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Results from the Chinese Taipei (Taiwan) 2018 Report Card on physical activity for children and youth

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ABSTRACT

Background/Objective: Taiwan is facing a high prevalence of physical inactivity in children and adolescents, which has led to rising obesity and morbidity levels in young people. Chinese Taipei (Taiwan) joined the Global Matrix 3.0 to share the local information on childhood physical activity and related factors with the international community. This study reports the grades for 10 indicators endorsed by the Global Matrix 3.0.

Methods: The local data for school-aged children and youth (5–17 year-olds) from 2010 to 2018 were used to determine the grades. The highest priority was given to the national survey data released by the government or academic institutions, followed by academic publications using nationally representative samples. Government or academic publications relying on only regional samples were excluded.

Results: The data showed very poor Overall Physical Activity and Organized Sport Participation (F and D–, respectively). The grades for Active Transportation and Sedentary Behavior were C–. Low physical activity levels and high screen time may have led to sub-optimal Physical Fitness levels (B–). The central and local governments have recognized the importance of physical activity by creating related policy and improving facilities. Therefore, School, Community and the Built Environment, and Government Strategies and Investments all received the grade of B+. Active Play and Family and Peers received INC for a lack of sufficient data.

Conclusions: Despite great effort by the governments and schools, physical activity and fitness levels are low while sedentary behavior is prevalent in Taiwanese children and youth.

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Background

Physical inactivity is a major factor for the increasing prevalence of non-communicable diseases worldwide.¹ Taiwan, along with many other countries, is facing a high prevalence of physical inactivity in children and adolescents.^{2–5} The National Health Interview Survey in 2001 showed that only 28.4% of 12- to 18-year-olds met the recommended guidelines of exercising three or more times a week for at least 30 min.⁶ Physical inactivity has led to serious health issues young Taiwanese people. According to the national fitness test in 2016, approximately 30% of children and adolescents

are overweight or obese.⁷ Physical fitness, specifically levels of cardiorespiratory fitness and explosive muscular strength, have declined in Taiwanese youth over the past two decades.⁸ Furthermore, the prevalence of hypertension in adolescents is rising.⁹ If these trends continue, it would lead to serious medical and social burden in the near future.

To develop a better understanding of childhood physical activity and inactivity across the international community, the Active Healthy Kids Global Alliance produced the first Global Matrix (i.e., Global Matrix 1.0) of grades on physical activity in 2014.¹⁰ Two years later the Global Matrix 2.0 presented the results from 38 countries in 2016.¹¹ With the help of experts from several local institutions, Chinese Taipei (Taiwan) produced its first Report Card in 2018 to inform the Global Matrix 3.0.

The purpose of this article is to summarize the results of the 2018 Taiwan Report Card. Grades were assigned using collected data between 2010 and 2018. The highest priority was given to the

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national survey data released by the government or academic institutions, followed by academic publications using nationally representative samples. Government or academic publications relying on only regional samples were excluded.

Methods

The Taiwan Report Card team, co-led by the two authors of this article, was financially supported by National Taiwan University of Sport, Taichung, Taiwan. The team consisted of 11 scholars from five local universities. One of the members also serves as the Director of Sports Bureau in a city government, while another one is the former Director of Department of Sports in another city government. The co-leaders were responsible for identifying key articles/datasets, summarizing preliminary results, and providing the initial grade for all indicators except Government Strategies and Investment. One team member who has expertise in sport policy, and two members with experience in government administration, provided the data and the initial Government Strategies and Investment grade.

This study reports the grades for 10 indicators endorsed by Global Matrix 3.0 (i.e., Overall Physical Activity, Organized Sport and Physical Activity Participation, Active Play, Active Transportation, Sedentary Behaviors, Physical Fitness, Family and Peers, School, Community and Environment, and Government) for school-aged children and youth (~5–17 year-olds). The benchmarks follow, as best as possible, those recommended by the Active Healthy Kids Global Alliance. The benchmarks and the characteristics of data sources for each indicator are presented in Table 1. The grade for Overall Physical Activity is based on the three waves of Nutrition and Health Survey in Taiwan (NHSIT) from 2010 to 2012, with participants from junior high schools, senior high schools, and elementary schools, respectively.^{12–14} The NHSIT is a longitudinal, stratified, national survey.^{15,16}

The grade for Organized Sport and Physical Activity Participation and School are based on the Census of Physical Education for the 2015–16 school year,¹⁷ which is published annually by the Ministry of Education. The Census is constructed from data regarding physical education, the number of sports teams and clubs, the number of students who participate in such teams and clubs, and sport and exercise facilities, which are collected and delivered by each elementary, junior high, and senior high school to the Ministry of Education.

