Territory-wide Physical Fitness Survey for the Community

Research Report

Commissioned by

Community Sports Committee
of the Sports Commission

Co-ordinated by

康樂及文化事務署
Leisure and Cultural
Services Department

Survey Consultant

Department of Sports Science and Physical Education
The Chinese University of Hong Kong
Prof. Stanley Sai-chuen HUI and Research Team

27 June 2023

Table of content

1 Executive Summary

Introduction

The present survey is the third citywide community fitness survey in Hong Kong, commissioned by Community Sports Committee (CSC) and coordinated by the Leisure and Culture Service Department (LCSD). The data collection was conducted between August 2021 to December 2022. Similar to the second survey in 2012, the data of this survey was collected by random sampling method. The sample size calculation was based on the age and gender distribution reported by the Hong Kong Government's 2021 Population Census. The age covered from 7-79 years old in 3 major batches: 1) 7-11, 2) 12-16, and 3) 17-79 years old. Both genders, working and non-working populations were selected according to the distribution of the 2021 census. The data collection was divided into two parts: 1) physical fitness assessments and 2) questionnaire survey on physical activity (PA) and lifestyle. Overall, 9,326 participants were collected in the present survey, which exceeded the targeted sample size (i.e., 8500). After filtering and excluding incomplete and invalid data, a total of 8,419 data entered the final analysis.

The objectives of the present survey were to 1) enable the people of Hong Kong participating in the Survey to have a general understanding of his/her own fitness condition; 2) set up a database on the physical fitness of people of Hong Kong and compare the data with those collected in 2011-12 in order to understand how the physical fitness of the public has changed over time; 3) identify the relationship between physical exercise pattern and physical fitness of people of Hong Kong; and 4) assist the Government in identifying priority areas for improvement to enhance the overall physical fitness of the community.

Children (7-11 years old)

Results

Physical Fitness Performance. Overall, there were 225 boys and 201 girls included in the analysis. The average physical fitness performance among children were: 1) 15m PACER = 19.7±11.1 laps, 2) sit-and-reach = 25.7±7.5 cm, 3) handgrip strength (both hands) = 27.1±9.3 kg, 4) 1-min sit-up = 15.8±9.3 repetitions, 5) standing long jump = 114.2±27.1 cm, and 6) body fat = 18.7±9.0 %.

Obesity and Body Composition. 33.0% of children were recognized as overweight and obese by the body mass index (BMI) for age-gender reference criteria from the World Health Organization (WHO).

18.2% of children were overweight or obese according to the Hong Kong Weight-for-Height Growth Chart.

Physical Activity Level. 66.3% of primary school children did not meet the WHO recommended level of physical activity (i.e., an average of ≥ 60 minutes moderate-to-vigorous physical activity (MVPA) per day across the week). However, only 15.7% of primary school children perceived that they did not have sufficient physical activity. Hence, a significant discrepancy exists between the perception of PA participation and their actual PA behavior.

Favorite Sports and Major Barrier to Physical Activity. The top 5 favorite sports for boys were 1) ball games (67.8%), 2) swimming (49.5%), 3) cycling (48.1%), 4) distance running (36.0%), and 5) track and field (29.9%). For girls, the top 5 favorite sports were: 1) swimming (53.8%), 2) rope skipping (46.2%), 3) cycling (43.1%), 4) dance (42.1%), and 5) ball games (32.8%). The top three barriers to participation in physical activity were: 1) bad weather (60.4%), 2) busy with homework (40.8%), and 3) feeling tired (34.7%).

Further Analysis. Boy who met the WHO PA recommendation have better cardiovascular and muscular fitness compared to those who did not meet the WHO PA recommendation. Furthermore, we found that parent involvement in exercise could significantly improve the weekly PA level of children.

Boys performed significantly better in 15 meters PACER test and standing long jump than girls. Girls have significantly greater sit-and-reach performance compared with boys. Furthermore, body fatness parameters (i.e., total body fat and total skinfold) were negatively correlated with the performance of 1) 15m PACER and 2) handgrip strength, and 15-meter PACER performance was positively correlated with the muscular fitness (i.e., handgrip, 1-min sit-up, and standing long jump) for both genders. For boys, body fatness parameters (i.e., total body fat and total skinfold) were negatively correlated with the performance of 1-min sit-up and standing long jump.

Recommendation

We observed that muscular endurance in boys and girls was poorer than the data collected in 2012. Additional training focused on muscular endurance was warranted among children.

It is important to continuously monitor the children's physical fitness (i.e., cardiovascular fitness, muscular strength, muscular endurance, flexibility, and body composition). We recommended that the norm of physical fitness should be shared via designated websites and mobile applications.

A large discrepancy was observed between the actual physical activity level and the perceived sufficiency of physical activity among children. We recommended that stakeholders work together to 1) promote the WHO physical activity recommendations to children and parents and 2) educate the children, parents, and teachers on the strategies of skills to evaluate and monitor the daily PA level of children.

Additional after-school sports or exercise activities are needed for children. We suggested that stakeholders organize more sports activities based on their favorite sports.

We suggested several strategies for overcoming obstacles to PA: 1) provide parents and children with information on home-based exercise; 2) emphasize the quality of homework (優質課業) to schools rather than its quantity; and 3) continuously promote sufficient sleep time (i.e., ≥ 9 hours).

Parent involvement was an important factor influencing the PA participation of children. More family-based exercise events should be organized after school, over the weekends, and on holidays. Promoting PA, sports, and physical fitness reward programs among children could be a feasible approach to encourage their participation in sports.

Adolescents (12-16 years old)

Results

Physical Fitness Performance. Overall, there were 180 boys and 170 girls included in the analysis. The average physical fitness performances among adolescents were: 1) 15m PACER = 37.2±20.1 ml/kg/min, 2) sit-and-reach = 26.9±10.1 cm, 3) standing long jump = 150.3 ± 35.4 cm, 4) 1-min sit-up = 24.2 ±11.7 repetitions, 5) push-up = 10.3±10.3 repetitions, and 6) body fat = 21.8±9.7%.

Obesity and Body Composition. 27.7% of adolescents were identified as overweight and obese by the WHO BMI for age-gender growth chart, and 23.2% were recognized as overweight and obese by the Hong Kong weight-to-height growth chart standard.

Physical Activity Level. 50.7% of adolescents indicated that their PA level did not meet the WHO recommendation, which was better than the prevalence (i.e., 66.3%) among children aged 7-11. However, only 34.4% of secondary school adolescents perceived that they had insufficient PA.

Favorite Sports and Major Barrier to Physical Activity. The top 5 favorite sports for boys were 1) ball games (72.2%), 2) swimming (21.7%), 3) track and field (12.2%), 4) distance running (11.7%), and 5) rope skipping (7.8%). For girls, the top 5 favorite sports were: 1) ball games (50.6%), 2) swimming (34.7%), 3) dance (26.5%), 4) skating/roller skating (25.9%), and 5) rope skipping (17.1%). The top four barriers for adolescents to participation in physical activity were: 1) muscle soreness (45.0%), 2) lack of time (42.0%), 3) bad weather (41.4%), and 4) too tired (41.1%).

Further Analysis. Boys who met the WHO-recommended PA level performed significantly better in push up. In contrast, girls who met the WHO recommended PA level had significantly greater performance in 1) 15-meter PACER, 2) 9-minute run/walk test, and 3) Standing Long Jump.

For boys, body adiposity was negatively correlated with cardiovascular fitness and all muscular fitness parameters, while cardiovascular fitness was positively correlated with lower body flexibility and all muscular fitness parameters. For girls, body adiposity was negatively associated with cardiovascular fitness and muscular power, while cardiovascular fitness was positively correlated with lower body flexibility and all muscular fitness parameters. Furthermore, boys perform significantly better in 1) 15-meter PACER, 2) 9-minute run/walk, 3) 1-minute sit-up, and 4) standing long jump. We also found that boys have significantly lower body fat compared with girls. On the other hand, girls have significantly greater sit-and-reach performance compared with boys.

Recommendation

We observed that the muscular power of boys was poorer than in the data collected in 2012. Additional muscular fitness training is needed, such as plyometric exercise.

More subcutaneous fat was observed among adolescents compared with data collected in 2012. Stakeholders should provide more weight management education and exercise programs specific to obesity.

Adolescents should have sufficient knowledge to identify their performance in physical fitness (i.e., cardiovascular fitness, muscular strength, muscular endurance, flexibility, and body composition).

Normative values of physical fitness should be provided to adolescents via the internet, mobile applications, and social media.

Stakeholders should work together to support adolescents with poor physical fitness through additional exercise and fitness training. More interesting PA initiatives, such as IT-based virtual fitness programs with mobile applications and school-based fitness workshops should be promoted.

We suggested that stakeholders should organize more sports activities based on their favorite sports, such as organizing ball games (1st favorite sport), organizing more swimming (2nd favorite sport) courses, and organizing skating/roller skating (3rd favorite sport). Furthermore, we recommended that the stakeholders should work together to encourage students to participate in at least one sport after school or leisure time (一人一運動計劃) and educate the student about the understanding of WHO recommended PA level.

Major obstacles for secondary school adolescents to refrain from participation in PA: 1) muscle soreness, 2) lack of time, and 3) bad weather conditions. We suggested a few different approaches to tackle those obstacles to PA: 1) educate adolescents on some fundamental post-exercise recovery knowledge, such as appropriate cool-down exercises, self-myofascial release techniques, and adequate amounts of sleep; 2) focus on the quality of homework (優質課業), rather than the quantity of homework, and 3) examples of home-based exercises should be share via internet, mobile application, and social media.

Adults (17-79 years old)

Results

Physical Fitness Performance. Participants in the current survey generally performed better in cardiovascular fitness, muscular strength, muscular endurance, and muscular power than in the 2012 survey. However, participants in the current survey typically had poorer balance than those in 2012.

Prevalence of Obesity and Central Obesity. 34.2% of males and 23.7% of females had general obesity (defined by BMI > 25), and 26.5% of males and 34.3% of females had central obesity (waist circumference ≥ 90 cm for men; ≥80 cm for women). A high prevalence of central obesity was observed among females aged 40-59 years old and adults aged 60 or above.

Prevalence of Hypertension. Overall, 31.0% of males and 22.4% of females had hypertension (systolic blood pressure ≥ 140 mmHg, diastolic blood pressure ≥ 90 mmHg). A high prevalence of hypertension was observed among adults aged 60 or above.

Physical Activity Level. Overall, 53.8% of adults did not meet the WHO PA recommendation (i.e., ≥ 150 minutes of MVPA per week or 600 MET-min per week). A high prevalence (~60%) of physical inactivity was observed among adults aged 20-59.

Favorite Sports and Major Barrier to Physical Activity. For 17–19 years older adults, the most favorable sport was ball games. For 20-39 years old men, the most favorable sport was running/jogging. For 20-79 years old women and 40-79 years old men, the most favorable sport was walking. Half the male adults aged 17-59 reported that "lack of time" and "feel tired" were barriers to engaging in PA, whereas "feel tired", "lazy", and "lack of time" were the main obstacles for the female adults from the age group of 17-59 years. Bad weather was the main barrier for the elderly (60-79 years old) to participate in physical activity.

Further Analysis. Adults who met the WHO PA recommendation perform significantly better in 1) body composition (i.e., lower body fat and higher muscular mass), 2) cardiovascular fitness (i.e., lower post step test heart rate), 3) lower body flexibility, 4) handgrip strength, 5) core muscular strength and endurance, 6) lower limb power, and 7) balance (i.e., longer time in single leg stance with eyes closed).

Men have significant greater 1) body composition, 2) cardiovascular fitness, 3) upper body flexibility, 4) all muscular fitness parameters, and 5) agility, while women have better lower body flexibility. Moreover, women have less BMI and waist circumference. Younger adults have better physical fitness than those with older age.

Recommendation

Adults in the current survey typically had worse balance than respondents from 2012. Therefore, additional balance exercises should be provided to this generation of adults.

We recommended several suggestions for stakeholders to organize more community-based physical fitness tests for adults to monitor their fitness levels: 1) establish self-test fitness corners near exercise venues. The tests should be easy for citizens to conduct (test examples: electric blood pressure, height and weight scales with BMI chart, Bioelectrical impedance analysis for body fat measurement,

handgrip, and sit-and-reach), 2) organize regular fitness test workshops led by trained testers, and 3) provide free physical fitness consultation service, to improve the citizen's fitness by professional coaches. Furthermore, we suggest providing more home-based physical tests for adults to monitor their physical fitness level. An online physical fitness norm table could also enhance the feasibility for adults to assess and review their fitness levels.

A high prevalence of central obesity and hypertension was observed in the older age population. We suggested stakeholders launch a series of exercise programs to manage obesity and hypertension.

Intriguingly, most of the age and gender groups with a high prevalence of physical inactivity were interested in walking, running, yoga, or stretching. We recommended that stakeholders should organize more exercise courses or workshops based on the abovementioned favorite type of exercise, such as the QualiWalk program (優質健行), body and mind relaxation class (身心伸展), and running course. Moreover, "lack of time" was the commonly cited barrier for adults to participate in physical activity. We recommended that stakeholders collaborate to offer more online or video-based training courses to people with little time for physical activity.

2 Introduction

2.1 Background

In 2005, the first citywide community fitness survey in Hong Kong was commissioned by the HKSAR Government under the "Guangdong, Hong Kong, and Macau Sports Exchange and Co-operation Agreement" and conducted by the Department of Sports Science and Physical Education of the Chinese University of Hong Kong (SSPE/CUHK), which followed the conduction of the 2nd All-China National Fitness Survey. In the written report for this first-ever large-scale citywide physical fitness survey in Hong Kong, profiles and norms of the physical fitness of Hong Kong citizens, including kindergarten, primary and secondary school children, and young, middle-aged, and older adults, were produced. In addition to the population-based statistics, recommendations on such citywide surveys implemented every five years to monitor the change in the fitness level of Hong Kong people was raised. In 2011, steered by the Community Sports Committee (CSC), and organized by the Leisure and Cultural Services Department (LCSD), the 2nd Community Fitness Survey was launched. The SSPE/CUHK, the Physical Fitness Association of Hong Kong, China (HKPFA), and MVA Hong Kong Limited were appointed for the implementation.

The 3rd survey, entitled the "Territory-wide Physical Fitness Survey for the Community" (Survey), was steered by CSC and implemented by the LCSD. An Advisory Committee consisting of representatives from CSC, relevant government departments/bureaus, and professional organizations in the field were established under CSC in November 2019 to advise on the Survey's implementation, publicity and promotional strategies, community involvement, as well as data collection and preparation of the report by the professional agent to be commissioned. The data collection of the Survey was launched in August 2021. The SSPE/CUHK, HKPFA, and Dragon Creative Media Limited (DCML) were appointed to conduct the Survey. The SSPE/CUHK research team was responsible for providing consultation and professional advice regarding the sampling method, questionnaire design, and physical fitness test items, monitoring the data collection process, and providing timely opinions to the government and other parties on board. The team was also responsible for data processing, statistical analysis, and the results report write-up. The HKPFA was responsible for testers recruiting and training, conducting the fitness tests, collecting questionnaire data, and providing operational supporting services, including site visiting and picking, safety screening, and professional advice provision. The DCML provided information technology services to the Survey, including developing the online platform for survey promotion, participants' registration, data input,

assisting with data storage, provision, and maintenance of devices for on-site data collection, and generating physical fitness reports for the participants.

2.2 Project Objectives

Similar to the previous survey, this survey's objective is to investigate the current level of physical fitness among different age and gender groups in Hong Kong. The detailed purposes were concluded as follows:

a) To enable the individuals participating in the survey to have a general understanding of their physical fitness condition;
b) To continue building up a database of the physical fitness of Hong Kong people and compare the data with those collected in 2011-12 to understand how the physical fitness of the public has changed over time;
c) To identify the relationship between the physical activity pattern and the physical fitness of Hong Kong people and
d) To identify priority areas for improvement to enhance the public's overall physical fitness.

3 Methodology

3.1 Sampling Method and Recruitment:

The breakdowns for each age group were calculated based on the percentages provided in the 2021 Population Census of the Census and Statistics Department. Appendix 1 shows the analysis of the sample size.

3.2 Participants & Sample Size

The target participants of this Physical Fitness Test were those Hong Kong Citizens aged 7 to 79 years old, with a total sample size of 8,500. The requirements of the participants include:

(i) Hong Kong citizens aged 7 to 79;

(ii) the target groups of the Survey do not include people with physical mal-development (e.g., dwarfism, gigantism), handicaps (e.g., blindness, deafness, or physical handicap), pregnancy, or who were hospitalized for over three consecutive days due to sickness or injury (except health check) in the last three months; and

(iii) foreign domestic helper.

The targeted sample size was 8,500, which were categorized into different age groups as follows:

1. Children (Age: 7 - 11): n=410
2. Young Adolescents (Age: 12 - 16): n=350
3. Older Adolescents (Age: 17 - 19): n=223
4. Young Adults (Age: 20 - 39): n=2,612
5. Middle-aged Adults (Age: 40 - 59): n=2,902
6. Elderly (Age: 60 - 79): n=2,003

3.2.1 Children (Age: 7-11)

The sample was selected on a school basis. A total of 9 primary schools were recruited from six districts, i.e., Hong Kong East, Hong Kong West & Islands, Kowloon East, Kowloon West, New Territory West, and New Territory East. The table below displays the list of schools by district. Four girls and four boys were recruited from each grade by each school. The survey took place at schools from June to November 2022.

Table 3-1 A list of all the primary schools involved.

Date	School	District	
13/7/2022	Hong Kong and Macau Lutheran Church Primary School	New Territories East	Sai Kung District
14,20/7/2022	Ma On Shan Ling Liang Primary School	New Territories East	Sha Tin District
15/7/2022	HKTA Yuen Yuen Institute Shek Wai Kok Primary School	New Territories West	Tsuen Wan District
21/7/2022	Father Cucchiara Memorial School	New Territories West	Kwai Tsing District
26/7/2022	S.K.H. St. Michael's Primary School	Hong Kong East	Eastern District
27,28/7/2022	Sau Ming Primary School	Kowloon East	Kwun Tong District
3/8/2022	Po Yan Oblate Primary School	Kowloon West	Kowloon City District
27/8/2022	West Kowloon Parents Association	Kowloon West	Sham Shui Po District
18/11/2022	Precious Blood Primary School	Hong Kong West	Wan Chai District

3.2.2 Young Adolescents (Age: 12-16)

Both the fitness test and questionnaire data for the young adolescents were collected by the Education Bureau (EDB) during two periods, from September 2019 to January 2020 and from February to June 2021. The research team randomly extracted 350 data from the data pool provided by EDB, including 36 males and 34 females from each age, to serve as partial data for this survey.

3.2.3 Adults (Age: 17-79)

The sampling for these age groups considered their employment status and covered all the working industries. In addition to the age and gender, the proportion of the working and non-working population was used to calculate the sample size. All the adopted percentages for calculation were from the data of the 2021 Population Census. Appendix 1 displayed the sample size by age, gender, and employment status. Data collection involved various corporations or companies, government or non-government organizations, and large-scale working unions. When recruiting working participants, companies and federations were invited to participate through random sampling on a pro-rata basis based on the economic groups' framework provided by the Census & Statistics Department for the working population. Arrangements were then made on mutual agreement for those willing to get involved. To recruit the non-working participants, tertiary education institutions, District Social Welfare Offices, and non-government organizations with broad district coverage were invited. The participants were invited through the network and influence of these institutions/organizations.

Apart from the recruitment through various companies, organizations, or institutions, public test days were organized at large-scale events and LCSD leisure venues to recruit participants from specific age and gender groups to enhance the representation of the sample.

3.3 Estimation Method

(i) Provided with the total sample size and the subtotal for each sub-group, the age-gender proportions extracted from the Hong Kong Government's 2021 by-census data were adopted to calculate the breakdowns under each sub-group.

(ii) The estimation formula of the parameters and their corresponding sampling errors were prepared and outlined as follows.

(iii) The sample mean for each sub-group was presented as $\overline{x_k} = \frac{1}{n_k}\sum_{i=1}^{n} x_i$ with estimated variance

$\text{var}(\bar{x}_k) = (1 - \frac{n_k}{N_k})\frac{s_k^2}{n_k}$, where

- n_k was the sample size of respondents within the *k*-th sub-group respectively.
- x_i was the response from respondent *i* in the *k*-th sub-group.

(iv) The sample variance of each sub-group $s_k^2 = \frac{1}{n_k - 1}\sum_{i=1}^{n_k}(x_i - \bar{x}_k)^2$.

3.4 Procedures

3.4.1 Children (Age: 7-11)

LCSD sent the invitation to all the primary schools according to the list provided by the Education Bureau (EDB), attached with an invitation letter stating the purposes, content, and schedules of this survey. Those schools which were willing to join were recruited on the reservation schedule. Trained testers from the HKPFA attended the venues with portable testing equipment provided by LCSD and portable electronic tablet provided by DCML, conducted the physical fitness test, and guided the questionnaire survey. The questionnaire was completed through an electronic form on the electronic tablet. Each participant was given a participant ID to pair their fitness test results with the questionnaire.

3.4.2 Young Adolescents (Age: 12-16)

Data was collected from a survey conducted by the EDB targeting all secondary school students from September 2019 to January 2020 and February to June 2021. Three sets of data, each consisting of 180 boys and 170 girls, were randomly selected from the entire data pool. To ensure the reliability of the selected sample, a comparison of the major characteristics between the selected data sets and the original data was conducted. The sample with the slightest difference from the original data pool was chosen for analysis.

3.4.3 Adults (Age: 17-79)

The sampling of all adults in these age groups was done by gender and sub-age group. The data collection process involved various corporations or companies, government or non-government organizations, working unions, and large -scale community events. To recruit the working population, the following methods were used:

- Through leading companies within each industry that had a specific employment scale (with over 100 employees);
- Through assistance from large working unions that targeted their member corporations;
- Through promotion by the government.

When recruiting non-working participants, we randomly selected tertiary educational institutions and non-governmental organizations with a specific scale and comprehensive district coverage and obtained mutual agreement. District Social Welfare Offices were also invited to assist with the recruitment. Fitness testing sessions were scheduled at a time and venue convenient for each organization/institution/company to lessen the inconvenience.

Public test days were organized at large-scale community events and LCSD leisure venues to recruit participants from specific age and gender groups to enhance the representation of the sample.

3.5 Physical Fitness Test and Questionnaire Survey

Except for the data of young adolescents (age: 12-16) collected by EDB, all the data was collected by HKPFA, the service contractor for data collection. For all the testing sessions, LCSD staff were responsible for liaison works and attended the venues with all the necessary testing equipment, while the testers from HKPFA were responsible for the whole data collection process, which included a physical fitness test and a questionnaire survey. Each testing item was located at different testing stations, and the participants were assigned to other stations by the testers on-site. The participants were required to complete the questionnaire survey before or after the fitness test was conducted. Electronic tablets were used to input the data collected by the testers from HKPFA. After completing the whole process, a summary report showing the results of the testing items was produced for each participant.

Supervisors, consultants, testers, and interviewers were assigned on-site for each survey by HKPFA, responsible for these staff's ongoing recruitment and training. Appendix 2 presents the staff training manual. HKPFA, in collaboration with LCSD, was responsible for carrying all portable equipment to every testing venue, running the testing process, and other logistic arrangements.

3.6 Information Technology Support

The DCML developed an online platform for participants to make an appointment before the survey and to complete the questionnaire on-site. Testers input data during the test and DCML generated physical fitness reports for each participant right after the survey. It also provided data storage service, hardware devices, and internet connection throughout the survey period. After each test, the collected data in the designated format was sent to SSPE/CUHK.

3.7 Implementation of Main Survey

On 30th June 2021, a grand charter signing ceremony for Territory-wide Physical Fitness Survey for the Community was held at the Tsuen Wan Sports Center to promote the survey among organizations and companies. Representatives from different industries attended. The main survey was collected from August 2021 to December 2022. However, from January to April 2022, the survey was suspended due to the critical conditions of COVID-19. In total, 124 fields of the test were conducted either at the LCSD's venues or venues within the participating institutions/schools. All the schedules of the tests are listed in Appendix 3.

3.8 Content of the Survey

The Survey included two parts:1) undertaking physical fitness tests through various test items, and 2) filling out questionnaires on health and PA participation.

(i) Physical fitness test

Five aspects, including body composition, cardiovascular endurance, flexibility, muscular strength/ endurance, and neuromuscular function of the participant, were measured by standard and recognized physical fitness testing methods. The items were different depending on different age groups. The complete list is listed in Appendix 4.

(ii) Questionnaire survey

The questionnaire for the adults and the elderly collected information on basic health conditions, living habits, exercising habits, and demographic status. The questionnaires for children of primary schools and young adolescents from secondary schools included questions on physical activity (PA) level, attitudes towards PA, sleep situation, static activity, and parent's and family's participation in PA. Questions also varied for different age groups. Appendix 5-7 across 3 age groups were displayed the questionnaires.

3.9 Quality Control

Research delegates of the SSPE/CUHK research team attended most of the field tests on-site to observe in the early stage of the survey. After several months when the survey had been on track, the team monitored the sessions occasionally based on the need on special occasions. The list of the sessions the research team attended for supervision is mentioned in Appendix 8. A supervision report was completed upon attending the field each time. Appendix 9 shows the template of the supervision report. HKPFA and SSPE/CUHK produced a testing manual, which was incorporated into the training material for testers. All testers had to read the manual before service to ensure standardized test procedures. Appendix 2 shows the staff training manual. Soon after each data collection session, the DCML sent the data to the SSPE/CUHK. The SSPE/CUHK research team reviewed the data and monitored the progress of data collection. A de-briefing meeting between the testers of the operation, the staff of LCSD, the SSPE/CUHK research staff, and the staff of DCML were called immediately after each testing session.

3.10 Data Management and Analysis

All the collected data, including the questionnaire survey and physical fitness tests, was cleaned, combined, and transformed from a pile of Excel files into SPSS format for statistical analysis. The data cleaning criteria included as following:

a. Having a unique participant ID.
b. Over 50% of the fitness testing items were completed.
c. Completed ten or more question items in the questionnaire survey.

The data analysis included as following:

a. Descriptive statistics, both questionnaire surveys and fitness tests, in terms of prevalence, sampling distribution, the frequency distribution of the measured variables, and cross-tabulated sector analysis, were conducted.
b. Correlations between the various physical fitness variables were investigated. The difference of means on the interested physical fitness performance within groups of multiple lifestyles, demographic backgrounds, etc., were compared using one-way Analysis of Variance (ANOVA). Non-parametric tests, Chi-square tests, and one-sample t-tests were adopted for relevant data analysis.
c. Add-ups may not be equal to the total due to rounding.
d. It should be noted that part of the current survey's physical fitness testing and questionnaire items were modified and thus different from 2012.

4 Pilot Test

The objectives for this pilot test were to examine the proposed process of the fitness test and to identify the possible problems that might be encountered in the formal survey. Particular focus was put on the issues related to implementing the computer system developed by the IT service provider, logistic arrangements, the questionnaire designed by SSPE in CUHK, the physical fitness tests executed by the data collectors, and others that may play critical roles in the whole survey.

In the pilot test, the targeted sample size was 80, with 20 from each desired age group, i.e., 17-19, 20-39, 40-59, and 60-79.

The small-scale pilot test was conducted at two testing venues, the Yeung Ming Biu Indoor Sports Centre, CUHK, and Tsuen Wan Sports Centre, on 22nd and 29th May 2021, respectively. Participants from the four age groups were recruited through internal referrals.

Two sections were scheduled on each test day, with 20 participants in each age-group. Participants were asked to pre-register through the online system before they attended the test and checked in when they arrived at the designated venue. A QR code was distributed to each participant before their identification during the testing process. Physical Activities Readiness Questionnaire (PAR-Q) and resting blood pressure and heart rate were assessed before the fitness test. The questionnaire survey was conducted at the same time after they had arrived and checked in.

Each testing item was conducted at separate counters and served by trained fitness testers. Upon finishing each test, the responsible tester would immediately input the participant's result into an online system via a tablet. After completing all the testing items and the questionnaire survey, the participants were provided with a final report on their fitness test and a set of souvenirs. On-site consultation service on the fitness report was provided to those in need.

During the testing sessions, 1-2 supervisors from HKPFA arranged the logistics and human resources and monitored the testers' performance. SSPE/CUHK also rendered 1-2 observers to monitor the flow and check the test implementation's quality. A briefing session at the beginning of each testing day was held. An evaluation meeting was also conducted immediately after the test to share experiences, problems, and suggestions for the test so that improvements can be made in future formal testing.

A total of 84 participants registered for the test, of which 68 (81%) were pre-registered, and 16 (19%) walked in. In the end, 80 participants completed the on-site check-in, and 79 completed the fitness test

and survey. The percentages of participants who completed the fitness test and questionnaire at CUHK and Tsuen Wan Sports Centre were 54.4% and 45.6%, respectively. The table below displays their age and gender distribution. 41.8% were from the 20-39, and the overall men-to-women ratio is 6:4.

Table 4-1 Distribution of the sample cross-tabulated with age and gender

Age group		Men	Women	Total
17-19	Count	6	2	8
	% within Age Group	75.0%	25.0%	100.0%
	% within Gender	12.8%	6.3%	10.1%
20-39	Count	23	10	33
	% within Age Group	69.7%	30.3%	100.0%
	% within Gender	48.9%	31.3%	41.8%
40-59	Count	3	10	13
	% within Age Group	23.1%	76.9%	100.0%
	% within Gender	6.4%	31.3%	16.5%
60-69	Count	13	7	20
	% within Age Group	65.0%	35.0%	100.0%
	% within Gender	27.7%	21.9%	25.3%
70-79	Count	2	3	5
	% within Age Group	40.0%	60.0%	100.0%
	% within Gender	4.3%	9.4%	6.3%
Total	Count	47	32	79
	% within Age Group	59.5%	40.5%	100.0%

Since we conducted two surveys previously (2006 and 2012), the overall operation of the present pilot was smooth. We received feedback from the participants about the questionnaires. Therefore, we revised some questions using the tables for a better presentation. We settled down the logistic support to transport the testing equipment to the testing venue and tested the I.T. equipment for entering the testing data. An additional pilot test was conducted on April 30, 2022 at the Cheung Sha Wan Sports Centre in order to familiarize the children's group with the physical test operations.

5 Results of Children (Age: 7-11)

5.1 Summary of the Chapter

a) 66.3% of primary school children did not meet the WHO recommended level of physical activity (i.e., an average of ≥ 60 minutes moderate-to-vigorous physical activity (MVPA) per day across the week). However, only 15.7% of primary school children perceived that they did not have a sufficient level of PA. Hence, there is a significant discrepancy between the perception of PA participation and their actual PA behavior.

b) 33.0% of children were recognized as overweight (including obesity) by the Body Mass Index (BMI) for age-gender reference criteria from the World Health Organization (WHO). 18.2% of children were overweight (including obesity) according to the Hong Kong Weight-for-Height Growth Chart.

c) Overall, there were 225 boys and 201 girls included in the analysis. The average physical fitness performance among children were: 1) 15m PACER = 19.7±11.1 laps, 2) sit-and-reach = 25.7±7.5 cm, 3) handgrip strength (both hands) = 27.1±9.3 kg, 4) 1-min sit-up = 15.8±9.3 repetitions, 5) standing long jump = 114.2±27.1 cm, and 6) body fat = 18.7±9.0 %.

d) Major reasons for participating in PA: 1) sense of pleasure (49.1%), 2) making friends (32.8%), and 3) maintaining good health and physique (30.6%).

e) Children only received two sessions or 67.5 minutes of physical education weekly. Apparently, increasing the number of PE lessons (i.e., 60 minutes of physical education daily) is not feasible to achieve the WHO PA recommendations. Therefore, after-school time should be utilized to increase physical activity.

f) The top 5 favorite sports for children were 1) swimming (51.6%), 2) ball games (51.1%), 3) cycling (45.7%), 4) rope skipping (36.9%), and 5) running (29.8%). Those data might provide an important insight into creating incentives for children to engage in physical activity. We suggested that stakeholders organize more of those top 5 favorite sports for children to improve their PA level during the extra-curriculum time and organize more exercise events to involve both parents and children during the holidays and weekends. Reward schemes should be continuously promoted among children to encourage their participation in sports.

g) Major obstacles to PA participation: 1) bad weather (60.4%), 2) busy with homework (40.8%), and 3) feeling tired (34.7%). We recommended several strategies to tackle those barriers to PA: 1) provide information to parents and children on exercise at home, 2) emphasize the quality of homework (優質課業), rather than quantity, and 3) schools and parents should continuously review the sleep time of children (i.e. ≥9 hours).

h) It is important to continuously monitor the children's physical fitness (i.e., cardiovascular fitness, muscular strength, muscular endurance, flexibility, and body composition). We recommended that the norm of physical fitness should be shared via the designated websites and mobile applications.

5.2 Demographic Distribution

Four hundred twenty-six primary school children completed the fitness test, and 409 completed the questionnaire survey. The data were collected from 9 primary schools from 6 districts in Hong Kong, including HK East, HK West & Islands, KLN east, KLN West, NT East, and NT West. The school list is attached in appendix 10.

Table 5-1 Gender distribution and mean age on the children

		Boy	Girl	Total
Completed Fitness Test	n	225	201	426
	%	52.8	47.2	100
	Age	N/A	N/A	N/A
Completed Questionnaire survey	n	214	195	409
	%	52.3	47.7	100.0
	Age	9.2 (1.5)	9.1 (1.4)	9.1 (1.5)

Remarks: The age data was not collected during the fitness test.

