the major challenges associated with their cultivation. Furthermore, corresponding developmental pathways and motivational enhancement strategies are proposed to provide both theoretical support and practical guidance for promoting students' non-cognitive development and improving the quality of motivation in secondary school physical education.

2. the Logical Relationship Among Self-Determination Theory, Non-Cognitive Factors, and Physical Education

2.1 The Guiding Significance of Self-Determination Theory for Physical Education

Self-Determination Theory not only serves as an important psychological framework for explaining the generation and maintenance of individual motivation but also provides a solid theoretical foundation for transforming physical education from a teacher-directed model to a participatory learning paradigm. In traditional PE settings, instruction often centers on standardized demonstrations of technical movements and repetitive skill training. Teachers typically exercise instructional control through unified pacing, fixed content, and outcome-oriented evaluation methods. Although such environments may contribute to classroom management and instructional efficiency, they often overlook students' agency and individual differences, thereby suppressing opportunities for autonomous expression and the development of intrinsic motivation.

According to Self-Determination Theory, the persistence and intensity of individual behavior are not determined solely by external rewards, punishments, or normative constraints. Rather, they depend largely on the extent to which the basic psychological needs for autonomy, competence, and relatedness are satisfied within a given context [4]. Applied to physical education, this perspective suggests that instructional objectives should move beyond a narrow focus on physical fitness and skill attainment and instead respond systematically to students' psychological needs. By creating autonomy-supportive learning environments, PE classes can evolve from spaces where students passively follow external instructions and complete prescribed movements into social contexts in which students experience autonomy through active choice, develop competence through appropriately challenging tasks, and gain a sense of belonging through cooperative interactions. Consequently, the educational value of physical education extends beyond physical development to encompass the cultivation of intrinsic motivation and broader social and psychological growth.

2.2 The Evolution and Manifestation of Non-Cognitive Factors in Physical Education

Physical education is distinguished by its highly practical, context-dependent, and performance-

oriented nature. Students can rapidly perceive the outcomes of their actions and bodily responses during participation in physical activities. This characteristic makes non-cognitive factors more than mere background variables influencing the learning process; rather, they become integral components of learning outcomes themselves. Compared with academic disciplines that primarily emphasize cognitive processing, non-cognitive factors in physical education are not confined to abstract psychological constructs but are concretely manifested through sustained and observable physical behaviors [5].

On the one hand, the development of volitional qualities is deeply embedded in students' efforts to overcome both physiological limitations and psychological barriers. For instance, during endurance activities, students inevitably encounter the "critical point" characterized by physical exhaustion and discomfort. Similarly, in skill-based or performance-oriented activities, anxiety and psychological barriers often become key factors affecting performance. Through repeatedly confronting these physical and psychological challenges, students gradually learn to regulate attention, tolerate discomfort, and persist in completing tasks, thereby continuously strengthening and internalizing their willpower.

On the other hand, emotional regulation abilities and personality development in physical education are often fostered through experiences of success and failure as well as social interactions in competitive contexts. Students learn to balance competition and cooperation within established rules, assume responsibilities within team settings, and regulate emotions while rebuilding confidence in the face of setbacks and failure. These dynamic and context-specific behavioral responses collectively constitute the core manifestations of non-cognitive factors among secondary school students. Therefore, non-cognitive factors not only profoundly influence the process of sports learning but also serve as important non-technical indicators for evaluating the quality and educational value of physical education.

2.3 The Interactive Mechanism of Need Satisfaction, Motivational Internalization, and Competency Development

Self-Determination Theory, non-cognitive factors, and physical education are connected through a progressive and mutually embedded dynamic mechanism. Within this framework, physical education functions not merely as a vehicle for transmitting knowledge and skills but also as a foundational environment that satisfies students' basic psychological needs through diverse instructional approaches and contextual arrangements. When teaching practices provide students with appropriate opportunities for autonomous choice, offer challenges that match their competence levels, and cultivate supportive and cooperative learning climates, improvements in the instructional environment directly enhance students' experiences of autonomy, competence, and relatedness satisfaction [6].

The fulfillment of these psychological needs extends beyond temporary positive emotional experiences and facilitates qualitative changes in students' motivational structures, initiating a process of internalization through which motivation gradually shifts from external regulation to internal regulation. As students continuously experience respect for their autonomy and opportunities for competence development in physical education, their motivation for participation progressively moves beyond stages characterized by external control and compliance, advancing toward integrated regulation and eventually intrinsic motivation.