The grades for Active Transportation and Sedentary Behaviors are based on several national surveys. The annual fitness tests results of all school students who finished all four tests ($n = 1,965,074$) in the 2014–2015 school year were used to inform the Physical Fitness grade.^{18–20} The fitness tests include the number of sit-ups in 60 s, standing long jump, 800/1600 m walk/run, sit-and-reach, and body mass index (BMI).

The grade for Community and the Built Environment was primarily based on policy related to physical activity at the local government level and the database for sport facilities across the nation.²¹ Less emphasis was given to Exercise Status Survey²² and Opinions toward Exercise Environment Survey²³ because of their less rigid sampling methods. The grade for Government Strategies and Investments was based on the two major policies related to physical activity by the central government: Creating a sport island, 2010–15, and Sport i (love) Taiwan, 2016–21. The former aimed to improve physical activity infrastructure and promote physical activity, while the latter added the marketing aspect of sporting events and the enhancement of the expertise of people working in related fields.²⁴ The Annual Budget of Sport Administration, Ministry of Education, and the Ministry of Health and Welfare in 2017 was also included.

After identifying and organizing the data, the research team met in February 2018 to discuss the initial grades. During the meeting, several additional data sources were suggested, especially in Government Strategies and Investment.

After collecting additional information, the second meeting was held in April 2018 to finalize the grades for all indicators. The mentor, Dr. Stephen Wong from The Chinese University of Hong Kong, provided support and guidance throughout the process.

Results

The 2018 Chinese Taipei (Taiwan) Report Card is the first annual assessment of physical activity and settings and sources of influence in youth. The grades for each indicator are shown in Table 1. The grades were very poor for Overall Physical Activity and Organized Sport Participation (F and D–, respectively). The grades for Active Transportation and Sedentary Behavior were C–, and the grade for Physical Fitness was B–. The central and local government has recognized the importance of physical activity by creating physical activity-related policy and improving facilities. Therefore, School, Community and the Built Environment, and Government Strategies and Investments all receive the grade of B+. Unfortunately, no sufficient data are available with which to grade Active Play and Family and Peers.

The cover picture for the Report Card is shown in Fig. 1. It depicts a team of 11- and 12-year-olds, with happiness and excitement on their faces, from a youth community baseball program before a tournament game.

Discussion

The grade for Overall Physical Activity was F. The 2011 NHSIT, based on self-reported data, showed that only 12.1% of 15–18 year-olds (19.4% of boys and 5.8% of girls) met the World Health Organization (WHO) standard of at least 60 min of moderate to vigorous physical activity per day.¹³ The result is even more alarming in younger children, with only 5.4% of 13–15 year-olds (8.7% of boys and 1.9% of girls) meeting the WHO standard.¹² In addition, only 5.8% of 7–12 year-old boys and 2.8% of girls participated in moderate physical activity more than 4 times a week.¹⁴ These are worrisome results indicating that only a small portion of the children and youth in Taiwan achieved sufficient levels of physical activity.

The grade for Organized Sport and Physical Activity Participation was D–. According to the Census of Physical Education in the 2015–16 school year,¹⁷ the percentage of students who participated in sports clubs and teams combined was 27.6% (16.8% in clubs and 9.8% in teams) in elementary schoolchildren; 24.2% (17.3% in clubs and 6.9% in teams) in junior high schoolchildren; and 19.5% (15.6% in clubs and 3.9% in teams) in senior high schoolchildren. It is assumed that there is no duplication in these two types of participation.

There are no data available for the number or participants enrolled in sports clubs outside of the school system. However, there are very few organized sports teams, clubs, or leagues for youth outside the school system, with the only major exception being community baseball teams and leagues across the country. Therefore, only school-based organized sport was used to inform this grade.

We were unable to identify any survey or study that investigated the participation rate or time spent in unorganized play. In the Global Matrix 2.0, 21 of 38 participating countries reported INC for Active Play. The reasons for the incomplete information include the lack of consensus in its definition, and the lack of valid and reliable measurements to quantify unorganized play.¹¹ These limitations exist in Taiwan.