5.3 Descriptive Statistics on Physical Fitness

The physical fitness parameters are presented in Table 5-2.

Table 5-2 Descriptive statistics of physical fitness

	Boy			Girl			Total	
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Body composition									
Height (cm)	225	137.2	12.1	201	137.0	12.0	426	137.1	12.0
Weight (kg)	225	34.8	11.6	201	32.1	9.6	426	33.6	10.7
BMI (kg/m^2)	225	18.1	3.7	201	16.9	2.8	426	17.5	3.3
Body Fat (%)	225	18.7	10.6	201	18.8	6.7	426	18.7	9.0
Skinfold - Triceps (mm)	225	11.7	5.4	201	11.2	4.1	426	11.5	4.8
Skinfold - Calf (mm)	225	11.4	6.0	201	11.2	4.7	426	11.3	5.4
Skinfold – Total (mm)	225	23.1	11.0	201	22.4	8.3	426	22.8	9.8
Cardiovascular Endurance									
15m PACER (laps)	222	21.1	12.6	200	18.1	8.9	422	19.7	11.1
VO_{2max} (ml/kg/min)	212	34.2	14.9	194	34.2	14.0	406	34.2	14.4
Flexibility									
Sit-and-reach (cm)	225	24.7	13.8	201	27.8	7.9	426	25.7	7.5
Muscular Fitness									
Handgrip – both hands (kg)	225	32.1	54.3	201	26.5	9.3	426	27.1	40.0
1-min Sit-up (reps)	221	16.4	9.5	200	15.2	9.1	421	15.8	9.3
Standing Long Jump (cm)	224	117.0	29.7	199	111.1	23.5	423	114.2	27.1

5.3.1 Body Composition

The average body fat percentage was 18.7% for primary school children. There was no body fat percentage data in the previous survey conducted in 2012. The average skinfold value was dropped compared with the 2012 survey for both boys (total skinfold in 2012= 25.3mm vs. total skinfold in present survey = 22.9mm) and girls (total skinfold in 2012= 26.1mm vs. total skinfold in current survey = 22.6mm).

5.3.2 Cardiovascular Endurance

The following equation calculated the maximal oxygen consumption (VO_{2max}) value: VO_{2max} = 31.025 + 3.238(speed corresponding to the PACER stage) – 3.248(age) + 0.1536(speed corresponding to the PACER stage)(age) (Léger, Mercier, Gadoury, & Lambert, 1988). The average VO_{2max} among children was 14.4 ml/kg/min. However, there were 16 missing data in VO_{2max} due to no age data for calculation. The aerobic capacity (measured by the laps achieved in PACER) was greater than the boys (2012: 16.6 laps vs. the present: 21.1 laps) and girls (2012: 14.9 laps vs. the present: 18.1 laps) data collected in the 2012 survey (age: 7-12).

5.3.3 Flexibility

Girls showed better flexibility than boys. The average sit and reach performances were 24.7 cm for boys and 27.8 cm for girls.

5.3.4 Muscular Fitness

Boys (32.1 kg) generally had better performance in handgrip strength than girls (26.5 kg). Compared with the 2012 survey, the handgrip strength improved among boys (2012: 27.0 kg) but dropped among girls (2012: 27.1kg). The 1-minute sit-up had 16.4 repetitions among boys and 15.2 repetitions among girls. Compared with the 2012 survey, muscular endurance was dropped for boys (2012: 19.58 repetitions) and girls (2012: 18.78 repetitions). Furthermore, the average standing long jump distance was 117.0 cm among boys and 111.1 cm among girls. The muscular powers decreased for boys (2012: 124.93 cm) and girls (2012: 112.79 cm) compared with the 2012 survey.

5.3.5 Prevalence of Overweight and Obesity

33.0% of children were recognized as overweight (including obesity) by the body mass index (BMI) for age-gender reference criteria from the World Health Organization (WHO). 18.2% of children were overweight (including obesity) according to the Hong Kong Weight-for-Height Growth Chart.

Table 5-3 Prevalence of overweight and obesity

	Boys		Girls		Total	
	n	%	n	%	n	%
The WHO BMI for Age-Gender Growth Standard						
Severe Thinness	0	0	0	0	0	0
Thinness	6	2.8	4	2.1	10	2.4
Normal	125	58.4	139	71.2	264	64.5
Overweight	42	19.6	39	20.0	81	19.8
Obesity	41	19.2	13	6.7	54	13.2
Total	214	100.0	195	100.0	409	100.0
Hong Kong Weight-for-Height Growth Chart						
Non-overweight	169	75.4	178	89.0	347	81.8
Overweight (including obesity)	55	24.6	22	11.0	77	18.2
Total	224	100.0	200	100.0	424	100.0

The WHO Child Growth Standard (World_Health_Organization, 2006):
Severe Thinness is defined as BMI-for-age less than 3 standard deviations from the WHO Growth Reference median.
Thinness is defined as BMI-for-age less than 2 standard deviations from the WHO Growth Reference median.
Overweight is defined as BMI-for-age greater than 1 standard deviation from the WHO Growth Reference median.
Obesity is defined as BMI-for-age greater than 2 standard deviations above the WHO Growth Reference median.

Hong Kong weight-to-height growth chart (Leung, Lau, Tse, & Oppenheimer, 1996):
Overweight (including obesity) is defined as body weight >120% of the median weight-for-height for boys with height between 55 to 175 cm and girls with height between 55 to 165 cm.

5.4 Descriptive Statistics on the Questionnaire Survey

5.4.1 Physical Activity

Overall, the average weekly volume of MPVA among children was 1561.2 MET-minutes per week. 66.3% of children did not met the WHO recommended PA level (i.e., an average of ≥ 60 minutes per day of MVPA across the week, or 1680 MET-min/wk). However, 84.4% of children perceived that they had sufficient PA levels. The results suggest a discrepancy between the actual and perceived PA sufficiency among the children. The situation is even worse for girls. 80.7% of girls did not meet the WHO PA recommendation, but 85.1% of girls perceived that they have sufficient PA.

Table 5-4 Descriptive statistics on the self-reported level of PA

	Boys		Girls		Total	
	n	%	n	%	n	%
Met the WHO-recommended PA level						
Yes	99	46.9	37	19.3	136	33.7
No	112	53.1	155	80.7	267	66.3
Total	211	100.0	192	100.0	403	100.0
Self-perceived sufficiency on PA						
Definitely sufficient	66	30.8	41	21.0	107	26.2
Sufficient	113	52.8	125	64.1	238	58.2
Insufficient	30	14.0	26	13.3	56	13.7
Definitely insufficient	5	2.3	3	1.5	8	2.0
Total	214	100.0	195	100.0	409	100.0
		Mean (SD)		Mean (SD)		Mean (SD)
Weekly volume of MVPA						
Total MVPA, MET-min/wk	211	1894.4 (1464.2)	192	1195.1 (922.5)	403	1561.2 (1283.2)

MET: metabolic equivalent of task; one MET was equivalent to the energy expenditure sitting in a quiet room.

5.4.2 PE lessons and Atmosphere of PA at Schools

The results of the number and duration of PE lessons are displayed in Table 5-5. Most of the primary school children (69.7%) receive two PE lessons weekly. The average duration per PE lesson was 33.7 minutes. Given that the current PA recommendation is an average of ≥ 60 minutes MVPA per day across the week, two PE sessions weekly might not be the most feasible approach for children to meet the recommended level of PA. Therefore, the physical education curriculum can be a tool to develop students' physical competence and knowledge of movement and safety.

Table 5-5 Descriptive statistics on the frequency and duration of PE lessons

	Boys		Girls		Total	
	n	%	n	%	n	%
No PE lesson	0	0.0	1	0.5	1	0.2
1	42	19.6	50	25.6	92	22.5
2	154	72.0	131	67.2	285	69.7
3	8	3.7	6	3.1	14	3.4
4	5	2.3	4	2.1	9	2.2
5	3	1.4	0	0.0	3	0.7
6	2	0.9	3	1.5	5	1.2
Total	214	100.0	195	100.0	409	100.0
		Mean (SD)		Mean (SD)		Mean (SD)
Number of PE lessons	214	2.0 (0.8)	195	1.9 (0.8)	409	1.9 (0.8)
Duration of each PE lesson (mins)	214	34.6 (11.9)	195	32.7 (9.9)	409	33.7 (11.0)
Sum of PE lessons per week (mins)	214	67.5 (33.7)	195	60.6 (30.5)	409	64.2 (32.4)

Despite only having two PE lessons weekly, most children thought that the atmosphere of PA in their school was strong.

Table 5-6 Agreement on the statement of "the atmosphere of PA in your school is strong"

	Boys		Girls		Total	
	n	%	n	%	n	%
Strongly agree	70	32.7	67	34.4	137	33.5
Agree	86	40.2	90	46.2	176	43.0
Neutral	42	19.6	28	14.4	70	17.1
Disagree	11	5.1	7	3.6	18	4.4
Strongly disagree	5	2.3	3	1.5	8	2.0
Total	214	100.0	195	100.0	409	100.0

Approximately half (50.1%) of primary school children had less than three sports training days apart from their PE lessons.

Table 5-7 Frequency of sports training apart from PE lesson (day/week)

	Boys		Girls		Total	
	n	%	n	%	n	%
0 day	34	15.9	42	21.5	76	18.6
1–2 days	68	31.8	70	35.9	138	33.8
3–4 days	66	30.8	56	28.7	122	29.8
5–6 days	29	13.6	16	8.2	45	11.0
7 days	17	7.9	11	5.6	28	6.8
Total	214	100.0	195	100.0	409	100.0

5.4.3 Favorite Sports

For boys, the top 5 favorite sports were 1) ball games (67.8%), 2) swimming (49.5%), 3) cycling (48.1%), 4) distance running (36.0%), and 5) track and field (29.9%). For girls, the top 5 favorite sports were: 1) swimming (53.8%), 2) rope skipping (46.2%), 3) cycling (43.1%), 4) dance (42.1%), and 5) ball games (32.8%).

Table 5-8 Descriptive statistics on favorite Sports

Boys			Girls			Total		
	n	%		n	%		n	%
Ball games	**145**	**67.8**	**Swimming**	**105**	**53.8**	**Swimming**	**211**	**51.6**
Swimming	**106**	**49.5**	**Rope skipping**	**90**	**46.2**	**Ball games**	**209**	**51.1**
Cycling	**103**	**48.1**	**Cycling**	**84**	**43.1**	**Cycling**	**187**	**45.7**
Running	**77**	**36.0**	**Dance**	**82**	**42.1**	**Rope skipping**	**151**	**36.9**
Track and field	**64**	**29.9**	**Ball games**	**64**	**32.8**	**Running**	**122**	**29.8**
Rope skipping	61	28.5	Track and field	47	24.1	Track and field	111	27.1
Wushu	44	20.6	Roller Skating	47	24.1	Dance	94	23.0
Roller Skating	27	12.6	Running	45	23.1	Roller Skating	74	18.1
Gymnastics	21	9.8	Gymnastics	30	15.4	Wushu	66	16.1
Dance	12	5.6	Wushu	22	11.3	Gymnastics	51	12.5
Don’t like any	6	2.8	Don’t like any	4	2.1	Don’t like any	10	2.4

5.4.4 Attitudes towards PA

The top reason for children to participate in physical activities was the sense of pleasure (47.2%). Other significant reasons included "make friends" (36.4%), "cope with daily needs" (29.0%), and "maintain good health and physique" (27.6%). The results suggested that "having fun" was the most important incentive for children to participate in PA. Shareholders should consider "having fun" when designing exercise programs for primary school children.

Table 5-9 Main reason(s) for participating physical activities

Boys			Girls			Total	
	n	%		n	%	n	%
Sense of pleasure	**101**	**47.2**	**Sense of pleasure**	**100**	**51.3**	**Sense of pleasure**	**201**	**49.1**
Make friends	**78**	**36.4**	**Maintain good health and physique**	**66**	**33.8**	**Make friends**	**134**	**32.8**
Cope with daily tasks	**62**	**29.0**	**Make friends**	**56**	**28.7**	**Maintain good health and physique**	**125**	**30.6**
Maintain good health and physique	59	27.6	Cope with daily needs	49	25.1	Cope with daily needs	111	27.1
Develop various PA skills	45	21.0	Control body weight	43	22.1	Develop various PA skills	78	19.1
Enhance self-confidence	44	20.6	Arranged by parents	35	17.9	Enhance self-confidence	76	18.6
Arranged by parents	41	19.2	Develop various PA skills	33	17.0	Arranged by parents	76	18.6
Control body weight	32	15.0	Enhance self-confidence	32	16.4	Control body weight	75	18.3

Fill free time	32	15.0	Fill free time	31	15.9	Fill free time	63	15.4
Sense of success	26	12.1	Sense of success	27	13.8	Sense of success	53	13.0
Develop leadership	24	11.2	Develop leadership	15	7.7	Develop leadership	39	9.5

Note: This question item allowed respondents to choose maximum of 3 options.

Bad weather (60.4%), busy with homework (40.8%), and feel tired (34.7%) were the common barriers to primary school children to engage PA.

Table 5-10 Barrier(s) for engaging PA

Boys			Girls			Total	
	n	%		n	%	n	%
Bad weather	**126**	**58.9**	**Bad weather**	**121**	**62.1**	**Bad weather**	**247**	**60.4**
Busy with homework	**84**	**39.3**	**Busy with homework**	**83**	**42.6**	**Busy with homework**	**167**	**40.8**
Feel tired	**75**	**35.0**	**Feel tired**	**67**	**34.4**	**Feel tired**	**142**	**34.7**
No venue	39	18.2	No venue	37	19.0	No venue	76	18.6
No peer company	38	17.8	No peer company	36	18.5	No peer company	74	18.1
Feel boring	18	8.4	Afraid to affect academic performance	18	9.2	Feel boring	33	8.1
Feel uncomfortable	18	8.4	Feel boring	15	7.7	Afraid to affect academic performance	33	8.1
Afraid to affect academic performance	15	7.0	Discouraged by family	12	6.2	Feel uncomfortable	28	6.8
Discouraged by family	14	6.5	Feel uncomfortable	10	5.1	Discouraged by family	26	6.4
Health issues	14	6.5	Don’t like to follow sports rule	9	4.6	Don’t like to follow sports rule	21	5.1
Don’t like to follow sports rule	12	5.6	Health issues	6	3.1	Health issues	20	4.9

Note: This question item allowed respondents to choose up to 3 options.

5.4.5 Sedentary Activity

Table 5-11 shows the number of hours children spend on sedentary activities during school days. Most of the children spend ≤ 2 hours of daily sedentary time for after-school academic activity (89.7%), screen time (85.3%), and reading/painting/crafting/listening to music/playing instruments (92.1%).

Table 5-11 Sedentary activity during school days

	Boys		Girls		Total	
	n	%	n	%	n	%
Academic activity after school						
<1 hour	61	28.5	79	40.5	140	34.2
1-2 hours	129	60.3	98	50.3	227	55.5
>2 and ≤3 hours	12	5.6	11	5.6	23	5.6
>3 hours	12	5.6	7	3.6	19	4.6
Total	214	100.0	195	100.0	409	100.0
Screen time (Watching television, playing video games, or browsing web pages)						
<1 hour	83	38.8	83	42.6	166	40.6
1-2 hours	98	45.8	85	43.6	183	44.7
>2 and ≤3 hours	13	6.1	9	4.6	22	5.4
>3 hours	20	9.3	18	9.2	38	9.3
Total	214	100.0	195	100.0	409	100.0
Reading, painting, crafting, listening to music or playing instrument						
<1 hour	98	45.8	87	44.6	185	45.2
1-2 hours	104	48.6	88	45.1	192	46.9
>2 and ≤3 hours	4	1.9	12	6.2	16	3.9
>3 hours	8	3.7	8	4.1	16	3.9
Total	214	100.0	195	100.0	409	100.0

During weekends or holidays, children usually engage in outdoor PA (50.4%), study (19.6%), and play video games or browse webpages (16.4%). The results showed that more children participated in outdoor physical activities compared with the previous survey in 2012 (i.e., 40.7% of boys and 44.6% of girls).

Table 5-12 Type of usual activity during weekends or holidays

	Boys		Girls		Total	
	n	%	n	%	n	%
Study	40	18.7	40	20.5	80	19.6
Outdoor PA	100	46.7	106	54.4	206	50.4
Watching TV	24	11.2	13	6.7	37	9.0
Video games or browsing webpages	41	19.2	26	13.3	67	16.4
Others	9	4.2	10	5.1	19	4.6
Total	214	100.0	195	100.0	409	100.0

5.4.6 Sleep and Lifestyle

The self-reported daily sleep time ranged from less than 4 hours to over 10 hours. In the present survey, 56.1% of boys and 56.9% of girls reported sleeping less than 9 hours daily as compared with 33.9% of boys and 32.7% of girls in 2012).

Table 5-13 Daily sleep time in the past week

	Boys			Girls			Total		
	n	%	Cumulative %	n	%	Cumulative %	n	%	Cumulative %
≤4 hours	2	0.9	0.9	2	1.0	1.0	4	1.0	1.0
4.5 hours	6	2.8	3.7	3	1.5	2.6	9	2.2	3.2
5 hours	4	1.9	5.6	4	2.1	4.6	8	2.0	5.1
5.5 hours	2	0.9	6.5	1	0.5	5.1	3	0.7	5.9
6 hours	11	5.1	11.7	9	4.6	9.7	20	4.9	10.8
6.5 hours	6	2.8	14.5	7	3.6	13.3	13	3.2	13.9
7 hours	17	7.9	22.4	11	5.6	19.0	28	6.8	20.8
7.5 hours	21	9.8	32.2	16	8.2	27.2	37	9.0	29.8
8 hours	29	13.6	45.8	45	23.1	50.3	74	18.1	47.9
8.5 hours	22	10.3	56.1	13	6.7	56.9	35	8.6	56.5
9 hours	37	17.3	73.4	38	19.5	76.4	75	18.3	74.8
9.5 hours	21	9.8	83.2	19	9.7	86.2	40	9.8	84.6
≥10 hours	36	16.8	100.0	27	13.8	100.0	63	15.4	100.0
Total	214	100.0		195	100.0		409	100.0	

In terms of the reasons that would cause physical unhealthy, “insufficient sleep” was recognized by 49.1% of boys and 52.8% of girls, followed by “imbalanced diet” (39.3% of boys, 43.6% of girls), “academic pressure” (31.3% of boys, 35.9% of girls), “insufficient PA” (30.8% of boys, 36.9% of girls) and being “nervous” (22.9% of boys, 27.2% of girls). The results suggested that more attention is needed to increase children's sleep time. Parents and schools should pay more attention to the children's sleep time and quality.

Table 5-14 The perceived reasons of causing physical unhealthy

Boys			Girls			Total		
	n	%		n	%		n	%
Insufficient sleep	105	49.1	Insufficient sleep	103	52.8	Insufficient sleep	208	50.9
Imbalanced diet	84	39.3	Imbalanced diet	85	43.6	Imbalanced diet	169	41.3
Academic Pressure	67	31.3	Insufficient PA	72	36.9	Insufficient PA	138	33.7
Insufficient PA	66	30.8	Academic Pressure	70	35.9	Academic Pressure	137	33.5
Nervous	49	22.9	Nervous	53	27.2	Nervous	102	24.9

5.4.7 Family Participation in PA

Table 5-15 shows the education level of parents. Most parents were educated at the secondary-school level, whereas 36.3% of fathers and 29.7% of mothers' education levels were unknown by the children.

Table 5-15 Education level of parent

	Fathers		Mothers	
	n	%	n	%
Primary Education or below	52	12.3	72	17.0
Secondary Education (Form 1 to Form 3)	67	15.8	61	14.4
Secondary Education (Form 4 to Form 7)	76	17.9	89	21.0
Tertiary Education or above	75	17.7	76	17.9
Don't know	154	36.3	126	29.7
Total	424	100.0	424	100.0

Approximately 80% of children reported their father's exercise frequency (i.e., days of exercise weekly), and 84% reported their mother's exercise frequency. According to their response, most of their fathers (25.0%) and mothers (18.6%) had 0 exercises, whereas 31.1% of fathers and 38.7% of mothers exercised 1-3 times weekly. There were only 10.8% and 9.4% of the fathers and mothers doing exercise 7 times or more in a week.

Table 5-16 Parents' frequency of doing exercise per week

	Fathers		Mothers	
Time(s)	n	%	n	%
0	106	25.0	79	18.6
1	51	12.0	56	13.2
2	48	11.3	62	14.6
3	33	7.8	46	10.8
4	22	5.2	31	7.3
5	19	4.5	23	5.4
6	11	2.6	18	4.2
7 or more	46	10.8	40	9.4
Don't know	88	20.8	69	16.3
Total	424	100.0	424	100.0

46.7% of boys and 40% of girls reported engaging in sports activities with the family at least once per week during weekends/holidays, and 24.8% and 28.2% of boys and girls did once or twice per month, respectively. However, 19.6% of boys and 23.6% of girls didn't engage in sports activities with family.

Table 5-17 Frequency of engaging in sports activities with family during weekends/ holidays in the past year

	Boys		Girls		Total	
	n	%	n	%	n	%
Never	42	19.6	46	23.6	88	21.5
At least once per week	100	46.7	78	40.0	178	43.5
Once or twice per month	53	24.8	55	28.2	108	26.4
Every several months	19	8.9	16	8.2	35	8.6
Total	214	100.0	195	100.0	409	100.0

5.4.8 Attitudes towards Electronic Somatosensory Games

58.2% of children reported having experience playing an electronic somatosensory game on sports. A higher proportion of them thought playing these games would make them more interested in sports.

Table 5-18 Electronic somatosensory games

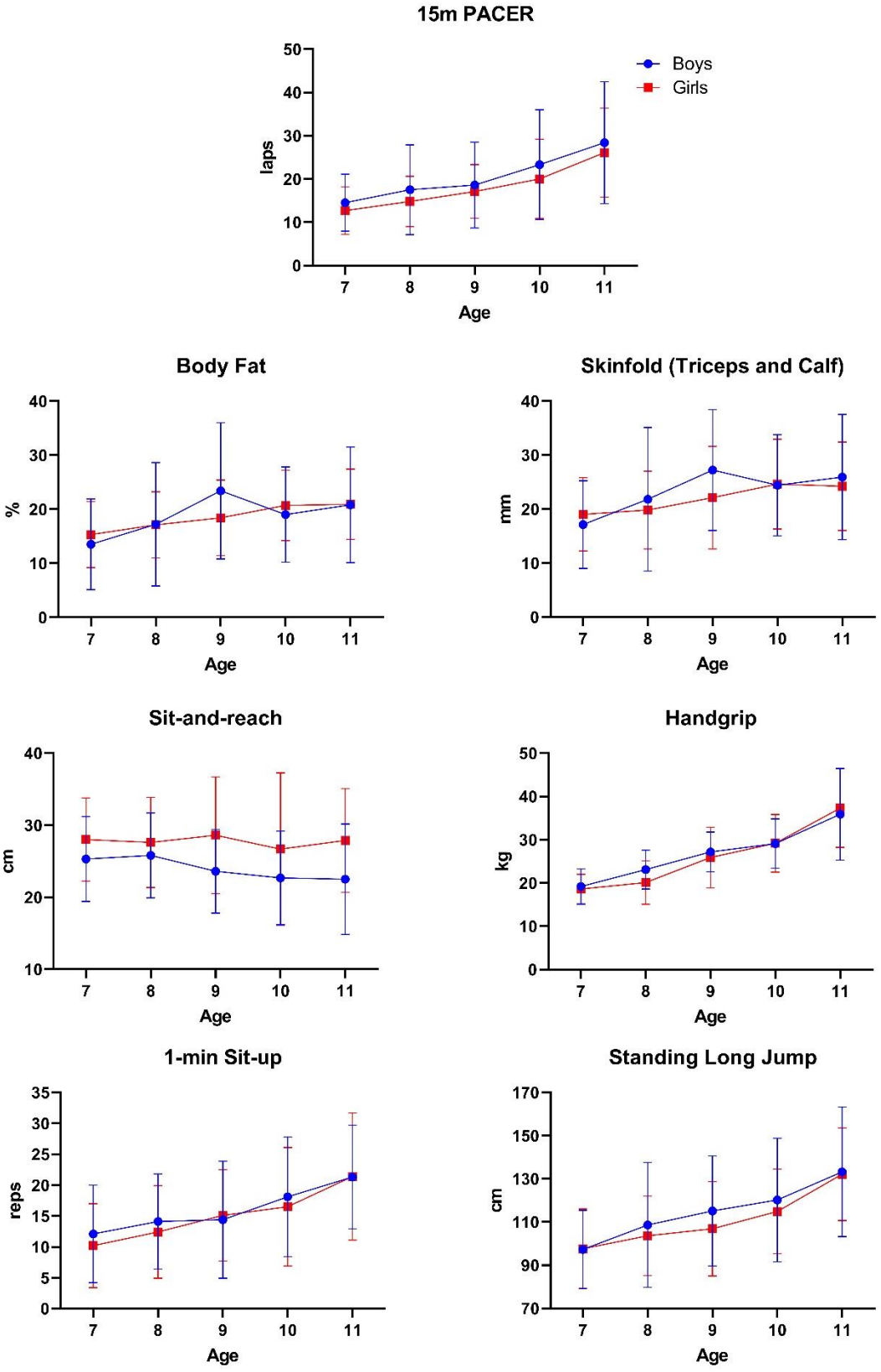
	Boys		Girls		Total	
	n	%	n	%	n	%
Experience in electronic somatosensory games						
Yes	126	58.9	112	57.4	238	58.2
No	88	41.1	83	42.6	171	41.8
Total	214	100.0	195	100.0	409	100.0
Feel more interested in sports after electronic somatosensory games						
Yes	135	63.1	121	62.1	256	62.6
No	79	36.9	74	37.9	153	37.4
Total	214	100.0	195	100.0	409	100.0
Average time of play electronic somatosensory games daily						
None	83	38.8	79	40.5	162	39.6
<1 hour	54	25.2	53	27.2	107	26.2
1 hour	46	21.5	43	22.1	89	21.8
2 hours	15	7.0	9	4.6	24	5.9
≥ 3 hours	16	7.5	11	5.6	27	6.6
Total	214	100.0	195	100.0	409	100.0

5.5 Further Analysis

5.5.1 Effect of Age and Gender on Physical Fitness Test

Overall, an increasing trend was observed in the following fitness parameters with age: 1) 15 PACER, 2) body fat, 3) skinfold (triceps + calf), 4) handgrip strength, 5) 1-minute sit-up, and 6) standing long jump. No substantial change was observed for the sit-and-reach performance across the ages.

Figure 5.1 Trend of physical fitness across ages



The independent sample t-test was used to compare the physical fitness between boys and girls. The results are summarized in Table 5-19. Boys perform significantly better in 15 meters PACER test and standing long jump than girls. Girls have significantly greater sit-and-reach performance compared with boys.

Table 5-19 Comparison of physical fitness between boys and girls

	Boy Mean (SD)	Girl Mean (SD)	p-value
Body Fat (%)	18.7 (10.6)	18.8 (6.7)	0.88
Skinfold - Triceps (mm)	11.7 (5.4)	11.2 (4.1)	0.28
Skinfold - Calf (mm)	11.4 (6.0)	11.2 (4.7)	0.66
Skinfold – Total (mm)	23.1 (11.0)	22.4 (8.3)	0.44
15m PACER (lap)	21.1 (12.6)	18.1 (8.9)	0.005**
Sit-and-reach (cm)	23.8 (6.6)	27.8 (7.9)	<0.001**
Handgrip (kg)	27.7 (9.3)	26.5 (9.3)	0.20
1-min Sit-up (rep)	16.4 (9.5)	15.2 (9.1)	0.20
Standing Long Jump (cm)	117.0 (29.7)	111.1 (23.6)	0.02*

**Statistically significant at $p<0.01$
*Statistically significant at $p<0.05$

5.5.2 Influence of WHO PA level on Physical Fitness

The independent sample t-test was used to compare differences in physical fitness performance between the children who met the WHO PA recommendation (weekly MVPA reached 60 minutes ×7 days = 420 minutes or 1680 MET-minutes) and did not meet the WHO PA recommendation. Our results found that boys with sufficient PA level perform significantly better in 1) 15 PACER, 2) handgrip, 3) 1-minute sit-up, and 4) standing long jump than those with insufficient PA level.

Table 5-20 PA sufficiency on physical fitness

	Boys			Girls		
PA sufficiency	Met the WHO PA level	Below the WHO PA level	p-value	Met the WHO PA level	Below the WHO PA level	p-value
Body Fat (%)	18.3 (9.5)	18.8 (11.5)	0.77	18.8 (6.0)	18.6 (6.9)	0.91
Skinfold - Triceps (mm)	11.3 (4.6)	12.1 (5.9)	0.25	11.4 (4.0)	11.1 (4.2)	0.68
Skinfold - Calf (mm)	11.1 (5.6)	11.8 (6.3)	0.39	11.6 (4.9)	11.0 (4.7)	0.51
Skinfold - Total (mm)	22.4 (9.8)	24.0 (12.0)	0.30	22.9 (8.1)	22.1 (8.4)	0.56
15m PACER (lap)	25.3 (14.0)	17.6 (9.5)	<0.001**	19.1 (8.9)	18.1 (9.0)	0.53
Sit and Reach (cm)	23.9 (6.2)	23.6 (6.9)	0.77	27.3 (8.4)	28.0 (7.9)	0.65
Handgrip –Both Hands (kg)	29.5 (9.5)	25.9 (8.0)	0.004*	27.1 (11.5)	26.3 (8.6)	0.65
1-min Sit-up (rep)	18.3 (9.4)	15.1 (9.1)	0.016*	15.0 (9.2)	15.4 (9.2)	0.85
Standing Long Jump (cm)	123.0 (28.0)	110.9 (29.0)	0.002**	117.8 (25.5)	110.2 (22.6)	0.78

**Statistically significant at p<0.01

*Statistically significant at p<0.05

5.5.3 Effect of Sleeping Duration on Physical Fitness Parameters

One-way ANOVA was used to compare sleep hours and physical fitness. Overall, no significant ($p<0.05$) between groups effects were detected between the sleep hours and all physical fitness parameters.

Table 5-21 Comparison between the physical fitness parameters and sleeping hours

	< 6 hours	6-8 hours	> 8 hours	Between groups effect
Body Fat (%)	18.6 (11.1)	18.7 (8.5)	18.7 (9.2)	p=0.99
Skinfold - Total (mm)	23.0 (11.2)	22.5 (9.4)	23.1 (10.1)	p=0.83
15m PACER (lap)	16.8 (7.7)	20.7 (11.5)	19.3 (10.7)	p=0.19
Sit and Reach (cm)	26.1 (5.8)	25.8 (8.0)	25.6 (7.3)	p=0.94
Handgrip –Both Hands (kg)	24.6 (7.8)	28.3 (10.0)	26.4 (8.4)	p=0.05
1-min Sit-up (rep)	13.8 (8.1)	16.5 (9.9)	15.5 (9.0)	p=0.34
Standing Long Jump (cm)	104.3 (28.9)	115.4 (26.7)	114.2 (26.2)	p=0.16

5.5.4 Physical Fitness and Time Spent on Electronic Screens on School Days

An Independent sample t-test was used to investigate the differences in physical fitness amongst groups of children with various time spent on electronic screens for leisure during school days.

Table 5-22 Comparison between physical fitness and electronic screen time

	Boys			Girls		
	Electronic Screen time		p-value	Electronic Screen time		p-value
	≤2 hours (n=181)	>2 hours (n=33)		≤2 hours (n=168)	>2 hours (n=27)	
Body Fat (%)	18.6 (10.8)	20.0 (10.4)	0.48	17.9 (6.2)	22.9 (8.2)	0.005**
Total skinfold (mm)	23.1 (10.9)	25.2 (12.3)	0.33	21.6 (7.9)	25.8 (9.6)	0.013*
15m PACER (lap)	21.9 (12.8)	16.3 (7.7)	0.001**	18.2 (8.7)	18.7 (10.0)	0.77
Sit-and-reach (cm)	23.7 (6.3)	24.0 (7.9)	0.83	27.7 (7.7)	28.5 (9.6)	0.64
Handgrip (kg)	27.5 (9.0)	28.6 (8.9)	0.52	25.7 (9.0)	31.3 (9.1)	0.003**
1-min Sit-up (rep)	16.2 (9.6)	18.0 (8.2)	0.31	15.4 (8.6)	13.9 (12.2)	0.53
Standing Long Jump (cm)	115.8 (29.7)	119.6 (26.1)	0.49	111.4 (22.8)	113.2 (26.9)	0.71

** Statistically significant at $p<0.01$
* Statistically significant at $p<0.05$

5.5.5 The Correlation Between Physical Fitness Parameters

The Pearson product-moment correlation coefficient was used to compare the correlation between physical fitness parameters. The correlation coefficient (r) between physical fitness parameters were displayed in the table below. Overall, the body fatness parameters (i.e., total body fat and total skinfold) were negatively correlated with the performance of 1) 15m PACER and 2) handgrip strength, and 15-meter PACER performance was positively correlated with the muscular fitness (i.e., handgrip, 1-min sit-up, and standing long jump) for both genders. For boys, body fatness parameters (i.e., total body fat and total skinfold) were negatively correlated with the performance of 1-min sit-up and standing long jump.

