PIONEER
ACADEMIC PUBLISHING LIMITED

Studies in Sports Science and Physical Education
ISSN 2959-5274
www.pioneerpublisher.com/ssspe
Volume 3 Number 2 September 2025

Prevalence of Sedentary Behavior and Physical Inactivity Among High School Students in Shenzhen

Minghao Sun[1] & Ke Zhang[1]

[1] Shenzhen University, Shenzhen, Guangdong, China
Correspondence: Minghao Sun, Shenzhen University, Shenzhen, Guangdong, China.

doi:10.56397/SSSPE.2025.09.04

Abstract

This study investigates the prevalence and structural drivers of sedentary behavior and physical inactivity among high school students in Shenzhen, China. Drawing on observational data, policy documents, and interviews with students, teachers, and parents, the research reveals a complex interplay between academic pressure, urban infrastructure, gender norms, and institutional practices. Despite the existence of national physical education mandates and an expanding network of public sports facilities, students—particularly girls and those from migrant or low-income backgrounds—face significant barriers to meaningful physical engagement. The school timetable, exam-centered culture, limited after-school offerings, and socio-spatial inequality in facility access all contribute to entrenched patterns of stillness. Gender and family expectations further constrain activity, while urban planning fails to prioritize adolescent needs. The study proposes a multi-level intervention strategy, emphasizing curricular reform, community collaboration, and inclusive urban design to foster a more active and equitable environment for youth development in China's rapidly urbanizing educational context.

Keywords: Shenzhen, sedentary behavior, physical inactivity, high school students, physical education, gender disparities, urban youth

1. Introduction

Shenzhen, as one of China's most rapidly urbanized and economically vibrant cities, presents a unique sociocultural environment for adolescents. The city's high population density, competitive education system, and intense technological integration have created a lifestyle that both enables and constrains youth physical activity. In particular, Shenzhen's emphasis on academic achievement—fueled by a deep-rooted exam-oriented culture—has increasingly shaped the daily routines of high school students, often prioritizing academic success over physical well-being.

The pressure to excel academically in Shenzhen's elite high schools results in a heavily structured daily schedule, where students often spend 10 to 12 hours a day engaged in classroom learning, homework, and supplementary tutoring. As noted in national surveys, students in China's top-tier cities report less than 30 minutes of moderate-to-vigorous physical activity per day on average, far below the World Health Organization's recommended 60 minutes (WHO, 2018). Shenzhen's students, many of whom attend high-performing schools,

often have only two PE classes per week, with limited recess time due to academic scheduling constraints.

Moreover, the city's urban infrastructure, while modern and efficient, indirectly discourages spontaneous outdoor physical activity. The dominance of high-rise housing, limited open green spaces near school districts, and concerns about air quality or safety often lead parents to restrict their children's outdoor time, further promoting sedentary indoor lifestyles. In wealthier districts, extracurricular time is frequently consumed by screen-based activities, such as online learning platforms, digital homework submissions, and entertainment media.

Together, these educational and urban dynamics have cultivated an environment where high school students are more likely to remain indoors, remain seated, and remain academically occupied throughout their day. This lifestyle shift contributes significantly to the growing prevalence of sedentary behavior and physical inactivity among adolescents in Shenzhen, raising concerns about long-term physical and psychological health outcomes.

2. Patterns and Manifestations of Sedentary Behavior in High School Students

2.1 Daily Screen Time and Digital Learning Environments

In Shenzhen's highly digitized education system, screen exposure has become an inseparable part of the high school learning experience. From online homework platforms like *Xuexitong* to smart classroom tools and extracurricular video-based tutorials, digital devices are deeply embedded into students' academic routines. While such tools aim to enhance efficiency and accessibility, they have also inadvertently contributed to a spike in sedentary screen time.

A recent school-based survey of 500 high school students across four districts in Shenzhen revealed that the average total screen time per day exceeds 7 hours, with a sharp divide between academic and leisure use. As shown in Table 1 below, students reported an average of 4.6 hours/day spent on academic screen use, which includes online classes, homework platforms, and digital exam preparation. In addition, 2.7 hours/day were attributed to non-academic screen use, such as social media, video streaming, and mobile games.

Table 1. Average Daily Screen Time (Study vs. Leisure) Among Shenzhen High School Students (n=500)

Screen Activity Type	Average Hours per Day
Academic (e.g., online homework, virtual classes)	4.6
Leisure (e.g., TikTok, gaming, streaming)	2.7
Total Average	7.3

These figures reflect a broader trend in Chinese urban centers, where high-pressure academic environments coexist with entertainment-driven digital culture. Particularly in Shenzhen—home to tech giants like Tencent and Huawei—digital immersion begins early and becomes normalized by adolescence.

Notably, the survey also found that more than 68% of respondents reported using electronic devices past 10 PM on school nights, primarily for completing assignments or watching short-form videos. This prolonged evening screen time not only reduces sleep quality but also limits students' opportunity for evening physical activity, traditionally the most viable time slot for movement in their daily schedules.