Through this process of motivational internalization, non-cognitive qualities such as self-discipline, resilience, and self-confidence no longer depend on external rewards or evaluative pressures for maintenance. Instead, they emerge and strengthen naturally as outcomes of stable intrinsic motivation. Consequently, a logical pathway is established linking psychological need satisfaction, motivational internalization, and the development of non-cognitive competencies. This pathway reveals the underlying mechanism through which physical education contributes to students' holistic personality development. By responding to students' fundamental developmental needs, physical education promotes the continuous enhancement and structural improvement of their psychological qualities.

The effective functioning of this mechanism not only facilitates the acquisition of sports skills and physical competencies but also supports the formation of positive and enduring values toward physical activity and lifelong health. Ultimately, it provides a solid psychological foundation for achieving the dual objectives of

physical education: cultivating both physical competence and psychological well-being.

3. Practical Challenges and Causes in Cultivating Non-Cognitive Factors among Secondary School Students through Physical Education

3.1 The Compulsory Nature of Instruction and the Lack of Student Autonomy

A strong teacher-centered control logic remains prevalent in contemporary secondary school physical education classes. Within this instructional model, teaching activities are often reduced to the delivery of commands and the mechanical repetition of movements, leaving students with little or no choice regarding practice content, exercise intensity, or organizational formats [7]. From the perspective of Self-Determination Theory, learning environments characterized by excessive external control and rigid regulation continuously constrain students' sense of autonomy, making it difficult for them to develop authentic experiences of agency in physical education. When students participate in sports activities primarily to avoid criticism from teachers, comply with classroom rules, or fulfill academic assessment requirements rather than to pursue self-improvement, competence development, or personal interest, their behavioral regulation remains at the levels of external regulation or introjected regulation. As a result, intrinsic motivation is substantially diminished. Under such circumstances, students tend to perceive the value of physical education in a passive and utilitarian manner, viewing participation as an obligation rather than a personally meaningful endeavor.

The prolonged absence of autonomy not only leads students to exhibit superficial engagement, low investment, or even avoidance behaviors during PE classes, but also deprives them of opportunities to develop self-decision-making and self-regulation skills throughout the learning process. This issue is particularly significant in physical education, a discipline that relies heavily on embodied experiences and contextualized practice. Once students lose their sense of control over their actions, their physical participation is unlikely to translate into positive psychological experiences. Consequently, physical education struggles to move beyond the superficial goals of skill acquisition and physical conditioning to address deeper dimensions such as character development and value formation. Therefore, an excessively controlling instructional environment not only undermines the motivational foundation of sports learning but also structurally restricts the realization of the broader educational functions of physical education.

3.2 The Bottleneck of a Unidimensional Evaluation System

Influenced by the longstanding legacy of examination-oriented education, current physical education assessment systems generally exhibit a pronounced score-centered orientation, with evaluation criteria focusing predominantly on physical fitness test results and athletic performance indicators [8]. This outcome-oriented evaluation model, grounded in standardized performance benchmarks, often overlooks individual differences in physical fitness, developmental starting points, and rates of growth among students. As a result, the evaluative function of assessment shifts from facilitating learning to categorizing and differentiating learners. For students with relatively weaker physical foundations or slower developmental progress, uniform and high-standard assessment requirements frequently generate repeated experiences of failure, gradually fostering a negative cognitive schema characterized by the belief that success is unattainable regardless of effort.

From the perspective of Self-Determination Theory, such persistent experiences of failure directly frustrate students' need for competence, making it difficult for them to experience improvement, mastery, and enhanced self-efficacy in physical activity. Students whose competence needs remain chronically unmet are more likely to attribute failure to personal inadequacies rather than to task difficulty or inappropriate assessment methods, thereby increasing the likelihood of developing learned helplessness [9]. When students are unable to gain stable experiences of achievement and positive feedback in PE classes, their self-confidence and learning expectations gradually decline, leading to heightened anxiety toward challenging tasks and an increased tendency to avoid participation. Consequently, the systematic frustration of competence needs not only reduces students' willingness to engage persistently in physical education but also

impedes the development of crucial non-cognitive qualities such as achievement motivation and resilience. Under these conditions, physical education is unable to fully realize its motivational and educational potential.