Table 5-23 Correlation between physical fitness parameters

Boys	Body fat	Skinfold - Total	15m PACER	Sit-and-reach	Handgrip	1-min Sit-up
Body Fat (%)						
Skinfold – Total (mm)	0.92**					
15m PACER (lap)	-0.23**	-0.27**				
Sit-and-reach (cm)	-0.10	-0.19**	0.12			
Handgrip - both hands (kg)	0.35**	0.31**	0.47**	0.03		
1-min Sit-up (reps)	-0.21**	-0.19**	0.53**	0.11	0.34**	
Standing Long Jump (cm)	-0.19**	-0.22**	0.59**	0.12	0.51**	0.46**
Girls						
Body Fat (%)						
Skinfold – Total (mm)	0.83**					
15m PACER (lap)	-0.15*	-0.15				
Sit-and-reach (cm)	0.04	0.05	0.20**			
Handgrip - both hands (kg)	0.41**	0.32**	0.53**	0.14*		
1-min Sit-up (reps)	-0.03	-0.06	0.61**	0.11	0.47**	
Standing Long Jump (cm)	-0.05	-0.07	0.60**	0.23**	0.57**	0.52**

** Statistically significant at $p<0.01$

* Statistically significant at $p<0.05$

5.5.6 Influence of family exercise participation on the children's PA level

One-way ANOVA was used to investigate the influence of family factors on children's physical activity levels. Our results revealed that the children's fathers who had more than 6 exercise sessions weekly were significantly more active compared with the children's fathers who have no exercise. The one-way ANOVA detected a significant between-group effect in the mother's exercise frequency. However, the post-hoc analysis did not reach statistical significance across four levels of the mother's exercise frequency. Furthermore, children who exercise with their family 1-2 sessions monthly and at least once weekly have significantly greater MVPA weekly volume than those who did not exercise with their family.

Table 5-24 Influence of family exercise participation on the children's PA level

	N	MVPA of children, MET-min/wk	Between group effect
Father's exercise frequency			
None	103	1312.4 (1119.6)	p=0.008**
1-2 sessions weekly	93	1613.4 (1110.0)	
3-5 sessions weekly	69	1739.7 (1260.9)	
≥ 6 sessions weekly	54	1973.1 (1394.4)$^{+}$	
Mother's exercise frequency			
None	74	1355.6 (1229.3)	p=0.035*
1-2 sessions weekly	112	1416.8 (1051.0)	
3-5 sessions weekly	95	1768.0 (1176.3)	
≥ 6 sessions weekly	55	1762.4 (1262.0)	
Frequency of family-based exercise			
None	86	1144.5 (1082.9)	p=0.007**
1 session per several months	35	1596.2 (1108.8)	
1-2 sessions monthly	108	1634.2 (1421.4)$^{+}$	
At least 1 session weekly	174	1714.8 (1282.7)$^{+}$	

$^{+}$ Significantly different with the "None" participation group (detected by the Bonferroni adjusted multiple group comparison).

MET: metabolic equivalent of task; one MET was equivalent to the energy expenditure sitting in a quiet room.

**Statistical significance at $p<0.01$

*Statistical significance at $p<0.05$

5.6 Conclusions and Recommendations

66.3% of primary school children did not meet the WHO PA recommendation (i.e., an average of ≥ 60 minutes MVPA per day across the week)(Bull et al., 2020), but only 15.7% of primary school children thought they did not have sufficient physical activity. Therefore, there is a large discrepancy between the perception of PA participation and their actual PA behavior. We recommended that stakeholders work together to 1) promote the WHO PA recommendations to children and parents and 2) educate the parents and teachers on the strategies of skills to evaluate and monitor the daily PA level of children. The current curriculum only provides two sessions of PE lessons (i.e., 64 minutes weekly) for primary school children, which largely deviates from the WHO-recommended weekly PA volume (i.e., 60 minutes × 7 days per week). Therefore, additional after-school sports or exercise activities are needed for children. We suggested that stakeholders should organize more sports activities based on the children's favorite sports apart from the PE lesson, such as organizing ball game events, rope skipping workouts, and running events.

33.0% of children were recognized as overweight (including obesity) by the Body Mass Index (BMI) for age-gender reference criteria from the World Health Organization (WHO), and 18.2% of children were overweight (including obesity) according to the Hong Kong Weight-for-Height Growth Chart. Compared with the skinfold data collected in 2012, the subcutaneous fat was reduced in the current survey. Since 22.4% of primary school children perceived that an imbalanced diet is a cause of physical unhealthy, stakeholders should pay more attention to the food intake.

Overall, there were 225 boys and 201 girls included in the analysis. The average physical fitness performance among children were: 1) 15m PACER = 19.7±11.1 laps, 2) sit-and-reach = 25.7±7.5 cm, 3) handgrip strength (both hands) = 27.1±9.3 kg, 4) 1-min sit-up = 15.8±9.3 repetitions, 5) standing long jump = 114.2±27.1 cm, and 6) body fat = 18.7±9.0 %. Our results found that boys with sufficient PA level perform significantly better in 1) 15m PACER, 2) handgrip, 3) 1-minute sit-up, and 4) standing long jump than those with insufficient PA level. Our further analysis indicated that girls were more flexible, and boys performed better in cardiovascular and muscular

power. Most of the physical fitness parameters went up through the ages, except sit-and-reach performance.

It is important to continuously monitor the children's physical fitness (i.e., cardiovascular fitness, muscular strength, muscular endurance, flexibility, and body composition). We recommended that share the norm of physical fitness via the designated website and mobile application.

The top three barriers to participation in PA were: 1) bad weather (60.4%), 2) being busy with homework (40.8%), and 3) feeling tired (34.7%). We suggested several strategies for overcoming these obstacles to PA: 1) provide parents and children with information on home exercise; 2) emphasize (優質課業) to schools rather than its quantity; and 3) continuously promote sufficient sleep time (i.e., ≥ 9 hours).

Parent involvement was an important factor influencing the PA participation of children. More family-based exercise events should be organized after school, over the weekends, and on holidays. Promoting PA, sports, and physical fitness reward programs among children could be a feasible approach to encourage their participation in sports.

6 Results of Adolescents (Age: 12-16)

6.1 Summary of the Chapter

a) 50.7% of adolescents indicated that their PA level did not meet the WHO recommendation, which was better than the prevalence (i.e., 66.3%) among children aged 7-11. However, only 34.3% of secondary school adolescents perceived insufficient PA levels.

b) 27.7% of adolescents were identified as overweight (including obese) by the WHO BMI for age-gender growth chart, and 23.2% were recognized as overweight (including obese) by the Hong Kong weight-to-height growth chart standard.

c) Overall, there were 180 boys and 170 girls included in the analysis. The average physical fitness performance among adolescents were: 1) 15m PACER = 37.2±20.1 ml/kg/min, 2) sit-and-reach = 26.9±10.1 cm, 3) standing long jump = 150.3 ± 35.4 cm, 4) 1-min sit-up = 24.2 ±11.7 repetitions, 6) push-up = 10.3±10.3 repetitions, and 6) body fat = 21.8±9.7%.

d) Schools and parents should educate adolescents on monitoring their physical fitness (i.e., cardiovascular fitness, muscular strength, endurance, flexibility, and body composition). The norms of physical fitness should be provided to adolescents after each semester of a fitness test in the PE curriculum. The norms of physical fitness should be assessable for adolescents. We suggest stakeholders provide those norms on their website or mobile application.

e) For boys, body adiposity was negatively correlated with cardiovascular fitness and all muscular fitness parameters, while cardiovascular fitness was positively correlated with lower body flexibility and all muscular fitness parameters. For girls, body adiposity was negatively associated with cardiovascular fitness and muscular power, while cardiovascular fitness was positively correlated with lower body flexibility and all muscular fitness parameters.

f) The top 5 favorite sports for adolescents were 1) ball games (61.7%), 2) swimming (28.0%), 3) skating/roller skating (14.6%), 4) dance (14.3%), and 5) rope skipping (12.3%). We suggested that stakeholders organize more sports courses and events based on the abovementioned top 5 favorite sports. We suggested that stakeholders organize more of those top 5 favorite sports for

adolescents to improve their PA level during extra-curriculum time. Stakeholders should organize more exercise events to involve parents and adolescents during the holidays and weekends. Reward schemes should be continuously promoted to motivate adolescents to engage in sports training systematically.

g) Major obstacles for secondary school adolescents to refrain from participation in PA: 1) PA causes muscle soreness (45.0%), 2) insufficient time (42.0%), and 3) bad weather conditions (41.4%). We recommended several strategies to tackle those barriers to PA: 1) education adolescents for basic post-exercise recovery knowledge (i.e., appropriate cool-down exercise, self-myofascial release, and sufficient sleep), 2) emphasize the quality of homework (優質課業), rather than quantality, and 3) example for home-based exercises for adolescents and parents should be posted in the designated website, mobile application, and social media.

6.2 Data extraction

In total, 815 participants from the EDB data pool finished the complete fitness test and questionnaire survey set. Three sample selections, each with 350 data which included 180 males and 170 females, were extracted randomly from the data pool. Comparisons on descriptive results of key factors showed a minimum difference between the three selections and the data pool. The difference ranged from 0.12% to 6.39% and 0.12% to 4.85% for boys and girls, respectively.

6.3 Demographic Distribution

There were 36 males and 34 females in each age stratum. The mean age was 14 years old. The 350 participants were from 16 schools located in all four major regions in HK, i.e., HK Island, Kowloon, NT East, and NT West.

6.4 Descriptive Statistics on Physical Fitness

The descriptive statistics of physical fitness are presented in Table 6-1.

Table 6-1 Descriptive statistics on physical fitness

	Boys			Girls			Total		
	n	Mean	*SD*	n	Mean	*SD*	n	Mean	*SD*
Body composition									
Height (cm)	180	165.9	8.9	170	158.4	6.2	350	162.3	8.5
Weight (kg)	180	57.8	15.4	170	51.1	10.1	350	54.5	13.5
BMI (kg/m^2)	180	20.8	4.6	170	20.3	3.4	350	20.6	4.1
Body Fat (%)	180	17.3	9.9	170	26.6	6.8	350	21.8	9.7
Skinfold - Triceps (mm)	180	13.8	7.0	170	17.0	5.0	350	15.4	6.3
Skinfold - Calf (mm)	180	13.5	7.0	168	16.4	6.3	348	14.9	6.9
Skinfold - Total (mm)	180	27.3	13.8	168	33.4	10.6	348	30.2	12.7
Cardiovascular fitness									
15m PACER (lap)	180	46.7	21.5	170	27.1	12.0	350	37.2	20.1
VO_{2max} (ml/min/kg)	180	41.5	5.1	170	37.1	3.5	350	39.4	4.9
9-min Run / Walk (m)	180	1392.2	266.4	170	1235.8	194.5	350	1316.3	246.7
Flexibility									
Sit-and-reach (cm)	180	23.1	8.7	170	31.1	9.8	350	26.9	10.1
Muscular Fitness									
Standing Long Jump (cm)	180	167.7	35.5	170	131.9	24.2	350	150.3	35.4
1-min Sit-up (rep)	180	28.4	9.3	170	19.9	12.3	350	24.3	11.7
Push-up (rep)	180	11.2	11.0	170	9.5	9.4	350	10.3	10.3

6.4.1 Body Composition

Boys' total body fat percentage was 17.3%, and girls' was 26.6%. Compared with the data collected in 2012 (age: 13-19 years), both boys (2012: 16.3%) and girls (2012: 23.5%) had higher body fat percentages. Both boys (27.3 mm) and girls (33.9 mm) showed more subcutaneous fat than the total skinfold value collected in 2012.

6.4.2 Cardiovascular Fitness

The following equation calculated the maximal oxygen consumption (VO_{2max}) value: VO_{2max} = 31.025 + 3.238(speed corresponding to the 15m PACER stage) – 3.248(age) + 0.1536(speed corresponding to the 15m PACER stage)(age) (Léger et al., 1988). Compared with the 2012 survey, the 15m PACER performance increased for boys (2012: 40.8 laps vs. present: 46.7 laps) and girls (2012: 22.0 laps vs. present: 27.1 laps).

6.4.3 Flexibility

Girls (31.1 cm) were more flexible than boys (23.1 cm) in the Sit and Reach test.

6.4.4 Muscular Fitness

Boys performed better in standing long jump, 1-min sit-up and push-up than the girls. Compared with the 2012 data, the muscular endurance and strength were dropped among boys (sit up: 2012 = 29.6 reps vs. present 28.4 reps; push-up: 2012 = 12.3 reps vs. present = 11.2 reps), the sit-up performance of girls (2012 = 22.3 reps vs. present = 19.9 reps) was decreased, and the push-up performance (2012 6.4 reps vs. present = 9.5 reps) was improved for girls. The muscular power was reduced for boys (long jump 2012: 178.9 cm vs. present: 167.7 cm) and girls (long jump 2012: 133.1 cm vs. present: 131.9 cm).

6.4.5 Prevalence of Overweight and Obesity

27.7% of adolescents were recognized as overweight and obese by the Body Mass Index (BMI) for age-gender reference criteria from the World Health Organization (WHO). 23.2% of adolescents were overweight (including obesity) according to the Hong Kong Weight-for-Height Growth Chart.

Table 6-2 Prevalence of overweight and obesity

	Boys		Girls		Total	
	n	%	n	%	n	%
The WHO BMI for Age-Gender Growth Standard						
Severe Thinness	3	1.7	0	0	3	0.9
Thinness	10	5.6	5	2.9	15	4.3
Normal	108	60.0	127	74.7	235	67.1
Overweight	33	18.3	27	15.9	60	17.1
Obesity	26	14.4	11	6.5	37	10.6
Total	180	100.0	170	100.0	350	100.0
Hong Kong Weight-for-Height Growth Chart						
Non-overweight	118	74.2	121	79.6	239	76.8
Overweight (including obesity)	41	25.8	31	20.4	72	23.2
Total	159	100.0	152	100.0	311	100.0

The WHO Child Growth Standard (World_Health_Organization, 2006):
Severe Thinness is defined as BMI-for-age less than 3 standard deviations from the WHO Growth Reference median.
Thinness is defined as BMI-for-age less than 2 standard deviations from the WHO Growth Reference median.
Overweight is defined as BMI-for-age greater than 1 standard deviation from the WHO Growth Reference median.
Obesity is defined as BMI-for-age greater than 2 standard deviations above the WHO Growth Reference median.

Hong Kong weight-to-height growth chart (Leung et al., 1996):
Overweight (including obesity) is defined as body weight >120% of the median weight-for-height for boys with height between 55 to 175 cm and girls with height between 55 to 165 cm.

6.5 Descriptive Statistics on the Questionnaire Survey

6.5.1 Physical Activity

50.7% of adolescents did not meet the WHO recommended level of PA, which was better than the prevalence (i.e., 66.3%) among children aged 7-11. However, we found that only 34.4% of secondary school adolescents perceived insufficient PA levels. On the other hand, 27.8% of boys and 43.8% of girls did not have extra sports training in an average week, apart from PE classes. Overall, boys performed an average of 2244.3 MET-min of MVPA weekly, and girls performed an average of 1947.7 MET-min of MVPA per week.

Table 6-3 Descriptive statistics on the self-reported physical activity

	Boys		Girls		Total	
	n	%	n	%	n	%
Met the WHO recommended PA level						
Yes	91	52.0	77	46.4	168	49.3
No	84	48.0	89	53.6	173	50.7
Self-perceived sufficiency on PA						
Very sufficient	33	18.3	15	8.8	48	13.7
Sufficient	41	22.8	26	15.3	67	19.1
Average	57	31.7	58	34.1	115	32.9
Insufficient	36	20.0	53	31.2	89	25.4
Very insufficient	13	7.2	18	10.6	31	8.9
Total	180	100.0	170	100.0	350	100.0
Days participated in extra sports training in a week on average						
None	50	27.8	74	43.8	124	35.5
1-2 days	67	37.2	65	38.5	132	37.8
3-4 days	43	23.9	23	13.6	66	18.9
5-6 days	9	5.0	5	3.0	14	4.0
Everyday	11	6.1	2	1.2	13	3.7
Total	180	100.0	169	100.0	349	100.0
		Mean (SD)		Mean (SD)		Mean (SD)
Weekly volume of MVPA						
Total MVPA, MET-min/wk	175	2244.3 (1580.9)	166	1947.7 (1352.1)	341	2099.9 (1479.2)

MET: metabolic equivalent of task; one MET was equivalent to the energy expenditure sitting in a quiet room.

6.5.2 Favorite Sports

Ball games were the most popular, favored by 72.2% of boys and 50.6% of girls, followed by swimming which was reported by 21.7% of boys and 34.7% of girls. Furthermore, a certain proportion of girls mentioned dancing (26.5%) and skating/roller skating (25.9%).

Table 6-4 Statistics on the favorite Sports

Boys			Girls			Total		
	n	%		n	%		n	%
Ball games	130	72.2	Ball games	86	50.6	Ball games	216	61.7
Swimming	39	21.7	Swimming	59	34.7	Swimming	98	28.0
Track and field	22	12.2	Dance	45	26.5	Skating/roller skating	51	14.6
Running (>1500m)	21	11.7	Skating/roller skating	44	25.9	Dance	50	14.3
Rope skipping	14	7.8	Rope skipping	29	17.1	Rope skipping	43	12.3
Wushu	13	7.2	Track and field	20	11.8	Track and field	42	12.0
Skating/roller skating	7	3.9	Gymnastics	13	7.6	Running (>1500m)	30	8.6
Dance	5	2.8	Running (>1500m)	9	5.3	Wushu	20	5.7
Gymnastics	3	1.7	Wushu	7	4.1	Gymnastics	16	4.6

Note: The respondents are allowed to choose up to 3 sports.

6.5.3 Means of Commute to School

Over 60% of boys and girls usually walked to school, followed by 51.7% of boys and 60% of girls taking public transportation. There were also 12.4% of girls using private vehicles to go to school.

Table 6-5 Type of commute to school

Boys			Girls			Total	
	n	%		n	%	N	%
On foot	109	60.6	On foot	108	63.5	On foot	217	62.0
Public transport	93	51.7	Public transport	102	60.0	Public transport	195	55.7
Taxi	12	6.7	Private vehicle	21	12.4	Private vehicle	30	8.6
Cycling	11	6.1	Taxi	11	6.5	Taxi	23	6.6
Private vehicle	9	5.0	School bus	3	1.8	Cycling	12	3.4
School bus	7	3.9	Cycling	1	0.6	School bus	10	2.9

Note: The respondents are allowed to choose up to 3 options.

6.5.4 Non-PA Extra-Curricular Activities

Generally, most adolescents spend 1 to 3 hours on non-PA extra-curricular activities. In the 2012 survey, most students spend less than 1 hour on non-PA extra-curricular activities. Therefore, the time spent on non-PA extra-curricular activity during school days was increased compared with the 2012 results.

Table 6-6 Time spent on academic activity and electronic screen products for leisure purposes

	Boys		Girls		Total		2012
	n	%	n	%	n	%	%
After-school academic activity during school days							
None	16	8.9	7	4.1	23	6.6	42.7
<1 hour	33	18.4	16	9.5	49	14.1	
1 - <2 hours	56	31.3	37	21.9	93	26.7	27.0
2 - <3 hours	33	18.4	46	27.2	79	22.7	16.6
3 - <4 hours	15	8.4	23	13.6	38	10.9	6.3
4 - <5 hours	6	3.4	10	5.9	16	4.6	7.3
5 - <6 hours	3	1.7	10	5.9	13	3.7	
≥ 6 hours	17	9.5	20	11.8	37	10.6	
Total	179	100.0	169	100.0	348	100.0	100.0
Electronic screen for leisure purposes during school days							
None	8	4.4	2	1.2	10	2.9	29.1
<1 hour	17	9.4	5	2.9	22	6.3	
1 - <2 hours	44	24.4	49	28.8	93	26.6	27.4
2 - <3 hours	43	23.9	41	24.1	84	24.0	17.9
3 - <4 hours	22	12.2	31	18.2	53	15.1	11.2
4 - <5 hours	10	5.6	19	11.2	29	8.3	14.5
5 - <6 hours	8	4.4	9	5.3	17	4.9	
≥ 6 hours	28	15.6	14	8.2	42	12.0	
Total	180	100.0	170	100.0	350	100.0	100.0
Academic activity during weekends and holidays							
None	20	11.1	9	5.3	29	8.3	
<1 hour	33	18.3	18	10.7	51	14.6	
1 - <2 hours	54	30.0	42	24.9	96	27.5	
2 - <3 hours	35	19.4	36	21.3	71	20.3	
3 - <4 hours	16	8.9	26	15.4	42	12.0	
4 - <5 hours	5	2.8	16	9.5	21	6.0	
5 - <6 hours	5	2.8	9	5.3	14	4.0	
≥ 6 hours	12	6.7	13	7.7	25	7.2	
Total	180	100.0	169	100.0	349	100.0	

Electronic screen for leisure purposes during weekends and holidays						
None	5	2.8	2	1.2	7	2.0
<1 hour	12	6.7	3	1.8	15	4.3
1 - <2 hours	24	13.4	20	11.8	44	12.6
2 - <3 hours	39	21.8	30	17.6	69	19.8
3 - <4 hours	28	15.6	32	18.8	60	17.2
4 - <5 hours	18	10.1	36	21.2	54	15.5
5 - <6 hours	11	6.1	17	10.0	28	8.0
≥ 6 hours	42	23.5	30	17.6	72	20.6
Total	179	100.0	170	100.0	349	100.0

6.5.5 Reason for PA Participation

The top five important (including very important) reasons for PA participation were: 1) control body weight, 2) maintain good health and physique, 3) cope with daily needs, 4) develop social skills, and 5) sense of pleasure.

Table 6-7 Reason for PA Participation

	Very unimportant	Unimportant	Neutral	Important	Very important	Total	Important & Very important
Total							
Control body weight	3.4	5.2	21.3	35.1	35.1	100.0	78.8
Maintain good health and physique	2.3	2.3	16.6	48.1	30.7	100.0	70.1
Cope with daily needs	2.9	4.6	26.0	48.0	18.6	100.0	67.0
Develop social skills	3.7	6.9	31.4	38.0	20.0	100.0	66.6
Sense of pleasure	2.6	5.7	24.7	42.8	24.1	100.0	64.9
Make friends	2.9	6.6	31.6	38.2	20.7	100.0	64.7
Foster the ability of self-cognition	1.7	5.2	29.2	43.3	20.6	100.0	63.9
Develop sportsmanship	3.2	5.2	26.7	39.1	25.9	100.0	63.1
Develop various PA skills	3.1	5.4	28.3	42.0	21.1	100.0	61.3
Develop a habit of PA participation	3.8	5.8	25.7	45.1	19.7	100.0	58.9
Foster the ability of emotion management	2.9	6.3	29.5	40.7	20.6	100.0	58.0
Enhance self confidence	4.9	5.5	31.0	39.4	19.3	100.0	58.6
Sense of success	4.0	5.8	33.7	38.0	18.4	100.0	56.5

Develop leadership	4.3	9.1	39.1	30.9	16.6	100.0	50.7
Understand others	2.9	9.2	37.2	36.7	14.0	100.0	47.4
Prepare for getting a job	4.9	10.6	41.5	29.8	13.2	100.0	43.0
Boys							
Maintain good health and physique	2.8	2.8	14.5	46.4	33.5	100.0	79.9
Sense of pleasure	2.8	5.1	19.1	45.5	27.5	100.0	73.0
Develop a habit of PA participation	5.1	3.9	20.8	48.9	21.3	100.0	70.2
Control body weight	3.9	4.5	22.3	33.5	35.8	100.0	69.3
Develop various PA skills	4.4	2.8	23.9	40.6	28.3	100.0	68.9
Develop sportsmanship	2.8	3.9	25.0	36.7	31.7	100.0	68.3
Make friends	3.9	5.1	23.6	42.7	24.7	100.0	68.0
Develop social skills	4.4	6.1	21.7	42.2	25.6	100.0	67.8
Foster the ability of self-cognition	2.2	5.0	25.1	42.5	25.1	100.0	67.6
Foster the ability of emotion management	3.4	6.1	22.9	43.6	24.0	100.0	67.6
Enhance self confidence	5.6	3.9	22.5	43.3	24.7	100.0	67.4
Cope with daily needs	4.4	4.4	25.0	42.2	23.9	100.0	66.1
Sense of success	3.9	4.5	29.1	40.2	22.3	100.0	62.6
Understand others	3.9	6.7	31.1	40.0	18.3	100.0	58.3
Prepare for getting a job	4.5	6.1	36.9	35.2	17.3	100.0	52.5

Develop leadership	5.0	6.1	37.2	31.7	20.0	100.0	51.7
Girls							
Maintain good health and physique	1.8	1.8	18.8	50.0	27.6	100.0	77.6
Control body weight	3.0	5.9	20.1	36.7	34.3	100.0	71.0
Cope with daily needs	1.2	4.7	27.1	54.1	12.9	100.0	67.1
Develop sportsmanship	3.6	6.5	28.6	41.7	19.6	100.0	61.3
Sense of pleasure	2.4	6.5	30.6	40.0	20.6	100.0	60.6
Foster the ability of self-cognition	1.2	5.3	33.5	44.1	15.9	100.0	60.0
Develop a habit of PA participation	2.4	7.7	31.0	41.1	17.9	100.0	58.9
Enhance self confidence	4.1	7.1	40.0	35.3	13.5	100.0	57.1
Foster the ability of emotion management	2.4	6.5	36.5	37.6	17.1	100.0	54.7
Make friends	1.8	8.2	40.0	33.5	16.5	100.0	50.0
Sense of success	4.2	7.1	38.7	35.7	14.3	100.0	50.0
Develop various PA skills	1.8	8.2	32.9	43.5	13.5	100.0	48.8
Develop social skills	2.9	7.6	41.8	33.5	14.1	100.0	47.6
Develop leadership	3.5	12.4	41.2	30.0	12.9	100.0	42.9
Understand others	1.8	11.8	43.8	33.1	9.5	100.0	42.6
Prepare for getting a job	5.3	15.3	46.5	24.1	8.8	100.0	37.1

6.5.6 Attitudes on PA Participation

Twelve statements were used to evaluate the adolescent's attitudes toward PA participation. The top five attitudes on PA participation (i.e., agree & totally agree) were: 1) always try my best in participating in PA, 2) Doing PA helps me concentrate, 3) PE lesson is interesting, 4) PA makes me happy, and 5) PA is fun.

Table 6-8 Attitudes on PA participation

	Totally disagree	Disagree	Neutral	Agree	Totally agree	Total	Agree & Totally agree
Total							
Always try my best in participating in PA	2.6	5.7	28.4	49.3	14.0	100.0	63.3
Doing PA helps me concentrate	2.3	6.6	37.8	38.1	15.2	100.0	53.3
PE lesson is interesting	4.0	10.6	34.6	35.1	15.7	100.0	50.9
PA makes me happy	5.7	11.5	32.1	34.1	16.6	100.0	50.7
PA is fun	4.9	13.4	31.1	34.0	16.6	100.0	50.6
Feel good when participating in PA	3.2	8.9	39.3	36.7	12.0	100.0	48.7
PA keeps me energetic	5.7	9.7	38.6	31.7	14.3	100.0	46.0
Participating in PA gives me strong sense of success	8.0	11.4	36.6	27.7	16.3	100.0	44.0
Participating in PA makes me relaxed	5.4	16.0	34.6	30.0	14.0	100.0	44.0
I like being physically active	4.9	12.0	39.1	31.7	12.3	100.0	44.0
PA facilitates my interest in continuing to be involved in it	5.7	14.0	36.9	28.9	14.6	100.0	43.4
Rather do something else than PA	10.6	22.6	30.6	23.1	13.1	100.0	36.3

Boys							
Always try my best to participate in PA	1.7	4.4	27.2	50.0	16.7	100.0	66.7
Doing PA helps me concentrate	2.8	3.9	32.8	43.9	16.7	100.0	60.6
PE lesson is interesting	3.3	6.1	30.6	40.6	19.4	100.0	60.0
PA makes me happy	6.1	6.7	27.8	37.8	21.7	100.0	59.4
PA is fun	4.4	10.0	27.8	33.9	23.9	100.0	57.8
Feel good when participating in PA	3.3	6.1	34.4	41.7	14.4	100.0	56.1
PA facilitates my interest in continuing to be involved in it	5.6	7.8	31.1	36.1	19.4	100.0	55.6
PA keeps me energetic	6.1	7.8	31.7	37.2	17.2	100.0	54.4
I like being physically active	3.9	7.8	35.6	36.1	16.7	100.0	52.8
Participating in PA makes me relaxed	3.9	11.7	32.2	34.4	17.8	100.0	52.2
Participating in PA gives me a strong sense of success	7.2	8.9	33.3	29.4	21.1	100.0	50.6
Rather do something else than PA	15.0	23.9	31.1	18.3	11.7	100.0	30.0
Girls							
PA makes me happy	5.3	16.6	36.7	30.2	11.2	100.0	59.8
Doing PA helps me concentrate	1.8	9.5	43.2	32.0	13.6	100.0	45.6
PA is fun	5.3	17.1	34.7	34.1	8.8	100.0	42.9
Rather do something else than PA	5.9	21.2	30.0	28.2	14.7	100.0	42.9
Always try my best to participate in PA	3.6	7.1	29.6	48.5	11.2	100.0	41.4

PE lesson is interesting	4.7	15.3	38.8	29.4	11.8	100.0	41.2
Feel good when participating in PA	3.0	11.8	44.4	31.4	9.5	100.0	40.8
Participating in PA gives me a strong sense of success	8.8	14.1	40.0	25.9	11.2	100.0	37.1
PA keeps me energetic	5.3	11.8	45.9	25.9	11.2	100.0	37.1
I like being physically active	5.9	16.5	42.9	27.1	7.6	100.0	34.7
Participating in PA makes me relaxed	7.1	20.6	37.1	25.3	10.0	100.0	35.3
PA facilitates my interest in continuing to be involved in it	5.9	20.6	42.9	21.2	9.4	100.0	30.6

6.5.7 Factors that hindered the PA participation

The top reasons that hindered the PA participation (i.e., Important/very important) were: 1) Muscle soreness, 2) Lack of time, 3) Too tired, 4) Bad weather condition, and 5) Feel hot and sweating.

Table 6-9 Factors that hindered the PA participation

	No	Very unimportant	Unimportant	Neutral	Important	Very important	Total	Important/ very important
Total								
Muscle soreness	19.8	3.4	8.3	29.2	22.9	16.3	100.0	45.0
Lack of time	22.0	3.1	4.9	28.6	23.1	18.3	100.0	42.0
Bad weather	19.5	4.0	6.0	28.4	29.3	12.6	100.0	41.4
Too tired	19.3	2.9	5.8	27.1	27.1	17.9	100.0	41.1
Feel hot and sweating	21.8	4.9	10.9	27.0	24.4	10.9	100.0	39.3
Uncomfortable	25.4	4.3	5.5	30.8	22.2	11.8	100.0	35.3
Laziness	23.7	4.0	4.0	27.1	18.9	22.3	100.0	34.0
No peer participation	24.9	4.6	8.4	29.8	19.9	12.4	100.0	34.0
Boring	23.4	2.3	4.9	47.4	15.4	6.6	100.0	32.4
No appropriate venue nearby	29.3	4.1	8.1	29.0	20.9	8.7	100.0	29.6
PA is monotonous	32.2	4.9	6.0	33.6	14.9	8.3	100.0	23.3

Too many rules to follow	34.2	4.6	8.9	34.2	10.9	7.2	100.0	22.9
Affects academic results	35.3	3.7	8.0	33.6	10.6	8.6	100.0	22.0
Health issues	32.0	2.9	3.7	27.4	22.5	11.5	100.0	19.3
Body incoordination during PA	32.7	4.0	7.4	33.0	16.0	6.9	100.0	18.1
PA affects social life	40.1	2.9	8.6	33.0	10.0	5.4	100.0	15.5
Other	84.0	0.9	1.8	6.6	2.4	4.2	100.0	11.3
Discouraged by family	48.3	4.3	10.1	26.0	8.4	2.9	100.0	6.6
Boys								
Bad weather	17.9	5.6	5.0	30.2	24.0	17.3	100.0	41.3
Too tired	22.5	5.1	5.6	28.1	23.6	15.2	100.0	38.8
Muscle soreness	21.8	4.5	7.3	31.3	21.2	14.0	100.0	35.2
Laziness	27.8	5.6	5.0	28.3	15.0	18.3	100.0	33.3
Lack of time	26.1	3.9	4.4	32.2	21.1	12.2	100.0	33.3
Feel hot and sweating	20.8	6.7	11.2	30.9	20.2	10.1	100.0	30.3
Health issues	32.8	3.9	3.9	30.6	18.9	10.0	100.0	28.9
No peer participation	26.0	6.2	7.9	32.8	17.5	9.6	100.0	27.1
No appropriate venue nearby	30.7	5.6	7.3	29.6	17.3	9.5	100.0	26.8
Uncomfortable	28.5	5.0	6.7	35.8	15.6	8.4	100.0	24.0
Boring	25.0	3.3	6.1	42.2	14.4	8.9	100.0	23.3

Body incoordination during PA	31.8	4.5	8.4	35.2	13.4	6.7	100.0	20.1
PA is monotonous	34.4	7.2	5.6	32.8	9.4	10.6	100.0	20.0
PA affects social life	37.4	3.9	6.7	34.1	8.9	8.9	100.0	17.9
Too many rules to follow	32.6	6.7	7.3	36.0	8.4	9.0	100.0	17.4
Affects academic results	37.6	4.5	7.9	34.8	7.9	7.3	100.0	15.2
Discouraged by family	44.9	6.7	8.4	28.1	7.9	3.9	100.0	11.8
Other	77.7	1.7	3.4	9.1	3.4	4.6	100.0	8.0
Girls								
Too tired	16.0	0.6	5.9	26.0	30.8	20.7	100.0	51.5
Lack of time	17.6	2.4	5.3	24.7	25.3	24.7	100.0	50.0
Laziness	19.4	2.4	2.9	25.9	22.9	26.5	100.0	49.4
Uncomfortable	22.0	3.6	4.2	25.6	29.2	15.5	100.0	44.6
Muscle soreness	17.6	2.4	9.4	27.1	24.7	18.8	100.0	43.5
Bad weather	21.3	2.4	7.1	26.6	34.9	7.7	100.0	42.6
Feel hot and sweating	22.9	2.9	10.6	22.9	28.8	11.8	100.0	40.6
Health issues	31.1	1.8	3.6	24.0	26.3	13.2	100.0	39.5
No peer participation	23.7	3.0	8.9	26.6	22.5	15.4	100.0	37.9
No appropriate venue nearby	27.7	2.4	9.0	28.3	24.7	7.8	100.0	32.5
PA is monotonous	29.8	2.4	6.5	34.5	20.8	6.0	100.0	26.8

Body incoordination during PA	33.5	3.5	6.5	30.6	18.8	7.1	100.0	25.9
Affects academic results	32.9	2.9	8.2	32.4	13.5	10.0	100.0	23.5
Boring	21.8	1.2	3.5	52.9	16.5	4.1	100.0	20.6
Too many rules to follow	35.9	2.4	10.6	32.4	13.5	5.3	100.0	18.8
PA affects social life	42.9	1.8	10.6	31.8	11.2	1.8	100.0	12.9
Discouraged by family	51.8	1.8	11.9	23.8	8.9	1.8	100.0	10.7
Other	91.1	0.0	0.0	3.8	1.3	3.8	100.0	5.1

6.5.8 Sleep

Most boys (82.1%) and girls (89.9%) slept less than 9 hours per day. Moreover, 6.7% and 14.8% of them reported less than 5 hours of sleeping duration per day. It was reported by 42.2% of boys and 62.4% of girls that they didn't get sufficient sleep, and only 10% and 3.5% of them regarded their sleep as very sufficient, respectively. Moreover, over half of them perceived the quality of sleep as good. However, 25% of boys and 37.1% of girls reported bad or very bad sleep quality.