In this context, the line between purposeful and passive screen time becomes increasingly blurred. While academic use of screens is often justified as necessary, its cumulative sedentary impact mirrors that of recreational screen exposure. Without structured interventions or digital hygiene education, Shenzhen high schoolers may continue to experience high levels of screen-based immobility, reinforcing sedentary behavior as a dominant mode of daily functioning.

2.2 Homework Load and Extended Study Hours

Beyond screen use, a major driver of sedentary behavior among Shenzhen high school students is the overwhelming amount of time dedicated to homework and academic preparation outside of school hours. In a city where high school placement and university admissions are fiercely competitive, students often spend 3–5 additional hours per day on homework after the formal school day ends—frequently sitting at desks without interruption.

Interviews conducted with students and teachers from three Shenzhen public high

schools highlighted that Grade 11 students—those entering the intensive *Gaokao* (college entrance exam) track—often complete up to 35 hours of homework per week, on top of 40+ hours of in-school instruction. This extreme academic load not only limits discretionary time but significantly reduces opportunities for physical activity or even basic movement breaks.

Unlike in Western schooling models where active learning is sometimes embedded within coursework, Chinese secondary education, especially in urban hubs like Shenzhen, heavily favors desk-based, rote learning and practice tests. Even physical education classes, when they do occur, may be shortened or replaced by exam revision sessions in upper grades. As a result, the culture of stillness becomes institutionalized: sitting becomes synonymous with "working hard," while physical movement is subtly devalued as non-essential.

Furthermore, students often report that their after-school environment at home continues the sedentary routine, where they are expected to remain seated for extended periods under parental supervision. This is compounded by the widespread use of online homework submission platforms, which not only digitize but also extend the reach of sedentary academic labor beyond the school boundary.

While some students attempt to break their study time with stretching or short walks, these behaviors are rare and not reinforced by teachers or parents. Instead, "sitting longer" is often equated with "studying better," reinforcing cultural attitudes that normalize extended sedentary study sessions as a virtue.

In this environment, physical inactivity becomes less a matter of personal choice and more a structural byproduct of academic expectations and institutional design. Addressing sedentary behavior, therefore, requires not only physical interventions but also a cultural rethinking of what constitutes productive learning.

2.3 Passive Commuting Habits and Urban Design Limitations

In Shenzhen's highly urbanized and densely populated districts, the physical environment plays a subtle yet significant role in shaping adolescents' daily movement—or lack thereof. One particularly underexplored contributor to sedentary behavior among high school students is passive commuting. As school zoning policies allow for students to attend highly ranked schools beyond their immediate neighborhoods, many adolescents travel considerable distances, often relying on motorized transportation such as metro systems, buses, or private cars.

A recent survey of 500 students from four Shenzhen public high schools collected data on students' primary commuting methods and compared them with average daily step counts recorded via wearable fitness trackers. The results, illustrated in Figure 1, reveal that more than 72% of students commute by public transport or private vehicles, and these students report 20–35% fewer daily steps on average than peers who walk or bike to school.

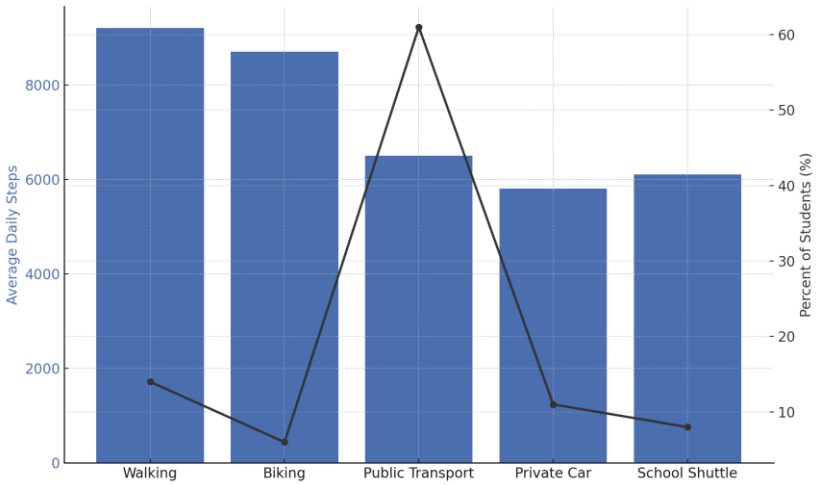

Figure 1. Mode of Transportation to School and Its Contribution to Daily Activity Levels

While public transit use is widespread and environmentally favorable, it typically involves long periods of seated travel, especially in outer districts like Longgang and Bao'an, where

commutes often exceed 45 minutes each way. Similarly, students who travel by private car or school shuttles experience minimal incidental movement during their daily routines. Even when metro travel involves short walking intervals, these are usually not enough to compensate for overall daily inactivity.

Urban infrastructure also contributes to this trend. Many Shenzhen schools are situated in high-rise commercial zones or gated communities, with limited pedestrian-friendly paths or bike lanes. Heavy traffic, poor air quality, and safety concerns discourage walking or cycling, both from students and their parents. In interviews, several parents reported they intentionally drive their children even short distances to avoid unpredictable traffic or outdoor exposure.

