

Time–Space–Behavior Translation Logic of the “Double Reduction” Policy on Youth Sports Participation: A Theoretical Framework and Research Agenda

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Abstract: China’s “Double Reduction” policy (2021) expanded adolescents’ discretionary time, creating conditions for greater sports participation. Whether released time becomes sports time, however, depends on mediating mechanisms that remain under-theorized. This paper integrates Becker’s time allocation theory, self-determination theory, and the social-ecological model into a “Time–Space–Behavior” framework that traces policy effects through three layers: time release, space provision, and behavioral motivation. Four structural barriers—supply shortages, motivational substitution, social norm inertia, and evaluation bias—are identified as suppressing translation efficiency. Five research directions are proposed, spanning time-use elasticity, program quality gradients, exam pressure effects, urban–rural disparities, and long-term health outcomes. The paper provides a theoretical architecture and testable hypotheses rather than causal evidence.

Keywords: Double reduction policy; Sport-education integration; Youth sports participation; Theoretical framework; Time allocation

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1. Introduction

The Double Reduction policy, issued in July 2021, cut homework loads and shrunk the off-campus tutoring sector while requiring schools to provide two hours of daily after-school services ^[1]. Though its primary aim was easing academic pressure, the policy inadvertently addressed one of the most stubborn obstacles to youth sports participation: the simple absence of discretionary time in over-scheduled daily routines.

This temporal opening intersects with the sport–education integration agenda launched in 2020, which deployed measures across school PE curricula, youth competitions, teacher staffing, and community sports

involvement^[2]. The institutional logic is straightforward: Double Reduction frees time on the demand side, while sport–education integration builds capacity on the supply side^[3]. But whether this coupling actually produces more physical activity is an empirical question that turns on what happens in between. Early evidence points to a “time substitution” risk: freed-up hours may gravitate toward screens rather than sports, consistent with broader findings that time availability alone does not drive physical activity without adequate facilities, organized programs, and supportive motivational contexts^[4–5]. The World Health Organization has been explicit on this point, calling for coordinated action across education, urban design, and transport rather than relying on single-sector interventions^[6].

The existing literature, while rich in policy commentary and prescriptive recommendations, lacks an integrative theoretical framework capable of linking specific policy instruments to behavioral outcomes through identifiable causal mechanisms. Discussions have largely remained at the macro level, failing to connect time release, sports provision, and individual motivation into a unified analytical space. This paper addresses these gaps through three contributions: constructing a “Time–Space–Behavior” transformation model by integrating three established theoretical traditions; identifying four structural constraints on policy-to-behavior translation grounded in the Chinese school system; and proposing a set of empirically testable research directions. Rather than providing causal evidence, the paper supplies theoretical infrastructure—propositions, mechanisms, and falsifiable hypotheses—for subsequent work to test and refine.

2. The sports dimension of the “Double Reduction” policy

The Double Reduction document mentions sports only marginally. Article 8 calls for cultural and sports activities during after-school hours; Article 9 adds sports interest groups and clubs; Article 15 addresses venue utilization. The sport–education integration agenda fills the gap. The August 2020 joint opinion deployed 35 measures across school PE, youth competitions, teacher staffing, and community sports involvement; the October 2020 follow-up incorporated PE into the education modernization evaluation system. Together, they aim to expand the coverage and quality of youth sports participation. The evaluation system tells a revealing story: Double Reduction monitoring indicators track homework compliance, training institution closures, and after-school service coverage—all inputs reduced, not outcomes produced^[7]. Sports participation and physical fitness are absent from the dashboard. Local officials face strong pressure to show time was freed; they face no comparable pressure to show it was used productively.

The policy’s sports effect thus qualifies as what Merton called an “unanticipated consequence”: not a design objective but a possible by-product whose realization depends on intermediate conditions^[8]. Tracing the chain from policy lever to behavioral outcome—through time budget relaxation, supply-side response, and motivational activation—is the analytical task the remainder of this paper takes up.

