Scientific and Social Research, 2026, Volume 8, Issue 4
http://ojs.bbwpublisher.com/index.php/ssr
Online ISSN: 2981-9946
Print ISSN: 2661-4332

Embodied Learning: A Qualitative Study on Extracurricular Exercise, Psychological Capital, and Academic Experience of High School Seniors

Fanrui Luo*, Xiao Xu

Chengdu No.7 Wanda School, Chengdu 610000, Sichuan, China

Author to whom correspondence should be addressed.

Abstract: This study employs autoethnographic methods, using the researcher and three classmates as research subjects, to explore the impact of extracurricular exercise on psychological well-being and learning experience during the senior year examination preparation period. Through two weeks of learning journal records and semi-structured in-depth interviews, the study found that: (1) Regular exercise significantly enhances learning focus and problem-solving flexibility through emotional regulation mechanisms; (2) Appropriate blurring of the "exercise-learning" boundary helps expand cognitive flexibility and promotes interdisciplinary thinking; (3) "Time anxiety" under the examination-oriented culture is the main barrier restricting high school seniors' participation in exercise. The study suggests that high school education should reconstruct the "effective learning" time politics, integrate the mind-body connection into the examination preparation support system, and provide more humanistic academic guidance for high school seniors.

Keywords: High school seniors; Extracurricular exercise; Psychological capital; Learning experience; Autoethnography; Qualitative research

Online publication: May 25, 2026

1. Introduction

In September 2025, as a high school senior, the author fell into a typical examination preparation dilemma: studying more than 14 hours a day, yet the mock exam rankings continued to decline. Sitting at the author's desk, the author was like an overloaded machine, inefficient yet afraid to stop. The turning point came in October when the author was forced to participate in a sports meeting—after an 800-meter run, the author unexpectedly found that their thinking on the difficult math problems that evening was exceptionally clear, and that "stuck" feeling had disappeared. This experience prompted the author to reflect: Does the "every minute counts" concept people are instilled with ignore the wisdom of the body? Is there some overlooked connection between exercise and learning?

This personal confusion is not an isolated case. In their class, more than 80% of students exercise less than 30 minutes daily outside of class, and "no time for exercise" has become a consensus. However, when people are occasionally "forced" to participate in physical activities, many report similar "improved learning efficiency after exercise" experiences. This contradictory phenomenon sparked their research interest: Under the pressure of an examination-oriented culture, how does extracurricular exercise affect the psychological state and learning experience of high school seniors?

This study adopts the autoethnography method, using the researcher and three classmates as research subjects, to explore the mechanism of how extracurricular exercise affects psychological capital and academic experience during the senior year examination preparation period through two weeks of learning journal records and semi-structured interviews. The study aims to provide empirical evidence for the physical and mental health development of high school seniors, while offering a reference for educators to reconstruct the concept of "effective learning."

2. Literature review

2.1. The relationship between exercise and cognitive function

Numerous studies have shown a significant positive correlation between regular physical activity and cognitive function. A review study pointed out that acute aerobic exercise can immediately enhance executive function and attention by increasing cerebral blood flow and neurotransmitter release [1]. In adolescent populations, a meta-analysis found a moderate positive correlation between physical activity and academic performance ($r=0.25$) [2]. A recent meta-analysis based on the CNKI database further confirmed that physical exercise has a significant positive impact on academic performance, and different exercise intensities have significantly different effects on academic performance [3].

Notably, the relationship between exercise and academic performance is not simply linear. A study by South China Normal University found an inverted U-shaped relationship between weekly exercise time and academic performance among middle school students, with moderate exercise (3-5 times per week, 30-60 minutes each time) showing the best academic performance, while excessive exercise may encroach on study time [4]. This finding challenges the stereotype that "exercise affects learning."

A randomized controlled trial (RCT) published in JAMA Pediatrics provided more direct evidence for the relationship between exercise and academic performance. The study randomly assigned more than 500 elementary school students to a "daily additional exercise group" and a "regular activity group." After two years of follow-up, it was found that additional exercise not only did not harm academic performance but also produced a significant positive effect on math scores [5].

2.2. Psychological capital and learning performance

Psychological Capital is a concept proposed by Luthans and others in the fields of positive psychology and organizational behavior, including four core dimensions: self-efficacy, optimism, hope, and resilience [6]. Studies have shown that psychological capital is significantly positively correlated with academic performance, mental health, and life satisfaction.