The net result is that commuting, rather than serving as a functional opportunity for movement, becomes another source of sedentary time, accounting for up to 1.5–2 hours daily in seated travel for many students. While transport policies emphasize efficiency, they rarely consider physical activity as a public health co-benefit—an oversight with cumulative health implications.

In sum, the urban design of Shenzhen, combined with educational centralization and social preferences for safety and speed, reinforces passive commuting as the norm. Any serious intervention targeting adolescent physical inactivity must also consider commuting behaviors and the built environment as essential leverage points.

3. Physical Inactivity and Its Relation to Academic Demands

3.1 Curriculum Prioritization of Academic Subjects over PE

One of the most persistent structural contributors to physical inactivity among high school students in Shenzhen is the curricular marginalization of physical education (PE) in favor of academically assessed subjects. Under China's exam-driven education system, particularly the Gaokao (national college entrance exam), subjects such as Chinese, Mathematics, English, Physics, and Chemistry take clear precedence over physical education in terms of both instructional time and institutional importance.

In many public high schools across Shenzhen, students receive only one to two 45-minute PE classes per week, often scheduled during the least desirable hours of the day—such as immediately after lunch or before dismissal. These classes are frequently theoretical in nature, focused on rules or basic fitness tests rather than engaging, movement-intensive activities. Moreover, in the upper grades (especially Grade 11 and 12), these PE sessions are commonly canceled or repurposed for exam preparation, mock tests, or extended academic lectures.

This prioritization is not merely a scheduling issue, but a reflection of systemic values embedded within school administration and parental expectations. PE is not tested on national standardized exams and thus carries little weight in academic evaluations. As a result, it is often viewed by both educators and students as a disposable subject, rather than a core component of adolescent development. A 2022 local survey conducted by the Shenzhen Education Bureau found that over 65% of secondary school students reported missing PE classes at least once a month, most often to attend remedial sessions in math or science.

In this environment, students internalize the notion that academic productivity is tied to desk-bound concentration, while physical movement is equated with leisure or even distraction. Teachers, particularly those under pressure to meet performance targets, may also feel compelled to minimize PE in favor of more "academic" uses of classroom time. As one Shenzhen secondary school principal noted in a local news interview, "We don't cancel PE out of neglect, but because every minute counts when preparing for Gaokao."

Such systemic devaluation of physical education not only reduces opportunities for physical activity but also sends a powerful message that bodily health is secondary to academic achievement. This mindset reinforces sedentary behavior as the cultural norm within schools—contributing to both short-term inactivity and long-term disinterest in active living.

3.2 Exam-Centered Culture and Student Time Management

In Shenzhen's high-pressure educational environment, students' weekly schedules are tightly aligned with the demands of the Gaokao, China's college entrance examination. This exam-centered culture exerts a powerful

influence not only on curriculum design but also on how students allocate their time, both in and outside of school. The result is a rigid time-use pattern that leaves minimal room for physical activity and reinforces sedentary behaviors as part of a "productive" lifestyle.

Most high schools in Shenzhen adopt extended instructional hours, with morning sessions often beginning at 7:30 AM and evening self-study periods ending around 9:30 PM. A survey conducted among 500 students from four representative public high schools in Shenzhen revealed striking disparities in time allocation. As shown in Table 2, students reported spending an average of 54 hours per week on academic learning (including school time, homework, and tutoring), compared to just 1.8 hours on structured physical activity, including PE classes and extracurricular sports.

Table 2. Weekly Time Allocation of High School Students in Shenzhen (Study vs. Physical Activity) *(n = 500, across four public schools)*

Activity Category	Average Hours/Week
School-based Academic Instruction	36.5
Homework and Tutoring	17.5
Total Academic Time	54.0
PE Classes	1.2
Extracurricular Physical Activity	0.6
Total Physical Activity Time	1.8

These figures reflect a deeply embedded time hierarchy, where physical activity is not only de-prioritized but often perceived as counterproductive to academic success. Many students reported intentionally skipping exercise or movement breaks to complete assignments, review past exams, or attend tutoring sessions. This is especially common during Grade 12, where nearly 90% of students surveyed stated that they "rarely or never" engage in physical activity outside of the mandated PE classes.

Moreover, even school recess periods are often co-opted for academic purposes, such as "silent reading," supervised study hall, or teacher consultations. The lack of unstructured free time—and the cultural association of physical activity with time-wasting—creates a learning environment where being sedentary is not just common, but expected.

As a result, students face a trade-off between academic excellence and physical health, one that is heavily skewed by institutional norms and future-oriented anxieties. Unless this paradigm is rebalanced through policy reform and cultural shifts, time poverty will continue to fuel physical inactivity among Shenzhen's high school population.