3.3 The Competitive Orientation of Teaching Environments and the Weakening of Belongingness

Although sports inherently possess social attributes such as cooperation, interaction, and emotional connection, the excessive emphasis on competition and selection in physical education practice may significantly weaken these social functions and distort interpersonal relationships within the classroom [10]. When assessment systems prioritize competitive outcomes and performance rankings, instructional relationships gradually become instrumentalized. Teacher–student interactions tend to evolve into one-way managerial relationships characterized by supervision, control, and performance monitoring, while peer relationships are increasingly dominated by utilitarian comparison and competition. Consequently, opportunities for cooperation, mutual support, and empathy are substantially reduced. For students with lower athletic competence or slower developmental trajectories, such competition-oriented classroom environments not only fail to satisfy their need for acceptance and respect but may also reinforce feelings of marginalization and exclusion during group activities.

From the perspective of psychological need satisfaction, the absence of a stable social support system within PE classes significantly diminishes students' sense of meaning, security, and emotional well-being in sports participation. A lack of social support limits students' opportunities to develop effective communication skills, collaborative abilities, and conflict-resolution strategies in authentic learning contexts. It also weakens the educational value of physical activity in fostering rule consciousness, responsibility, and teamwork. Such a teaching orientation, which deviates from the fundamental educational purposes of physical education, not only undermines the interpersonal and relational functions of PE but also fundamentally restricts its unique contribution to students' socialization and holistic development.

4. Strategies for Cultivating Non-Cognitive Factors among Secondary School Students from the Perspective of Self-Determination Theory

4.1 Implementing Autonomy-Supportive Teaching to Activate the Intrinsic Driving Force of the Non-Cognitive System

To stimulate secondary school students' intrinsic engagement in physical activity, instructional strategies must shift from external control to autonomy support. Teachers should incorporate diversified choice mechanisms into lesson design by providing students with a range of activity options rather than relying solely on uniform task assignments [11]. For example, within a physical fitness training unit, students may be allowed to choose among circuit training, game-based competitions, or sport-specific progressive exercises according to their interests and preferences. Granting such choice not only satisfies students' need for autonomy but also cultivates their decision-making abilities and sense of responsibility for their own actions.

At the same time, teachers should employ informational rather than controlling forms of feedback, explaining the long-term physical, psychological, and social benefits associated with participation in sports activities. When students perceive themselves as being supported rather than merely trained, their motivational orientation is more likely to shift from externally regulated behavior to self-determined engagement. This transformation facilitates the internalization of learning motivation and fundamentally addresses the problem of insufficient enthusiasm and persistence in physical education participation. Through autonomy-supportive instruction, students are encouraged to become active agents in their own learning process, thereby fostering the development of positive non-cognitive qualities such as initiative, self-discipline, and intrinsic interest in physical activity.

4.2 Establishing a Tiered Challenge System to Reshape Volitional Qualities through Competence Experiences

To address the diminished sense of achievement caused by overly standardized assessment criteria, physical education instruction should adopt a dynamic goal-gradient approach. By breaking down complex motor skills into a series of attainable sub-goals, teachers can ensure that every student experiences success within their

respective zones of proximal development [12]. In activities such as hurdling, high jump, or other competitive sports, differentiated equipment settings, performance standards, or assessment criteria can be implemented to accommodate individual differences in ability. Such practices reduce the emphasis on horizontal comparisons among students while encouraging continuous self-improvement through vertical progress.

From the perspective of Self-Determination Theory, this instructional approach directly supports students' need for competence by enabling them to experience mastery and achievement. the satisfaction of competence needs not only helps prevent the emergence of learned helplessness but also allows students to perceive tangible improvements in their capabilities through a recurring process of goal setting, obstacle overcoming, and goal attainment. These accumulated experiences of success contribute significantly to the development of self-efficacy, confidence, and perseverance. Consequently, the continuous reinforcement of competence experiences provides a psychological foundation for cultivating key non-cognitive qualities and serves as an effective pathway for strengthening students' resilience and volitional strength.

4.3 Strengthening Cooperative-Oriented Mechanisms to Foster Social Character through the Satisfaction of Relatedness Needs

Physical education classes should be viewed as dynamic microcosms of society in which students develop not only physical competencies but also essential social and interpersonal qualities. To address the weakened sense of belonging resulting from excessively competitive instructional environments, greater emphasis should be placed on cooperative learning and shared responsibilities. Teachers can establish long-term heterogeneous learning groups in which students rotate through different roles, such as team leader, referee, technical analyst, or logistical coordinator. This structure enables every student to identify a meaningful position and unique contribution within the achievement of collective goals [13].