3. The “Time–Space–Behavior” Three-level transformation model

3.1. Theoretical foundations

The framework integrates three theoretical traditions that rarely converse. Becker’s time allocation theory treats time as a scarce resource: Double Reduction exogenously relaxes students’ time constraint by raising the shadow price of tutoring and homework, lowering the relative cost of alternative activities^[9]. The theory predicts substitution but not its direction—freed time could flow to sports, screens, sleep, or unstructured

leisure depending on relative attractiveness. Time-diary research provides well-established methods for tracking where the hours actually go ^[10].

Self-determination theory (SDT) addresses the quality of motivation behind those choices, distinguishing autonomous motivation—doing something because it feels meaningful or enjoyable—from controlled motivation—doing it because of external pressure or guilt ^[11]. SDT predicts that only autonomously motivated activity persists once external pressures are removed. This distinction matters acutely in the Chinese context, where the high-stakes physical education zhongkao exam can shift sports participation from genuine interest toward grudging compliance. Research conducted in Chinese schools has repeatedly found that when PE is driven by controlled motivation, short-term activity gains often mask long-term motivational erosion.

The social-ecological model rounds out the picture by situating individual behavior within nested environmental layers: intrapersonal, interpersonal, organizational/community, and policy. Double Reduction is a policy-layer intervention, but its effects must travel down through school facilities, peer norms, and individual skills before they register as behavior. Each layer can act as a bottleneck, and multi-level interventions consistently outperform single-level approaches for adolescent populations.

3.2. Model architecture

Integrating these perspectives yields a three-level model. The Time-Release Layer (L1) captures the direct policy effect on time budgets. Evidence supports this layer—homework compliance rose from 46% to over 90% by fall 2022—but L1 alone is insufficient. The Space-Provision Layer (L2) captures whether schools, communities, and families offer accessible, quality sports options: facility availability and usability, after-school program design and staffing, community venue accessibility, and family sports support. The Behavioral-Motivation Layer (L3) captures individual-level processes: autonomous versus controlled motivation, physical literacy, the psychological quality of PE class experiences, and peer activity norms. The model posits a serial pathway: L1→L2→L3→behavior. Each layer can independently break the chain.

3.3. Key propositions

Four testable propositions follow. Proposition 1 (Asymmetric dependence): L1 influences behavior primarily through L2 and L3; the direct path should largely vanish when mediators are controlled. Proposition 2 (Supply-side moderation): L2 amplifies the L1→L3 pathway—freed time is more motivating when facilities and programs are strong. Proposition 3 (Gate effect): Below a critical L2 threshold, even high L3 produces negligible behavior. Proposition 4 (Exam distortion): Zhongkao PE pressure shifts motivation from autonomous toward controlled, strengthening the L1→burnout path while weakening L1→autonomous participation ^[12].

4. Real-world constraints

The model describes how things could work. The Chinese school system throws up obstacles at almost every point, and four merit particular attention.

4.1. Structural supply shortages

Roughly 90% of primary schools meet formal sports venue standards, but compliance drops sharply in

central and western rural regions, and “meeting the standard” can mean a cracked court with rusted hoops. The teacher shortage is more serious: compulsory education is short approximately 200,000 PE teachers nationwide. In rural primary schools, over 40% of PE classes are taught by non-specialists. When after-school sports time is supervised by untrained staff managing unstructured free play, released hours produce negligible physical activity. National statistics confirm the geographic concentration of these shortages.

4.2. Motivational substitution

Two forms of substitution are at work. Screen time increased after Double Reduction, reflecting the formidable competitive pull of algorithmically optimized entertainment. Less visibly, the zhongkao PE exam may shift activity from intrinsically motivated to externally driven: students train for scores rather than enjoyment, producing short-term compliance at the cost of lasting engagement once the exam is over. The pattern is well documented in SDT research across multiple domains: external pressure inflates behavioral frequency while degrading motivational quality.

4.3. Social norm inertia

The cultural prioritization of academic achievement did not disappear when tutoring centers closed. It was redistributed into home-based study sessions, covert supplementary classes, and heavier family academic expectations. When parents and teachers treat PE as secondary, students internalize that judgment. Research in Chinese schools has shown that under these conditions, basic psychological needs are harder to satisfy in PE settings, suppressing the development of autonomous motivation for physical activity.