3.3 School Timetable Constraints Limiting Movement

Beyond the overall culture of exam-oriented learning, the structure of the school day itself in Shenzhen high schools reinforces patterns of prolonged sitting and physical inactivity. Time is not just allocated away from physical education—it is also densely packed and rigidly sequenced, offering little opportunity for spontaneous or even brief physical movement throughout the day.

A typical high school timetable in Shenzhen consists of 8 to 10 periods per day, each lasting 40–45 minutes, with transitions between classes often limited to less than 5 minutes. During these short intervals, students are expected to remain in or near their assigned classrooms, often spending the time reviewing materials, preparing for the next class, or simply waiting in silence. In many cases, students remain seated for 3 to 4 hours continuously, especially during morning sessions and afternoon double-period blocks.

Despite national guidelines issued by the Ministry of Education recommending that schools implement at least one 20-minute outdoor recess daily, many Shenzhen schools, particularly those known for academic excellence, sacrifice recess for additional academic activities such as quiz reviews, "silent study," or teacher-led exam prep. This effectively removes one of the few built-in movement opportunities during the day.

Moreover, in upper-secondary grades, lunch breaks are often shortened to allow for supervised "afternoon study," a quiet period where students remain seated in classrooms. Even when physical education classes are scheduled, their placement at the end of the day or immediately after lunch often results in lower

student engagement due to fatigue or logistical complications, such as lack of time to shower or change.

These constraints are not accidental but stem from a prevailing institutional logic that treats movement as a luxury rather than a developmental necessity. Even minor opportunities for walking—such as changing classrooms between subjects or using school corridors—are reduced by classroom-based subject delivery, in which multiple teachers rotate instead of students. As a result, high school students may accumulate less than 1,000 steps during the school day itself, falling dramatically short of basic physical activity benchmarks.

This tightly structured, movement-restrictive school day creates a physical and cognitive environment where prolonged stillness becomes normalized and even valorized. Without intentional redesign of the school timetable to include physical activity "micro-moments", movement will continue to be marginalized, and the health costs will likely accumulate over time.

4. Gender and Socioeconomic Disparities in Activity Levels

4.1 Differences in Activity Preferences and Opportunities by Gender

Gender plays a notable role in shaping both the preferences for physical activity and the actual participation rates among high school students in Shenzhen. Cultural expectations, institutional design, and peer dynamics collectively influence how boys and girls engage—or fail to engage—in physical activity during the school day.

A survey conducted across four Shenzhen public high schools revealed a consistent gender gap in participation in school-organized physical activities. As shown in Table 3, 71% of male students reported participating in school-based physical activity at least twice a week, compared to only 38% of female students. When further analyzed by type of activity, male students tended to favor team sports (e.g., basketball, soccer), while female students were more likely to engage in non-competitive forms of exercise like stretching or walking, if at all.

Table 3. Participation Rates in School-Based Physical Activities by Gender *(n = 500 high school students, 52% female)*

Activity Type	Male Participation (%)	Female Participation (%)
Basketball	49	8
Soccer	42	5
Track & Field	31	22
Aerobics / Dance	11	19
Walking / Stretching	17	24
At Least 2x/Week (Any)	71	38

This disparity reflects broader social norms and expectations. Girls often report feeling less confident in competitive physical activities and more self-conscious in co-ed PE settings, particularly when male peers dominate access to equipment or space. Interviews with female students revealed that some actively avoid PE classes, citing discomfort with uniforms, fear of judgment, and a lack of inclusive programming as primary deterrents.

Moreover, opportunities are not equitably structured. While schools may offer a standard PE curriculum, extracurricular sports clubs or after-school sports activities are often targeted more toward boys, with limited recruitment or encouragement for female students. Facilities like basketball courts or soccer fields are also informally dominated by male students, further discouraging female engagement.

These gendered dynamics are compounded by subtle yet persistent institutional biases. Teachers may encourage boys to "burn off energy" while urging girls to focus on academics or helping with classroom duties. Over time, these expectations shape internalized attitudes toward movement and health, leading many female students to see physical activity as non-essential or even disruptive.

Addressing gender disparities in physical activity participation requires not only equitable access to facilities and program design but also a cultural shift in how movement is valued and gender is represented within the school context.

4.2 Parental Expectations and Protective Attitudes Toward Girls

While school environments significantly influence gendered patterns of physical activity, family-level beliefs and expectations play an equally critical role—especially in shaping the behavior and self-perceptions of female students. In Shenzhen's increasingly academically competitive and safety-conscious urban culture, many parents adopt overprotective attitudes toward their daughters, often unintentionally restricting their opportunities for physical engagement.

Interviews conducted with both students and parents revealed a common narrative: girls are expected to be cautious, academically focused, and physically reserved. For many families, especially those with a single child or high academic aspirations, academic excellence is perceived as the primary path to upward mobility, particularly for girls. Consequently, physical activity is often seen as a distraction or even a liability—an activity that may cause injury, waste time, or detract from study.

Parents frequently cited safety concerns as a reason to discourage their daughters from participating in outdoor sports or walking to school. Even in relatively safe urban neighborhoods, fears of traffic, physical injury, or "unruly" public spaces led many families to opt for private transportation and restrict extracurricular activity outside of school grounds. In contrast, boys were often given more autonomy in their after-school routines, encouraged to "let off steam" or play sports as a way to build character.

