

Research on the Impact of App-Driven Zero-Time Exercises on College Students' Physical Fitness

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Abstract: The “Zero-Time Movement” offers a new approach to addressing the problem of “pre-exercise initiation resistance” among college students. By leveraging its low barriers and high adaptability, this movement successfully transforms instantaneous impulses into long-term behavioral habits through instant reward mechanisms, fragmented interactions, and social comparison psychology. Empirical data show that this model has significant benefits in improving cardiovascular endurance, optimizing body composition, and enhancing self-efficacy in the short term. However, after three months of intervention, it often enters a “yield plateau” and is accompanied by the “check-in hollowing out” phenomenon of behavioral alienation. This study points out that there is an essential distinction between “behavioral initiation” and “exercise efficacy,” and existing applications overly rely on fun incentives while neglecting the scientificity of load intensity and advanced planning. Future research needs to go beyond simple effect verification and shift to exploring the interactive matching mechanism of “solutions-populations-contexts” to precisely promote the advancement of college students’ physical health.

Keywords: Zero-time movement; College students’ physical fitness; Sports apps

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1. The concept and theoretical foundation of “zero-time exercise”

The concept of “Zero-Time Exercise” was proposed as a theoretical response to the current changes in the physical activity patterns of college students. “Zero-Time” does not mean that exercise does not require time; rather, it indicates that such exercises will not conflict with the “normal time” in an individual’s daily life that is pre-defined by social roles^[1]. In other words, it does not require you to specifically allocate time from your schedule to mark “exercise,” nor does it require you to put on sports clothes and go to a specific place. Instead, it embeds physical activities into those existing but often overlooked daily gaps, such as walking to change classrooms during breaks, the three minutes while waiting for takeout, the brief wakefulness after

lunch break, or the commercial breaks while scrolling through your phone before bed. These fragmented times are already embedded in the time structure of daily life, and the goal of Zero-Time Exercise is merely to re-recognize these times as “time for exercise” [2].

From the perspective of behavioral science, the fundamental logic of zero-time exercise lies in systematically reducing the activation cost of exercise behavior. The classic theories of health behavior change, whether the Health Belief Model or the Theory of Planned Behavior, all indicate a common problem: there is a significant gap between intention and behavior. In exercise, which is a behavior that requires continuous investment, this gap is particularly wide. Traditional exercise models impose multiple activation conditions on individuals, including time reservation, space arrival, equipment replacement, skill acquisition, and subtle psychological role transitions, such as the self-encouragement of “changing from a ‘student’ or ‘recreationalist’ to an ‘exerciser.’” Any one of these conditions can lead to a break in the behavior chain. The intervention strategy of zero-time exercise is to dismantle these links one by one: not based on a fixed time frame, not relying on specific venues and equipment, the exercise movements are designed to be simple enough to be imitated immediately, and psychologically, there is no need to complete the role transition.

From the perspective of exercise physiology, the legitimacy of zero-time exercise stems from the significant shifts in the field of physical activity epidemiology and exercise intervention research over the past decade. For a long time, the principle that “a single aerobic exercise needs to last for at least 30 minutes” has been regarded as an unbreakable rule. This principle began to loosen with the widespread use of objective measurement tools such as accelerometers — researchers found that those short periods of physical activity scattered throughout the day, each lasting less than 10 minutes, could still generate quantifiable health benefits when accumulated. In 2018, the US Department of Health and Human Services, when updating the second edition of the “Physical Activity Guidelines for Americans,” officially abolished the requirement that “each exercise session must last at least 10 minutes,” marking the recognition of the health value of fragmented exercise at the highest level of evidence. The same year, the position statement of the American College of Sports Medicine also made a similar judgment. At the mechanism level, research on high-intensity interval training provided further evidence: extremely short periods of high-intensity stimulation can activate the AMPK-PGC-1 α signaling pathway, promoting mitochondrial biosynthesis and adaptive remodeling of muscle fiber types. This indicates that the duration of a single exercise is not the only determining factor for health benefits; the intensity, frequency, and cumulative dose of the stimulation are also important, and even more crucial [3].