Table 1
The main data sources and grades of each indicator in the 2018 Chinese Taipei (Taiwan) Report Card on Physical Activity for Children and Youth.

Indicator	Benchmarks	Main data sources	Characteristics of the data	Grade*
Overall Physical Activity	% of children and youth with at least 60 min of daily moderate- to vigorous-intensity physical activity.	Nutrition and Health Survey in Taiwan, 3 waves, 2010–2012 ^{12–14}	Stratified national survey, self-reported physical activity 1 st -6th graders, n = 1260 7 th -9th grades: n = 1779 10 th -12th grades: n = 1169	F
Organized Sport and Physical Activity Participation	% of children and youth who participate in sport clubs or teams in schools	Census of Physical Education, school year 2015-16	All elementary, junior high, and senior high schools are mandatory to submit the data	D-
Active Play	% of children and youth who engage in unstructured or unorganized active play for several hours a day	Incomplete data		INC
Active Transportation	% of children and youth who bike or walk to school at least once a week	1 Student Participation in Physical Activity Survey, school year 2015–16 ²⁵ 2 Health Behavior Survey in Junior High School Students, 2016 ²⁶	1 Stratified national survey, self-reported questionnaire, C- n = 28934 2 Stratified national survey, self-reported questionnaire, n = 5556	
Sedentary behavior	% of children and youth who has non-study related screen time less than 2 h per day	1 Life Style Survey of Children and Teenagers, 2014 ²⁷ 2 Survey of Internet Usage in Students, 2015 ²⁸	1 Stratified national survey, self-reported questionnaire, C- n = 5130 (12-17-year-olds) 2 Stratified national survey, self-reported questionnaire, n = 8998	
Physical Fitness	% of children and youth who have all physical test results above 25th percentile of the norms by Ministry of Education	Nationwide physical fitness test in all schools, school year 2014–2015	All students in elementary, junior high, and senior high schools are mandatory to undergo 4 fitness tests: 800/1600 m walk-run, 60 s sit-up, sit-and-reach, and standing long jump.	B-
Family and Peers	1 % of family members who facilitate physical activity opportunities for their children 2 % of family members who are physically active with their kids 3 % of children and youth with friends and peers who encourage and support them to be physically active	Incomplete data		INC
School	1 % of schools with active school policies 2 % of schools where most students are offered the mandated 2 PE classes per week 3 % of schools where most students are taught by a PE specialist 4 % of schools that offer physical activity opportunities (excluding PE) to most of their students 5 % of schools with students who have regular access to facilities and equipment that support physical activity	1 Census of Physical Education, school year 2015–16 2 Student Participation in Physical Activity Survey, school year 2015–16 ²⁵	1 . All elementary, junior high, and senior high schools are mandatory to submit the data 2 . Stratified national survey, self-reported questionnaire, n = 28934	B+
Community and the Built Environment	1 % of residents who perceive their municipality is doing a good job at promoting PA 2 % of municipalities with policies promoting PA 3 % of municipalities with infrastructure specifically geared toward promoting PA 4 % of youth who report having facilities for physical activity available to them in their community 5 % of youth who are satisfied with facilities for physical activity in their community	1 Physical activity-related policy of local government 2 Database of sport facilities ³² 3 Exercise Status Survey, 2017 ²² 4 Opinions toward Exercise Environment Survey, 2017 ²³	1 Websites of local governments 2 Sport Administration, Ministry of Education 3 Stratified national survey, telephone interview, 13-17-year-old, n = 1366 4 Internet survey, >13-year-old, n = 10164	B+
Government Strategies and Investments	1 Evidence of leadership and commitment in providing physical activity opportunities for all children and youth 2 Allocated funds and resources for promoting physical activity for all children and youth 3 Demonstrated progress through the key stages of public policy making	1 Central government policy: Creating a sport island, 2010–2015 2 Central government policy: Sport i (love) Taiwan, 2016–2021 3 Annual budget of Sport Administration, Ministry of Education, and Ministry of Health and Welfare, 2017.	1 Government websites 2 Government websites 3 Government websites	B+

*The grade for each indicator is based on the percentage of children and youth meeting a defined benchmark: A + is 94%–100%; A is 87%–93%; A– is 80%–86%; B + is 74%–79%; B is 67%–73%; B– is 60%–66%; C + is 54%–59%, C is 47%–53%; C– is 40%–46%; D + is 34%–39%; D is 27%–33%; D– is 20%–26%; F is <20%; INC is Incomplete data.