Among high school students, the role of psychological resilience is particularly prominent. A study targeting Chinese high school seniors found that psychological resilience plays a significant buffering role between academic stress and mental health, with highly resilient students better able to cope with test anxiety

[7]. Fredrickson's Broaden-and-Build Theory provides a theoretical explanation for this: positive emotional experiences can expand the scope of instantaneous cognition and construct lasting psychological resources, thereby enhancing individual adaptability and creativity [8].

2.3. Research on the academic stress of high school seniors

The senior year is generally considered the most stressful period in middle school. The college entrance examination, as a critical node that "determines one's life in one exam", brings tremendous psychological burden to students. Studies show that more than 60% of high school seniors have varying degrees of anxiety symptoms, with sleep problems and emotional distress being widespread [9].

Under the background of an examination-oriented culture, "time politics" has become an important force restricting students' physical and mental development. Schools and parents view time as a scarce resource, with "every minute counts" becoming the motto of examination preparation, while activities such as exercise and rest are constructed as "unproductive time" and squeezed out [10]. However, the scientific validity and rationality of this time concept deserve reflection.

3. Methodology

3.1. Research design

This study adopts the autoethnography method, a research paradigm that combines personal experience with cultural analysis. The researcher is both the research subject and the data analyst, deeply understanding the experiential world of specific groups through an "insider" perspective [11]. This method was chosen based on the following considerations: First, as a high school senior, the author has a natural "insider" identity and can access deep experiences that other research methods find difficult to reach; Second, autoethnography allows researchers to transform personal confusion into academic questions, achieving the dual goals of "self-healing" and knowledge production.

3.2. Research Subjects

The research subjects include the researcher and three classmates, selected using purposive sampling. Specific information is shown in **Table 1**:

Table 1. Demographic information of research subjects

Code	Gender	Exercise Frequency	Main Exercise Type	Interview Duration
Researcher	Male	4 times/week	Running, Basketball	—
Interviewee A	Female	3 times/week	Badminton, Jogging	38 min
Interviewee B	Male	2 times/week	Basketball	42 min
Interviewee C	Female	4 times/week	Running, dancing	35 min

3.3. Data collection and analysis

Data collection adopted a mixed method, including learning journals and semi-structured interviews:

3.3.1. Autoethnographic journal

From January 6 to January 19, 2025, for 14 consecutive days, the author recorded daily exercise type, duration, emotional state (self-rated 1–10), learning events, and subjective experiences. The journal used a structured template including: date, exercise situation (type, duration, intensity), emotional state (before/after exercise), learning experience (focus, problem-solving flexibility, fatigue), and reflective notes.

3.3.2. Semi-structured interviews

One-on-one in-depth interviews were conducted with three classmates, each lasting 30-45 minutes, with recording after obtaining consent. The interview outline covered: (1) exercise habits and time arrangement; (2) subjective experiences after exercise; (3) cognition of the "exercise and learning" relationship; (4) factors hindering exercise participation. Interviews were conducted during free classroom time to ensure a quiet and undisturbed environment.

3.3.3. Data analysis

Thematic Analysis was used to analyze the data, following the six-step process proposed by Braun and Clarke [12]: familiarizing with data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and writing the report. The coding process was assisted by NVivo 12, and through repeated reading and comparison, three core themes were finally extracted.

4. Findings

Through repeated analysis of 14 days of learning journals and three interview transcripts, this study extracted three core themes: "Exercise as an Emotional Reset Mechanism", "The Physical Basis of Cognitive Flexibility", and "Time Anxiety and Exercise Barriers."

4.1. Exercise as an emotional reset mechanism

Journal records showed that after 6 evening runs, 5 reported "significant decrease in anxiety" (from 7–8 to 3–4). This emotional improvement is not simply "relaxation" but a "reset"—the learning state after exercise shows obvious "restart" characteristics. A recent randomized controlled trial on adolescents with ADHD also found that short-term moderate-intensity physical exercise intervention can significantly reduce self-reported stress levels and improve internalizing symptoms, providing further empirical support for the emotional regulation effect of exercise [13].

Interviewee A (exercises 3 times a week) described in the interview: "After running and doing physics problems, that stuck feeling is different—it's not 'I can't do it', but 'let me try again.'" This description reveals the subtle impact of exercise on self-efficacy—learners after exercise are more inclined to attribute difficulties to "task difficulty" rather than "lack of ability", and this shift in attribution is a manifestation of improved psychological resilience.