In conclusion, zero-time exercise lies at the intersection of behavioral science and exercise physiology. It uses behavioral science to explain how to motivate people to move, and uses exercise physiology to answer how far one needs to go to achieve effectiveness. The combination of the two provides a complete chain from motivation stimulation to physical response for this new exercise method. Consistent theory does not necessarily mean effective practice. Whether zero-time exercise can improve the physical fitness of college students depends on whether an appropriate balance can be found between lowering the threshold and ensuring intensity. This is also the question that empirical research needs to answer.

2. The driving mechanism of sports apps in students’ uninterrupted physical activity

The value of sports apps lies in transforming one-time impulses into sustainable habits. Now, let’s analyze

the driving mechanism of these apps. The first point is immediate feedback. The basic principle of behavioral change is that the faster positive feedback is received after an action, the less likely that behavior will be repeated. The app compresses the feedback into seconds. After you finish a set of exercises, a prompt appears on the screen showing that you have burned 35,000 calories and have achieved 30% of the daily goal. It updates in real time; the ranking is refreshed immediately, and the instant satisfaction, although criticized by some as being utilitarian, cannot be denied: this immediacy has indeed increased participation in physical activities ^[4]. The second point is the design matching of fragmented content. The most popular content on sports apps is seven-minute abdominal muscles, five-minute stretches, three-minute morning wake-up, etc. This content can be completed in a full “training” session within the two-minute gap of using the phone by users, without causing the psychological burden of “I don’t have time to exercise.” More importantly, these small units are designed as independent closed loops — with a beginning, an ending, stretching, and a completion routine, making the two-minute segments also have the psychological experience of “having completed an exercise” ^[5]. The third point is social comparison and community drive. This aspect is particularly prominent among the student population. The leaderboard of Keep, the step ranking of WeChat Sports, and the running route map in the friends circle are essentially creating a visual competitive field ^[6].

People are naturally inclined to social comparison. When seeing that classmates in the class have exercised for another 32 minutes today while you are still at the zero-point of exercise, a slight social pressure will be generated. Some applications also set group check-ins, friend competitions, etc. activities. To some extent, they overcome the feeling of isolation brought by individual exercise, and group exercise becomes a source of habit, increasing the possibility of behavior maintenance ^[7].

3. Empirical examination of app-driven fragmentation movement: benefits, boundaries, and concerns

The existing empirical studies have provided some preliminary support for the app-driven fragmentation movement. After 12 weeks of app fragmentation training, the cardiopulmonary endurance of the intervention group of college students was significantly better than that of the control group ^[8]. The second study found that students led by the host did 20 minutes of fragmented exercise every day, and after 8 weeks, their body fat rate decreased by 1.3%, and there were also trends of improvement in waist circumference and hip circumference. Its psychological changes cannot be ignored either ^[9]. Survey results showed that students using the exercise app scored higher in three aspects: exercise self-efficacy, body image satisfaction, and exercise intention compared to those who did not use it. Its mechanism may lie in that the app breaks down exercise into perceivable and achievable micro-tasks, and each time it is completed, it strengthens the individual’s positive perception of their own exercise ability, thereby alleviating anxiety caused by academic and social pressures. According to the 2025 Blue Book on Chinese National Sports Behavior, the number of domestic exercise app users has exceeded 680 million, with the majority being young people aged 18 to 25, accounting for more than 40% of the total; among this group, the number of people using fragmented training accounts for about 40% of the total, and the data on exercise persistence is 58% higher than that of traditional fitness methods. This indicates that digital tools use low thresholds to create a positive feedback loop. However, some studies have shown that there is an inverted U-shaped relationship between app usage duration and the physical fitness improvement effect. There is a significant initial benefit, but after about three months, the improvement level tends to stabilize, and some indicators may even decline. The research