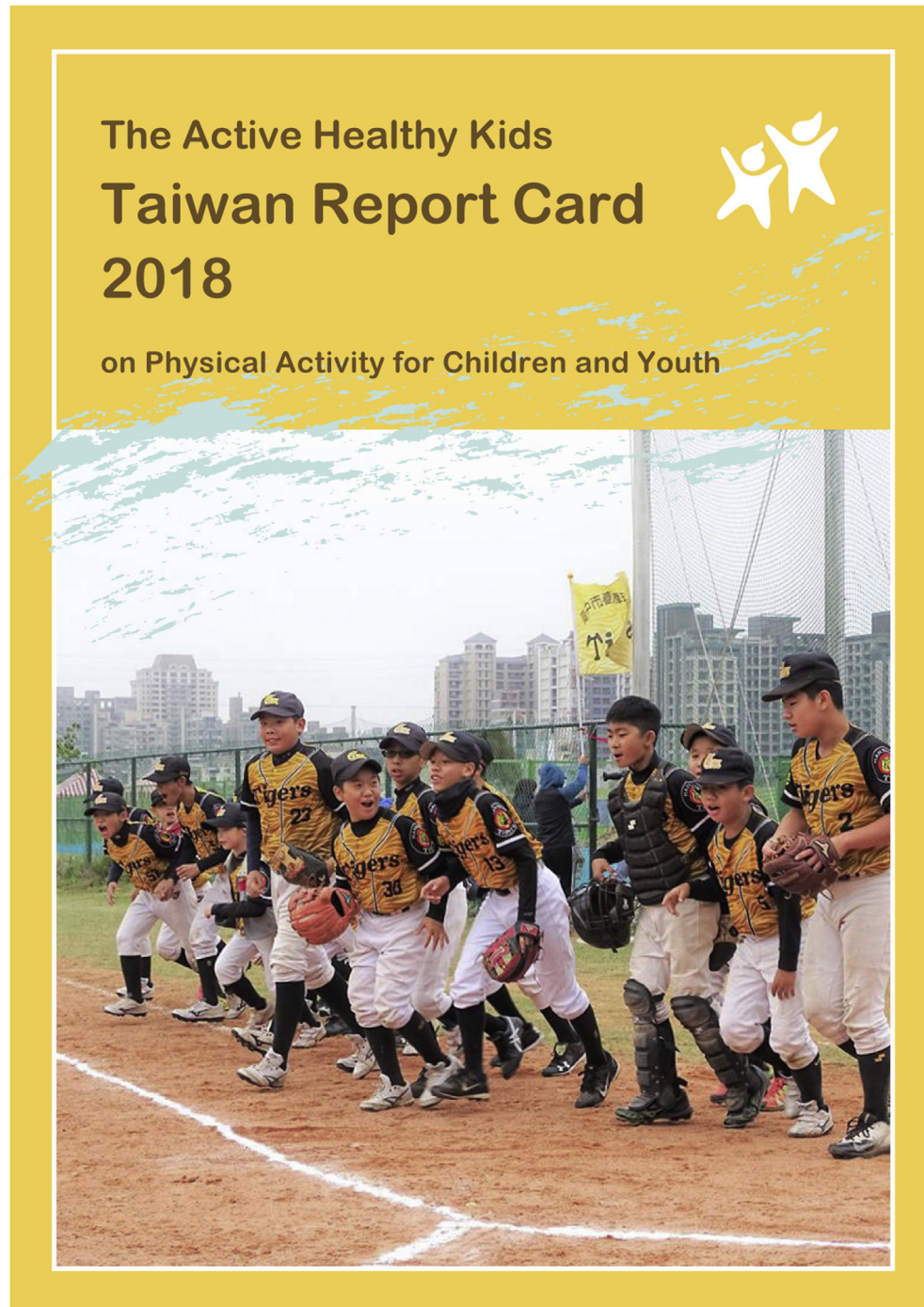


Fig. 1. Front cover of the 2018 Chinese Taipei (Taiwan) physical activity report card.