Table 6-10 Sleep duration, self-perceived sleep sufficiency, and sleep quality

	Boys		Girls		Total		2012	
	n	%	n	%	n	%	School days (%)	Non-school days (%)
Average sleeping time per day								
>10 hours	10	5.6	1	0.6	11	3.2	7.8	71.5
9-10 hours	22	12.3	16	9.5	38	10.9		
7-8 hours	82	45.8	63	37.3	145	41.7	57.7	24.3
5-6 hours	53	29.6	64	37.9	117	33.6	34.5	4.2
<5 hours	12	6.7	25	14.8	37	10.6		
Total	179	100.0	169	100.0	348	100.0	100.0	100.0
Self-perceived sleep sufficiency								
Definitely sufficient	18	10.0	6	3.5	24	6.9		
Sufficient	86	47.8	58	34.1	144	41.1		
Insufficient	65	36.1	81	47.6	146	41.7		
Definitely insufficient	11	6.1	25	14.7	36	10.3		
Total	180	100.0	170	100.0	350	100.0		
Sleep quality								
Very good	27	15.0	20	11.8	47	13.4	12.9	
Good	108	60.0	87	51.2	195	55.7	42.5	
Bad	38	21.1	50	29.4	88	25.1	36.7	
Very bad	7	3.9	13	7.6	20	5.7	7.9	
Total	**180**	**100.0**	**170**	**100.0**	**350**	**100.0**	**100.0**	

Note: The sleep quality in 2012 was categorized into five levels: very good, good, fair, poor, and very poor. The percentages were re-grouped to fit into the categories in the current survey.

6.5.9 Parents' Participation in PA

Most parents' highest level of education (fathers: 76.7%, mothers: 76.9%) was secondary education. 14% of fathers and 13.7% of mothers attended tertiary education or above.

Table 6-11 Education level of parents

	Father		Mother	
Education level	n	%	n	%
Primary Education or below	30	9.3	31	9.4
Secondary Education (Form 1 to Form 3)	80	24.8	95	28.9
Secondary Education (Form 4 to Form 7)	167	51.9	158	48.0
Tertiary Education or above	45	14.0	45	13.7
Total	322	100.0	329	100.0

Nearly one-quarter of parents (father: 23.7%, mother:24%) didn't take any PA that lasted for at least 30 minutes per week, and 24.3% and 29.7% of them took 1-2 days, respectively. 52% of fathers and 46.3% of mothers engaged at least thrice weekly, and 23.4% and 17.2% did it daily. For the frequency of PA with family, 40% of boys and 38.5% of girls never did so. 41.7% and 46.7% of them did it with family once every few months to once every month. Only 10.3% and 8.9% of them did so at least once per week, respectively.

Table 6-12 Statistics on parents' and family's participation in PA

	Father		Mother	
	n	%	n	%
Days per week of engaging in at least 30 mins of PA				
0 day	78	23.7	81	24.0
1-2 days	80	24.3	100	29.7
3-4 days	65	19.8	69	20.5
5-6 days	29	8.8	29	8.6
Everyday	77	23.4	58	17.2
Total	329	100.0	337	100.0
	Boys		Girls	
How often did you participate in PA with your family in the past year				
Never	70	40.0	65	38.5
Once every few months	45	25.7	62	36.7
Once every month	28	16.0	17	10.1
Once every alternate week	14	8.0	10	5.9
1-2 times a week	12	6.9	9	5.3
3-4 times a week	4	2.3	4	2.4
5-6 times a week	1	0.6	1	0.6
Every day	1	0.6	1	0.6
Total	175	100.0	169	100.0

6.5.10 Engagement in Government-led Fitness or Health activities

Around 57% of the participants joined the "Student Health Service" organized by the Department of Health in the past academic year. When asked whether they would participate in similar fitness survey after five years, 51.6% of the adolescents said "yes".

Table 6-13 Engagement in the Government-led Fitness or Health activities

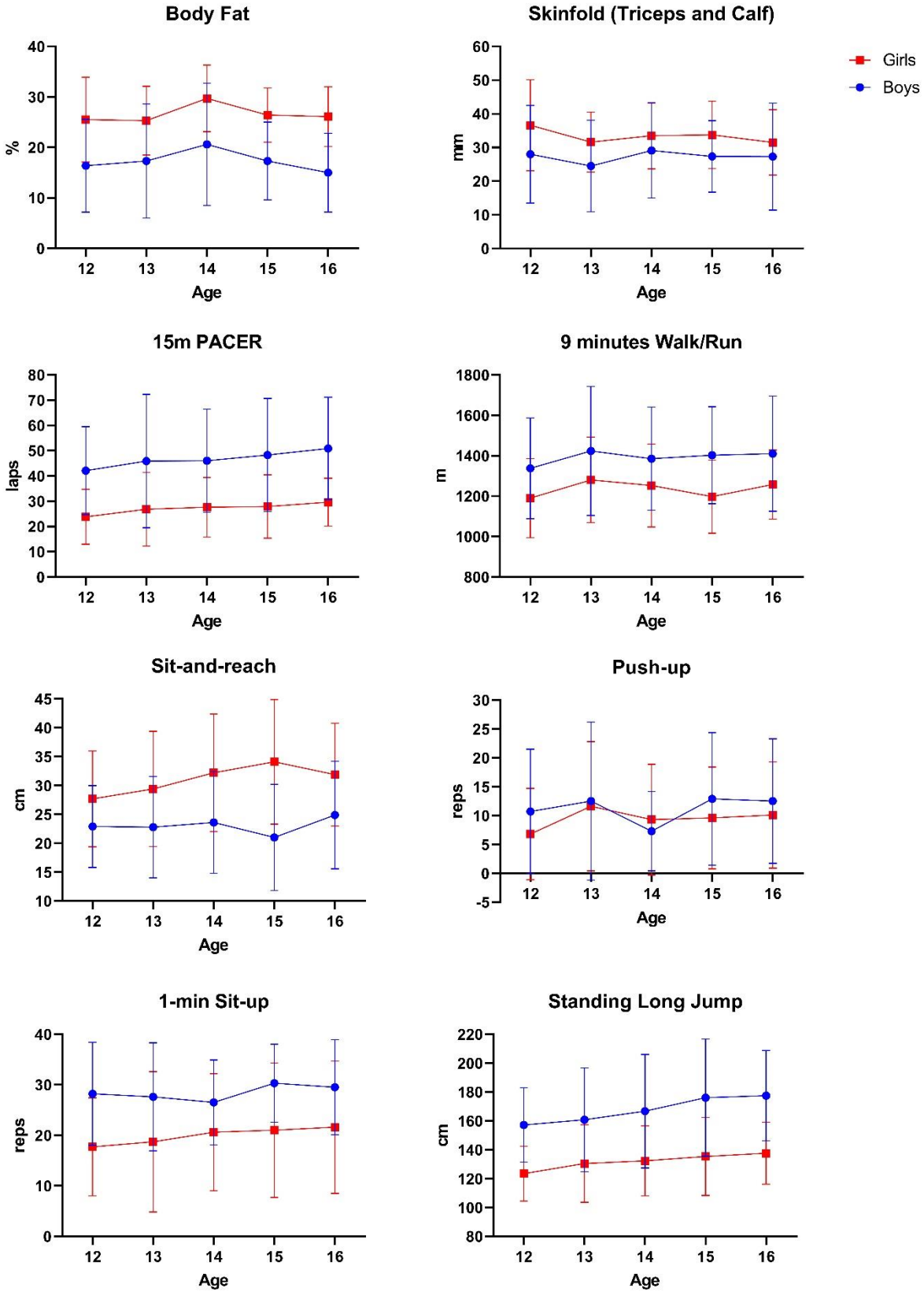
	Boys		Girls		Total	
	n	%	n	%	n	%
Did you join the "Student Health Service" organized by the Department of Health in the past academic year?						
Yes	103	57.2	98	57.6	201	57.4
No	77	42.8	72	42.4	149	42.6
Total	180	100.0	170	100.0	350	100.0
If your school took part in similar fitness survey after five years, would you be willing to engage in it?						
Yes	95	53.7	83	49.4	178	51.6
No	82	46.3	85	50.6	167	48.4
Total	177	100.0	168	100.0	345	100.0

6.6 Further Analysis

6.6.1 Results by Age and Gender on Physical Fitness Test

Overall, an increasing trend was observed in the following fitness parameters with age: 1) 15m PACER and 2) standing long jump. The sit-and-reach performance increased with the age in girls, but no change was observed among boys. No substantial change was observed for the other fitness parameters across the ages.

Figure 6.1. Trend of physical fitness across ages



The independent sample t-test was used to compare the physical fitness between boys and girls. The results are summarized in the below table. Our results showed that boys perform significantly better in 1) 15m PACER, 2) 9-minute run/walk, 3) 1-minute sit-up, and 4) standing long jump. We also found that boys have significantly lower body fat compared with girls. On the other hand, girls have significantly greater sit-and-reach performance compared with boys.

Table 6-14 Comparison of physical fitness between boys and girls

	Boys	Girls	p-value
Body Fat (%)	17.3 (9.9)	26.5 (7.3)	<0.001**
Skinfold - Total (mm)	27.3 (13.8)	33.4 (10.6)	<0.001**
15m PACER (laps)	46.7 (21.5)	27.1 (12.0)	<0.001**
9-min Run/Walk (m)	1392.2 (266.4)	1235.8 (194.5)	<0.001**
Sit-and-reach (cm)	23.1 (8.7)	31.1 (9.8)	<0.001**
Push-up (reps)	11.1 (11.0)	9.5 (9.4)	0.13
1-min Sit-up (reps)	28.4 (9.3)	19.9 (12.3)	<0.001**
Standing Long Jump (cm)	167.7 (35.6)	131.9 (24.2)	<0.001**

**Statistically significant at p<0.01.

6.6.2 Influence of WHO recommended PA level on Physical Fitness

The independent sample t-test was used to compare differences of physical fitness performance between the adolescents who met the WHO PA recommendation (weekly MVPA reached 60×7=420 minutes or 1680 MET-minutes) and did not meet the WHO PA recommendation. Our results found that boys with sufficient PA levels perform significantly better in push up. In contrast, girls with sufficient PA level perform significantly better in 1) 15m PACER, 2) 9-minute run/walk test, and 3) Standing Long Jump.

Table 6-15 The effect of PA sufficiency on physical fitness

	Boys (Mean (SD))			Girls (Mean (SD))		
PA sufficiency	Met the WHO PA level	Below the WHO PA level	p-value	Met the WHO PA level	Below the WHO PA level	p-value
Body Fat (%)	17.3 (10.2)	16.9 (9.2)	0.78	26.5 (7.3)	26.6 (6.1)	0.997
Skinfold - Total (mm)	27.3 (14.9)	27.0 (12.6)	0.87	33.9 (11.1)	32.8 (10.0)	0.51
15m PACER (laps)	44.8 (18.2)	49.0 (24.1)	0.20	24.9 (10.0)	30.0 (13.7)	0.008**
9-min Run/Walk (m)	1379.1 (230.2)	1410.5 (296.4)	0.43	1198.5 (181.0)	1274.4 (200.5)	0.01*
Sit-and-reach (cm)	22.3 (8.4)	24.0 (9.0)	0.18	30.7 (9.1)	31.2 (10.6)	0.78
Push-up (rep)	9.5 (8.3)	12.8 (12.8)	0.04*	8.5 (8.3)	11.0 (10.6)	0.10
1-min Sit-up (rep)	27.3 (8.2)	29.6 (10.2)	0.10	18.5 (12.1)	21.3 (12.6)	0.15
Standing Long Jump (cm)	163.3 (33.8)	173.5 (35.9)	0.06	126.7 (21.9)	137.9 (25.8)	0.003**

**Statistically significant at $p<0.01$

* Statistically significant at $p<0.05$

6.6.3 Effects of Sleeping Duration on Physical Fitness

One-way ANOVA was used to compare the effect of sleep hours on physical fitness. Overall, no significant ($p<0.05$) between groups effects were detected between the sleep hours and most of the fitness parameters.

Table 6-16. Comparison between the physical fitness parameters and sleeping hours

	< 5 hours	5-6 hours	7-8 hours	9-10 hours	>10 hours	Between-group effect
Body Fat (%)	23.3 (10.5)	23.9 (9.6)	20.6 (9.5)	19.4 (9.0)	20.0 (9.7)	p=0.02
Skinfold – Total (mm)	27.7 (12.5)	32.6 (13.4)	29.7 (12.4)	27.4 (10.9)	33.1 (12.7)	p=0.08
15m PACER (lap)	34.7 (15.7)	36.8 (20.4)	37.8 (20.9)	39.2 (21.7)	33.7 (14.9)	p=0.08
9-min run/walk	1282.8 (234.3)	1319.5 (230.2)	1322.1 (255.2)	133.93 (295.3)	1227.3 (177.8)	p=0.64
Sit-and-reach (cm)	31.3 (11.4)	27.5 (10.1)	26.6 (9.4)	24.4 (9.9)$^{+}$	18.9 (8.0)$^{+}$	p=0.002**
Push-up (rep)	11.3 (9.9)	10.0 (9.2)	11.2 (11.8)	9.3 (7.8)	7.7 (9.0)	p=0.46
1-min Sit-up (rep)	24.3 (11.7)	24.2 (12.9)	24.1 (12.1)	24.7 (11.8)	23.8 (9.6)	p=0.93
Standing Long Jump (cm)	146.0 (30.1)	147.1 (35.1)	154.5 (37.9)	147.6 (34.8)	150.0 (19.0)	p=0.44

**Statistically significant at $p<0.01$

$^{+}$Significantly different ($p<0.05$) with the "<5 hours" group detected by the Bonferroni adjusted multiple comparisons

6.6.4 Physical Fitness and Time Spent on Electronic Screens on School Days

An Independent sample t-test was used to investigate the differences in physical fitness amongst groups of adolescents with various time spent on electronic screens for leisure during school days. Our results showed that adolescents with less than 2 hours of electronic screen time have better push-up performance than those who speed more than 2 hours on electronic screens.

Table 6-17 Comparison between physical fitness and electronic screen time

	Electronic Screen time		p-value
	≤2 hours (n=125)	>2 hours (n=225)	
Body Fat (%)	21.3 (9.1)	22.1 (10.0)	0.17
Total skinfold (mm)	30.8 (14.2)	29.9 (11.8)	0.093
15m PACER (lap)	40.4 (21.8)	35.4 (18.9)	0.14
9 min run/walk (m)	1343.7 (242.8)	1301.0 (248.0)	0.90
Sit-and-reach (cm)	27.2 (9.9)	26.8 (10.2)	0.39
Push-up (rep)	11.9 (11.6)	9.5 (9.4)	0.02*
1-min Sit-up (rep)	25.2 (10.6)	23.8 (12.2)	0.08
Standing Long Jump (cm)	151.8 (37.3)	149.4 (34.3)	0.37

* Statistically significant at $p<0.05$

6.6.5 The Correlation Coefficient Between Physical Fitness Parameters

For boys, body adiposity was negatively correlated with cardiovascular fitness and all muscular fitness parameters, while cardiovascular fitness was positively correlated with lower body flexibility and all muscular fitness parameters. For girls, body adiposity was negatively associated with cardiovascular fitness and muscular power, while cardiovascular fitness was positively correlated with lower body flexibility and all muscular fitness parameters.

Table 6-18 Inter-correlation for the physical fitness parameter

	Body fat	Skinfold-total	15m PACER	9-min run/walk	Sit-and-reach	Push-up	1-min Sit-up
Boys							
Skinfold-total	0.83**						
15m PACER	-0.48**	-0.51**					
9-min run/ walk	-0.42**	-0.41**	0.77**				
Sit-and-reach	-0.41	-0.17*	0.31**	0.23**			
Push-up	-0.27**	-0.33**	0.48**	0.42**	0.27**		
1-min Sit-up	-0.32**	-0.39**	0.51**	0.47**	0.22**	0.42**	
Standing Long Jump	-0.42**	-0.41**	0.55**	0.45**	0.45**	0.46**	0.46**
Girls							
Skinfold-total	0.76**						
15m PACER	-0.25**	-0.29**					
9-min run/ walk	-0.28**	-0.29**	0.77**				
Sit-and-reach	-0.05	-0.16*	0.30**	0.18*			
Push-up	-0.15	-0.23**	0.24**	0.24**	0.23**		
1-min Sit-up	-0.10	-0.19*	0.58**	0.47**	0.22**	-0.12	
Standing Long Jump	-0.29**	-0.30**	0.52**	0.42**	0.28**	0.26**	0.34**

** Statistically significant at $p<0.01$

* Statistically significant at $p<0.05$

6.6.6 Frequency of parent exercise and family-based exercise on the adolescent's PA level

One-way ANOVA was used to compare parent and family-based exercise frequency on the adolescent's PA level. Compared to the adolescent's father with no exercise habits, a higher PA level was observed among the adolescent whose father exercised at least five sessions weekly. Furthermore, we found that adolescents who exercise with their family for one session monthly or at least one weekly have significantly higher weekly MVPA than those who did not exercise throughout the week.

Table 6-19 Frequency of parent exercise and family-based exercise on the adolescent's PA level

	N	MVPA of adolescent, MET-min/wk	Between-group effect
Father's weekly exercise frequency			
None	77	1652.8 (1305.6)	p<0.001**
1-4 sessions weekly	137	2096.0 (1480.9)	
≥ 5 sessions weekly	106	2514.1 (1549.8) [a]	
Mother's weekly exercise frequency			
None	78	1793.4 (1422.1)	p=0.10
1-4 sessions weekly	163	2216.3 (1530.2)	
≥ 5 sessions weekly	87	2185.1 (1434.0)	
Frequency of exercise with family			
None	134	1901.4 (1499.1)	p=0.002**
Once every few months	105	1931.1 (1343.5)	
One session monthly	42	2664.6 (1645.0) [a]	
One session biweekly	22	2184.5 (1644.0)	
At least one session weekly	33	2775.0 (1644.0) [a b]	

** Statistically significant at p<0.01

[a] Significantly different (p<0.05) from the group of "None"

[b] Significantly different (p<0.05) from the group of "Once every few months"

6.7 Conclusions and Recommendations

There are 50.7 % of secondary school adolescents failed to meet the WHO-recommended PA level (an average of 60 minutes of MVPA daily across the week) (Bull et al., 2020). The prevalence of physical inactivity was better than the children aged 7-11 (i.e., 66.3%). Furthermore, 35.5% of adolescents did not participate in extra-curricular sports training. We suggested that stakeholders should organize more sports activities based on their favorite sports, such as organizing ball games (1st favorite sport), organizing more swimming (2nd favorite sport) courses, and organizing skating/roller skating (3rd favorite sport) courses. Furthermore, we recommended that the stakeholders should work together to 1) encourage students to participate in at least one sport after school (一人一運動計劃), 2) utilize the available sports facility for students to exercise during lunch hours (e.g., basketball, badminton, or gym), 3) educate the student about the concept of WHO recommended PA level.

Compared to the 2012 survey, boys and girls had greater subcutaneous fat and lower muscular power. Stakeholders should provide more weight management education and exercise programs specific for obesity and muscular fitness training to this generation of adolescents.

Adolescents should have sufficient knowledge to identify their performance in physical fitness (i.e., cardiovascular fitness, muscular strength, muscular endurance, flexibility, and body composition). Stakeholders should work together to support adolescents with poor physical fitness through fitness courses, virtual fitness programs with mobile applications, and school-based fitness workshops. Moreover, the norms of physical fitness tests should be assessable by adolescents. We propose to include these norms on designated websites, mobile applications, and social media.

Major obstacles for secondary school adolescents to refrain from participation in PA: 1) PA causes muscle soreness, 2) lack of time, 3) feeling tired, and 4) bad weather conditions. We suggested a few different approaches to tackle those obstacles to PA: 1) educate adolescents on some fundamental post-exercise recovery knowledge, such as appropriate cool-down exercises, self-myofascial release techniques, and adequate amounts of sleep; 2) focus more on the quality of homework (Chinese: 優質課業), rather than the quantity of homework, and 3) examples of home-based exercises should be posted on the designated website, mobile application, and social media for both adolescents and their parents.

7 Results of Adults (Age: 17-79)

7.1 Summary of the Chapter

a) 53.8% of adults (age: 17-79) did not meet the WHO PA recommendation (i.e., ≥ 150 minutes of MVPA per week or 600 MET-min per week). A high prevalence of physical inactivity was observed among adults aged 20-59 (~60%). Most 20-50 years old adults indicated that their favorite sports were: 1) running/jogging, 2) walking, 3) hiking, or 4) yoga/stretching. To increase the incentive for the physically inactive individual to engage in PA, we recommended that stakeholders organize more exercise activities or workshops based on their favorite type of exercise (e.g., walkathon, running class, and stretching class).

b) For physical fitness, participants in the current survey generally perform better in cardiovascular fitness, muscular strength, muscular endurance, and muscular power than in the 2012 survey. However, participants in the current survey typically have poorer balance than those in 2012. Therefore, additional balance exercises should be provided to this generation of adults.

c) 27.7% of adults had general obesity (defined by BMI > 25), and 31.4% of adults had central obesity (waist circumference ≥ 90 cm for men; ≥80 cm for women). A high prevalence of central obesity was observed among 40-59 years old females and adults aged 60 years old or above (>30.0%). Overall, 25.7% of adults had hypertension (SBP ≥ 140, DBP ≥ 90). A high prevalence of hypertension was observed among 40-59 years old males and adults aged 60 years old or above.

d) Our results found that adults who met the WHO PA recommendation performed significantly better in 1) body composition (i.e., lower body fat and higher muscular mass), 2) cardiovascular fitness (i.e., step test performance), 3) lower body flexibility, 4) handgrip strength, 5) core muscular strength and endurance, 6) lower limb power, and 7) balance (i.e., longer time in single leg stance with eyes closed).

e) Half the male adults aged 17-59 reported that “lack of time” and “feel tried” were barriers to engaging in PA. “Feel tired”, “lazy” and “lack of time” were the main obstacles for the female adults from the age group of 17-59 years. “Bad weather” was the main barrier for the elderly to participate in PA. “Feel tired” and “lack of time” seems to be the most commonly cited

barriers for male and female adults to engage in physical activity. To tackle those barriers, we suggest that stakeholders work together to provide additional online or video-based training courses to individuals with limited time to engage in physical activity.

7.2 Demographic Distribution

The expected sample size for participants aged 17 - 79 was 7,740. In the present survey, 7,643 participants completed the physical fitness test and questionnaire survey, meeting 98.7% of the target. The data was collected from 18 districts across Hong Kong. The district distribution is presented in Table 7 2.

Table 7-1 Gender distribution across age groups and the completion percentages

	Sample size (% of achieving the targeted sample size)		Targeted Sample size	
Age group	Male	Female	Male	Female
17-19	93 (82.3)	55 (50.0)	113	110
20-39	937 (73.3)	1064 (79.8)	1278	1334
40-59	996 (76.5)	1946 (121.6)	1302	1600
60-69	592 (91.4)	855 (126.9)	648	674
70-79	325 (97.3)	780 (224.8)	334	347
Sub-total	2943 (80.1)	4700 (115.6)	3675	4065
Total	7640 (98.7)		7740	

Table 7-2 The district distribution of participants

	Male		Female		Total	
	N	%	N	%	N	%
Central and Western	121	4.2	194	4.2	315	4.2
Wan Chai	46	1.6	101	2.2	147	1.9
Eastern	258	8.9	449	9.6	707	9.3
Southern	173	6.0	291	6.2	464	6.1
Yau Tsim Mong	109	3.8	238	5.1	347	4.6
Sham Shui Po	134	4.6	272	5.8	406	5.4
Kowloon City	119	4.1	225	4.8	344	4.5
Wong Tai Sin	175	6.0	298	6.4	473	6.3
Kwun Tong	263	9.1	354	7.6	617	8.2
Kwai Tsing	113	3.9	223	4.8	336	4.4
Tsuen Wan	104	3.6	215	4.6	319	4.2
Tuen Mun	170	5.9	246	5.3	416	5.5
Yuen Long	194	6.7	248	5.3	442	5.8
North	203	7.0	240	5.1	443	5.9
Tai Po	177	6.1	267	5.7	444	5.9
Sha Tin	296	10.2	443	9.5	739	9.8
Sai Kung	203	7.0	302	6.5	505	6.7
Islands	47	1.6	55	1.2	102	1.3
Total	2905	100.0	4661	100.0	7566	100.0

The level of education is outlined in Table 7-3. Most participants received senior secondary education (27.2%) or tertiary education (23.4%).

Table 7-3 Education level of the participants

	Male		Female		Total	
	N	%	N	%	N	%
No Education/ Preschool	8	0.3	92	2.0	100	1.3
Primary School	133	4.6	555	12.1	688	9.2
Junior Secondary School (Form 3)	307	10.7	570	12.4	877	11.7
Senior Secondary School (Form 6/7)	672	23.4	1363	29.6	2035	27.2
Certificate/ Diploma	268	9.3	380	8.3	648	8.7
Higher Diploma/ Associate Degree	299	10.4	269	5.8	568	7.6
Bachelor's Degree	796	27.7	952	20.7	1748	23.4
Graduate Degree	390	13.6	422	9.2	812	10.9
Total	2873	100.0	4603	100.0	7476	100.0

The family members' self-reported monthly household income is listed in the Table below. 5518 adults reported their household income, and 2054 adults reported that their monthly household income was unknown or uncertain. Over half (51.5%) of the participants' families earned less than $25,000 monthly.

Table 7-4. Distribution of household income

	N	%	Cumulative %
<$4,000	515	9.3	9.3
$4,000-$5,999	113	2.0	11.4
$6,000-7,999	438	7.9	19.3
$8,000-9,999	123	2.2	21.5
$10,000-14,999	455	8.2	29.8
$15,000-19,000	610	11.1	40.9
$20,000-24,999	590	10.7	51.5
$25,000-29,999	442	8.0	59.6
$30,000-34,999	441	8.0	67.5
$35,000-39,999	303	5.5	73.0
$40,000-44,999	298	5.4	78.4
$45,000-49,999	189	3.4	81.9
$50,000-59,999	0	0	81.9
$60,000-79,999	422	7.6	89.5
$80,000-99,999	243	4.4	93.9
≥100,000	336	6.1	100.0

7.3 Employment Status

The employment status was further classified within each age group. Overall, the percentage of the expected sample size was 93.5%, 107.7% in the status of working and non-working accordingly. The portions of the expected sample size by employment status and age group varied from 46.4% (non-working aged 20-39) to 182.2% (non-working aged 70-79).

Table 7-5 Working status and completed data collection

		Data collected (% of completion)			Data expected		
Age group	Working status	Male	Female	Total	Male	Female	Total
17-19	Working	44	28	72(83.7)	43	43	86
	Non-working	95	63	158(115.3)	70	67	137
20-39	Working	826	919	1745(87.6)	1049	942	1991
	Non-working	127	161	288(46.4)	229	392	621
40-59	Working	874	1415	2289(107.7)	1107	1018	2125
	Non-working	106	503	609(78.3)	196	582	778
60-69	Working	212	185	397(72.4)	332	216	548
	Non-working	368	656	1024(132.5)	316	457	773
70-79	Working	36	30	66(48.5)	89	47	136
	Non-working	282	713	995(182.2)	246	300	546
Total	Working	1992	2577	4569(93.5)	2620	2266	4886
	Non-working	978	2096	3074(107.7)	1057	1798	2855

Among the participants who were not working, neither part-time nor full-time, most were retirees. 24.2% of females were in charge of housekeeping at home, and 15.8% of males were full-time students.

Table 7-6 Categories of the non-working population by gender

	Male		Female	
	n	%	n	%
Full-time student	145	15.8	80	3.9
In charge of housekeeping at home	9	1.0	503	24.2
A retiree	688	75.1	1378	66.4
Unemployed	72	7.9	108	5.2
Others	2	0.2	7	0.3
Total	916	100.0	2076	100.0

The participants came from various occupations. The top four occupations included clerical support workers, managers and administrators, professionals, and service and sales workers for both males and females.

Table 7-7 Occupations by gender

	Male		Female	
	n	%	n	%
Managers and administrators	364	18.4	420	16.4
Professionals	492	24.8	403	15.7
Associate professionals	143	7.2	111	4.3
Clerical support workers	294	14.8	976	38.0
Service and sales workers	271	13.7	403	15.7
Craft and related workers	80	4.0	23	0.9
Plant & machine operators and assemblers	84	4.2	9	0.4
Elementary occupations	121	6.1	111	4.3
Skilled agricultural and fishery workers	5	0.3	4	0.2
Refuse to answer	108	5.5	79	3.1
Others	18	0.9	27	1.1
Total	1980	100.0	2566	100.0

The participants came from various industries, as listed in Table 7-8. The top three industries for males included “public administration, education, human health, and social work activities” (27%), “construction” (15.7%), and “transportation, storage, postal and courier services” (11%). The top two industries for females included “public administration, education, human health, and social work activities” (43.6%), and “miscellaneous social and personal services” (14.2%).

Table 7-8 Working industries by gender

	Male		Female	
	n	%	n	%
Manufacturing	70	3.5	43	1.7
Construction	310	15.7	139	5.4
Import/export, wholesale, and retail trades	150	7.6	254	9.9
Transportation, storage, postal and courier services	218	11.0	94	3.7
Accommodation and food services	73	3.7	91	3.5
Information and communications	175	8.8	74	2.9
Financing and insurance	128	6.5	203	7.9
Real estate, professional and business services	119	6.0	142	5.5
Public administration, education, human health, and social work activities	534	27.0	1120	43.6
Miscellaneous social and personal services	181	9.2	366	14.2
Others	20	1.0	43	1.7
Total	1978	100.0	2569	100.0

7.4 Physical Fitness Profile

7.4.1 Descriptive Statistics

The descriptive statistics of the participants aged 17-79, including means and standard deviations (SD), of all the physical fitness parameters are presented in Table 7-9 to Table 7-13.