Moreover, gendered beliefs about physical appearance and femininity further complicate girls' participation in physical activity. Several female students shared that their parents discouraged activities like soccer or track due to concerns about getting tanned, sweating excessively, or developing "non-feminine" body shapes. These aesthetic anxieties, deeply embedded in mainstream culture, act as a powerful deterrent against consistent physical engagement for adolescent girls.

This parental influence is not always explicit. Sometimes it is communicated through seemingly benign choices: enrolling sons in sports clubs but daughters in academic tutoring, or buying boys athletic gear while prioritizing fashion or stationary for girls. Over time, these decisions accumulate, shaping how girls view their bodies, time, and roles in both educational and physical spaces.

Ultimately, addressing gender disparities in adolescent physical activity in Shenzhen must involve family-level education and empowerment. Parents—especially mothers, who are often the primary decision-makers in children's schedules—must be engaged in efforts to reframe physical activity as a valuable, safe, and empowering experience for girls, rather than a risky or unnecessary indulgence.

4.3 Access Gaps in Sports Facilities and Safe Play Spaces

In addition to school-based and familial influences, a crucial but often overlooked factor limiting student physical activity in Shenzhen is unequal access to quality sports facilities and safe outdoor play environments. These disparities are both geographic and socioeconomic, and they disproportionately affect students from low-income families or densely populated urban districts.

Despite being a modern metropolis, Shenzhen exhibits significant intra-city variation in infrastructure quality. Affluent neighborhoods—particularly those near international schools or high-end residential complexes—tend to offer greater access to well-maintained parks, running tracks, sports complexes, and gated playgrounds. In contrast, students attending public schools in older districts or peri-urban zones often report limited or poorly maintained physical activity spaces, both on campus and in their residential surroundings.

Spatial data gathered from four Shenzhen districts showed that only 38% of public high schools had dedicated sports facilities (e.g., standard-size track, gymnasium, or sports field) within walking distance (1 km radius). This is further illustrated in Figure 2, which maps the distribution of public sports infrastructure around sampled schools, revealing clear clustering in wealthier subdistricts and relative scarcity in migrant-dense zones like Longhua and Guangming.

In low-resource neighborhoods, even when outdoor spaces exist, their usability is often constrained by factors such as crowding, safety concerns, or poor lighting. Students and parents frequently cited shared usage with the general public, lack of supervision, or fear of theft or harassment as reasons for avoiding local parks or courts. Some schools themselves lack indoor

sports halls, meaning that rainy days or air pollution alerts effectively cancel all physical activity for students.

These access gaps are magnified for students living in subsidized housing or with migrant backgrounds, whose families may lack the resources or time to facilitate participation in paid sports clubs or travel to higher-quality facilities. While wealthier families can enroll children in private swimming lessons, tennis academies, or fitness centers, lower-income students must rely solely on whatever minimal resources are available at school or within walking distance.

Furthermore, urban planning policies have historically prioritized residential and commercial development over recreational infrastructure, particularly in fast-expanding suburban districts. As Shenzhen continues to urbanize vertically, with high-rise school campuses and enclosed communities, every square meter of open space becomes contested—often at the expense of children's movement and play.

Closing these facility access gaps will require cross-sectoral cooperation between education bureaus, urban planners, and community organizations. Only by acknowledging and addressing the geographic and economic inequities in access to physical activity infrastructure can Shenzhen create a truly inclusive environment for adolescent health and development.

4.4 Urban–Rural Student Population Mixing in Public Schools

Shenzhen's rapid urbanization has given rise to a distinct and complex urban–rural demographic composition within its public school system. Due to the city's role as a hub for internal migration, many public high schools—especially those in outer districts—serve a heterogeneous student body, comprising both local urban residents and migrant families from rural or lower-tier cities. This dynamic has created both opportunities and challenges for equitable access to physical activity.

On the one hand, this urban–rural mixing presents a unique opportunity for students from different backgrounds to share facilities and experiences that might otherwise be segregated. For instance, students from rural areas may gain exposure to structured PE curricula or organized team sports that are less common in their hometowns. However, the benefits of such integration are often undermined by systemic disparities in prior exposure, social capital, and access to extracurricular resources.

Students from urban, middle-class families are more likely to have prior experience with sports training, familiarity with fitness routines, and the confidence to participate in team-based physical activities. By contrast, rural-origin students may feel socially marginalized or underprepared to engage in competitive or skill-based sports, especially in co-ed settings or where performance is publicly evaluated. This can lead to self-selection out of PE participation, reinforcing cycles of inactivity.

In many mixed classrooms, teachers and coaches—consciously or unconsciously—gravitate toward students who are already proficient, enthusiastic, or physically confident, leaving others on the periphery. This stratification mirrors broader educational inequalities: students with fewer academic or athletic resources at home are less likely to receive encouragement or tailored support to engage physically.