The grade for Active Transportation is C–. According to Student Participation in Physical Activity Survey data from 2015 to 16, 33–46% of the students across different age groups walked or cycled as the primary transport method to schools.²⁵ In addition, the Health Behavior Survey in Junior High School Students from 2016 showed that about 50% of youth walked or cycled to schools more than once per week.²⁶ Although these two benchmarks differ from one another and from that recommended by the Active Healthy Kids Global Alliance, these data were used without modification because the type of transportation to school is usually consistent.

The grade for sedentary Behaviors is C–. We are able to identify two stratified national surveys, Life Style Survey of Children and Teenagers²⁷ and Survey of Internet Usage in Students.²⁸ However, neither of them used the benchmark of screen time less than 2 h per day as recommended by Global Matrix. The former reported that 53.4% of adolescent boys and 53.9% of adolescent girls spent 1–4 h using the Internet. The Survey of Internet Usage in Students reported that on school days, elementary school students spent 57.8 min per day on the Internet for non-study purposes, while junior and senior high school students spent 115.8 and 147.2 min, respectively.²⁸ During school holidays, Internet time increased to

120.1, 231.0, and 266.1 min per day for elementary, junior high, and senior high school students, respectively. Only the Internet time spent for non-study purposes was used to develop this grade.

The grade for fitness is B–. It is mandatory for all elementary, junior high, and senior school students to have their physical fitness measured each year. Unfortunately, the Ministry of Education does not release detailed results. We were able to identify the number of students who met certain fitness criteria in the 2014–15 school year.^{18–20} Compared to national norms published by Ministry of Education, Taiwan, in 2012, approximately 60% of students scored above the 25th percentile in all fitness tests (number of sit-ups in 60 s, sit-and-reach, 800/1600 m walk/run, and standing long jump). Nonetheless, it is disturbing that fitness levels have decreased over the past two decades.⁸

For Family and Peers, we were only able to identify a single study that investigated the frequency of parents performing physical activity with their children.²⁹ Unfortunately, it relied on small, local sample comprising 614 children of immigrant parents who lived in southern Taiwan. While another Internet survey also tried to explore the frequency of parents and children who exercised together, these data were excluded due to the relatively small unrepresentative sample and poor sampling method.

It is mandated by the Ministry of Education that all schools have at least two physical education classes per week. Most schools have complied with this policy. Census of Physical Education data from the 2015–16 school year¹⁷ show that average number of physical education classes per week were 1.99 and 2.03 for junior and senior high schools, respectively, with elementary schools averaging 1.84 classes per week. Certified teachers in junior and senior high schools taught more than 93% of physical education classes, with only 45% in elementary schools. Most schools have basic facilities for physical activity, with more than 90% of schools having running tracks and basketball courts and more than 82% that were freely open to the public after school. The majority (74.7%) of schools reported meeting the policy of Sport and Health 150 (SH 150), which recommends at least 150 min per week of physical activity in schools in addition to physical education classes. However, it is unclear what percentage of schoolchildren meets the SH 150 standard. According to the aforementioned results, an A grade was assigned to the following benchmarks: having policy to promote physical activity, meeting the mandatory number of physical education classes, and having access to physical activity facilities. A B grade was assigned to students being taught by certified teachers and offering opportunities for physical activity in addition to physical education classes. Collectively, the overall grade for School was B+.

Each local government has certain policies for the promotion of physical activity. Most of the policies are aimed at the overall population with a small number specifically targeting at children and youth. As the result of improved infrastructures for physical activity in the past decade, a total of 12,270 sport facilities were included in the database created by Sport Administration, Ministry of Education.²¹ Cycling has gained significant popularity in recent years as a form of recreation and transportation. It was estimated in 2016 that the total length of cycling paths in Taiwan is 5530 km, spreading across most counties and cities.³⁰ In the Exercise Status Survey, 81% of 13–17 year-olds considered that their neighborhood had sufficient exercise facilities.²² The facilities have high accessibility as the responders averaged 9.6 min to reach the facility from their residence. In the Opinions toward Exercise Environment Survey, an Internet survey of people aged 13 years and older who had participated in sport or watched sporting events in the previous year, the satisfaction toward built environments ranged from 2.4 to 3.3 (on 5-pt scale) across different counties and cities. These results were not strongly emphasized in the grading process because the former used telephone interview while the latter used an Internet questionnaire. We

were unable to find nationally representative data on the environmental safety of these facilities. However, the degree of satisfaction toward sporting facilities in the neighborhood probably considered safety, among other factors. Overall, we considered that most communities have policies to promote physical activity and a sufficient number of facilities, although the quality of these facilities remains to be determined. Therefore, a B+ grade was assigned to Community and Built Environment.