Table 7-9 Descriptive Statistics of Fitness Parameters (Age: 17-19)

	Age: 17-19					
	Male			Female		
	N	Mean	SD	N	Mean	SD
Body Composition						
Height (cm)	93	173.1	6.0	55	160.6	4.8
Weight (kg)	93	68.0	12.3	55	55.5	11.0
Waist Circumference (cm)	93	77.3	10.0	55	69.1	8.4
BMI (kg/m^2)	93	22.7	3.8	55	21.5	3.8
Body Fat (%)	93	18.1	7.5	55	29.1	8.2
Muscle Mass (%)	93	46.9	15.0	55	33.6	8.4
Cardiovascular Endurance						
3-min Step Test (Post Exercise HR)	90	136.4	22.1	54	153.3	18.2
3-min Step Test (Recovery HR)	90	113.5	17.2	54	128.2	18.7
Estimated VO_{2max} (ml/kg/min)	68	43.8	7.7	50	40.9	6.9
Flexibility						
Sit-and-reach Test (cm)	93	28.6	10.3	54	32.1	8.9
Muscular Fitness						
Handgrip Strength (Both Hands) (kg)	92	73.9	13.5	55	50.5	7.5
Vertical Jump (cm)	91	49.7	10.1	54	36.5	8.5
Plank (s)	91	114.1	67.4	55	77.7	43.5
1-min Sit-up Test (rep)	88	31.5	9.3	53	25.8	12.8
Agility and Balance						
Single Leg Stance with Eyes Closed (s)	93	21.8	23.1	55	25.2	30.3

Table 7-10 Descriptive Statistics of Fitness Parameters (Age: 20-39)

	Age: 20-39					
	Male			Female		
	N	Mean	SD	N	Mean	SD
Body Composition						
Height (cm)	935	172.5	6.0	1064	159.7	5.7
Weight (kg)	935	71.2	12.1	1064	56.4	9.8
Waist Circumference (cm)	934	81.9	10.1	1064	71.9	9.4
BMI (kg/m^2)	935	23.9	3.7	1064	22.1	3.6
Body Fat (%)	933	20.5	6.7	1061	30.3	6.8
Muscle Mass (%)	932	53.2	8.1	1061	36.2	4.3
Cardiovascular Endurance						
3-min Step Test (Post Exercise HR)	911	139.4	20.2	1022	145.3	18.2
3-min Step Test (Recovery HR)	911	117.4	17.7	1022	120.1	17.1
Estimated VO_{2max} (ml/kg/min)	757	41.4	9.0	877	40.4	8.9
Flexibility						
Sit-and-reach Test (cm)	928	23.8	9.5	1059	30.4	9.4
Muscular Fitness						
Handgrip Strength (Both Hands) (kg)	933	77.1	13.5	1061	49.7	9.2
Vertical Jump (cm)	930	46.6	9.8	1054	31.7	7.5
Plank (s)	929	109.1	66.3	1047	75.8	46.4
1-min Sit-up Test (rep)	919	27.5	9.8	977	20.8	9.8
Agility and Balance						
Single Leg Stance with Eyes Closed (s)	927	19.4	23.1	1052	23.2	37.5

Table 7-11 Descriptive Statistics of Fitness Parameters (Age: 40-59)

	Age: 40-59					
	Male			Female		
	N	Mean	SD	N	Mean	SD
Body Composition						
Height (cm)	991	170.0	6.3	1945	157.7	5.5
Weight (kg)	990	70.7	10.9	1945	57.0	9.0
Waist Circumference (cm)	988	85.0	9.4	1941	76.0	9.3
BMI (kg/m^2)	990	24.4	3.3	1945	22.9	3.4
Body Fat (%)	987	21.7	6.1	1942	31.7	6.8
Muscle Mass (%)	987	51.6	6.9	1941	36.0	3.8
Cardiovascular Endurance						
3-min Step Test (Post Exercise HR)	929	135.4	18.7	1686	143.8	17.6
3-min Step Test (Recovery HR)	929	115.0	16.6	1686	119.9	16.9
Estimated VO_{2max} (ml/kg/min)	672	38.0	8.7	1218	36.4	7.5
Flexibility						
Sit-and-reach Test (cm)	976	21.5	9.2	1926	29.5	9.0
Muscular Fitness						
Handgrip Strength (Both Hands) (kg)	978	75.3	13.2	1919	48.3	8.4
Vertical Jump (cm)	963	38.8	8.0	1887	25.8	6.0
Plank (s)	965	117.3	69.5	1879	81.8	60.0
1-min Sit-up Test (rep)	886	21.1	9.5	1352	14.8	8.8
Agility and Balance						
Single Leg Stance with Eyes Closed (s)	974	11.2	24.5	1922	11.6	19.2

Table 7-12 Descriptive Statistics of Fitness Parameters (Age: 60-69)

	Age: 60-69					
	Male			Female		
	N	Mean	SD	N	Mean	SD
Body Composition						
Height (cm)	590	166.8	5.9	855	153.9	5.7
Weight (kg)	590	67.0	9.5	854	55.5	9.3
Waist Circumference (cm)	583	85.4	9.1	853	79.0	10.3
BMI (kg/m^2)	590	24.1	3.1	854	23.5	3.8
Body Fat (%)	585	22.8	5.8	848	33.7	7.4
Muscle Mass (%)	585	48.3	5.8	848	34.1	3.3
Cardiovascular Endurance						
2-min Step Test (steps)	541	99.3	22.1	801	92.6	24.0
Flexibility (Upper and Lower Body)						
Sit-and-reach Test on Chair (cm)	589	11.1	8.3	845	11.9	8.3
Back Scratch Left (cm)	586	15.5	10.6	843	9.8	8.2
Back Scratch Right (cm)	586	12.6	10.9	843	8.2	6.9
Muscular Fitness						
Handgrip Strength (Both Hands) (kg)	576	67.1	12.2	841	42.7	7.9
Arm Curl (rep)	570	15.5	4.9	827	13.2	4.2
Chair Stand Test (rep)	564	16.0	5.1	816	15.2	4.9
Agility and Balance						
8-Feet Up and Go (s)	574	5.0	1.3	834	5.6	1.4
Single Leg Stance with Eyes Open (s)	574	53.3	69.0	834	55.9	72.4

Table 7-13 Descriptive Statistics of Fitness Parameters (Age: 70-79)

	Age: 70-79					
	Male			Female		
	N	Mean	SD	N	Mean	SD
Body Composition						
Height (cm)	324	164.6	6.1	778	152.6	5.6
Weight (kg)	323	64.7	9.4	776	55.0	8.5
Waist Circumference (cm)	322	86.9	9.5	778	81.4	9.7
BMI (kg/m^2)	323	23.9	3.0	776	23.7	3.6
Body Fat (%)	319	24.5	6.4	765	34.7	7.1
Muscle Mass (%)	319	46.0	5.9	764	33.4	2.9
Cardiovascular Endurance						
2-min Step Test (steps)	295	91.1	23.4	687	85.8	25.8
Flexibility (Upper and Lower Body)						
Sit-and-reach Test on Chair (cm)	318	11.2	8.4	751	10.0	7.7
Back Scratch Left (cm)	317	18.6	12.2	761	10.9	9.0
Back Scratch Right (cm)	317	15.2	11.9	761	9.7	8.1
Muscular Fitness						
Handgrip Strength (Both Hands) (kg)	312	59.2	12.9	744	39.9	7.6
Arm Curl (rep)	309	12.9	4.8	729	12.2	4.2
Chair Stand Test	309	13.6	4.0	722	13.3	4.2
Agility and Balance						
8-Feet Up and Go (s)	316	6.0	1.7	737	6.8	2.0
Single Leg Stance with Eyes Open (s)	311	25.1	37.5	726	23.9	37.3

7.4.2 General Obesity, Central Obesity, Hypertension, and Cardiovascular Fitness at Risk

Table 7-14 shows the distribution of BMI classification, as recommended by the Regional Office for the Western Pacific of WHO in 2000. 59.3% of the males and 42.7% of the females were classified as overweight, obese, or severely obese. For males, the age group of 40-59 had the highest proportion of overweight and obese (63.8%), followed by those aged 60-69 (61.5%). For the females, the highest proportion of overweight and obese was from the age group of 70-79 (55.9%).

Table 7-14 Distribution of BMI classifications

		Obese II (BMI≥30.0)	Obese I (BMI 25-29.9)	Overweight (BMI 23-24.9)	Normal (BMI 18.5-22.9)	Underweight (BMI <18.5)
17-19	Male (n=93)	6.5%	16.1%	20.4%	47.3%	9.7%
	Female (n=55)	7.3%	9.1%	3.6%	61.8%	18.2%
20-39	Male (n=935)	6.5%	25.8%	22.5%	41.7%	3.5%
	Female (n=1064)	3.3%	12.3%	15.3%	57.6%	11.4%
40-59	Male (n=990)	5.3%	31.5%	27.0%	34.6%	1.6%
	Female (n=1945)	3.8%	18.3%	19.1%	54.0%	4.8%
60-69	Male (n=590)	3.2%	32.0%	26.3%	36.6%	1.9%
	Female (n=854)	6.2%	23.4%	20.6%	44.0%	5.7%
70-79	Male (n=323)	2.2%	31.3%	26.0%	37.2%	3.4%
	Female (n=776)	5.1%	27.7%	23.1%	38.1%	5.9%
Total	Male (n=2931)	4.9%	29.3%	25.1%	38.0%	2.7%
	Female (n=4694)	4.4%	19.3%	19.0%	50.5%	6.8%
	Both gender (n=7625)	4.6%	23.1%	21.3%	45.7%	5.2%

Table 7-15 shows the prevalence of central obesity by gender and age group. Central obesity was defined as waist circumferences ≥ 90 cm for men and ≥ 80 cm for women, according to the International Diabetes Federation's cut-off for the Asian population (Alberti, Zimmet, & Shaw, 2005). In general, 26.6% of males and 34.3% of females had central obesity.

Table 7-15 Prevalence of central obesity

		Central Obesity (Waist circumferences ≥ 90 cm for men and ≥ 80 cm for women)	Normal
17-19	Male (n=93)	15.1%	84.9%
	Female (n=55)	10.9%	89.1%
20-39	Male (n=934)	20.7%	79.3%
	Female (n=1059)	16.6%	83.4%
40-59	Male (n=988)	27.3%	72.7%
	Female (n=1941)	31.1%	68.9%
60-69	Male (n=583)	30.2%	69.8%
	Female (n=853)	44.3%	55.7%
70-79	Male (n=322)	38.5%	61.5%
	Female (n=778)	57.2%	42.8%
Total	Male (n=2920)	26.6%	73.4%
	Female (n=4686)	34.3%	65.7%
	Both gender (n=7606)	31.4%	68.6%

Those with either SBP ≥ 140 mmHg or DBP ≥ 90 mmHg were classified as hypertension. Overall, 31.0% of the males and 22.4% of the females had hypertension. Hypertension was high among 70-79 years old men (43.1%) and women (43.3%).

Table 7-16 Prevalence of hypertension

		Hypertension (SBP≥ 140 mmHg or DBP ≥ 90 mmHg	Normal
17-19	Male (n=93)	20.4%	79.6%
	Female (n=55)	5.5%	94.5%
20-39	Male (n=835)	18.6%	81.4%
	Female (n=1064)	6.5%	93.5%
40-59	Male (n=963)	34.2%	65.9%
	Female (n=1941)	18.3%	81.7%
60-69	Male (n=589)	40.2%	59.8%
	Female (n=850)	34.0%	66.0%
70-79	Male (n=325)	43.1%	56.9%
	Female (n=772)	43.3%	56.7%
Total	Male (n=2932)	31.0%	69.0%
	Female (n=4682)	22.4%	77.6%
	Both gender (7614)	25.7%	74.3%

Cardiovascular fitness at risk was defined as maximal oxygen consumption (i.e., estimated from the post exercise heart rate from the 3-minute step test) lower than 35 ml/kg/min for males and 32.5 ml/kg/kg/min for females (Blair et al., 1989). Overall, 28.5% of males and 21.1% of females were cardiovascular fitness at risk.

Table 7-17 Cardiovascular Fitness at Risk

		Poor (< 35 ml/kg/min for male, < 32.5 ml/kg/min for female)	Normal
17-19	Male (n=70)	12.9%	87.1%
	Female (n=65)	9.2%	90.8%
20-39	Male (n=857)	21.5%	78.5%
	Female (n=972)	10.9%	89.1%
40-59	Male (n=811)	37.4%	62.6%
	Female (n=1351)	28.9%	71.1%
Total	Male (n=1738)	28.5%	71.5%
	Female (n=2388)	21.1%	78.9%
	Both gender (n=4126)	24.2%	75.8%

7.5 Results of Questionnaire

7.5.1 Level of PA

53.8% of adults did not meet the WHO PA recommendation (i.e., ≥ 150 minutes MVPA or 600 MET-min/wk) (Bull et al., 2020). A high prevalence of physical inactivity was observed among adults aged 20-59 (~60%). The average weekly MVPA volume of adults was 823.1 MET-min/wk.

Table 7-18 Descriptive statistics for the PA level

		Age Group					
		17-19	20-39	40-59	60-69	70-79	Total
Met the WHO recommended PA level							
Male							
Yes	n	56	424	333	304	180	1297
	%	65.1%	50.1%	39.0%	60.2%	67.9%	50.7%
No	n	30	423	520	201	85	1259
	%	34.9%	49.9%	61.0%	39.8%	32.1%	49.3%
Female							
Yes	n	21	294	630	352	350	1647
	%	40.4 %	32.2%	39.4%	52.1 %	61.1%	43.2%
No	n	31	618	969	324	223	2165
	%	59.6 %	67.8%	60.6%	47.9%	38.9%	56.8%
Total							
Yes	n	77	718	963	656	530	2944
	%	55.8%	40.8%	39.3%	55.5%	63.2%	46.2%
No	n	61	1041	1489	525	308	3424
	%	44.2	59.2%	60.7%	44.5%	36.8%	53.8%
Weekly volume of MVPA, mean (SD)							
Male							
Total MVPA, MET-min/wk		1294.6 (1266.4)	843.8 (945.9)	714.5 (905.9)	1044.4 (1042.1)	1268.8 (1153.5)	899.5 (1005.4)
Female							
Total MVPA, MET-min/wk		805.5 (863.8)	544.3 (634.1)	731.3 (963.3)	939.9 (1057.1)	1045.9 (1020.4)	771.9 (937.5)
Total							
Total MVPA, MET-min/wk		1110.3 (1153.0)	688.5 (813.2)	725.5 (943.6)	984.6 (1051.5)	1116.4 (1068.6)	823.1 (967.3)

Regarding the history of maintaining the level of PA, 37.7% of males and 33.5% of females have maintained their exercise habits for at least five years. Nearly half of the older adults aged 70-79 have kept their exercise habits for at least 5 years, while most young adults (age: 17-39) have maintained their exercise habits for less than six months.

Table 7-19 History of maintaining exercise habits.

		Age Group					
		17-19	20-39	40-59	60-69	70-79	Total
Male							
< 6 months	n	23	191	144	42	19	419
	%	26.4%	22.6%	15.8%	7.7%	6.4%	15.6%
6-12 months	n	8	134	124	38	18	322
	%	9.2%	15.8%	13.6%	6.9%	6.0%	12.0%
1 to 3 years	n	16	200	186	121	46	569
	%	18.4%	23.6%	20.5%	22.1%	15.4%	21.2%
3 to 5 years	n	15	101	129	75	44	364
	%	17.2%	11.9%	14.2%	13.7%	14.7%	13.5%
≥ 5 years	n	25	220	326	271	172	1014
	%	28.7%	26.0%	35.9%	49.5%	57.5%	37.7%
Total	n	87	846	909	547	299	2688
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Female							
< 6 months	n	14	299	337	102	51	803
	%	30.4%	33.4%	19.8%	13.0%	7.1%	19.4%
6-12 months	n	11	167	234	94	46	552
	%	23.9%	18.7%	13.8%	12.0%	6.4%	13.3%
1 to 3 years	n	8	225	391	165	105	894
	%	17.4%	25.2%	23.0%	21.0%	14.7%	21.6%
3 to 5 years	n	4	72	221	115	94	506
	%	8.7%	8.1%	13.0%	14.7%	13.1%	12.2%
≥ 5 years	n	9	131	518	308	419	1385
	%	19.6%	14.7%	30.5%	39.3%	58.6%	33.5%
Total	n	46	894	1701	784	715	4140
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Nearly half of the adults reported a reduced level of PA (52.5% of males and 48.9% of females) due to the COVID-19 pandemic, while around 40% of adults indicted that the COVID-19 pandemic did not affect their PA participation.

Table 7-20 PA level affected by COVID-19

		Age Group					
		17-19	20-39	40-59	60-69	70-79	Total
Male							
Increased	n	5	89	78	31	11	214
	%	5.4%	9.6%	7.9%	5.3%	3.4%	7.4%
Decreased	n	57	545	534	274	117	1527
	%	62.0%	58.5%	54.3%	47.2%	36.7%	52.5%
Not affected	n	30	297	372	275	191	1165
	%	32.6%	31.9%	37.8%	47.4%	59.9%	40.1%
Total	n	92	931	984	580	319	2906
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Female							
Increased	n	6	140	225	104	51	526
	%	10.9%	13.3%	11.7%	12.2%	6.5%	11.3%
Decreased	n	35	550	981	376	342	2284
	%	63.6%	52.1%	51.1%	44.0%	43.8%	48.9%
Not affected	n	14	366	715	374	387	1856
	%	25.5%	34.7%	37.2%	43.8%	49.6%	39.8%
Total	n	55	1056	1921	854	780	4666
	%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

7.5.2 Favorite Sports

When asked about the sports the participants were interested in, the male and female participants of different age groups provided various feedback, as shown in Table 7-21. The top sports selected by the male participants aged 17-39 included ball games, running/jogging, and swimming, while for the elderly aged 60-79, walking and hiking became their major sports. On the other hand, walking was selected as the favorite sports by the female participants from all age groups. Apart from walking, the young female adults aged 17-19 chose ball games and running/jogging, the females aged 20-59 selected hiking and yoga/stretching, and those elderly aged 60-79 selected yoga/stretching and Tai Chi/Baduanjin as their favorite sports.

Table 7-21 Descriptive statistics on favorite Sports

	Age group									
	17-19		20-39		40-59		60-69		70-79	
	n	%	n	%	n	%	n	%	n	%
Male										
Ball games	62	66.7	374	39.9	228	22.9	123	20.8	55	16.9
Swimming	18	19.4	164	17.5	232	23.3	119	20.1	66	20.3
Running/Jogging	32	34.4	431	46.0	435	43.8	142	24.0	43	13.2
Fitness/Body-building	42	45.2	379	40.4	208	20.9	97	16.4	65	20.0
Walking	17	18.3	295	31.5	472	47.5	354	59.8	227	69.8
Hiking	12	12.9	264	28.2	386	38.8	274	46.3	81	24.9
Cycling	13	14.0	128	13.7	192	19.3	81	13.7	24	7.4
Wushu/Qigong	3	3.2	30	3.2	16	1.6	19	3.2	17	5.2
Tai Chi/Baduanjin	0	0	14	1.5	26	2.6	66	11.1	59	18.2
Yoga/Stretching	2	2.2	44	4.7	61	6.1	57	9.6	41	12.6
Aerobic(dance)/Dancing	1	1.1	7	0.7	7	0.7	14	2.4	11	3.4
Female										
Ball games	28	50.9	167	15.7	185	9.5	63	7.4	28	3.6
Swimming	11	20.0	179	16.8	271	13.9	116	13.6	84	10.8
Running/Jogging	23	41.8	324	30.5	444	22.8	60	7.0	25	3.2
Fitness/Body-building	12	21.8	279	26.2	255	13.1	122	14.3	111	14.2
Walking	21	38.2	496	46.6	1139	58.6	568	66.4	522	66.9
Hiking	7	12.7	379	35.6	752	38.7	242	28.3	107	13.7
Cycling	6	10.9	115	10.8	163	8.4	35	4.1	29	3.7
Wushu/Qigong	3	5.5	10	0.9	31	1.6	40	4.7	28	3.6
Tai Chi/Baduanjin	0	0	12	1.1	105	5.4	208	24.3	255	32.7
Yoga/Stretching	10	18.2	363	34.1	641	33.0	334	39.1	293	37.6
Aerobic(dance)/Dancing	6	10.9	81	7.6	210	10.8	147	17.2	112	14.4

Note: This question item allowed respondents to choose maximum of 3 options.

7.5.3 Attitudes towards PA

"Health strengthening/prevention or cure of sickness" was regarded as the key purpose by over half of the males from all the age groups. Moreover, the proportions for the elderly aged 60-79 were higher, over 80%. "Raising ability in sports" was selected by more than half of the males aged 17-59. For the female participants, "health strengthening/prevention or cure of sickness" was chosen by most of them aged 20-79, which percentage was higher in the elder groups. There were 50.9% and 56.7% of the females aged 17-19 and 20-39 who regarded "keeping fit" as the primary purpose. For the females aged 20-39, "releasing pressure and emotion" was further recognized by 52.7% of them.

Table 7-22 Purpose(s) of participating in sports activities.

	Age group									
	17-19		20-39		40-59		60-69		70-79	
	n	%	n	%	n	%	n	%	n	%
Male										
Health promotion, disease prevention/treatment	47	50.5	627	66.9	758	76.3	496	83.8	275	84.6
Raising ability in sports	67	72.0	549	58.6	499	50.2	264	44.6	122	37.5
Releasing pressure and emotion	38	40.9	457	48.8	481	48.4	247	41.7	98	30.2
Keeping fit	34	36.6	368	39.3	279	28.1	99	16.7	41	12.6
Socializing	23	24.7	172	18.4	134	13.5	106	17.9	70	21.5
No special purposes	12	12.9	91	9.7	117	11.8	67	11.3	37	11.4
Female										
Health promotion/prevention or cure of sickness	22	40.0	664	62.4	1460	75.1	753	88.1	704	90.3
Raising ability in sports	26	47.3	466	43.8	761	39.1	395	46.2	296	37.9
Releasing pressure and emotion	23	41.8	561	52.7	948	48.7	380	44.4	233	29.9
Keeping fit	28	50.9	603	56.7	805	41.4	188	22.0	105	13.5
Socializing	13	23.6	143	13.4	247	12.7	182	21.3	220	28.2
No special purposes	3	5.5	86	8.1	153	7.9	50	5.8	53	6.8

Note: This question item allowed respondents to choose maximum of 3 optio

More than half of adults aged 17-59 say "lack of time" is the main barrier to physical activity. “Lazy” was a major barrier for the males aged 17-39, while “bad weather” was a key obstacle for the male elderly. “Tired”, “lazy” and “lack of spare time” were the main impediments to the females from the age group of 17-59, and “bad weather” was the main reason for the elderly females to do PA.

Table 7-23 Barriers to participate PA.

	Age group									
	17-19		20-39		40-59		60-69		70-79	
	n	%	n	%	n	%	n	%	n	%
Male										
Tired	46	49.5	566	60.4	511	51.4	246	41.6	109	33.5
Lazy	41	44.1	482	51.4	388	39.0	146	24.7	63	19.4
Lack of time	54	58.1	558	59.6	508	51.1	181	30.6	82	25.2
Not interested	11	11.8	56	6.0	98	9.9	54	9.1	33	10.2
Health concern	2	2.2	77	8.2	105	10.6	84	14.2	45	13.8
Lack of venue and facility	15	16.1	159	17.0	138	13.9	102	17.2	46	14.2
Already have plenty of physical activities at work	3	3.2	39	4.2	54	5.4	16	2.7	12	3.7
No company	25	26.9	104	11.1	109	11.0	81	13.7	27	8.3
Bad weather	12	12.9	212	22.6	378	38.0	259	43.8	131	40.3
No incentive to be healthy	1	1.1	2	0.2	7	0.7	10	1.7	5	1.5
Lack of guidance	6	6.5	34	3.6	28	2.8	32	5.4	10	3.1
Lack of organizing (such as training course)	2	2.2	18	1.9	20	2.0	28	4.7	18	5.5
Constrained by money	6	6.5	25	2.7	14	1.4	5	0.8	1	0.3
Afraid of being derided	1	1.1	6	0.6	3	0.3	1	0.2	2	0.6
Female										
Tired	29	52.7	606	57.0	858	44.1	306	35.8	199	25.5
Lazy	30	54.5	635	59.7	933	48.0	268	31.3	137	17.6
Lack of spare time	32	58.2	607	57.0	859	44.2	279	32.6	177	22.7
Not interested	7	12.7	93	8.7	200	10.3	68	8.0	52	6.7

Health concern	4	7.3	139	13.1	256	13.2	161	18.8	154	19.7
Lack of venue and facility	5	9.1	127	11.9	261	13.4	104	12.2	82	10.5
Already having plenty of physical activities on work	1	1.8	28	2.6	81	4.2	23	2.7	17	2.2
No company	9	16.4	161	15.1	247	12.7	96	11.2	69	8.8
Bad weather	8	14.5	188	17.7	515	26.5	307	35.9	288	36.9
No incentive to be healthy	0	0	2	0.2	15	0.8	8	0.9	10	1.3
Lack of guidance	4	7.3	62	5.8	123	6.3	73	8.5	34	4.4
Lack of organizing (such as training course)	2	3.6	37	3.5	96	4.9	48	5.6	42	5.4
Constrained by money	2	3.6	31	2.9	26	1.3	11	1.3	5	0.6
Afraid of being derided	3	5.5	16	1.5	7	0.4	3	0.4	2	0.3

Note: This question item allowed respondents to choose up to 3 options.

7.5.4 Accessibility of Sports Facilities

Most participants used public sports facilities (86.1%), and 74.9% reported spending 30 minutes or less to access these public facilities. 38% of the participants used private sports facilities, and 65.9% spent 30 minutes or less going there.

Table 7-24 Travel time to the sports facilities.

	Public sports facilities		Private sports facilities	
	N	%	N	%
≤ 15 minutes	2843	43.6	1281	44.5
16 - 30 minutes	2041	31.3	617	21.4
31- 45 minutes	775	11.9	377	13.1
46 minutes – 60 minutes	449	6.9	313	10.9
61 minutes - 90 minutes	269	4.1	191	6.6
> 90 minutes	145	2.2	102	3.5
I don’t do sports at these locations	1050	13.9	4691	62.0

7.5.5 Working Hours and Prevalence of Night Shift

53.6% of males and 60.3% of females reported their weekly working hours as 40-49 hours. Most working participants aged 17-19 reported weekly hours under 30. Furthermore, 84.2% of males and 89.2% of females reported no need to work in night shift.

Table 7-25 Descriptive statistics on the weekly working hours

		Age group					
		17-19	20-39	40-59	60-69	70-79	Total
Male							
< 20 hours	N	23	80	38	22	13	176
	%	69.7	9.9	4.4	10.2	39.4	9.0
20-29 hours	N	6	24	18	18	3	69
	%	18.2	3.0	2.1	8.3	9.1	3.5
30-39 hours	N	2	44	58	33	3	140
	%	6.1	5.4	6.7	15.3	9.1	7.1
40-49 hours	N	1	446	494	104	8	1053
	%	3.0	55.1	56.7	48.1	24.2	53.6
50-59 hours	N	1	159	179	22	2	363
	%	3.0	19.6	20.5	10.2	6.1	18.5
60-69 hours	N	0	49	71	15	2	137
	%	0.0	6.0	8.1	6.9	6.1	7.0
≥ 70 hours	N	0	8	14	2	2	26
	%	0.0	1.0	1.6	0.9	6.1	1.3
Total	N	33	810	872	216	33	1964
	%	100.0	100.0	100.0	100.0	100.0	100.0
Female							
< 20 hours	N	12	71	107	29	7	226
	%	57.1	7.9	7.6	15.7	30.4	8.9
20-29 hours	N	5	32	69	12	5	123
	%	23.8	3.6	4.9	6.5	21.7	4.8
30-39 hours	N	2	62	118	21	3	206
	%	9.5	6.9	8.4	11.4	13.0	8.1
40-49 hours	N	1	586	849	89	6	1531
	%	4.8	65.1	60.3	48.1	26.1	60.3
50-59 hours	N	1	119	193	20	2	335
	%	4.8	13.2	13.7	10.8	8.7	13.2
60-69 hours	N	0	27	60	12	0	99
	%	0.0	3.0	4.3	6.5	0.0	3.9
≥ 70 hours	N	0	3	13	2	0	18
	%	0.0%	0.3	0.9	1.1	0.0	0.7
Total	N	21	900	1409	185	23	2538
	%	100.0	100.0	100.0	100.0	100.0	100.0

Table 7-26 Descriptive statistics on the prevalence of night shift

		Age group					
		17-19	20-39	40-59	60-69	70-79	Total
Male							
No need	N	33	688	726	190	30	1667
	%	97.1	84.1	82.9	87.6	85.7	84.2
Regular basis	N	1	25	31	13	1	71
	%	2.9	3.1	3.5	6.0	2.9	3.6
On-shift	N	0	105	119	14	4	242
	%	0.0	12.8	13.	6.5	11.4	12.2
Female							
No need	N	19	827	1238	177	30	2291
	%	86.4	91.4	87.3	92.7%	93.8	89.2
Regular basis	N	0	15	39	3	2	59
	%	0.0	1.7	2.8	1.6	6.3	2.3
On-shift	N	3	63	141	11	0	218
	%	13.6	7.0	9.9	5.8	0.0	8.5

7.5.6 Leisure Time Activities

For male adults, the top three activities in leisure time reported by all age groups were "sports/physical exercise" (ranging from 45% to 66.7%), "browsing on the internet" (ranging from 33.2% to 63.4%), and "audio/video entertainment" (ranging from 38.5% to 51.6%). The young and middle-aged groups further reported "supplementary sleeping" and "gathering with family or friends" as major activities, while the elderly reported "housekeeping" as a major one.

For females adults, the activities varied among different age groups. More than half of them aged 17-19 reported "browsing on the internet" (60%) and "supplementary sleeping" (50.9%) as key activities, while around 60% of the elderly aged 60-79 reported "housekeeping" as the major one. The percentages of "sports/physical exercise" ranged from 30.9% (aged 17-19) to 46.8% (aged 70-79), which were lower than some of the static activities within each age group.

Table 7-27 Descriptive statistics on the leisure time activities

	Age group									
	17-19		20-39		40-59		60-69		70-79	
	n	%	n	%	n	%	n	%	n	%
Male										
Audio/Video entertainment	48	51.6	455	48.6	415	41.8	228	38.5	143	44.0
Shopping	18	19.4	201	21.5	195	19.6	128	21.6	64	19.7
Internet browsing	59	63.4	575	61.4	489	49.2	223	37.7	108	33.2
Sports/Physical exercise	62	66.7	501	53.5	447	45.0	326	55.1	173	53.2
Supplementary sleeping	30	32.3	252	26.9	174	17.5	53	9.0	40	12.3
Housekeeping	3	3.2	118	12.6	244	24.5	164	27.7	112	34.5
Gathering with family or friends	23	24.7	284	30.3	257	25.9	110	18.6	60	18.5
Reading	5	5.4	68	7.3	115	11.6	111	18.8	75	23.1
Playing chess/Card games/Mahjong	5	5.4	38	4.1	29	2.9	22	3.7	8	2.5
Outing	2	2.2	95	10.1	170	17.1	136	23.0	54	16.6
Female										
Audio/Video entertainment	20	36.4	415	39	637	32.8	345	40.4	384	49.2
Shopping	18	32.7	326	30.6	517	26.6	211	24.7	219	28.1
Browsing on the internet	33	60.0	565	53.1	764	39.3	267	31.2	171	21.9
Sports/Physical exercise	17	30.9	332	31.2	638	32.8	395	46.2	365	46.8
Supplementary sleeping	28	50.9	370	34.8	317	16.3	75	8.8	87	11.2
Housekeeping	7	12.7	241	22.7	970	49.9	517	60.5	461	59.1
Gathering with family or friends	21	38.2	454	42.7	637	32.8	225	26.3	177	22.7
Reading newspaper/Magazine/Comics	3	5.5	70	6.6	165	8.5	128	15.0	118	15.1
Playing chess/Card games/Mahjong	2	3.6	27	2.5	55	2.8	28	3.3	40	5.1
Outing	1	1.8	169	15.9	423	21.7	142	16.6	41	5.3

Note: This question item allowed respondents to choose maximum of 3 options

7.5.7 Sleep Duration and Quality

32.3% of males and 28.7% of females who needed to work or were full-time students reported sleeping less than 7 hours daily on working or school days. The percentages on no working or no school days were lower, 11.3% and 12.1%, respectively. On the other hand, the proportions of sleeping for 10 hours or more in both genders were around 10% on working/school days and approximately 22% on no working or no school days. In general, the males slept 7.51 hours on working or school days and 8.51 hours on no working or no school days, whereas the female slept for 7.63 hours and 8.4 hours, respectively.