report believes that although most users think fragmented training is convenient, only 29% of them will continue to use it for a year or more, and most people have the phenomenon of reduced intensity due to long-term record-keeping. Physiologically, if one persists in a low-intensity, short-duration fixed plan without making advanced adjustments, the increase in physical fitness will follow the principle of progressive overload and stop; in terms of action, the Check-in behavior continues, but the objective intensity indicators such as heart rate gradually stabilize. This means that zero-time exercise, while lowering the participation threshold, also unconsciously lowers users' self-demand for exercise quality. The university stage is the golden period for the formation of lifelong exercise habits. If this stage forms a movement attitude that emphasizes frequent logging but neglects effectiveness, it will have a long-term impact on future healthy behaviors. How to strike a balance between convenience for participation and training quality is a proposition that digital exercise tools must answer in the next round of development ^[10].

4. Reflection and reconstruction

The app-driven zero-time exercise has opened up a feasible path for improving the physical fitness of college students. It solves the problem of starting from inactivity to activity, enabling students who never exercised before to take the first step. Among the group with a sedentary rate exceeding 60% and a continuously declining physical fitness qualification rate, its contribution is not ordinary light. If the app is responsible for initiating the behavior, then the scientific nature of the exercise plan itself is the key to determining whether physical fitness can truly improve after the initiation. For practitioners promoting the physical health of college students, they also need to adjust their working approach. For example, physical education teachers can recommend reliable exercise apps in class and teach students how to judge whether the training intensity is up to standard and how to connect fragmented exercise with traditional physical education classes and extracurricular exercises. The student affairs department can try to use the group function of the exercise app to organize fragmented exercise challenges and use the digital method that students are already accustomed to promote physical health work. The zero-time exercise driven by the app is essentially a redefinition of "exercise." It transforms exercise from a specialized activity into a behavior that can permeate every gap in daily life. For researchers, what is most needed at present is not to prove again whether fragmented exercise is useful, but to figure out "what kind of fragmented exercise plan is the most effective, for whom, and under what conditions it is effective." The answers to these questions can truly help college students move from "doing exercise" to "doing exercise effectively," and obtain real physical fitness improvement from the digital incentives of the app. After users have practiced with the app for half a year, they may have been wandering in their comfort zone and have not made substantive progress in their exercise ability.

5. Summary

This article systematically and logically examines the internal logic of the "zero-time exercise" phenomenon and the various practical issues involved in its implementation process. Firstly, it clarifies the behavioral science foundation of this model: reducing the cost of exercise initiation, thus enabling exercise to be better integrated into daily life, and thereby providing a feasible exercise entry point for college students who have been sedentary for a long time. Subsequently, it systematically analyzes the behavioral driving role of exercise apps in this process: immediate feedback shortens the waiting time for rewards, which is conducive

to behavior repetition; fragmented content is designed in an independent closed-loop form, thereby eliminating the psychological barrier of “no time for exercise”; leaderboards and social functions leverage the psychological tendency of social comparison to create moderate social pressure, and together they maintain the participation motivation. Then, from the perspective of exercise physiology, it provides a clear discussion: fragmented exercise does have health benefits, but its physiological effects highly depend on the exercise intensity and whether the intensity is appropriately advanced, so empirical research has confirmed its positive effects on the cardiovascular function and body composition, and objectively pointed out that due to the fixed pattern and decreased intensity during long-term use, the effects weaken. What is more valuable is that this article directly addresses the most fundamental and prominent contradiction of the current zero-time exercise, that is, the successful application of the app has increased the frequency of exercise, but has not effectively guaranteed the physiological effectiveness of the exercise plan. Therefore, this article believes that physical education practitioners should actively participate and guide students to scientifically control exercise load and coordinate systematic exercise, while academic research should further explore the necessary conditions and limits for effective solutions, thus moving from “digital comfort” to true physical fitness improvement.

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