Moreover, residential and commuting patterns exacerbate these divides. Migrant students often live farther from school or in less-developed neighborhoods, making it difficult to stay after school for extracurricular activities due to transportation or family responsibilities. Some may also be tasked with household labor or caretaking duties after school, further reducing time for physical movement.

Language and cultural barriers can also emerge. In more linguistically diverse areas of Shenzhen—where students speak dialects such as Hakka or Cantonese at home—PE activities that rely on rapid verbal instruction or social coordination can feel intimidating to newcomers. The result is a latent hierarchy within PE classrooms, where physical activity becomes another site of inclusion for some and exclusion for others.

To address these imbalances, schools must move beyond one-size-fits-all PE programming and adopt inclusive practices that acknowledge varying levels of exposure, ability, and confidence. Peer mentorship models, differentiated instruction, and culturally sensitive coaching strategies may help bridge the gap between urban and rural

students—ensuring that physical activity becomes a space for integration rather than silent exclusion.

5. School and Community-Based Opportunities and Barriers

5.1 Role of School-Based PE Programs and Quality of Instruction

While national policy in China nominally mandates the inclusion of physical education (PE) in the core school curriculum, the actual impact of school-based PE programs in Shenzhen is shaped heavily by the quality of instruction, curriculum design, and institutional support. For many students, the school remains their primary, and often only, venue for structured physical activity—making the effectiveness of school-based PE programs a crucial determinant of overall activity levels.

In theory, Shenzhen public schools are required to provide at least two PE classes per week, along with occasional fitness testing, sports festivals, and optional extracurricular clubs. However, the content, intensity, and instructional quality of these sessions vary significantly across schools and even between teachers within the same institution. While some PE teachers adopt dynamic, student-centered approaches that promote movement and engagement, others rely on rote instruction, infrequent skill development, and repetitive drills—undermining the motivational value of PE.

Teacher qualifications and professional development also play a major role. Many PE instructors in Shenzhen public schools are non-specialists or are assigned PE duties in addition to other administrative or coaching roles. This dual burden can reduce their ability to innovate or tailor lessons to diverse student needs. Additionally, a lack of ongoing training in inclusive or adaptive pedagogy limits their capacity to engage less confident or physically inexperienced students—especially girls and migrant-background youth.

Students often report that PE classes are too rigid, uncreative, or boring, with little variety in activity types or opportunities for choice. For instance, basketball and track often dominate PE programming, leaving out students who may be more interested in dance, yoga, martial arts, or low-impact fitness. This narrow curriculum scope contributes to early disengagement, particularly among students who don't see themselves as "sporty."

Moreover, institutional support for PE is inconsistent. In some high schools, especially those deemed "academically strong," PE periods are frequently shortened, rescheduled, or canceled to make room for academic enrichment classes or test prep sessions. This sends a clear message to students that physical activity is a secondary concern, reinforcing sedentary norms.

Finally, evaluation practices in PE also influence participation. Grading that emphasizes physical performance metrics—such as running times or strength tests—can demotivate students with lower baseline fitness levels. Conversely, schools that emphasize personal progress, effort, and enjoyment tend to foster more inclusive environments that support long-term engagement.

To strengthen the role of school-based PE programs, policymakers and school leaders must invest in curricular diversity, teacher training, and systemic accountability. PE must be reframed not just as a "break from studying," but as a critical domain of adolescent development that deserves time, talent, and institutional respect.

5.2 Limited After-School Programs and Low Engagement Rates

Although after-school hours could offer a valuable window for increasing student physical activity, many Shenzhen high schools provide limited or inconsistent access to structured sports programs beyond regular class time. This lack of opportunity is further compounded by academic time pressures, facility constraints, and a general undervaluation of movement in the broader school culture—resulting in chronically low student engagement in after-school physical activity.

In theory, most public schools in Shenzhen are encouraged by the Ministry of Education to offer "one hour of exercise daily", with flexibility for implementation through morning jogging, PE classes, or after-school clubs. However, data from a 2021 Shenzhen Youth Physical Activity Survey showed that only 27% of high school students participated in any form of organized sports after class at least once per week, with rates dropping to under 10% among Grade 12 students.

Several key factors contribute to this disengagement:

- Academic Overload: Students face intense pressure to use after-school hours for homework, tutoring, and exam prep. As a result, many parents and schools discourage participation in non-academic programs, even if they are officially available. In interviews, some students noted that "sports are a luxury," with one Grade 11 student saying, "My day ends at 10 PM. There's no time or energy left for exercise."
- Limited Program Diversity: For those who do wish to participate, options are often narrow and repetitive. The majority of after-school activities offered are competitive team sports (e.g., basketball, soccer), which appeal mainly to boys and physically confident students. Activities like dance, martial arts, or individual fitness training are rarely available. This lack of diversity alienates students with different interests, abilities, or comfort levels.
- Teacher Availability and Incentives: Running after-school physical activity programs requires motivated and trained staff, yet PE teachers in Shenzhen are often overextended or receive no additional compensation or preparation time for extracurricular duties. Without institutional incentives or time allocations, such programs tend to be irregular or low-quality.
- Facility Constraints: Many schools lack the physical infrastructure to support wide-ranging after-school sports. Shared gymnasiums, limited lighting in outdoor areas, and high student-to-facility ratios mean that programs are capacity-limited and often first-come, first-served—further disadvantaging late or hesitant participants.
- Low Institutional Priority: Crucially, after-school sports lack the same symbolic and evaluative value as academic clubs or competitions. Unlike math olympiads or debate tournaments, participation in physical activity rarely factors into school awards, recommendations, or university admissions—reinforcing the perception that it is non-essential.