Table 7-28 Sleeping hours on working/school days

		Age Group					
		17-19	20-39	40-59	60-69	70-79	Total
During working/school days							
Male							
<6	N	10	97	75	9	3	194
	%	11.0	10.9	8.6	4.2	7.9	9.2
6 to <7	N	18	219	205	42	3	487
	%	19.8	24.5	23.5	19.6	7.9	23.1
7 to <8	N	25	277	311	63	8	684
	%	27.5	31.0	35.6	29.4	21.1	32.4
8 to <9	N	22	156	167	56	12	413
	%	24.2	17.5	19.1	26.2	31.6	19.6
9 to <10	N	7	44	46	16	7	120
	%	7.7	4.9	5.3	7.5	18.4	5.7
≥ 10	N	9	100	69	28	5	211
	%	9.9	11.2	7.9	13.1	13.2	10.0
N		91	893	873	214	38	2109
Mean		7.41	7.47	7.46	7.86	8.13	7.51
SD		1.78	1.82	1.59	1.74	2.21	1.73
Female							
<6	N	10	90	104	17	2	223
	%	18.5%	9.4	7.4	8.7	6.1	8.4
6 to <7	N	11	201	283	36	5	536
	%	20.4	21.0	20.2	18.5	15.2	20.3
7 to <8	N	11	314	466	54	8	853
	%	20.4	32.9	33.2	27.7	24.2	32.3
8 to <9	N	12	211	298	57	10	588
	%	22.2	22.1	21.2	29.2	30.3	22.3
9 to <10	N	3	56	82	14	1	156
	%	5.6	5.9	5.8	7.2	3.0	5.9

≥ 10	N	7	83	171	17	7	285
	%	13.0	8.7	12.2	8.7	21.2	10.8
N		54	955	1404	195	33	2641
Mean		7.24	7.52	7.70	7.63	8.19	7.63
SD		2.29	1.65	1.80	1.62	2.15	1.75
During non-working/school days							
Male							
<6	N	5	37	44	20	15	121
	%	5.4	4.0	4.5	3.4	4.7	4.2
6 to <7	N	4	58	58	56	30	206
	%	4.3	6.2	5.9	9.7	9.4	7.1
7 to <8	N	7	124	188	137	79	535
	%	7.6	13.3	19.1	23.6	24.8	18.4
8 to <9	N	20	251	250	170	93	784
	%	21.7	26.9	25.4	29.3	29.2	27.0
9 to <10	N	25	219	187	105	57	593
	%	27.2	23.5	19.0	18.1	17.9	20.4
≥ 10	N	31	243	257	92	45	668
	%	33.7	26.1	26.1	15.9	14.1	23.0
N		92	932	984	580	319	2907
Mean		8.90	8.70	8.59	8.23	8.08	8.51
SD		2.27	2.05	2.19	1.78	1.64	2.03
Female							
<6	N	5	36	105	42	51	239
	%	9.1	3.4	5.5	4.9	6.5	5.1
6 to <7	N	3	34	121	76	95	329
	%	5.5	3.2	6.3	8.9	12.2	7.0
7 to <8	N	6	138	309	210	230	893
	%	10.9	13.1	16.1	24.6	29.5	19.1
8 to <9	N	11	283	530	272	238	1334
	%	20.0	26.8	27.6	31.9	30.5	28.6
9 to <10	N	10	237	387	135	108	877
	%	18.2	22.4	20.1	15.8	13.8	18.8
≥ 10	N	20	328	470	119	58	995
	%	36.4	31.1	24.5	13.9	7.4	21.3
N		55	1056	1922	854	780	4667
Mean		8.77	8.93	8.52	8.05	7.73	8.40
SD		2.33	1.85	2.18	1.79	1.56	1.99

Most males and females regarded their sleep quality as average or above, and 39.6% of males and 34.2% of females reported it as good or very good. On the other hand, 11.4% of males and 15.7% of females reported their sleeping quality as bad or very bad.

Table 7-29 Statistics on the quality of sleep

		Age Group					
		17-19	20-39	40-59	60-69	70-79	Total
Male							
Very good	N	8	50	62	36	15	171
	%	8.7	5.4	6.3	6.2	4.7	5.9
Good	N	30	295	314	215	125	979
	%	32.6	31.7	31.9	37.1	39.2	33.7
Average	N	40	449	510	278	148	1425
	%	43.5	48.2	51.8	47.9	46.4	49.0
Bad	N	12	112	83	46	27	280
	%	13.0	12.0	8.4	7.9	8.5	9.6
Very bad	N	2	25	15	5	4	51
	%	2.2	2.7	1.5	0.9	1.3	1.8
Female							
Very good	N	5	77	91	27	42	242
	%	9.1	7.3	4.7	3.2	5.4	5.2
Good	N	18	343	551	245	195	1352
	%	32.7	32.5	28.7	28.7	25.0	29.0
Average	N	25	493	1000	436	387	2341
	%	45.5	46.7	52.0	51.1	49.6	50.2
Bad	N	6	128	243	123	125	625
	%	10.9	12.1	12.6	14.4	16.0	13.4
Very bad	N	1	15	37	23	31	107
	%	1.8	1.4	1.9	2.7	4.0	2.3

The proportion of “no conscious problem at all” when working or studying was only 23.4% and 24% among males and females, respectively. The percentages varied primarily among age groups. The elderly reported fewer conscious problems than the young adults.

Table 7-30 Descriptive statistics on the conscious problems when working/ studying

		Age Group					
		17-19	20-39	40-59	60-69	70-79	Total
Male							
No problem at all	N	14	115	234	113	26	502
	%	15.2	12.7	26.2	51.6	68.4	23.4
Little problem	N	50	511	510	91	11	1173
	%	54.3	56.3	57.2	41.6	28.9	54.6
Some problem	N	26	245	131	14	1	417
	%	28.3	27.0	14.7	6.4	2.6	19.4
Great problem	N	2	36	17	1	0	56
	%	2.2	4.0	1.9	0.5	0.0	2.6
Female							
No problem at all	N	6	119	415	90	18	648
	%	11.1	12.3	28.7	45.7	58.1	24.0
Little problem	N	34	520	756	79	10	1399
	%	63.0	53.9	52.2	40.1	32.3	51.9
Some problem	N	14	287	263	28	3	595
	%	25.9	29.7	18.2	14.2	9.7	22.1
Great problem	N	0	39	14	0	0	53
	%	0.0	4.0	1.0	0.0	0.0	2.0

7.6 Further Analysis

7.6.1 Gender Comparison on Physical Fitness Parameters

The independent sample t-test was used to distinguish the gender difference among all physical fitness parameters. Significant gender differences were observed in most of the physical fitness parameters. Our results showed that men have significantly greater 1) body composition (higher muscle mass and lower body fat mass), 2) cardiovascular fitness (i.e., step test performance), 3) upper body flexibility, 4) all muscular fitness parameters, and 5) agility, while women have better lower body flexibility. Furthermore, we found that women have less BMI and waist circumference.

Table 7-31 Gender comparison of physical fitness parameters

	Male	Female	p-value
Body Composition			
BMI (kg/m^2)	24.1 (3.38)	22.9 (3.61)	<0.001**
Waist Circumference (cm)	84.1 (9.8)	76.4 (10.1)	<0.001**
Body Fat (%)	21.7 (6.5)	32.2 (7.1)	<0.001**
Muscle Mass (%)	50.4 (7.8)	35.3 (3.9)	<0.001**
Cardiovascular Fitness			
3-min Step Test (Post Exercise HR) (bpm)	137.3 (19.7)	144.6 (17.9)	<0.001**
2-min Step Test (step)	96.4 (22.9)	89.5 (25.0)	<0.001*
Flexibility (Upper and Lower Body)			
Sit-and-reach Test (cm)	22.9 (9.5)	29.8 (9.1)	<0.001**
Chair sit-and-reach test (cm)	11.0 (8.0)	11.1 (8.4)	0.71
Back Scratch – left (cm)	16.6 (11.3)	10.3 (8.6)	<0.001**
Back Scratch – right (cm)	13.5 (11.3)	8.9 (7.5)	<0.001**
Muscular Endurance (Upper, Core, and Lower Body)			
Handgrip Test (kg)	72.5 (14.4)	46.3 (9.2)	<0.001**
Arm Curl (rep)	14.6 (5.0)	12.7 (4.2)	<0.001**
1-min Sit-up Test (rep)	24.7 (10.2)	17.5 (9.9)	<0.001**
Plank (s)	113.3 (68.0)	79.6 (55.4)	<0.001**
Chair Stand Test (rep)	15.1 (4.9)	14.3 (4.7)	<0.001**
Vertical Jump (cm)	43.0 (9.9)	28.1 (7.2)	<0.001**
Agility and Balance			
8-Feet Up and Go (s)	5.3 (1.6)	6.2 (1.8)	<0.001**
Single Leg Stance with Eyes Closed (s)	15.6 (27.7)	15.9 (27.7)	0.68
Single Leg Stance with Eyes Open (s)	43.4 (61.3)	41.0 (60.8)	0.36

**significant differences at p<0.01

7.6.2 Comparison of Physical Fitness Between Age Groups

The below table shows the physical fitness across all age groups. One-way ANOVA was applied to the physical fitness parameters compared to more than three age groups (e.g., BMI, 3-min step test, and handgrip), and the independent sample t-test was used on the parameter that only compared on two age groups (e.g., 2-min step test, chair sit-and-reach test, and chair stand test). Significant group effects were detected in most of the physical fitness parameters, except plank. Generally speaking, our post hoc analysis showed that younger adults have better physical fitness than those older.

Table 7-32 Comparison of Physical Fitness Parameters between age groups

	Age group					
	17-19	20-39	40-59	60-69	70-79	p-value
Body composition						
BMI (kg/m^2)	22.2 (3.8)	23.0 (3.7)	23.4 (3.5) [a b]	23.7 (3.6) [a b]	23.7 (3.4) [a b]	<0.001**
Waist Circumference (cm)	74.2 (10.2)	76.6 (11.0)	79.1 (10.2) [a b]	81.6 (10.3) [a b c]	83.0 (10.0) [a b c]	<0.001**
Body Fat (%)	22.2 (9.4)	25.7 (8.4) [a]	28.3 (8.1) [a b]	29.3 (8.6) [a b c]	31.7 (8.3) [a b c]	<0.001**
Muscle Mass (%)	41.9 (14.4)	43.8 (10.3)	41.3 (8.9) [b]	39.9 (8.3) [b c]	37.1 (7.0) [a b c]	<0.001**
Cardiovascular fitness						
Post 3-min Step Test Heart Rate (bpm)	142.7 (22.2)	142.5 (19.4)	140.8 (18.4) [b]	------	------	0.009**
2-min Step Test (step)	------	------	------	95.3 (23.5)	87.4 (25.2)	<0.001**
Flexibility						
Sit-and-reach Test (cm)	29.9 (9.9)	27.3 (10.0) [a]	26.8 (9.8) [a]	------	------	<0.001**
Chair Sit-and-reach Test (cm)	------	------	------	11.5 (8.3)	10.3 (7.9)	<0.001**
Back Scratch Left (cm)	------	------	------	12.1 (9.7)	13.2 (10.6)	0.01*

Back Scratch Right (cm)	------	------	------	10.0 (9.0)	11.4 (9.7)	<0.001**
Muscular fitness						
Handgrip (kg)	65.1 (16.2)	62.5 (17.9)	57.5 (15.5) [a b]	45.6 (12.9) [a b c]	56.4 (12.9) [a b c]	<0.001**
Arm Curl (rep)	------	------	------	15.52 (4.95)	12.94(4.77)	<0.001**
Chair Stand Test (rep)	------	------	------	15.5 (5.0)	13.4 (4.1)	<0.001**
Vertical Jump (cm)	44.8 (11.4)	38.7 (11.4) [a]	30.2 (9.1) [a b]	------	------	<0.001**
1-min Sit-up Test (rep)	29.3 (11.1)	24.0 (10.4) [a]	17.3 (9.6) [a b]	------	------	<0.001**
Plank (s)	100.4 (62.0)	91.5 (59.0)	93.9 (65.6)	------	------	0.16
Agility and balance						
8-Feet Up and Go (s)	------	------	------	5.3 (1.4)	6.6 (2.0)	<0.001**
Single Leg Stance with Eyes Closed (s)	23.1 (25.9)	21.4 (31.6)	11.5 (21.1) [a b]	------	------	<0.001**
Single Leg Stance with Eyes Open (s)	------	------	------	54.8 (71.0)	24.3 (37.3)	<0.001**

**Significant differences at p<0.01
*Significant differences at p<0.05
[a] Significantly different (p<0.05) from the age group of "17-19 years old"
[b] Significantly different (p<0.05) from the age group of "20-39 years old"
[c] Significantly different (p<0.05) from the age group of "40-59 years old"
Note: The Bonferroni adjusted multiple comparison test was used as a post-hoc comparison

7.6.3 Influence of WHO PA Level on Physical Fitness

The independent sample t-test was used to compare differences in physical fitness performance between the adults with sufficient PA level (met the WHO recommendation, weekly MVPA reached 150 minutes/week or 600 MET-minutes) and insufficient PA level. Our results found that adults with sufficient PA levels perform significantly better in 1) body composition (i.e., lower body fat and higher muscular mass), 2) cardiovascular fitness (i.e., step test performance), 3) lower body flexibility, 4) handgrip strength, 5) core muscular strength and endurance, 6) lower limb power, and 7) balance (i.e., longer time in single leg stance with eyes closed).

Table 7-33 Influence of WHO PA level on Physical Fitness

	Met the WHO recommendation	Below the WHO recommendation	p-value
Body Composition			
BMI (kg/m^2)	23.4 (3.3)	23.3 (3.7)	0.18
Waist Circumference (cm)	79.5 (10.0)	79.0 (10.9)	0.05
Body Fat (%)	27.1 (8.6)	28.4 (8.3)	<0.001**
Muscle Mass (%)	42.1 (9.7)	40.9 (9.2)	<0.001**
Cardiovascular Fitness			
3-min Step Test (Post Exercise HR) (bpm)	137.4 (19.6)	143.7 (18.4)	<0.001**
2-min Step Test (step)	95.3 (25.1)	90.7 (23.8)	<0.001**
Flexibility (Upper and Lower Body)			
Sit-and-reach Test (cm)	28.8 (9.6)	26.6 (9.9)	<0.001**
Chair sit-and-reach test (cm)	11.4 (8.2)	10.7 (7.8)	0.04*
Back Scratch – left (cm)	12.9 (10.2)	12.2 (10.0)	0.15
Back Scratch – right (cm)	10.6 (9.3)	10.5 (9.7)	0.87
Muscular fitness (Upper, Core, and Lower Body)			
Handgrip Test (kg)	58.7 (17.9)	56.1 (16.5)	<0.001**
Arm Curl (rep)	13.8 (4.8)	13.5 (4.4)	0.22
1-min Sit-up Test (rep)	24.2 (10.9)	19.4 (10.1)	<0.001**
Plank (s)	108.1 (68.3)	88.1 (59.1)	<0.001**
Chair Stand Test (rep)	15.0 (4.8)	14.7 (5.0)	0.34
Vertical Jump (cm)	36.4 (11.9)	33.3 (10.6)	<0.001**
Agility and Balance			
8-Feet Up and Go (s)	5.8 (1.7)	5.8 (1.7)	0.63
Single Leg Stance with Eyes Open (s)	46.0 (63.8)	42.8 (65.2)	0.28
Single Leg Stance with Eyes Closed (s)	17.2 (25.4)	15.5 (28.0)	0.04*

**Significant differences at p<0.01

*Significant differences at p<0.05

7.6.4 Comparison of household income, education level, working hours, and working industry on PA level

Significant group effects of PA levels were detected in 1) Monthly Household Income, 2) Education Level, 3) Working Hours, and 4) Working Industry by the one-way ANOVA. The Bonferroni adjusted multiple comparison test was used as a post-hoc comparison. In monthly household income, adults with < $4000 monthly household income have significantly higher PA levels compared with adults who have $6000 or above monthly household income. In education level, the post-hoc analysis revealed that adults with bachelor's degrees or graduate degrees have significantly lower PA levels than most other education levels (i.e., No Education/ Preschool, Primary School, Senior Secondary School, and Higher Diploma/ Associate). In working hours, adults with 30-59 working hours have significantly lower PA levels compared with adults with less than 20 working hours and 60-69 working hours. In working Industry, adults working in 1) information and communications, 2) financing and insurance, 3) real estate, professional and business services, and 4) public administration, education, human health, and social work activities have significantly lower PA levels compared with the adults in the miscellaneous social and personal services industry.

Table 7-34 Comparison of household income, education level, Working Hours, and Working Industry on PA level

	N	Weekly MVPA (MET-min)	Between-group effect
Monthly Household Income			
<$ 4,000	408	1083.5 (1056.2)	p<0.001**
$4,000 - $5999	89	964.4 (1213.8)	
$6,000 - $7,999	372	737.9 (845.3) [a]	
$8,000 - $9,999	97	726.1 (871.5) [a]	
$10,000 - $14,999	381	808.4 (1054.2) [a]	
$15,000 - $19,999	523	725.1 (931.7) [a]	
$20,000 - $24,999	495	748.1 (936.0) [a]	
$25,000 - $29,999	375	732.2 (903.8) [a]	
$30,000 - $34,999	375	691.2 (837.3) [a]	
$35,000 - $39,999	261	738.6 (942.6) [a]	
$40,000 - $44,999	263	717.8 (869.2) [a]	
$45,000 - $49,999	156	684.4 (803.2) [a]	
$50,000 - $59,999	0	0 (0)	
$60,000 - $79,999	369	654.2 (681.9) [a]	
$80,000 -$99,999	218	732.1 (954.6) [a]	
≥ $100,000	307	789.1 (883.0) [a]	

Education level			
No Education/ Preschool	63	1126.9 (1119.8)	p<0.001**
Primary School	509	1090.4 (1172.7) [c]	
Junior Secondary School (Form 3)	706	952.5 (1052.9)	
Senior Secondary School (Form 6/7)	1685	821.7 (1021.8) [b]	
Certificate/ Diploma	549	806.9 (949.7) [b]	
Higher Diploma/ Associate Degree	509	900.2 (1063.8) [b]	
Bachelor's Degree	1544	700.0 (777.2) [a b c d]	
Graduate Degree	729	703.4 (760.6) [a b d]	
Working Hours			
< 20 hours	346	961.4 (1192.8)	p<0.001**
20-29 hours	172	755.2 (886.5)	
30-39 hours	309	682.8 (695.4) [a b]	
40-49 hours	2212	626.5 (746.2) [a b]	
50-59 hours	601	695.6 (924.8) [a b]	
60-69 hours	181	944.2 (1400.1)	
≥ 70 hours	33	791.2 (795.1)	
Working Industry			
Manufacturing	98	728.2 (751.3)	p=0.002**
Construction	366	711.0 (939.3)	
Import/export, wholesale and retail trades	345	687.6 (777.8)	
Transportation, storage, postal and courier services	273	679.6 (842.3)	
Accommodation and food services	143	770.4 (1076.2)	
Information and communications	217	612.6 (618.0) [β]	
Financing and insurance	293	631.8 (677.7) [β]	
Real estate, professional and business services	217	624.5 (693.3) [β]	
Public administration, education, human health and social work activities	1418	660.6 (833.5) [β]	
Miscellaneous social and personal services	465	867.5 (1172.4)	
Others	54	859.4 (1187.8)	

[a] Significantly different (p<0.05) from the group of "<$ 4,000" in monthly household income or "No Education/ Preschool" in education level or "< 20 hours" in working hours.

[b] Significantly different (p<0.05) from the group of "Primary School" in education level or "60-69 hours" in working hours.

[c] Significantly different (p<0.05) from the group of "Senior Secondary School (Form 6/7)"

[d] Significantly different (p<0.05) from the group of "Higher Diploma/ Associate"

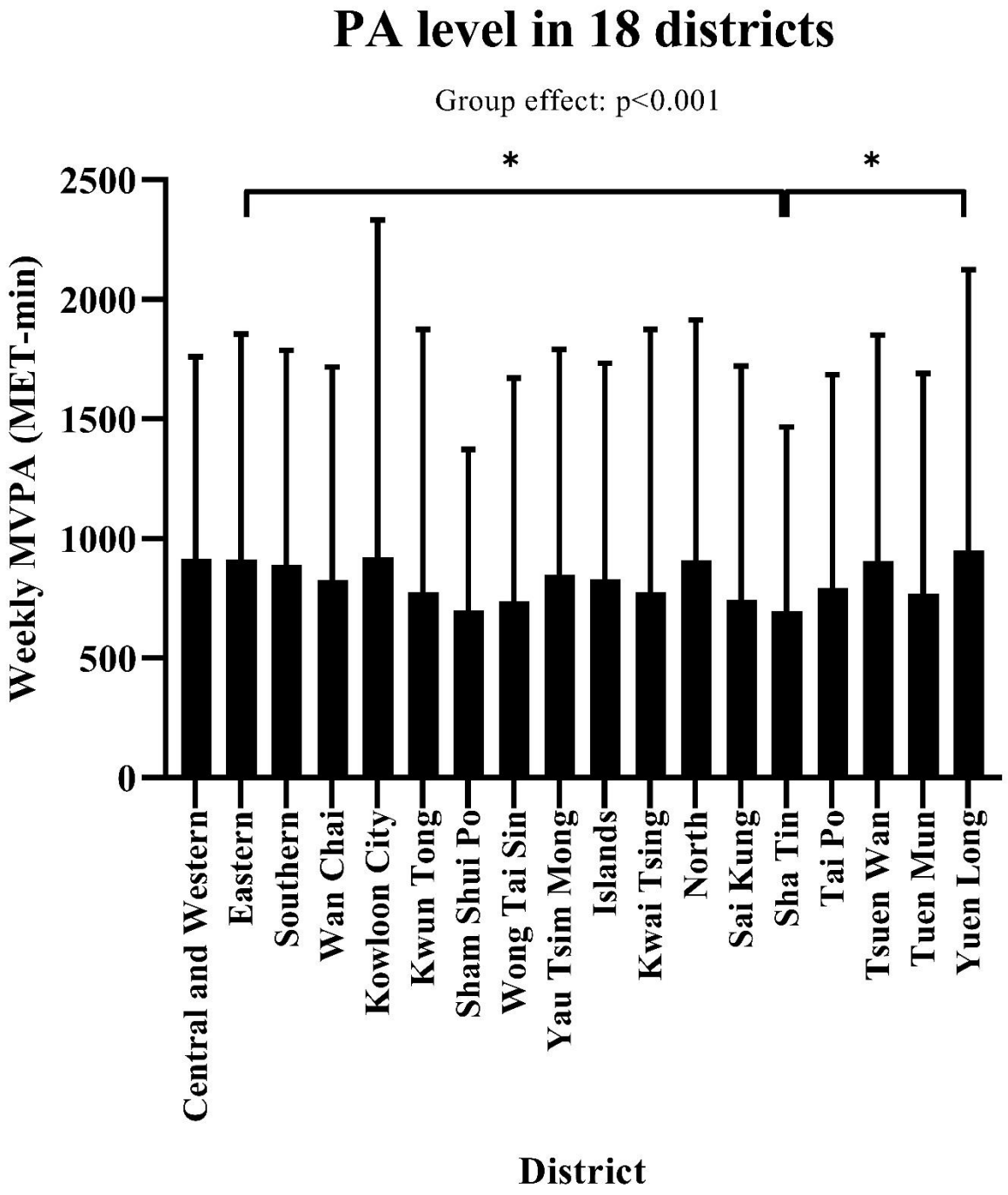
[β] Significantly different (p<0.05) from the group of "miscellaneous social and personal services"

** Significant differences at p<0.01

7.6.5 Comparison of PA level in 18 districts

A significant group effect was detected among 18 districts by the one-way ANOVA. The Bonferroni adjusted post-hoc multiple comparisons showed that adults in Sha Tin district have significantly lower PA levels than those living in Eastern and Yuen Long.

Figure 7.1 Comparison of PA level in 18 districts



*Significant group difference (p<0.05) detected by the Bonferroni adjusted post-hoc multiple comparisons

7.7 Conclusion and Recommendations

53.8% of adults (age: 17-79 did not meet the WHO PA recommendation (i.e., ≥ 150 minutes of MVPA per week or 600 MET-min/wk). A high prevalence of physical inactivity was observed among adults aged 20-59 (~60%). Intriguingly, most of the abovementioned age and gender groups are interested in walking, running, yoga, or stretching. We recommended that stakeholders should organize more exercise courses or workshops based on the abovementioned favorite type of exercise, such as the QualiWalk program (優質步行), body and mind relaxation class (身心伸展), and running course. Moreover, "lack of time" is the commonly cited barrier for adults to participate in physical activity. We recommend that stakeholders collaborate to offer more online or video-based training courses to people with little time for physical activity.

Regarding physical fitness, participants in the current survey typically perform better than those in the 2012 survey regarding cardiovascular fitness, muscular strength, endurance, and power. However, respondents to the current survey usually have a worse balance than respondents from 2012. Therefore, this generation of adults should receive additional balance training.

Unlike primary and secondary school students, adults generally did not have regular fitness tests to monitor their physical fitness. We recommended that stakeholders organize more community-based physical fitness tests for adults to monitor their fitness levels. Furthermore, we suggested that stakeholders provide home-based physical tests for adults to monitor their physical fitness level. The norms of the physical fitness level should be provided on the stakeholder's website for adults to assess and review their fitness level.

A high prevalence of central obesity (defined by IDF for ethnic Chinese: waist circumference ≥ 90 cm for men or ≥ 80 cm for women) (Alberti et al., 2005) was observed among females aged 40-59 years old (31.1%) and adults aged 60 years old or above (>30%). Our further analysis showed that adults aged 40-79 have higher waist circumference than adults aged 17-39, and males have significantly higher waist circumference than females. We suggested that the stakeholders should provide additional weight and management programs, especially to the obese population, such as in-person or online exercise classes for obese individuals, community exercise workshops targeting obese individuals, and mobile applications for obese adults to record the BMI and waist circumference regularly with exercise and dietary advice.

8 General Conclusion

1) This study provides the government and relevant sports promotion stakeholders with the latest physical fitness data of Hong Kong citizens, which serves as a reference for them to develop targeted policies in the future. Moreover, publishing the research results can also allow the public to understand the current physical fitness level of Hong Kong citizens and the importance of regularly participating in sports and physical activities.

2) The previous citywide physical fitness test was conducted ten years ago. Most of the physical fitness parameters have improved across different age groups. This improvement may be attributed to the sports atmosphere and awareness in Hong Kong over the past decade. In recent years, Hong Kong athletes have achieved success in various international competitions, and relevant stakeholders have actively promoted various programs for regular physical activities, which have positively contributed to improving the physical fitness of Hong Kong citizens. However, physical fitness can decline if not continuously maintained, and we still need to work on various community physical activity promotion programs, provide appropriate sports activities based on the physical conditions and exercise preferences of different age groups and genders, and support athlete training and professional development through hosting large-scale events. Moreover, we need to educate the public on the benefits of regular exercise and understand that "exercise is medicine", particularly in weight control, preventing osteoporosis and sarcopenia, and treating and preventing various chronic diseases, all of which have a positive impact on improving the overall sports atmosphere of society.

3) The data shows that the higher the participation in physical activity, the better the physical fitness. However, more than half of adults and young people have not met the World Health Organization's standards for physical activity, and over 60% of children have not met the standards. Therefore, promoting nationwide physical activity is crucial for improving physical fitness. Policy makers in education, healthcare, business, social institutions, and other fields should consider promoting physical activity one of their important goals.

4) To increase public awareness of physical activity and physical fitness improvement, it is recommended to use different media channels, such as news releases, social media, interviews, websites, and documentaries, to share the key findings and recommendations of the research report with the public. This will help them understand Hong Kong citizens' current physical fitness levels.

5) Through different promotional channels, such as dedicated webpages, video productions, and touring exhibitions, the public can be educated on the "Physical Activity Guidelines." This includes children and adolescents engaging in at least 60 minutes or more of MVPA daily, and adults accumulating at least 150 minutes of MVPA per week. Individuals who meet these guidelines can gradually increase their level of physical activity and eventually establish regular exercise habits.

6) Using big data to develop simple self-assessment methods for physical fitness levels based on different age groups, allowing citizens to monitor their physical fitness levels at any time; or designing mobile applications to record their daily physical activity levels, thereby increasing the database of data.

7) It is warranted to evaluate the physical fitness of Hong Kong citizens regularly. We recommend conducting territory-wide physical fitness surveys every five years and conducting longitudinal studies to gain an in-depth understanding of the relationship between physical activity habits and physical fitness levels.

8) It is noteworthy that this is a cross-sectional survey. Except for the actual descriptive statistics, the interpretation of the results was based on correlation, not causal relationships. For example, this study found that lower education levels are associated with higher physical activity. However, this is only a correlation, not a causal relationship.

9 Team Composition

Survey Manager/ Principal Project Leader*:

Prof. Stanley Sai-chuen HUI, Ed.D, FACSM, FAAHPERD
Professor, Department of Sports Science and Physical Education, CUHK
ACSM Fellow
ACSM Health Fitness Specialist & Director ® Certified
Tel: 3943 6081 Fax: 2603 5781
e-mail: hui2162@cuhk.edu.hk

Deputy Survey Manager:

Dr. Jacky Ka-wai CHAN, BEd, MEd, PhD
Assistant Professor, School of Health Sciences, CIHE
ACSM Exercise Physiologist® Certified

Survey Executive (Quality Control):

Mr. James Ho-pong Wan, BSc., MSc (Exercise Science)
PhD student, Department of Sports Science and Physical Education, CUHK

Survey Executive (Statistics):

Prof. Ben Ping-shing CHAN, BSc., MSc, PhD
Associate Professor, Department of Statistics, CUHK

Survey Assistant:

Ms. Sabrina Yujun LU, BSc, MPH
Research Associate, Department of Sports Science and Physical Education, CUHK

Research Assistants:

Dr. Edwin Chun-yip CHIN, BScEd, PhD

Mr. Billy Chung-Yan WONG, BSocSc, MSc

Ms. Carmen Ka-man CHEUNG, BSc

*If you have any questions about this final report, please contact the Survey Manager/ Principal Project Leader, Prof. Stanley Sai-chuen HUI.

10 Reference

Alberti, K. G., Zimmet, P., & Shaw, J. (2005). The metabolic syndrome--a new worldwide definition. *Lancet, 366*(9491), 1059-1062. doi:10.1016/s0140-6736(05)67402-8

Blair, S. N., Kohl, H. W., 3rd, Paffenbarger, R. S., Jr., Clark, D. G., Cooper, K. H., & Gibbons, L. W. (1989). Physical fitness and all-cause mortality. A prospective study of healthy men and women. *JAMA, 262*(17), 2395-2401. doi:10.1001/jama.262.17.2395

Bull, F. C., Al-Ansari, S. S., Biddle, S., Borodulin, K., Buman, M. P., Cardon, G., . . . Willumsen, J. F. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *Br. J. Sports Med., 54*(24), 1451-1462. doi:10.1136/bjsports-2020-102955

Léger, L. A., Mercier, D., Gadoury, C., & Lambert, J. (1988). The multistage 20 metre shuttle run test for aerobic fitness. *J Sports Sci, 6*(2), 93-101. doi:10.1080/02640418808729800

Leung, S. S., Lau, J. T., Tse, L. Y., & Oppenheimer, S. J. (1996). Weight-for-age and weight-for-height references for Hong Kong children from birth to 18 years. *J Paediatr Child Health, 32*(2), 103-109. doi:10.1111/j.1440-1754.1996.tb00904.x

World_Health_Organization. (2006). World Health Organization Child Growth Standards.