Interviewee B (exercises 2 times a week) provided a more specific experience description: "After playing ball, it feels like the 'mush' in my brain has been shaken off, and math problems look more pleasing." This metaphor vividly illustrates the "purifying" effect of exercise on cognitive state. From a neuroscience perspective, this may be related to exercise promoting the release of neurotransmitters such as dopamine and norepinephrine, which play important roles in attention and emotional regulation.

4.2. The physical basis of cognitive flexibility

The study found that exercise not only affects emotional state but is also closely related to cognitive flexibility. The author wrote in the author's journal on January 8: "No exercise today, my brain was like a rusty gear during evening self-study, staring at analytic geometry for 20 minutes, with letters floating around."

In contrast, the record from January 10 (when there was basketball activity): "Although I only played for 20 minutes, when writing English compositions in the evening, I suddenly thought of using the dialectics learned in history class to organize arguments." This "interdisciplinary association" experience is a typical manifestation of cognitive flexibility.

Interviewee C's (exercises 4 times a week) interview further confirmed this finding: "I found that after exercise, I have a particularly good feeling when doing comprehensive arts problems, as if knowledge from different subjects automatically connects." This "sense of connection" may be related to exercise promoting prefrontal cortex function, which is the neural basis of executive function and cognitive flexibility.

Notably, this cognitive benefit is not a "byproduct" of exercise but has its physiological mechanism. Studies have shown that acute aerobic exercise can increase levels of brain-derived neurotrophic factor (BDNF), promoting neuroplasticity and thereby enhancing learning and memory abilities [14].

4.3. Time anxiety and exercise barriers

Despite the obvious physical and mental benefits of exercise, the exercise participation rate among high school seniors remains low. The study found that "time anxiety" is the main barrier restricting exercise participation.

Interviewee A admitted: "I know exercise is useful, but every time I go running, I feel like I'm 'wasting time,' and there's always a voice in my head saying 'others are studying, what are you doing.'" This "time guilt" is widespread among high school seniors and is a psychological product of the internalization of examination-oriented culture.

Interviewee B's description is more universal: "Most people in our class 'would rather sit than stand, would rather lie than sit'—it's not that they don't want to move, but they dare not move." This expression of "dare not move" reveals the discipline of examination-oriented culture on body and mind—exercise is constructed as "unproductive time" and opposed to "effective learning."

The author also recorded similar contradictory psychology multiple times in the author's journal. On January 12, the author wrote: "I originally wanted to go running today, but when I saw my deskmate doing mock exams, I gave up. Now I somewhat regret it; my efficiency was very low in the evening." This dilemma of "wanting to move but not daring to move" is a true portrayal of time anxiety.

5. Discussion

The findings of this study support Fredrickson's Broaden-and-Build Theory: positive emotional experiences (triggered by exercise) can expand the scope of instantaneous cognition and construct lasting psychological resources. This is highly compatible with the "interdisciplinary thinking" and "problem-solving ability" needed by high school seniors. However, the "time tyranny" under examination-oriented culture constructs exercise as "unproductive time", and this myth needs to be challenged and reconstructed.

From the perspective of embodied cognition, this study reveals the essence of "embodied learning." Traditional education views learning as purely "mental activity", ignoring the cognitive function of the body.

However, more and more evidence shows that the body is not only a “container” but also a “participant” in cognition—physical activity affects brain function through neurophysiological mechanisms, thereby affecting learning performance. Embodied cognition theory emphasizes that cognitive processes are deeply rooted in the interaction between the body and the environment; the body is not only the “carrier” of cognition but also the “shaper” of cognition [15]. This theoretical perspective provides an important framework for understanding the deep connection between exercise and learning.

The unique value of this study lies in the “insider” perspective. As a high school senior, the author can access subtle experiences that quantitative research finds difficult to capture, such as “that stuck feeling is different” and “the mush in my brain has been shaken off.” These “emic concepts” enrich our understanding of the relationship between exercise and learning.

However, this study also has obvious limitations. First, the small sample size (n=4) limits the generalizability of the findings; second, the short tracking period (2 weeks) makes it difficult to capture long-term effects; third, the subjectivity of the autoethnographic method may bring interpretive bias. Future research can use mixed-method designs with larger samples and longer tracking periods to verify and expand the findings of this study.