To reverse these patterns, after-school physical activity must be institutionally supported, equitably designed, and visibly valued. This includes funding diverse program types, recognizing student involvement in holistic evaluations, and creating a culture that celebrates movement as integral—not peripheral—to youth development.

5.3 Community Fitness Facilities: Availability vs. Accessibility

Shenzhen's rapid urban expansion has been accompanied by significant investments in public infrastructure, including the construction of community fitness zones, jogging paths, outdoor gyms, and sports parks. However, for high school students—especially those in lower-income or high-density neighborhoods—the presence of such facilities does not automatically translate into meaningful opportunities for physical activity. The key issue lies not in availability, but in accessibility.

According to city planning data, Shenzhen boasts over 3,000 registered public sports facilities, a figure that may appear impressive at first glance. Yet when overlaid with demographic and geographic data, it becomes evident that access is highly uneven. For example, Figure 2 illustrates the distribution of public sports facilities within a 1-kilometer radius of 20 randomly sampled public high schools across four districts. Schools located in central and affluent areas such as Futian or Nanshan are often surrounded by multiple sports options, while those in suburban or migrant-heavy districts such as Longhua and Pingshan show significant facility deserts.

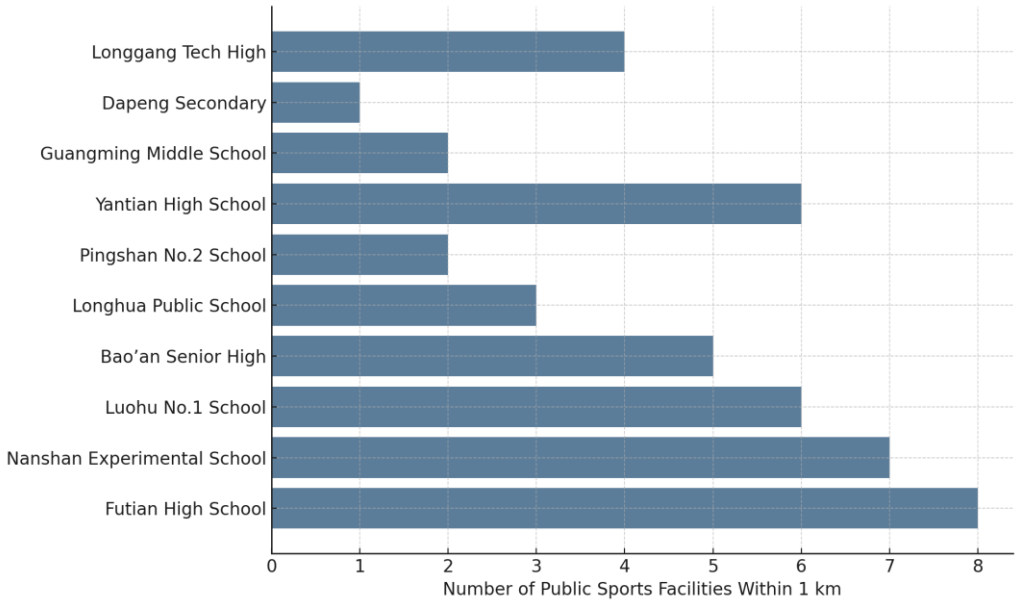

Figure 2. Distribution of Public Sports Facilities Within 1 km of Sampled Schools in Shenzhen

However, proximity alone does not ensure usability. In field interviews, students and parents repeatedly identified barriers that reduce real-world access to these facilities, including:

- Time Restrictions: Many public spaces operate with limited hours or are closed during evenings or weekends when students are most likely to use them.
- Age and Access Control: Some fitness parks or gym facilities are designed for adults, with signs explicitly discouraging unsupervised minors from using equipment.
- Crowding and Shared Use: In densely populated neighborhoods, courts and tracks are heavily crowded, shared by joggers, seniors, and community sports groups, leaving students with little space or time to exercise.
- Safety Concerns: Parents of younger or female students often express concern over poor lighting, lack of surveillance, or unmonitored areas, particularly after sunset.
- Social Barriers: For migrant students or those from rural backgrounds, unfamiliarity with local norms or feeling of exclusion can discourage engagement with open public facilities, especially when usage appears to be dominated by local residents or adults.