11 Appendix

11.1 Appendix 1 Table of sample size

	Overall			Working		Non-Working	
Age groups	Male	Female	Total	Male	Female	Male	Female
7-11	**211**	**199**	**410**	**0**	**0**	**211**	**199**
12-16	**181**	**169**	**350**	**0**	**0**	**181**	**169**
17-19	**113**	**110**	**223**	**43**	**43**	**70**	**67**
20-39	**1278**	**1334**	**2612**	**1049**	**942**	**229**	**392**
20-24	250	236	487	95	93	155	144
25-29	326	325	650	302	265	24	59
30-34	346	366	712	321	299	26	67
35-39	356	407	763	332	285	24	122
40-59	**1302**	**1600**	**2902**	**1107**	**1018**	**196**	**582**
40-44	304	367	671	283	257	21	110
45-49	313	392	705	279	273	34	119
50-54	317	404	721	282	281	34	122
55-59	368	436	805	262	206	107	230
60-69	**648**	**674**	**1322**	**332**	**216**	**316**	**457**
60-64	360	371	732	256	175	104	196
65-69	287	302	590	76	41	211	261
70-79	**334**	**347**	**681**	**89**	**47**	**246**	**300**
70-74	218	227	445	58	31	160	196
75-79	116	121	237	31	16	85	104
Total				**2619**	**2267**	**1448**	**2166**
Grand total	**4067**	**4433**	**8500**	**4886**		**3614**	

11.2 Appendix 2 Staff Manual

HONGKONG
中國香港體適能總會

《2021/22 體適能測試員培訓課程》

學員手冊

學員姓名 ： _____

課程日期 ： _____

1

目錄

2021/22 全港社區體質調查

目標

1. 讓市民更了解自己的身體狀況，鼓勵市民勤做運動。
2. 研究市民現時的運動習慣與其體適能狀況之間的關係。
3. 比較 2011 年與 2021 年「社區體質測試計劃」的調查結果，分析市民在十年內健康狀況的改變。
4. 探討能夠提升市民整體身體素質的方案。

抽樣

調查目標人口為全港 18 區所有 7-79 歲的市民，預計有 8,500 名市民參與調查研究。市民可自願或經其他機構邀請參與此計劃，如教育機構、公司、長者中心、非政府組織、政府部門等。其中，教育局將會提供數百組 7-16 歲中、小學生的數據，以協助調查。測試對象會依年齡分成 7 個組別，7-11 歲；12-16 歲；17-19 歲；20-39 歲；40-59 歲；60-69 歲；70-79 歲。測試分為兩部分，第一部分為填寫問卷，第二部分為體適能測試。測試項目會根據不同的年齡層而改變，以提升研究結果的準確性。

測試項目

一）7 - 11 歲 / 12 - 16 歲

項目		7 - 11 歲	12 - 16 歲
1.1	身高	男/女	男/女
1.2	體重	男/女	男/女
1.3	皮摺厚度（上臂及小腿）	男/女	男/女
1.4	生物電子抗阻分析	男/女	男/女
1.5	十五米漸進式心肺耐力跑	男/女	男/女
1.6	六或九分鐘跑或步行	男/女	男/女
1.7	坐前伸	男/女	男/女
1.8	手握力	男/女	
1.9	一分鐘仰臥起坐	男/女	男/女
1.10	俯臥撐		男/女
1.11	立定跳遠	男/女	男/女

二）17－19 歲 / 20－39 歲 / 40－59 歲

項目		17－19 歲	20－39 歲	40－59 歲
2.1	身高	男/女	男/女	男/女
2.2	體重	男/女	男/女	男/女
2.3	生物電子抗阻分析	男/女	男/女	男/女
2.4	腰圍	男/女	男/女	男/女
2.5	靜態血壓	男/女	男/女	男/女
2.6	三分鐘台階測試 (運動後即時心率)	男/女	男/女	男/女
2.7	坐前伸	男/女	男/女	男/女
2.8	手握力	男/女	男/女	男/女
2.9	一分鐘仰臥起坐	男/女	男/女	男/女
2.10	平板支撐	男/女	男/女	男/女
2.11	立定跳高	男/女	男/女	男/女
2.12	單腳站(閉眼)	男/女	男/女	男/女

三）60 - 69 歲 / 70 - 79 歲

項目		60 - 69 歲	70 - 79 歲
3.1	身高	男/女	男/女
3.2	體重	男/女	男/女
3.3	生物電子抗阻分析	男/女	男/女
3.4	腰圍	男/女	男/女
3.5	靜態血壓	男/女	男/女
3.6	兩分鐘踏步測試	男/女	男/女
3.7	椅上坐前伸	男/女	男/女
3.8	抓背	男/女	男/女
3.9	手握力	男/女	男/女
3.10	肱二頭肌屈舉	男/女	男/女
3.11	坐椅站立	男/女	男/女
3.12	八英尺繞物	男/女	男/女
3.13	單腳站(開眼)	男/女	男/女

測試方法:

身體組合成分

身高

步驟：

1. 除鞋及除去身上大件的衣物，只穿襪子
2. 受試者軀幹自然挺直，頭部正直，兩眼平視，耳屏上緣與眼眶下緣最低點，「兩點呈水平」
3. 上肢自然下垂，兩腿伸直，兩腳足跟合攏，腳尖分開約 60°，足跟、骶骨部及兩肩胛間與立柱相接觸，成「三點靠立柱」的站立姿勢
4. 度高尺靠牆放置，調節項站伸縮裝置，使之靠實牆身，保持立柱垂直
5. 測試員單手將水平壓板沿立柱向下滑動至受試者頭頂點，妨礙測量的髮辮、髮結要放開，飾物要取下
6. 記錄數值
7. 完成記錄後，立即將水平壓板輕輕推向安全高度，以防碰壞

用具：　度高尺

量度成績：　讀數取最近 0.1 厘米

備註:

1. 嚴格執行「三點靠立柱」、「兩點呈水平」的測量要求
2. 身高計應選擇平坦地面，靠牆放置，調節項站伸縮裝置，使之靠實牆身，保持立柱垂直
3. 當水平壓板與頭部接觸時，鬆緊要適度，頭髮蓬鬆者要壓實

適用年齡組別；全部

體重及生物電子抗阻分析

步驟：
1. 用消毒紙巾清潔分析儀四點感應器及手把
2. 受試者除鞋、除襪及除去身上大件的衣物
3. 測試員依電腦程式輸入受試者身高及出生日期
4. 此時受試者用消毒紙巾清潔足底，清潔後不要把腳放回地面，以免沾染塵埃或油脂
5. 測量者赤腳(必須脫下襪子)，踏上分析儀四點感應器
6. 受試者雙手握起手把，保持身體平穩
7. 待顯示屏上顯示的數值穩定後，列印記錄

用具：　生物電子抗阻分析儀

量度成績：　讀數取最近 0.1 千克/%

備註:　體內裝有電子儀器或鋼鐵裝置不宜進行這項測量

適用年齡組別；全部

皮摺厚度（上臂）

步驟：

1. 受試者須站立，右手放鬆，手心向身體，並置於身旁
2. 入鉗位置於右上臂肩膀肩峰突與手肘鷹嘴突之間的中位(肩峰突及鷹嘴的中央位置)
3. 測試員應站在被量度者的後方，於入鉗位置對上 1 厘米，用左手姆指、食指及中指捏起直位皮摺（切勿將肌肉抓起），然後輕輕提起。此外，手指需與皮摺垂直[90 度]
4. 然後用右手持皮摺鉗，於入鉗位置量度厚度，入鉗深度是捏起皮摺高度的一半，左手一直捏起皮褶，右手在鉗住皮摺後可稍放開 2 秒，讓讀數穩定
5. 讀取最近的 0.1 毫米（mm）單位數值，一小格為 0.2 毫米，兩格中間為 0.1 毫米。記下讀數後，小心放開手指及皮摺鉗
6. 重複量度兩次(應交替其他皮摺量度，或休息 1-2 分鐘後量度)，若讀數差距不超過 2 毫米便可接受。將 2 個可接納的讀數取平均值即是肱三頭肌的皮摺厚度
7. 記錄數值

用具：　皮下脂肪計

量度成績：　量度兩次；若果兩個數值相差或大於 2 毫米便需要取第三次的記錄；如此類推，直至其中兩個讀數差距於 2 毫米內

備註:

1. 皮摺的位置必須準確
2. 切勿將皮下脂肪計夾在皮摺底部

適用年齡組別；7-16 歲

皮摺厚度（小腿）

步驟：

1. 受試者須將重心放左腳，右腳屈曲踏在 12 英吋高矮櫈上
2. 入鉗位置於右小腿內側最大圓周上的內側中線
3. 測試員應站在被量度者的後方，於入鉗位置對上 1 厘米，用左手姆指、食指及中指捏起直位皮摺（切勿將肌肉抓起），然後輕輕提起。此外，手指需與皮摺垂直［90 度］
4. 然後用右手持皮摺鉗，於入鉗位置量度厚度，入鉗深度是捏起皮摺高度的一半，左手一直捏起皮褶，右手在鉗住皮摺後可稍放開 2 秒，讓讀數穩定
5. 讀取最近的 0.1 毫米（㎜）單位數值，一小格為 0.2 毫米，兩格中間為 0.1 毫米。記下讀數後，小心放開手指及皮摺鉗
6. 重複量度兩次(應交替其他皮摺量度，或休息 1-2 分鐘後量度)，若讀數差距不超過 2 毫米便可接受。將 2 個可接納的讀數取平均值即是小腿內側的皮摺厚度
7. 記錄數值

用具：　皮下脂肪計

量度成績：　量度兩次；若果兩個數值相差或大於 2 毫米便需要取第三次的記錄；如此類推，直至其中兩個讀數差距於 2 毫米內

備註:

1. 皮摺的位置必須準確
2. 切勿將皮下脂肪計夾在皮摺底部

適用年齡組別；7-16 歲

腰圍

步驟：

1. 受試者除去身上大件的衣物，捲起腰間衣服
2. 受試者自然站立，兩肩放鬆，雙臂手交叉抱於胸前
3. 測試員面對受試者，用古力彈簧量尺圍繞受試者的腰部（腰圍定義：最底一條肋骨與盤骨頂的中間點，與水平面平衡的位置），再請受試者將兩手垂直放下在身體兩旁，放鬆正常呼吸，測試員在側面量度
4. 將古力彈簧量尺圍腰後成交叉，並將金屬尺頭與尺平衡，向尺的另一端拉，直到金屬棒近尺的一端的線出現紅色
5. 測試員控制量尺圍繞腰部的鬆緊度（皮膚不應產生明顯凹陷），量尺上與 0 點相交的數值即為測量值
6. 記錄數值

用具：　古力彈簧量尺（Gulick tape）

量度成績：　讀數取最近 0.1 厘米

備註:

1. 測試員應嚴格控制古力彈簧量尺的鬆緊度
2. 測量時，受試者不能有意識地挺腹或收腹，呼吸自然
3. 男、女分開獨立測試

適用年齡組別；17-79 歲

靜態血壓

步驟：

1. 受試者除去身上大件的衣物
2. 受試者須坐著並把手臂微曲放於桌上，手臂放於桌上時應與心臟同一高度
3. 把未充氣壓力帶加在手肘內對上 2 厘米，膠喉位置依照手帶上的指示安放
4. 按掣自動量度，直至顯示器上顯示讀數
5. 記錄數值

用具：　手臂式血壓計

適用年齡組別；17-79 歲

心肺耐力

三分鐘台階測試

步驟：

1. 受試者進行熱身運動（伸展 + 踏步）
2. 將拍子機預設為每分鐘 96 拍
3. 面向一 12 吋高台階，重複「上上落落」三分鐘（每分鐘 24 次，即三分鐘內共 72 次上落），每次雙膝於台階上伸直為止，先踏上的腳要先落地
4. 完成後，受試者應站立，測試員立即讓受試者於食指上帶上血含氧儀以量度心率
5. 測試員立刻記錄從血含氧儀取得的運動後即時心率
6. 同時，於台階運動後 5 秒內，用人手開始量度連續 1 分鐘的運動後復回脈搏
7. 記錄數值

用具：　拍子播放機、台階數個（12 英吋高）、秒錶、血含氧儀

備註:　從血含氧儀讀取數值時，切勿誤將心率與血含氧量數據調換（血含氧量一般在 90-99% 內；而運動後的即時心率一般高於 100 bpm）

適用年齡組別；17-59 歲

兩分鐘踏步測試

步驟：

1. 受試者進行熱身運動（伸展 + 踏步）
2. 受試者側站牆邊，設定提膝高度為膝蓋與前髖(髂嵴 iliac crest）的中間，用膠紙在牆上標記高度
3. 受試者面向牆，測試員發指示「預備」、「開始」，並開始計時，受試者左右腳輪流提膝至標記高度
4. 記錄受試者於兩分鐘內原地提膝踏步最多次數，如受試者不能保持高度，則提醒他
5. 每次右膝達到標記高度算一次，任何一膝未達標記高度，該次則不算
6. 記錄數值

用具：　膠紙、秒錶及捲尺

備註:

1. 受試者提膝太高，測試員可提醒受試者降低提膝位置
2. 受試者任何一膝低過標記高度，該次不作計算
3. 若果受試者停止或稍作休息，測試可以繼續

適用年齡組別；60-79 歲

十五米漸進式心肺耐力跑

步驟：

1. 測量前，受試者聆聽錄音指示，於初階段進行兩次練習，以熟習測試過程
2. 受試者站於開始的端線後準備，按錄音指示開始測試
3. 當聽到指示開始的訊號發出後，受試者向前跑至另一端，在「嗶」聲響起時最少以單腳踏端線，以示到達，然後馬上轉身折返跑，如此類推
4. 如受試者於「嗶」聲未響已到達端線，應在原地等待下一次「嗶」聲響才進行折返跑
5. 如受試者於「嗶」聲響起時未能到達另一端線(此時測試員應記錄一次 X 號)，受試者應馬上轉身繼續折返跑，並加速以追上在下一次「嗶」聲響起時能到達端線
6. 若受試者未能趕上，測試立即終止(此時測試員應記錄第二次 X 號)
7. 當受試者累積兩次 X 號，測試亦會被終止
8. 一聲「嗶」響表示已完成一圈，三聲「嗶」響表示已完成一個階段。下一階段將會加快節奏，測試員應告知受試者需要加速和繼續進行測量
9. 測試員記錄受試者所完成的轉數(即最後出現√號的數值)

用具：

雪糕筒或飛碟、量度尺、膠紙、哨子、大聲公、PACER 測量指示的錄音光碟/ MP3、音樂播放器

量度成績：

記錄受試者所完成的轉數（15 米為一轉）

備註:

1. 標誌物需設置在跑道的兩端，並將光碟播放機設置在跑道外的中間位置
2. 每次小組進行測量，要注意受試者與測試員保持適當距離，以免發生碰撞
3. 測試員應查詢受試者身體狀況是否適宜進行測量
4. 測試前，受試者應有適當的熱身運動
5. 如受試者有不適，應停止測量

適用年齡組別；7-16 歲

六或九分鐘跑或步行

場地區域： 可在籃球場（25 米× 15 米）或
任何平坦及周界為 80 米之長形或方形空地上進行測量

步驟：
1. 每 10 米放一個雪糕桶
2. 讓受試者在不同雪糕桶後等候測試開始
3. 測試開始後鼓勵受試者繼續跑或步行
4. 受試者可減慢速度，待恢復後再加快
5. 時間過後，記錄受試者完成的總距離(雪糕桶)

用具： 雪糕筒、秒錶

量度成績： 以十米為一計算單位記錄所完成的距離

適用年齡組別：7-16 歲

柔軟度

坐前伸

步驟：

1. 將坐地前伸木箱放在墊上，木箱尾端須緊貼牆壁或柱，以固定其位置
2. 受試者應脫去鞋子，面向木箱，直膝坐在墊上，腳掌貼在該箱底板(即腳跟在刻度 23cm 的位置)。雙足距離約為肩膊闊度，保持直膝
3. 受試者雙手伸直前伸，雙手拇指可互扣，而手掌放於箱面上面，以指尖向前慢慢地向前移動，移至最遠的位置
4. 向前伸展時，受試者應盡量放鬆，並隨著彎腰動作緩緩地呼氣，眼望下前方，整個動作要流暢不能有任何抽動或躍動動作，保持呼吸暢順
5. 測試者可在受試者停 1 秒時，取其讀數並記錄
6. 重複以上測試三次，取較佳成績作結果

用具：　坐地前伸箱、地墊、記錄表

量度成績：

1. 量度單位為厘米（cm）
2. 如受試者在測量時曲膝或雙手不對稱則須重新測量

備註:

1. 坐地前伸木箱須符合規格
2. 如受試者因任何理由不方便坐在地上進行測試，可考慮在長櫈上進行測試

適用年齡組別；7-59 歲

椅上坐前伸

步驟：
1. 受試者坐在椅子邊沿（注意椅子穩固），一腳屈曲，足踝九十度，另一腳向前伸直
2. 受試者雙手伸直，手掌重疊，配合呼氣緩緩彎腰向前，中指盡可能延伸至觸及腳尖，於最遠延伸位置暫停並保持兩秒（膝蓋必須保持伸直）
3. 測試員量度中指與腳尖之間的距離；手腳觸碰為 0，未能相觸的距離為負數(–)，手指超過腳尖的距離為正數(+)
4. 重複測試兩次，取較佳成績作結果

用具：　椅子（座位約 17 英吋高）、長尺（18 英吋）

量度成績：　讀數取最近 0.5 厘米

適用年齡組別；60-79 歲

抓背

步驟：
1. 受試者以一手提起向下搔背，另一手從腰間向上搔背
2. 此時，兩手在背後，手指盡量靠近相觸
3. 測試員量度兩手中指之間的距離，未能相觸的為負數（－），手指重疊的距離為正數(+)
4. 左手和右手各重複測試兩次，取較佳成績作結果

用具：　軟尺

量度成績：　讀數取最近 0.5 厘米

適用年齡組別；60-79 歲

肌力/肌耐力

手握力

步驟：

1. 受試者站立並調較手握位置（以手指第二節扣緊手柄）
2. 先單手持握力計，垂下於大腿身旁，顯示屏幕向外
3. 在無其他身體及手部動作下，直臂盡全力緊握手柄 2 秒。測量時，握力計不得觸及身體或其他物件
4. 要左、右手輪流交替測試 3 次，每次之間可休息 30 秒
5. 測試員記錄每次成績，左右手各取最佳成績，然後相加

用具：　握力計

適用年齡組別；7-11 歲、17-79 歲

肱二頭肌屈舉

步驟：

1. 受試者靠慣用手一邊坐在椅上，以慣用手持啞鈴，手臂垂直於地面，手心向內側
2. 測試員發令「預備」、「開始」，並開始計時受試者屈臂提起啞鈴，並同時旋轉前臂至手心向上，恢復至垂直位置，三十秒內重複最多次屈臂
3. 記錄受試者三十秒內的屈臂次數

用具：　秒錶、直背椅、五磅啞鈴(女性)、八磅啞鈴(男性)

適用年齡組別；60-79 歲

一分鐘仰臥起坐

步驟：

1. 受試者曲膝在墊上仰臥，測試員緊按受試者腳掌固定在地上，使膝部屈曲成 90-120 度
2. 受試者雙臂在胸前交疊，手掌放在雙肩上，下頜貼於胸前
3. 測試員發令「預備」、「開始」並開始計時，受試者上身離地向前捲曲，至手肘觸及大腿後，再回復原來躺臥姿態，背部再次觸及軟墊，為一次動作，受試者要在時限內不停重複動作
4. 做整個動作時，雙手應該保持放在胸前位置，下頜貼於胸前(過程中，動作不能間斷)
5. 測試員記錄受試者在一分鐘內正確完成的仰臥起坐次數

用具：　計時器、軟墊

量度成績：　記錄在一分鐘內完成正確仰臥起坐的次數（以一次為一計算單位）

備註:　測試員應確保各動作合乎要求。測試員應提示受試者在軀幹下落時以背部觸墊，避免後腦撞擊地面

適用年齡組別；7-59 歲

俯臥撐（男生）

步驟：

1. 受試者俯臥直手支撐在地墊上，手掌放在肩膊闊度稍闊距離於地上，手指向前及分開，雙腿伸直平排微分，以腳趾支撐
2. 聽到測試員的指示後，測試開始，受試者屈曲手肘直至雙臂手肘成至少 90 度屈曲，然後再推直手肘，直至完全伸直，算作一次。完成一次後應立即做第二次，其中不能有停頓。受試者須不限時地連續重複動作至最多次數
3. 在測量過程中，受試者由頭、背部至腳須保持一直線，此項測量以推起身體至手臂完全伸直為一次
4. 動作需連續不可停頓，若受試者中途明顯停頓休息，測試員便立即停止測試
5. 發生以下情況時，必須修正：
   - ◆膝觸地
   - ◆背部擺動
   - ◆手臂未能完全伸直
   - ◆雙臂未能屈曲成 90 度
   - ◆動作不暢順
6. 若受試者動作不符合要求但沒有停頓，則測試者提醒他該次不算，但無需终止測試
7. 測試員記錄正確完成的掌上壓次數

用具：　地墊

量度成績：　正確掌上壓的次數（以一次為一計算單位）

備註:

1. 受試者保持背部挺直，手肘屈曲 90 度再回復至完全伸直方算一次
2. 受試者的動作被修正達兩次時，便須停止該次的測量。須修正的掌上壓次數不應計算入成績內
3. 若果受試者在測量期間出現極度不適或痛楚，應立即停止測量

適用年齡組別；12-16 歲

俯臥撐（女生）

步驟：

1. 受試者俯臥直手支撐在地墊上，雙手屈曲，手掌放在肩膊闊度稍闊距離於地上，手指向前分開；雙腳膝蓋在墊上，腳掌離地互相交疊；頭、背部至大腿須保持一直線
2. 聽到測試員的指示後，測試開始，受試者屈曲手肘直至雙臂手肘成至少 90 度屈曲，然後再推直手肘，直至完全伸直，算作一次。完成一次後應立即做第二次，其中不能有停頓
3. 在測量過程中，受試者由頭、背部至大腿須保持一直線，此項測量以推起身體至手臂完全伸直為一次
4. 動作需連續不可停頓，若受試者中途明顯停頓休息，測試員便立即停止測試
5. 發生以下情況時，必須修正：
   - ◆身軀接觸地面
   - ◆背部擺動
   - ◆手臂未能完全伸直
   - ◆雙臂未能屈曲成 90 度
   - ◆動作不暢順
8. 若受試者動作不符合要求但沒有停頓，則測試者提醒他該次不算，但無需終止測試
9. 測試員記錄正確完成的掌上壓次數

用具：　地墊

量度成績：　正確曲膝掌上壓的次數（以一次為一計算單位）

備註:

1. 受試者保持背部挺直，手肘屈曲 90 度再回復至完全伸直方算一次
2. 受試者的動作被修正達兩次時，便須停止該次的測量。須修正的掌上壓次數不應計算入成績內
3. 若受試者在測量期間出現極度不適或痛楚，應立即停止測量

適用年齡組別；12-16 歲

平板支撐

步驟：

1. 受試者保持左右腳的足跟和腳尖，雙腳合攏
2. 受試者身體俯臥，頭部及頸部也應成一直線向地下望
3. 平板支撐時，手肘擺位應該是將手肘關節放在肩關節的正下方，令手臂肌肉不會過份用力
4. 測試者發令「預備」、「開始」，並以秒錶計時
5. 當受試者放棄或頭、身軀和腳不能維持直線，測試立即終止，測試員記錄最終時間
6. 發生以下情況時，必須修正:
   - ◆ 頭、身軀和腳未能成直線
   - ◆ 身體或手腳搖動
7. 若受試者動作不符合要求，且未能成功作出修正，則終止測試

用具：　秒錶、地墊

量度成績：　讀數取最近 0.1 秒

適用年齡組別；17-59 歲

立定跳遠

步驟：
1. 受試者雙腳站在立定跳遠地墊的起跳線後，雙腳打開至肩膊闊度，雙腳半蹲，雙臂置於身體兩側的後方
2. 測試員發令「預備」、「開始」，受試者揮臂屈腿，盡力雙腳向前跳
3. 測試員記錄由起跳線至落地時(身體任何一部位)最靠近起跳線位置的距離
4. 著地時，需保持平衡，手部及臀部不能觸及地面

用具：　立定跳遠地墊

量度成績：　量度單位為厘米（cm）

備註:
1. 測試員應查詢受試者身體狀況是否適宜進行測量
2. 測量前，受試者應有適當的熱身運動
3. 如受試者有不適，應停止測量
4. 受試者進行起跳準備時手臂可以擺動，但雙腳不得離地
5. 如受試者在測量時非雙腳同時起跳並同時著地則須重新測量

適用年齡組別；7-16 歲

坐椅站立

步驟：
1. 受試者坐在椅子中央，雙手交叉胸前，腳平踏地上
2. 測試員發令「預備」、「開始」，並開始計時
3. 受試者從坐姿不用手輔助站起至完全直立，再坐下至坐姿，在三十秒內重複最多次站立(站起至完全直立為一次)
4. 測試員記錄受試者在時限內重複動作的次數

用具：　秒錶，重身的直背椅（座位高約 17 英吋）

適用年齡組別；60-79 歲

立定跳高

步驟：

1. 受試者雙腳踏在地上，雙足自然分開，呈直立姿勢
2. 把一手向上伸直，並緊貼在垂直跳量尺上，測試員記錄手指尖在量尺上的位置
3. 受試者屈膝蹲腿，雙臂盡力後擺，然後向前上方快速擺臂，雙腿同時發力，盡力地垂直向上跳起
4. 在垂直跳量尺上，用手拍在能力所及的最高位置
5. 測試員記錄受試者的成績
6. 進行兩次跳高測試，取最高成績減去步驟 2 的記錄作最終結果

用具：　垂直跳量尺

量度成績：　量度單位為 0.1 厘米（cm）

適用年齡組別；17-59 歲

神經肌肉功能

八英尺繞物

步驟：
1. 雪糕桶放置於椅子正面 8 尺處
2. 受試者坐在椅上，背直，手放大腿上，雙腳平放地面
3. 測試者發令「預備」、「開始」，並開始計時，受試者立刻站起行繞著雪糕筒走，然後坐回原位
4. 進行兩次測試，記錄最好成績

用具：　秒錶、重身的直背椅(座位高 17 英吋)、捲尺、雪糕筒

量度成績：　讀數取最近 0.1 秒

適用年齡組別；60-79 歲

單腳站(閉眼)

步驟：
1. 受試者閉眼，雙手垂直於身旁，但盡量不接觸身軀，亦不需要張開雙臂
2. 一隻腳向上提腳，另一隻腳保持單腳站立(測試員按秒錶計時)
3. 當受試者的支撐腳移動或抬起腳着地時，測試員停錶
4. 測試兩次，記錄最佳成績

用具：　秒錶

量度成績：　讀數取最近 0.1 秒

適用年齡組別；17-59 歲

單腳站(開眼)

步驟：
1. 受試者開眼，雙手垂直於身旁，但盡量不接觸身軀，亦不需要張開雙臂
2. 一隻腳向上提腳，另一隻腳保持單腳站立(測試員按秒錶計時)
3. 當受試者的支撐腳移動或抬起腳着地時，測試員停錶
4. 進行測試兩次，記錄最佳成績

用具：　秒錶

量度成績：　讀數取最近 0.1 秒

適用年齡組別；60-79 歲

11.3 Appendix 3 Schedule of All the Tests

Date	Time	Organisation/ Institute	Testing Venue
22/05/2021		The Chinese University of Hong Kong	Yeung Ming Biu Indoor Sports Centre, The Chinese University of Hong Kong
29/05/2021		Tsuen Wan Sports Centre	Tsuen Wan Sports Centre, 53 Wing Shun Street, Tsuen Wan, N.T.
06/08/2021	14:30	Yan Oi Tong Ng Kam Yuk Memorial Neighbourhood Elderly Centre (Sham Shing Estate)	G/F, Sam Shing Estate, Fung Yu House, Tuen Mun, N.T.
21/08/2021	08:30	Lo Yau Yuk Sheung Neighbourhood Elderly Centre	3/F, Kelly Commercial Centre, 570-572 Nathan Road, Mong Kok, Kowloon
24/08/2021	13:00	Hong Kong Institute of Vocational Education (Tuen Mun)	18 Tsing Wun Road, Tuen Mun, N.T.
06/09/2021	10:00	The Kwai Hing Campus of Hong Kong Metropolitan University	9/F, Tower 2, Kowloon Commerce Centre, 51-53 Kwai Cheong Road, Kwai Chung, N.T.
07/09/2021	10:30	Hong Kong Metropolitan University	Hall of Hong Kong Metropolitan, Homantin, Kowloon
15/09/2021	14:00	Hong Kong Electric Company	Hong Kong Electric Centre, 44 Kennedy Road, Hong Kong
16/09/2021	14:30		
18/09/2021	13:00	Yan Chai Hospital Tang Bik Wan Memorial Neighbourhood Elderly Centre	G/F, Block 21, Shek Kip Mei Estate, Sham Shui Po, Kowloon
20/09/2021	12:00	Hong Kong Adventist Hospital - Tsuen Wan	199 Tsuen King Circuit, Tsuen Wan, N.T.
21/09/2021	10:30	The Salvation Army Tai Po Integrated Home Care Services	3/F, Tai Po Community Centre, 2 Heung Sze Wui Street, Tai Po, N.T.
28/09/2021	08:30	Caritas District Elderly Centre - Yuen Long	Unit 11-20A, G/F, Ying Shui House, Shui Pin Wai Estate, Yuen Long, N.T.
29/09/2021	13:15	Hong Kong Electric Company	Hong Kong Ap Lei Chau Electric Tower, 1 Lee Wing Street, Kowloon
30/09/2021	13:45		
02/10/2021	09:45	Wilson T.S. Wang District Elderly Community Centre	Green Heron House, Sha Kok Estate, Shatin, N.T.
04/10/2021	10:00	Cathay Pacific	7/F, Cathy Pacific Cargo Terminal, 3 Chun Wan Road, Chek Lap Kok, N.T.

07/10/2021	9:00	Hong Kong YWCA Chi Po Neighbourhood Elderly Centre	4/F, Un Chau Street Municipal Services Building, 59-63, Un Chau St, Sham Shui Po, Kowloon
11/10/2021	10:00	The Salvation Army Wah Fu Centre for Senior Citizens	Rooms 301-310, G/F, Wah Kin House, Wah Fu Estate, Hong Kong
18/10/2021	09:00	Central Government Offices	Conference Hall C, 2 Tim Mei Avenue, Tamar, Hong Kong
29/10/2021	13:00	The Kowloon Motor Bus	Kowloon Motor Bus Kowloon Bay Depot, Kowloon
30/10/2021	08:15	Hong Kong Society for the Aged Eastern District Elderly Community Centre	G/F, Phase 2, Provident Centre, 53 Wharf Road, North Point, Hong Kong
03/11/2021	13:00	Yan Chai Hospital Mrs. Tsang Wing Neighbourhood Elderly Centre	Unit 131-134, Tip Ying House, Butterfly Estate, Tuen Mun, N.T.
04/11/2021	09:15	Ma On Shan District Elderly Community Centre, The Evangelical Lutheran Church of Hong Kong	1/F, Kam Tai Shopping Centre, Kam Tai Court, Ma On Shan, Shatin, N.T.
05/11/2021	14:00	Megastrength Security Services	Flat B, 17/F, 78 Hung To Road, Kowloon
08/11/2021	08:45	Central Government Offices	Conference Hall C, 2 Tim Mei Avenue, Tamar, Hong Kong
11/11/2021	09:30	Olympic House	Meeting Room, 1/F, Olympic House, No. 1 Stadium Path, So Kon Po, Causeway Bay, Hong Kong
15-19/11/2021	10:00	Tsuen Wan Sports Centre	Tsuen Wan Sports Centre, 53 Wing Shun Street, Tsuen Wan, N.T.
20/11/2021	10:00	Construction Industry Council	44 Tai Yip Street, Kowloon Bay, Kowloon
21/11/2021	09:00		
22/11/2021	11:15	Baptist Hospital	Hall, 9/F, Block D, Baptist Hospital, 222 Waterloo Road, Kowloon
23/11/2021	11:30		
24/11/2021	11:30		
25/11/2021	11:30		
23/11/2021	08:00	Hong Kong Stadium	55 Eastern Hospital Road, So Kon Po, Hong Kong
24/11/2021	08:30		
25/11/2021	08:30		
26/11/2021	08:30		
26/11/2021	10:30	Hall 3FG, Hong Kong Convention and Exhibition Centre	Hall 3FG, Hong Kong Convention and Exhibition Centre, Hong Kong
27/11/2021	09:30		
28/11/2021	09:30		

06/12/2021	10:00	Ricoh Hong Kong Limited	3/F, Modern Terminals Warehouse Phase II, Berth One, Kwai Chung, N.T.
10/12/2021	14:15	Modern Terminals	Concourse, G/F, Modern Terminals Warehouse Phase II, Berth One, Kwai Chung, N.T.
10/12/2021	14:15	Ricoh Hong Kong Limited	20/F, One Kowloon, 1 Wang Yuen Street, Kowloon Bay, Kowloon
13/12/2021	10:30	Hong Kong Brands and Products Expo	Victoria Park Swimming Pool, 1 Hing Fat Street, Causeway Bay, Hong Kong
14/12/2021	09:30		
17/12/2021	13:00	Hip Hing Construction Company Limited	Fitness room in the construction site of Kai Tak Sports Park, Muk Tai Street, Kai Tak, Kowloon
17/12/2021	10:00	South Horizons Residents Clubhouse	South Horizons Residents Club, 13B South Horizon Drive, Ap Lei Chau, Hong Kong
18/12/2021	09:00		
20/12/2021	10:30	Hong Kong Brands and Products Expo	Victoria Park Swimming Pool, 1 Hing Fat Street, Causeway Bay, Hong Kong
22/12/2021	09:30		
23/12/2021	09:30		
01/01/2022	10:00	Test Day (Siu Sai Wan Complex)	Siu Sai Wan Complex, 15 Siu Sai Wan Road, Hong Kong
30/04/2022	13:00	Test Day (Cheung Sha Wan Sports Centre)	Cheung Sha Wan Sports Centre, J/O Hing Wah Street and Cheung Sha Wan Road, Sham Shui Po, Kowloon
26/5/2022	16:00	North District Sports Ground	26 Tin Ping Road, Sheung Shui, N.T.
27-29/05/2022	15:00		
04/06/2022	09:00		
07/06/2022	10:00	Fu Hong Society Rehabilitation Centre	Hall, 1/F, Fu Hong Society Rehabilitation Centre, 85 Yue Kwong Road, Aberdeen, Hong Kong
10/06/2022	10:30	Free Duty	Shops 2039-2040, 2/F, D·Park, 398 Castle Peak Road, Tsuen Wan, N.T.
11/06/2022	10:00	Yuen Long Town Hall	Hall, 1/F, Yuen Long Town Hall, 4 Tai Yuk Road, Yuen Long, N.T.
14/06/2022	09:30	Test Day (Tai Po Hui Sports Centre)	Activity Room, Tai Po Hui Sports Centre, 6/F, Tai Po Complex, 8 Heung Sze Wui Street, Tai Po, N.T.
17/06/2022	08:45	China Great Wall AMC (International) Holdings Company Limited	20/F, Bank of America Tower, 12 Harcourt Road, Central, Hong Kong