4.4. Evaluation orientation bias

The measurement system around Double Reduction tells a narrow story. Monitoring dashboards track tutoring company closures, after-school service coverage, and homework compliance. None track sports participation or fitness outcomes. Local education officials face strong incentives to hit reduction targets but none to push sports as a priority. Schools can treat after-school hours as custodial time—cheap to staff, low in organization—rather than investing in structured sports programs. In an evaluation environment that does not ask whether the released time produced anything worthwhile, the path of least resistance prevails.

5. Research agenda: Five priority directions

The model and constraints point toward an empirical agenda with five directions as follows.

5.1. Estimating time-use substitution elasticities

How much released time flows to sports versus screens versus sleep? Time-diary studies would make it possible to estimate substitution elasticities. A fractional multinomial logit model fitted to diary data from a representative adolescent sample could produce the first reliable estimates of where the Double Reduction time actually went. Time-diary methodology has a well-established foundation in time-use research.

5.2. After-school program quality gradients

Schools across China now offer after-school services, but the content varies dramatically—from organized basketball leagues with trained coaches to classrooms where students sit nominally supervised. Does

this variation translate into different levels of sports participation? Exploiting the uneven rollout across provinces, a difference-in-differences design could compare activity changes in schools that introduced structured programs against those that did not. Program quality could be measured through direct observation instruments or student reports of psychological need satisfaction.

5.3. The zhongkao PE exam's dual effects

Few issues in Chinese physical education are as contested as the high-stakes PE exam. The Time–Space–Behavior model predicts that the zhongkao effect will cut both ways: it may boost short-term activity while shifting motivation from autonomous to controlled, setting the stage for dropout after the exam. Provincial variation in zhongkao reform timing creates a natural experiment. The key would be to measure not just whether students are active, but why—using validated SDT instruments—and to track activity levels after exam pressure is removed. The international SDT literature has debated the motivational costs of external rewards for decades.

5.4. Urban–rural structural disparities

If time release is uniform but sports facilities are concentrated in better-resourced urban schools, the policy's sports dividend may disproportionately benefit already-advantaged students. Multi-group structural equation modeling, with a school-level sports facility index as a cross-level moderator, could test whether the urban–rural gap operates through supply-side variables rather than geography per se. If so, rural schools are where additional spending would produce the largest marginal gains.

5.5. Long-term health outcomes

The ultimate test is whether the policy moved population health indicators—fitness, obesity, and myopia. Provincial panel data from National Student Physical Health Standard tests, combined with pandemic-intensity controls in an event-study framework, can trace health trajectories before and after the policy change. Even modest short-term behavioral effects could accumulate into meaningful health shifts over several years—or they could prove negligible. Either finding would matter.

6. Theoretical contributions

This paper makes three contributions. The most visible is the framework itself: the Time–Space–Behavior model replaces the implicit “policy→behavior” assumption with an explicit multi-level causal chain that generates falsifiable hypotheses. A second contribution lies in theoretical bridging: time allocation theory (economics), self-determination theory (psychology), and the social-ecological model (public health) have rarely been brought into conversation, yet each addresses a different part of the causal story. The third contribution is methodological: the five research directions span multiple analytical scales and methods—time-diary analysis, quasi-experimental designs, multi-group SEM, panel event studies—providing scholars with operationalized starting points for moving from commentary to evidence.

7. Conclusion

The Double Reduction policy opened a door; whether anyone walks through it depends on conditions the

policy did not directly control. Time was released—that much is clear from monitoring data. Whether it became sports time, and whether it will remain sports time once the immediate policy attention fades, are questions the data have not yet answered. This paper has tried to specify what the mediating conditions are and how they fit together, providing a structured framework that can be tested, revised, or discarded as evidence accumulates. If freed time flowed mostly toward screens, that argues for supply-side investment. If zhongkao pressure produces short-term compliance at the cost of lasting disengagement, the exam’s design warrants reconsideration. If rural schools are being left behind, targeted investment becomes harder to ignore.

Disclosure statement

The authors declare no conflict of interest.

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