The benchmarks for Government Strategies and Investments included leadership and commitment, allocating funds and resources, and progress through policy making. The central government in Taiwan has long recognized the importance of physical activity in promoting general health. The government has invested significant funds to two major projects toward promoting physical activity—Creating a Sport Island (2010–15) and Sport i (love) Taiwan (2016–21). Many infrastructures for physical activity, as seen in Community and Built Environment, were built through these two projects. In addition, the SH 150 project, implemented in 2014, aims to increase physical activity in the school setting. The annual budget for Sport Administration, Ministry of Education, was 8.45 billion NT in 2017, approximately 20–30% of which was allocated to youth. While this budget increases by 16% from the previous year, it still accounts for only 0.43% of the total central government budget. Another budget for health promotion in youth accounts for 1948 million NT from Ministry of Health and Welfare. However, it is unclear how much of that budget is directed toward promoting physical activity. Overall, the government has shown leadership and commitment by implementing major projects (A) with increasing, but still insufficient, funding to promote physical activity (C), while making steady progress in youth policy (B+) as well as the policy for all people. Therefore, an overall grade of B+ was assigned to Government Strategies and Investments.

While the percentage of children having ‘ideal’ BMI is not a benchmark in the Global Matrix 3.0, it is noteworthy that 28.1% of 7–12 year-olds and 29.5% of 13–15 year-olds were classified as overweight or obese in the 2016–17 school year.³¹ In addition, according to the three waves of NHSIT,^{12–14} the percentage of underweight ranged from 13 to 21% across different age groups. Although the BMI cut-offs for underweight, overweight and obesity published by the Ministry of Health and Welfare³² are slightly different from the WHO standards, it is alarming that only 50–60% of Taiwanese youth have ‘ideal’ BMI.

The largest strength of this Report Card is the heavy reliance on nationally representative data across indicators. The Taiwanese government has launched several waves of national face-to-face interviews with stratified sampling to investigate health-related issues across the nation. In addition, the mandatory annual report of physical education and fitness tests for all elementary, junior high, and senior high schoolchildren provides nationally representative data. Unfortunately, all physical activity data sources relied on self-report methods resulting in limited accuracy.

The cover picture of this Report Card was chosen for several reasons. First of all, baseball is the national sport of Taiwan. Secondly, community baseball programs are the only major form of organized sport outside of schools. The majority of these programs are led and coached by parents, symbolizing familial support of physical activity in children and youth.

Traditionally, physical activity participation has been outweighed by the pursuit of academic excellence in Taiwan.³³ It is common for junior and senior high school students to spend more than 12 h per day studying in regular and after-class schools. Participation in organized or unorganized physical activity by children and youth relies heavily on parental support. Parents should recognize that physical activity is an essential part of the physical, mental, and social development of children. In addition,

many of the students in school teams in Taiwan are grouped into specialized physical activity classes to provide additional training time and flexible schedules to participate in competitions. This unique system significantly limits the chances to participate in school teams by students who are not in these specialized classes.

Implications

In this Report Card, INC was assigned to two indicators—Active Play and Family and Peers. A clearer definition and improved methodology for Active Play are necessary in order to confidently assign a grade. Family and Peers have been recognized as important factors affecting physical activity participation, however, relevant data have been ignored in many large-scale surveys. These two indicators need to be included, along with objectively measured physical activity levels, in future national surveys to elucidate their current status and their impact on children's physical activity.

Furthermore, it is crucial to provide additional sporting opportunities outside of the school (e.g., community sports clubs) to compensate for the low number of organized sport in schools. These clubs may take advantage of free, open-to-public school sports facilities outside of school time.

Conclusion

It appears that despite great effort by the government and schools, physical activity and fitness levels are low while sedentary behavior is prevalent in Taiwanese children and youth.

Conflicts of interest

There is no relevant financial interest or potential conflicts of interest by any author.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jesf.2018.10.005>.

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