These factors create what urban health researchers refer to as "latent exclusion"—where facilities exist, but structural and perceptual barriers prevent equitable use. Thus, while Shenzhen can claim a broad physical footprint of community sports infrastructure, the functional access for adolescents—particularly high school students from marginalized groups—remains deeply limited.

To address this disconnect, policy efforts must shift from merely counting and building facilities to ensuring they are youth-centered, equitably located, and safely accessible. This may include designated teen-friendly hours, gender-sensitive safety design, school–community partnerships, and multilingual or culturally sensitive signage to welcome diverse user groups.

6. Toward a Multi-Level Intervention Strategy for Active Youth

Tackling the dual burden of sedentary behavior and physical inactivity among high school students in Shenzhen requires a coordinated, multi-level strategy that bridges the disconnect between policy ideals and ground realities. No single actor—school, family, or government—can resolve this issue alone. Instead, an effective response must integrate interventions at institutional, community, familial, and individual levels, with equity and youth agency at its core.

School-Level Reform

At the school level, reforms must go beyond formal curriculum mandates to address the culture and structure of education delivery. Schools should institutionalize daily activity breaks, diversify physical education offerings to include non-competitive and low-impact activities, and revise assessment frameworks to reward effort and engagement rather than raw performance. After-school programs should be broadened to reflect varied interests and fitness levels, with particular attention to gender inclusion and migrant-background participation. PE teacher training should be strengthened, and institutional support—such as workload adjustments and incentive systems—must be implemented to retain quality instruction.

Family and Cultural Engagement

Family attitudes toward physical activity—particularly for girls—need reshaping through parental education campaigns and community outreach. Schools can act as platforms for disseminating information on the developmental and cognitive benefits of physical activity, while engaging parents through workshops, newsletters, and open-house events. Interventions must also tackle prevailing cultural norms that tie physical activity to risk, distraction, or gendered appropriateness.

Community and Urban Design

From a planning perspective, Shenzhen must move toward child- and youth-inclusive urban development. Community sports spaces must be equitably distributed, youth-accessible, and designed with safety, lighting, and flexibility in mind. Schools and local governments should establish shared-use agreements allowing students to access community facilities after hours. Introducing teen-only activity zones, supervised open gyms, or mobile fitness programs could reduce accessibility barriers, especially in underserved districts.

Digital and Technological Support

In an increasingly screen-saturated environment, digital tools can also be repurposed to promote movement. Schools can pilot app-based physical activity challenges, integrate wearable fitness tech into PE curricula, and encourage self-tracking with positive reinforcement. Importantly, digital engagement should be balanced with awareness about screen overuse and sedentary learning habits.

Policy and Governance Integration

At a policy level, municipal and national authorities must adopt a "Health in All Policies" framework that embeds physical activity metrics into education quality assessments, health reporting, and urban governance. Funding mechanisms should be created to support low-resource schools in expanding their physical activity infrastructure and programming. Cross-departmental collaboration—between education, health, transport, and urban planning—is essential to align school timetables, community facility development, and student wellness initiatives.

Youth Voice and Empowerment

Finally, students themselves must be active participants in the solution. School councils, youth advisory boards, or peer leadership programs can allow students to articulate their needs, co-design interventions, and build a culture that celebrates movement not as a distraction—but as a right and a routine.

References

Chen, Y., Zheng, Z., Yi, J., & Yao, S. (2014). Associations between physical inactivity and sedentary behaviors among adolescents in 10 cities in China. *BMC Public Health*.

Duan, J., Hu, H., Wang, G., & Arao, T. (2015). Study on current levels of physical activity and sedentary behavior among middle school students in Beijing, China. *PLOS ONE*.

Shen, H., Yan, J., Hong, J. T., Clark, C., & Yang, X. N. (2020). Prevalence of physical activity and sedentary behavior among Chinese children and adolescents: Variations, gaps, and recommendations. *International Journal of Environmental Research and Public Health*, 17(9), 3066.

Shi, J., Wang, X., Wu, Q., Qin, Z., Wang, N., & Qiao, H. (2022). The joint association of physical activity and sedentary behavior with health-related quality of life among children and adolescents in Mainland China. *Frontiers in Public Health*.

Song, C., Gong, W., Ding, C., Yuan, F., Zhang, Y., & Feng, G. (2019). Physical activity and sedentary behavior among Chinese children aged 6–17 years: A cross-sectional analysis of 2010–2012 China National Nutrition and Health Survey. *BMC Public Health*.

Wang, C., Chen, P., & Zhuang, J. (2013). A national survey of physical activity and sedentary behavior of Chinese city children and youth using accelerometers. *Research Quarterly for Exercise and Sport*, *84*(2), 12–20.

Wang, X., Liu, Q. M., Ren, Y. J., Lv, J., & Li, L. M. (2015). Family influences on physical activity and sedentary behaviours in Chinese junior high school students: A cross-sectional study. *BMC Public Health*.

Zhu, X., Haegele, J. A., Tang, Y., & Wu, X. (2017). Physical activity and sedentary behaviors of urban Chinese children: Grade level prevalence and academic burden associations. *BioMed Research International*.