Within such highly interactive learning environments, interpersonal relationships shift from competition-centered interactions toward collaboration and mutual support. the fulfillment of students' need for relatedness can significantly reduce anxiety and psychological pressure associated with competitive settings while enhancing their sense of acceptance, inclusion, and social connection. When students feel valued and needed by their peers, important non-cognitive qualities—including collective responsibility, respect for rules, empathy, and social-emotional regulation—are naturally cultivated through authentic participation and interaction. the development of these social characteristics reflects the fundamental role of physical education as a powerful medium for socialization and holistic personal development.

5. Conclusions and Practical Implications

5.1 Major Research Conclusions

Through an integrated analysis of Self-Determination Theory and the developmental pathways of non-cognitive factors among secondary school students, this study reveals the underlying mechanisms through which physical education contributes to personality development. the findings suggest that the development of non-cognitive factors is not an isolated psychological process but is deeply rooted in the extent to which students' three basic psychological needs—autonomy, competence, and relatedness—are satisfied. When physical education moves beyond the mere transmission of motor skills and evolves into an ecological learning environment characterized by high levels of psychological support and low levels of external control, students' motivation for sports participation undergoes a fundamental transformation, progressing from externally regulated behavior toward integrated regulation and ultimately intrinsic motivation. This process of motivational internalization serves as the logical foundation for the emergence and development of important non-cognitive qualities such as self-discipline, resilience, and self-confidence.

Furthermore, the study highlights the unique and irreplaceable role of physical education in cultivating volitional qualities and social character. the physiological challenges and competitive situations inherent in sports provide authentic contexts in which students can develop perseverance and mental toughness. At the same time, the rule-based interactions and emotional exchanges that occur within team activities offer valuable opportunities for socialization and character formation. This transformative

mechanism—from physical practice to psychological development—demonstrates that physical education is not merely a means of enhancing physical fitness. Rather, it is an educational process that promotes the comprehensive development of psychological qualities by satisfying students' fundamental developmental needs and fostering holistic personal growth [14].

5.2 Practical Implications Based on the Theoretical Framework

Drawing on the above theoretical findings, future reforms in secondary school physical education should focus primarily on the ecological reconstruction of instructional environments. A key priority is the transformation of teachers' professional roles—from being mere correctors of movement techniques to becoming facilitators of students' psychological motivation. Teachers should adopt informational rather than controlling instructional communication and provide students with appropriate opportunities to make decisions regarding learning content and modes of participation. the establishment of a sense of autonomy represents a fundamental prerequisite for activating students' intrinsic motivational systems and fostering a stable sense of self-identification through sports participation.

At the same time, the reconstruction of assessment systems is essential for the sustained development of non-cognitive factors. Schools should move beyond evaluation systems that rely exclusively on absolute performance outcomes and instead adopt value-added assessment approaches that emphasize individual progress and developmental growth. By establishing dynamic personal development portfolios, students can experience competence through longitudinal comparisons with their own previous performance rather than through comparisons with others. Such an approach effectively reduces the likelihood of learned helplessness while strengthening students' perceptions of competence. Positive feedback grounded in personal improvement serves as a crucial psychological foundation for the development of achievement motivation and perseverance and plays a decisive role in enhancing students' self-confidence.

In addition, physical education classes should be regarded as micro-communities that facilitate students' social development. To optimize both personality development and emotional growth, instructional strategies should place greater emphasis on cooperative learning models. By incorporating heterogeneous group structures, collaborative agreements, and shared-role mechanisms into teaching practices, educators can encourage students to experience a sense of belonging while working toward collective goals. Within such emotionally supportive environments, students' collective responsibility, sense of fairness, and emotional regulation abilities can develop naturally. In this way, physical education can achieve a meaningful integration of its dual educational functions—cultivating both physical competence and psychological well-being.

5.3 Research Reflections and Future Directions

Although this study proposes a framework for cultivating non-cognitive factors based on Self-Determination Theory, further refinement is needed regarding targeted interventions for students at different developmental stages, particularly between junior and senior secondary school levels. Future research should adopt a more nuanced perspective by examining variations in psychological need satisfaction across different types of sports activities, such as high-intensity competitive sports and endurance-based activities.

Moreover, large-scale longitudinal and quantitative studies are needed to investigate the long-term effects of non-cognitive factor development in physical education settings. Through comprehensive analysis of empirical data, future research can not only verify the sustained impact of psychological need satisfaction and motivational internalization on non-cognitive development but also provide stronger evidence-based guidance for differentiated instruction in secondary school physical education. Such efforts will contribute to maximizing the educational value of physical education and enhancing its role in promoting the holistic and healthy development of adolescents.

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