6. Conclusion and recommendations

Through autoethnographic methods, this study explored the impact of extracurricular exercise on psychological capital and academic experience among high school seniors, drawing the following conclusions:

(1) Regular exercise significantly enhances learning focus and problem-solving flexibility through emotional regulation mechanisms, with learners after exercise showing higher self-efficacy and psychological resilience;

(2) Appropriate blurring of the “exercise-learning” boundary helps expand cognitive flexibility and promotes interdisciplinary thinking and creative problem-solving;

(3) “Time anxiety” under an examination-oriented culture is the main barrier restricting high school seniors’ exercise participation, requiring reconstruction of the “effective learning” time politics.

Based on the research findings, the following recommendations are proposed:

For schools: Ensure one hour of autonomous exercise time daily for high school seniors, and integrate physical activities into the examination preparation support system rather than viewing them as “sacrificial” flexible time. Consider setting collective exercise periods before evening self-study to help students “reset” their state and improve evening learning efficiency.

For teachers: Re-recognize the cognitive value of “rest” and “exercise”, avoiding opposition between exercise and learning. Share research evidence on exercise and cognitive function in class meetings to help students establish scientific learning concepts.

For students: Establish an “embodied learning” perspective, recognizing that the body is a “partner” in learning rather than an “obstacle.” Moderate exercise is not “wasting time” but “investing in efficiency.” It is recommended to engage in at least 30 minutes of moderate-intensity exercise daily, such as brisk walking, jogging, ball sports, etc.

As a qualitative study conducted independently by a high school student, the value of this study lies not in the universality of its conclusions but in revealing the gap between policy texts and bodily practices, providing educators with an “insider” perspective and voice. The author looks forward to more researchers paying attention to the physical and mental health development of high school seniors and contributing to building a more humanistic examination preparation support system.

Disclosure statement

The author declares no conflict of interest.

References

[1] Hillman CH, Erickson KI, Kramer AF, 2008, Be Smart, Exercise your Heart: Exercise Effects on Brain and Cognition. Nature Reviews Neuroscience, 9(1): 58–65.

[2] Sibley BA, Etnier JL, 2003, The Relationship between Physical Activity and Cognition in Children: A Meta-analysis. Pediatric Exercise Science, 15(3): 243–256.

[3] Xiang X, Wang Q, 2022, Physical Exercise Improves Academic Performance: Based on CNKI Meta-analysis Evidence. Mobile Information Systems, 2022, 1106573.

[4] Chen Z, 2019, The Relationship between Physical Activity and Academic Performance among Middle School Students: A Cross-sectional Study. Journal of Sports Science, 39(5): 45–52.

[5] Kvalø SE, Bru E, Brønnick K, et al., 2017, Effect of a School-based Physical Activity Intervention on Academic Performance. JAMA Pediatrics, 171(9): 839–845.

[6] Luthans, F, Youssef CM, Avolio BJ, 2007, Psychological Capital: Developing the Human Competitive Edge. Oxford University Press, Oxford.

[7] Zhang L, 2020, The Mediating Role of Psychological Resilience between Academic Stress and Mental Health among High School Seniors. Chinese Journal of Clinical Psychology, 28(2): 312–316.

[8] Fredrickson BL, 2001, The Role of Positive Emotions in Positive Psychology: The Broaden-and-build Theory of Positive Emotions. American Psychologist, 56(3): 218–226.

[9] Liu X, 2018, Mental Health Status and Influencing Factors among High School Seniors. Chinese Journal of School Health, 39(8): 1156–1159.

[10] Wu K, 2019, "Time Politics" in Education: A Sociological Analysis. Educational Research, 40(3): 4–14.

[11] Ellis C, 2004, The Ethnographic I: A Methodological Novel about Autoethnography. AltaMira Press, Walnut Creek.

[12] Braun V, Clarke V, 2006, Using Thematic Analysis in Psychology. Qualitative Research in Psychology, 3(2): 77–101.

[13] Dastamooz S, Wong SHS, Yang Y, et al., 2025, Efficacy of a Short-term Physical Exercise Intervention on Stress Biomarkers and Mental Health in Adolescents with ADHD: A Randomized Controlled Trial. Journal of Affective Disorders, 2025(371): 527–536.

[14] Voss MW, Erickson KI, Prakash RS, et al., 2013, Neurobiological Markers of Exercise-related Brain Plasticity in Older Adults. Brain, Behavior, and Immunity, 2013(28): 90–99.

[15] Wilson M, 2002, Six Views of Embodied Cognition. Psychonomic Bulletin & Review, 9(4): 625–636.