24/06/2022	14:00	Smithfield Sports Centre	7/F, Smithfield Municipal Services Building, 12K Smithfield, Kennedy Town, Hong Kong
25/06/2022	09:30	Tai Po Hui Sports Centre	Activity Room, Tai Po Hui Sports Centre, 6/F, Tai Po Complex, 8 Heung Sze Wui Street, Tai Po, N.T.
27/06/2022	10:15	Construction Industry Council	44 Tai Yip Street, Kowloon Bay, Kowloon
28/06/2022	09:00		
29/06/2022	09:00		
30/06/2022	12:00	Test Day (Tung Chung Man Tung Road Sports Centre)	Activity Room, 2/F, Tung Chung Municipal Services, 39 Man Tung Road, Tung Chung, N.T.
05/07/2022	13:30	Manulife (International) Limited	Meeting Rooms A-C, 15/F, Manulife Tower, One Bay East, 83 Hoi Bun Road, Kwun Tong, Kowloon, Hong Kong
10/07/2022	09:00	Test Day (Kowloon City Sports Centre)	3/F, Kowloon City Complex, 100 Nga Tsin Wai Road, Kowloon City, Kowloon
11/07/2022	10:30	Free Duty	Shops 2039-2040, 2/F, D·Park, 398 Castle Peak Road, Tsuen Wan, N.T.
13/07/2022	08:00	Hong Kong and Macau Lutheran Church Primary School	4 Chap Fuk Road, Tseung Kwan O, N.T.
14/07/2022	13:30	Ma On Shan Ling Liang Primary School	Lee On Estate, 23 Sha On Street, Ma On Shan, Shatin, N.T.
15/07/2022	13:00	HKTA Yuen Yuen Institute Shek Wai Kok Primary School	Estate Primary School, No. 2 Shek Wai Kok Estate, Tsuen Wan, N.T.
16/07/2022	14:00	Hong Kong Retired Civil Servants Association	Activity Room, 5/F, Smithfield Sports Centre, Smithfield Municipal Services Building, 12K Smithfield, Kennedy Town, Hong Kong
20/07/2022	13:30	Ma On Shan Ling Liang Primary School	Lee On Estate, 23 Sha On Street, Ma On Shan, Shatin, N.T.
21/07/2022	13:00	Father Cucchiara Memorial School	Estate *School* No. 2, Cheung Ching Estate Phase I, Tsing Yi, N.T.
23/07/2022	08:30	Tso Kung Tam Outdoor Recreation Centre	105 Route Twisk, Tsuen Wan, N.T.
25/07/2022	09:00	Chuk Yuen Sports Centre	Activity Room, Chuk Yuen Sports Centre, 10 Chuk Yuen Road, Kowloon
26/07/2022	08:00	SKH St Michael Primary School	23 Fortress Hill Road, North Point, Hong Kong
27/07/2022	08:30	Sau Ming Primary School	5 Sau Fung Street, Sau Mau Ping, Kwun Tong, Kowloon
28/07/2022	08:30		

28/07/2022	15:00	Kowloon Bay Sports Ground	1 Kai Lok Street, Kowloon Bay, Kowloon
30/07/2022	08:30	Tso Kung Tam Outdoor Recreation Centre	105 Route Twisk, Tsuen Wan, N.T.
01/08/2022	15:00	Kowloon Bay Sports Ground	1 Kai Lok Street, Kowloon Bay, Kowloon
02/08/2022	15:00		
03/08/2022	08:00	Po Yan Oblate Primary School	15 Lok Sin Road, Kowloon
04/08/2022	11:00	Test Day (Tsing Yi Southwest Sports Centre)	Tsing Yi Southwest Sports Centre, 70 Chung Mei Road, Tsing Yi, N.T.
06/08/2022	10:00	Manulife (International) Limited	Meeting Rooms A-C, 15/F, Manulife Tower, One Bay East, 83 Hoi Bun Road, Kwun Tong, Kowloon
07/08/2022	11:00	Sports For All Day 2022 (Tsuen Wan Sports Centre)	Tsuen Wan Sports Centre, 53 Wing Shun St, Tsuen Wan, N.T.
09/08/2022	13:00	Kwun Tong District Health Centre	4/F, Block J, United Christian Hospital, 130 Hip Wo Street, Kwun Tong, Kowloon
10/08/2022	12:00	Shun Lee Tsuen Sports Centre	Dance Room, Shun Lee Tsuen Sports Centre, 33 Shun Lee Tsuen Road, Kwun Tong, Kowloon
13/08/2022	09:00	Test Day (Siu Lun Sports Centre)	Activity Room 3, 4/F, Tuen Mun Siu Lun Government Complex, 19 Siu Lun Street, Tuen Mun, N.T.
14/08/2022	08:30	Test Day (Tiu Keng Leng Sports Centre)	Arena, Tiu Keng Leng Sports Centre, 2 Chui Ling Road, Tseung Kwan O, N.T.
17/08/2022	16:00	Hammer Hill Road Sports Ground	158 Hammer Hill Road, Diamond Hill, Kowloon
19/08/2022	09:00	Hong Kong Red Cross Headquarters	Rooms 102-103, 1/F, 19 Hoi Ting Road, West Kowloon
20/08/2022	08:30	Hong Kong Christian Service (Cheung Sha Wan Sports Centre)	Cheung Sha Wan Sports Centre, J/O Hing Wah Street and Cheung Sha Wan Road, Sam Shui Po, Kowloon
21/08/2022	09:00	The Federation of Hong Kong and Kowloon Labour Unions	Hall, 1/F, Ying Choi Jockey Club Education Centre, 4 Ying Choi Path, To Kwa Wan, Kowloon
22/08/2022	16:00	Hammer Hill Road Sports Ground	158 Hammer Hill Road, Diamond Hill, Kowloon
24/08/2022	13:00	Test Day (Shun Lee Tsuen Sports Centre)	Dance Room, Shun Lee Tsuen Sports Centre, 33 Shun Lee Tsuen Road, Kwun Tong, Kowloon
27/08/2022	08:30	West Kowloon Parents Association (Cheung Sha Wan Sports Centre)	Cheung Sha Wan Sports Centre, J/O Hing Wah Street and Cheung Sha Wan Road, Sham Shui Po, Kowloon

28/08/2022	09:00	The Federation of Hong Kong and Kowloon Labour Unions	Hall, 1/F, Ying Choi Jockey Club Education Centre, 4 Ying Choi Path, To Kwa Wan, Kowloon
29/08/2022	15:00	Hammer Hill Road Sports Ground	158 Hammer Hill Road, Diamond Hill, Kowloon
31/08/2022	15:00		
03/09/2022	11:00	Tung Cheong Street Sports Centre	Fitness Room, 3/F, Tai Po Tung Cheong Street Leisure Building, 25 Tung Cheong Street, Tai Po, N.T.
04/09/2022	11:00		
07/09/2022	15:00	Ma On Shan Sports Ground	1 Hang Hong Street, Ma On Shan, N.T.
09/09/2022	09:00	Leisure and Cultural Services Department Headquarters	1/F, Leisure and Cultural Services Department Headquarters, 1-3 Pai Tau Street, Sha Tin, N.T.
14/09/2022	15:00	Ma On Shan Sports Ground	1 Hang Hong Street, Ma On Shan, N.T.
15/09/2022	15:00		
16/09/2022	15:00	Tseung Kwan O Sports Ground	109 Po Hong Road, Tseung Kwan O, N.T.
22/09/2022	15:00		
23/09/2022	15:00		
27/09/2022	15:00		
28/09/2022	12:30	Lingnan University	Jackie Chan Gymnasium, Lingnan University
14/11/2022	10:00	Hong Kong Institute of Vocational Education (Chai Wan)	30 Shing Tai Road, Chai Wan, Hong Kong
16/11/2022	08:30	Yuen Long Town Hall	Hall, G/F, Yuen Long Town Hall, 4 Tai Yuk Road, Yuen Long, N.T.
18/11/2022	13:00	Precious Blood Primary School	72 Sing Woo Road, Happy Valley, Hong Kong
28/11/2022	14:00	Tung Cheong Street Sports Centre	3/F, Tai Po Tung Cheong Street Leisure Building, 25 Tung Cheong Street, Tai Po, N.T.
02/12/2022	1200	The Chinese University of Hong Kong	University Sports Centre, The Chinese University of Hong Kong

11.4 Appendix 4 List of the Testing Items for the Physical Fitness Test

Test Item / Age Group			Primary School Students (7-11)	Secondary School Students (12-16)	Adult (17-59)	Elderly (60–79)
Body Composition	Height		●	●	●	●
	Weight		●	●	●	●
	Skinfold Measurement - Triceps		●	●		
	Skinfold Measurement - Calf		●	●		
	Bioelectrical Impedance Analysis		● Fat%	● Fat%	● Fat% Muscle Mass	● Fat% Muscle Mass
	Waist Circumferences				●	●
	Blood Pressure				●	●
Cardiovascular Endurance	3-min Step				●	● 2 mins
	15m PACER		●	●		
	9-min Endurance Run & Walk			●		
Flexibility	Lower Back and Lower Limb	Sit-and-Reach	●	●	●	● Sit on Chair
	Upper Limb	Back Scratch				●
Muscular Strength/ Endurance	Upper Limb	Handgrip	●		●	●
		Arm Curl				●
	Torso	1-min Sit-up	●	●	●	
		Push up		●		
		Plank			●	
	Lower Limb	Standing Long Jump	●	●		
		Chair Stand				●
		Standing High Jump			●	
Neuromuscular Function	Agility	8-Feet Up and Go				●
	Balance	Single Leg Stance (With Eyes Closed)			●	● With Eyes Open
Total No. of Test Items			10	11	12	13

11.5 Appendix 5 Questionnaire for Children

Territory-wide Physical Fitness Survey for the Community 2020
Questionnaire Survey for the Primary School Children (Aged between 7-11)

Notes：

7. This survey aims to investigate your participation of physical activity, and extra-curricular physical activities, and your health-related lifestyle.
8. This questionnaire is divided into 5 parts.
9. Please carefully study every question and answer all of them based on your own situation.
10. There is no standard answer to the listed questions and the results of the questionnaire will not form part of the academic grading in your school.
11. Please choose the appropriate answer.
12. The results of this questionnaire will be kept confidential.

Part 1: Physical Activity Level

- Note to Q1:
- **Physical Activity:** Any bodily movement produced by skeletal muscles that requires energy expenditure, including walking, housework, PE lesson, extra-curricular physical activities, etc.

24. In the past month, Do you think you have sufficient **physical activity** on a weekly basis on average?

1. ☐ definitely sufficient 2. ☐ sufficient 3. ☐ insufficient
4. ☐ definitely insufficient

Note to Q2 - Q3:

- **Accumulation of physical activity**: Any form of intermittent physical activities, which last for 10 minutes or more, will be summed up.
- **Moderate-intensity physical activity:** Activity leads to slightly speeding up of breathing and heart rate, and mild sweating without exertion.
- **Vigorous-intensity physical activity:** Activity leads to greatly speeding breathing and heart rate, profuse sweating and exertion.

25. In the past month, except for PE lessons at school, how many days in an average week do you have **moderate- to vigorous-intensity physical activity**? Please write down the exact minutes under each day or choose "Don't know" if appropriate.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Minutes							
Don't know(✓)							

Note to Q3:

- Sports Training: Specific sports' interest group or team sport training (e.g. dance, track and field, ball games, water sports or field orientation, etc.)

26. In the past month, apart from school PE lesson, how many days do you

participate in **sports training** in a week on average?

_____Day(s)

27. Which type(s) of physical activities do you like? (You can choose more than one option.)
1.☐ Ball games 2.☐ Track & Field 3.☐ Rope Skipping 4.☐ Swimming 5.☐ Wushu 6.☐ Gymnastics 7.☐ Dance 8.☐ Roller Skating 9.☐ Distance Running 10.☐ Cycling 11.☐ Don't like any 12.☐ Others:_____

Part 2: Attitudes towards physical activity

28. What are the main reason(s) for you participating physical activities? (Please choose no more than 3 options.)

(l) To Cope with daily needs.	☐
(m) Sense of pleasure.	☐
(n) To make friends.	☐
(o) To enhance self-confidence.	☐
(p) To control body weight.	☐
(q) To fill free time.	☐
(r) To maintain good health and physique.	☐
(s) Sense of success.	☐
(t) To develop various physical activity skills.	☐
(u) To develop leadership skills.	☐
(v) Arranged by parents.	☐

29. What is/are the main barrier(s) for you participating physical activity? (Please choose no more than 3 options.)

(l) Physical activity is too boring.	☐
(m) Bad weather condition.	☐
(n) Discouraged by family members.	☐

(o) No appropriate venue nearby.	☐
(p) Too tired.	☐
(q) No peer company.	☐
(r) Too many rules to follow during physical activity.	☐
(s) Participating in physical activity makes me uncomfortable.	☐
(t) Physical activity participation affects academic results.	☐
(u) Too busy with homework.	☐
(v) Health issues.	☐

Part 3: Static Extra-curricular Activity

Notes to Q7 to Q10:
- School days: days for school, excluding weekends and holidays.
- When filling in the answer, please take 30 minutes as a unit (e.g. 30 minutes, 60 minutes or 90 minutes, etc.)

30. During school days in the past academic year, how much time do you spend on average per day doing academic activity (e.g. homework, revision and tutoring)?

_____ minutes.

31. During school days in the past academic year, how much time do you spend on average per day watching television, playing video games, or browsing webpages?

_____ minutes.

32. During school days in the past academic year, how much time do you spend on average per day reading, painting, crafting, listening to music or playing instrument?

_____ minutes.

33. What is your usual activity during weekends or holidays?

1. ☐ Study 2. ☐ Outdoor physical activity 3. ☐ Watching TV
4. ☐ Playing video games or browsing webpages
5. ☐Others:_____

Part 4: Sleep

Notes:
- Please answer the questions based on your sleep in the past week.

34. In the past week, what is your daily sleep time on average?

_____ hours (Please use hour as the unit, e.g. 6 hours, 7.5 hours or 8 hours, etc.)

35. What do you think are the general reasons that would cause physically unhealthy? (You can choose more than 1 option.)

1.☐ Insufficient physical activity 2.☐Insufficient sleep 3. ☐ Imbalanced diet 4.☐ Nervous 5.☐Pressure from academic 6. ☐ Others:_____

Part 5: Other information

36. Your father's education level:

1.☐ Primary Education or below 2.☐ Secondary Education (Form 1 to Form 3) 3.☐ Secondary Education (Form 4 to Form 7)
4.☐ Tertiary Education or above 5.☐ Don't know

37. Your mother's education level:

1.☐ Primary Education or below 2.☐ Secondary Education (Form 1 to Form 3) 3.☐ Secondary Education (Form 4 to Form 7)
4.☐ Tertiary Education or above 5.☐ Don't know.

38. How many times a week does your father have physical activity on average? (Including morning exercise, walking and other physical activity etc.)

_____ Time(s) ☐ Don't know.

39. How many times a week does your mother have physical activity on average? (Including morning exercise, walking and other physical activity etc.)

_____ Time(s) ☐ Don't know.

40. In the past year, how often did you participate in physical activity with your family during weekends or holidays? (For example, cycling, swimming, hiking, etc.)

1.☐ Never. 2.☐ At least once per week. 3.☐ Once or twice per month. 4.☐ Every several months.

41. The number of PE lesson(s) per week in your current academic year:

1.☐ 1 2.☐ 2 3.☐ 3
4.☐ 4 5.☐ 5 6.☐ 6

42. Each PE lesson last for _____ minutes.

43. Do you agree that the atmosphere of physical activity in your school is strong?

1.☐ Strongly agree 2.☐ Agree 3.☐ Neutral
4.☐Disagree 5.☐ Strongly disagree

44. Have you ever played any electronic somatosensory games on sports (e.g. badminton, dancing, obstacle course racing, etc.)?

1.☐ Yes 2.☐ No

45. Can playing electronic somatosensory games on sports make you feel more interested in sports?

1.☐ Yes 2.☐ No

46. In the past week, how long did you play electronic somatosensory games on sports on an average day?

1.☐ None 2.☐ Less than 1 hour 3.☐ 1 hour 4.☐ 2 hours
5.☐ 3 hours or more

The end. Thank you for your participation.

11.6 Appendix 6 EDB Questionnaire for Adolescence

Survey on Secondary School Students' Physical Fitness and Attitudes towards Physical Activities (2019/20)

Questionnaire

Notes:

1. This questionnaire aims to investigate students' participation in physical education (PE) lesson and extra-curricular physical activities, their attitudes and values towards physical activities, and their health-related lifestyle in the past year.
2. This questionnaire is divided into 5 parts and all questions are required to be answered.
3. Please carefully study every question and answer all of them.
4. There is no standard answer to the listed questions and the results of the questionnaire will not form part of the academic grading in PE subject.
5. Please choose the appropriate answer Example: ● Correct ◕ ⊘ ⊗ Incorrect
6. The results of this questionnaire will be kept confidential.

Class

0 ○	A ○	K ○	U ○
1 ○	B ○	L ○	V ○
2 ○	C ○	M ○	W ○
3 ○	D ○	N ○	X ○
4 ○	E ○	O ○	Y ○
5 ○	F ○	P ○	Z ○
6 ○	G ○	Q ○	
7 ○	H ○	R ○	
8 ○	I ○	S ○	
9 ○	J ○	T ○	

Number

0 ○	0 ○
1 ○	1 ○
2 ○	2 ○
3 ○	3 ○
4 ○	4 ○
5 ○	5 ○
6 ○	6 ○
7 ○	7 ○
8 ○	8 ○
9 ○	9 ○

Part 1: Physical Activity Level

Note to Q1:
Physical Activity: Any bodily movement produced by skeletal muscles that requires energy expenditure, including walking, housework, PE lesson, extra-curricular physical activities, etc.

1. Do you think you have sufficient physical activity on a weekly basis on average?

○ definitely sufficient ○ sufficient ○ average ○ insufficient ○ definitely insufficient

Note to Q2 – Q3:
Accumulation: Any form of intermittent physical activities will be taken into account. Sum up the total amount of time.
Moderate-intensity physical activity: Activity leads to slightly speeding up of breathing and heart rate, and mild sweating without exertion.
Vigorous-intensity physical activity: Activity leads to greatly speeding breathing and heart rate, profuse sweating and exertion.

2. Taking PE lesson into account, how many days in a week do you have at least 30 minutes of moderate- to vigorous-intensity physical activity on average?

○ 0 days ○ 1 to 2 days ○ 3 to 4 days ○ 5 to 6 days ○ everyday

3. Taking PE lesson into account, how many days in a week do you have at least 60 minutes of moderate- to vigorous-intensity physical activity on average?

○ 0 days ○ 1 to 2 days ○ 3 to 4 days ○ 5 to 6 days ○ everyday

Note to Q4:
Sports Training: Specific sports'interest group or team sport training (e.g. track and field, ball games, water sports or dance, etc.)

4. Apart from school PE lesson, how many days do you participate in sports training in a week on average?

○ 0 days ○ 1 to 2 days ○ 3 to 4 days ○ 5 to 6 days ○ everyday

5. Which type(s) of physical activities do you like? (★You can choose three options at most.★)

○ Ball games ○ Swimming ○ Dance ○ Distance Running (>1,500m) ○ Track & Field
○ Wushu ○ Gymnastics ○ Skating/Roller Skating ○ Rope Skipping ○ Others

Note to Q6:
Active Gaming/play: Any type of physically active games (e.g. hide-and-seek, active video games, etc.)

6. How much time do you spend on active gaming/play on average in a week?

○ None ○ <1 hour ○ ≥1 but < 2 hrs ○ ≥ 2 but < 3 hrs
○ ≥ 3 but < 4 hrs ○ ≥ 4 but < 5 hrs ○ ≥ 5 but < 6 hrs ○ ≥ 6 hrs

1

7 . How do you travel between home and school? (★You can choose three options at most.★)

○ by public transport ○ by taxi ○ by school bus ○ by private vehicle ○ on foot ○ by cycling ○ others

8 . During school days, how much time do you walk in a day?
(including travelling, curricular and extracurricular activities and leisure-time activities)

○ None ○ <10 min ○ ≥ 10 but <20 min ○ ≥ 20 but <30 min ○ ≥ 30 but <60 min
○ ≥ 1 but <2 hours ○ ≥ 2 but <3 hours ○ ≥ 3 but <4 hours ○ 4 hours or above

9 . During weekends and holidays, how much time do you walk in a day?
(including travelling, indoor or outdoor activities and leisure-time activities)

○ None ○ <10 min ○ ≥ 10 but <20 min ○ ≥ 20 but <30 min ○ ≥ 30 but <60 min
○ ≥ 1 but <2 hours ○ ≥ 2 but <3 hours ○ ≥ 3 but <4 hours ○ 4 hours or above

10. During school days, how much time do you spend on household activity in a day?
(e.g. cleaning and washing)

○ None ○ <15 min ○ ≥ 15 but <30 min ○ ≥ 30 but <60 min ○ ≥ 1 but <2 hours
○ ≥ 2 but <3 hours ○ 3 hours or above

11. During weekends and holidays, how much time do you spend on household activity in a day?
(e.g. cleaning and washing)

○ None ○ <15 min ○ ≥ 15 but <30 min ○ ≥ 30 but <60 min ○ ≥ 1 but <2 hours
○ ≥ 2 but <3 hours ○ 3 hours or above

Part 2: PE Lesson & Extra-curricular Physical Activity

12. How important do you think the following effects of physical activity participation are to you?

	Extremely Unimportant	Unimportant	Neutral	Important	Extremely Important
(1) Cope with daily needs	○	○	○	○	○
(2) Sense of pleasure	○	○	○	○	○
(3) Make friends	○	○	○	○	○
(4) Enhance self-confidence	○	○	○	○	○
(5) Understand others	○	○	○	○	○
(6) Develop a habit of physical activity participation	○	○	○	○	○
(7) Maintain good health and physique	○	○	○	○	○
(8) Sense of success	○	○	○	○	○
(9) Prepare for getting a job	○	○	○	○	○
(10) Develop various physical activity skills	○	○	○	○	○
(11) Develop social skills	○	○	○	○	○
(12) Foster the ability of emotion management	○	○	○	○	○
(13) Foster the ability of self-cognition	○	○	○	○	○
(14) Control body weight	○	○	○	○	○
(15) Develop sportsmanship	○	○	○	○	○
(16) Develop leadership	○	○	○	○	○

13. To what extent do you agree or disagree with the following statements on physical activity?

	Totally Disagree	Disagree	Neutral	Agree	Totally Agree
(1) I like physical activity	○	○	○	○	○
(2) Physical activity is fun	○	○	○	○	○
(3) Physical activity makes me happy	○	○	○	○	○
(4) Participating in physical activity gives me strong sense of success	○	○	○	○	○

13. To what extent do you agree or disagree with the following statements on physical activity?

	Totally Disagree	Disagree	Neutral	Agree	Totally Agree
(5) I would rather do something else than physical activity	○	○	○	○	○
(6) I feel good when participating in physical activity	○	○	○	○	○
(7) I always try my best in participating in physical activity	○	○	○	○	○
(8) During physical activity, I concentrate on it	○	○	○	○	○
(9) I like being physically active	○	○	○	○	○
(10) Participating in physical activity makes me relaxed	○	○	○	○	○
(11) PE lesson is interesting	○	○	○	○	○
(12) Physical activity keeps me energetic	○	○	○	○	○
(13) Physical activity facilitates my interest on my continuous involvement in it	○	○	○	○	○

14. Do the following factors affect your participation in physical activity? If yes, please rate their importance.

	No	Yes				
		Very Unimportant	Unimportant	Neutral	Important	Very Important
(1) Physical activity is too boring	○	○	○	○	○	○
(2) Bad weather condition	○	○	○	○	○	○
(3) Increasing body temperature and sweating due to physical activity	○	○	○	○	○	○
(4) Discouraged by family members	○	○	○	○	○	○
(5) No appropriate venue nearby	○	○	○	○	○	○
(6) Too tired	○	○	○	○	○	○
(7) Physical activity causes muscle soreness	○	○	○	○	○	○
(8) No peer participation	○	○	○	○	○	○
(9) Health issues	○	○	○	○	○	○
(10) Too many rules to follow during physical activity	○	○	○	○	○	○
(11) Body incoordination during physical activity	○	○	○	○	○	○
(12) Physical activity affects social life	○	○	○	○	○	○
(13) Physical activity is monotonous	○	○	○	○	○	○
(14) Participating in physical activity makes me uncomfortable	○	○	○	○	○	○
(15) Physical activity participation affects academic results	○	○	○	○	○	○
(16) Too lazy	○	○	○	○	○	○
(17) Not enough time	○	○	○	○	○	○
(18) Others: _____	○	○	○	○	○	○

Part 3: Extra-curricular Activity unrelated to PE

15. During school days (excluding weekends and holiday), how much time on average do you spend on the following activities per day?

	None	< 1 hr	≥ 1 but < 2 hrs	≥ but < 3 hrs	≥ 3 but < 4 hrs	≥ 4 but < 5 hrs	≥ 5 but < 6 hrs	≥ 6 hrs
(1) Academic activity (e.g. homework, revision and tutoring)	○	○	○	○	○	○	○	○
(2) Use of electronic screen products for leisure purposes (e.g. smartphone, tablet, desktop, television or electronic book etc.)	○	○	○	○	○	○	○	○

16. During weekends and holidays, how much time on average do you spend on the following activities per day?

	None	< 1 hr	≥ 1 but < 2 hrs	≥ but < 3 hrs	≥ 3 but < 4 hrs	≥ 4 but < 5 hrs	≥ 5 but < 6 hrs	≥ 6 hrs
(1) Academic activity (e.g. homework, revision and tutoring)	○	○	○	○	○	○	○	○
(2) Use of electronic screen products for leisure purposes (e.g. smartphone, tablet, desktop, television or electronic book etc.)	○	○	○	○	○	○	○	○

17 . In the past academic year, did you join the "Student Health Service" organised by the Department of Health?

○ Yes ○ No

18 . If your school took part in similar fitness survey after five years, would you be willing to engage in it?

○ Yes ○ No

Part 4: Diet and Sleep

19 . Generally speaking, do you think you have a healthy eating habit?

○ Very Healthy ○ Healthy ○ Average ○ Unhealthy ○ Very Unhealthy

20 . How do you feel about your weight?

○ Obese ○ Overweight ○ Normal ○ Underweight ○ Severely Underweight

21 . Here are some common food and drinks. Please answer according to your last week's diet

	None	1 to 2 times	3 to 4 times	5 to 6 times	Once a day	Twice or more a day
(1) Milk or other dairy products	○	○	○	○	○	○
(2) Soft drinks, paper-packed drinks and canned beverage	○	○	○	○	○	○
(3) Snacks	○	○	○	○	○	○
(4) One portion of vegetable (e.g. half bowl of cooked vegetables or beans)	○	○	○	○	○	○
(5) One portion of fruit (e.g. an orange, an apple, two kiwifruits or half bowl of grapes)	○	○	○	○	○	○
(6) Fried food (e.g. HK style French toast or instant noodle)	○	○	○	○	○	○

22 . Which of the following best describes your habit of having breakfast?

○ Before school everyday ○ At recess everyday ○ Not having at all

23 . Do you have a habit of having night meal (eating after dinner)?

○ No ○ Sometimes ○ Often ○ Everyday

24 . How many meals you have in a day are prepared by yourself or by your family? (Including breakfast, lunch, dinner, afternoon tea and night meal)

○ None ○ 1 ○ 2 ○ 3 or more

25 . What is your daily average sleeping duration? (excluding those less than one hour)

○ >10 hours ○ 9 to 10 hours ○ 7 to 8 hours ○ 5 to 6 hours ○ <5 hours

26 . Generally speaking, do you think you have sufficient sleep?

○ Definitely sufficient ○ Sufficient ○ Insufficient ○ Definitely insufficien

27 . Generally speaking, how do you feel about your quality of sleep?

○ Very good ○ Good ○ Bad ○ Very bad

Part 5: Parents' and Family's Participation in Physical Activity

28 . Your father's education level:

○ Primary Education or below ○ Secondary Education (Form 1 to Form 3) ○ Secondary Education (Form 4 to Form 7) ○ Tertiary Education or above

29 . Your mother's education level:

○ Primary Education or below ○ Secondary Education (Form 1 to Form 3) ○ Secondary Education (Form 4 to Form 7) ○ Tertiary Education or above

30 . How many days a week does your father have at least 30 minutes of physical activity on average? (Including morning exercise, walking and other physical activity etc.)

○ 0 days ○ 1 to 2 days ○ 3 to 4 days ○ 5 to 6 days ○ everyday

31 . How many days a week does your mother have at least 30 minutes of physical activity on average? (Including morning exercise, walking and other physical activity etc.)

○ 0 days ○ 1 to 2 days ○ 3 to 4 days ○ 5 to 6 days ○ everyday

32 . In the past year, how often did you participate in physical activity with your family? (For example, cycling, swimming, hiking, etc.)

○ Never ○ Once every few months ○ Once every month ○ Once every alternate week

○ 1-2 times a week ○ 3-4 times a week ○ 5-6 times a week ○ Every day

Thank you for your participation !

11.7 Appendix 7 Questionnaire for Adult & Elderly

Territory-wide Physical Fitness Survey for the Community 2020
Questionnaire Survey for the Adults and Elderly (Aged between 17-79)

Section 1 – Basic Health Conditions

b. Currently, do you have any following health conditions?

		Yes	No
a.	Pregnancy	1	2
b.	Abnormal physical development (e.g. Dwarfism, Gigantism)	1	2
c.	Physical disability (e.g. blindness, deafness, disability in limbs)	1	2
d.	In the recent past 3 months, I used to be hospitalized due to illness or body injury (excluding the routine health check) for over 3 successive days.	1	2

Section 2 – Living Habits

Q1 In the recent past year, how much time did you spend on walking for an average day of your daily life?

Less than 10 minutes..... 1
10 – 29 minutes..... 2
30 – 59 minutes..... 3
1 hour – 1 hour 59 minutes..... 4
2 hours or more 5

Q2 In the recent past year, how much accumulative time did you spend on sitting (including the time you sit down for work, watching TV, transportation, using computer/cell phone, taking meals, chatting, etc.)?

Less than 3 hours 1
3 hours – 5 hours 59 minutes 2
6 hours – 8 hours 59 minutes..... 3
9 hours – 11 hours 59 minutes 4
12 hours or more 5

Q3 Are you currently working (including both full-time and part-time nature)?

Yes..... 1	→ **【Skip to Q5】**
No..... 2	→ **【Continue with Q4】**

Q4 **【Answered by non-working person only】** Which category do you belong to?

Full-time student 1	
In charge of housekeeping at home 2	
A retiree..... 3	→ **【Skip to Q8】**
Unemployed 4	
Others：_____..... 98	

Q5 a **【Answered by working person only】** What is your occupation?

Managers and administrators..... 1
Professionals 2
Associate professionals 3
Plant & machine operators and assemblers 7
Elementary occupations..... 8
Skilled agricultural and fishery workers..... 9

Clerical support workers 4
Service and sales workers..... 5
Craft and related workers 6
Refuse to answer..... 10
Others：_____..... 98

Q5 b **【Answered by working person only】** What is your working industry?

Manufacturing 1
Construction..... 2
Import/export, wholesale and retail trades..... 3
Transportation, storage, postal and courier services.. 4
Accommodation and food services..... 5
Information and communications..... 6
Financing and insurance 7
Real estate, professional and business services (including: real estate activities; professional, scientific and technical activities; administrative and support service activities) 8
Public administration, education, human health and social work activities 9
Miscellaneous social and personal services (including: arts, entertainment and recreation; other service activities; work activities within domestic households)..... 10
Others..... 98

Q6 **【Answered by working person only】** What is the number of hours you spend on working for an average week? Please include over-time working hours.

Below 20 hours 1
20-29 hours 2
30-39 hours 3
40-49 hours 4
50-59 hours 5
60-69 hours..... 6
70 hours or above, please specify the hours per week：
_____ 998

Not applicable 7

Q7 **【Answered by working person only】** Do you need to work at night (covering at least 4 hours from 11pm to 7am)? That excludes over-time working hours.

No need..... 1
Yes – regular basis..... 2
Yes – on shift 3

Q8 What is your major activities in your leisure time? **【choose up to 3 items】**

Audio/video entertainment 1
Shopping..... 2
Browsing on the internet..... 3
Sports/Physical exercise 4
Supplementary sleeping..... 5
Housekeeping 6
Gathering with family or friends 7
Reading newspaper/magazine/comics.... 8
Playing chess/card games/mah-jong..... 9
Outing..... 10
Others：_____..... 98

Q9-10，Please recall the situation in the recent past year:

Q9 **【Answered by working person or full-time student only (i.e. Q3=1 or Q4=1)】** Usually, when do you go to sleep on working/ school days?

(24-hour system) _____ : _____

Q10 **【Answered by working person or full-time student only (i.e. Q3=1 or Q4=1)】** Usually, when do you wake up on working/ school days?

(24-hour system) _____ : _____

Q11-12，Please recall the situation in the recent past year:

Q11 **【Answered by working person or full-time student only (i.e. Q3=1 or Q4=1)】** Usually, when do you go to sleep on the day before non-working/ non-school days?

【Answered by non-working person or part-time student only (i.e. Q4=2/3/4/98)】 Usually, when do you go to sleep?

(24-hour system) _____ : _____

Q12 **【Answered by working person or full-time student only (i.e. Q3=1 or Q4=1)】** Usually, when do you wake up on holiday?

【Answered by non-working person or part-time student only (i.e. Q4=2/3/4/98)】 Usually, when do you wake up?

(24-hour system) _____ : _____

Q13 In the recent past month, how was your sleeping quality in general?

Very good 1	Bad 4
Good 2	Very bad 5
Average 3	

Q14 **【Answered by working person or full-time student only (i.e. Q3=1 or Q4=1)】** In the recent past month, did you have any conscious problems when working/ studying?

No problem at all 1	Some problem 3
Little problem 2	Great problem 4

Section 3 – Exercising habit

Q15 what is/are your purpose(s) of participating in sports activities? **【choose up to 3 items】**

Health strengthening/prevention or cure of sickness 1	
Raising ability on sports 2	
Releasing pressure and emotion 3	
Keeping fit 4	
Socializing 5	
No special purposes 6	Others: _____ 98
Do not participate in sports activities 7	→ **【Skip to Q17】**

Q16 **【Answered by those who participate sports activities only (i.e. Q15≠7)】** Which sports do you mainly participate? **【choose up to 3 items】**

Ball games	1	Wushu/Qigong	8
Swimming	2	Tai Chi/Baduanjin	9
Running/Jogging	3	Yoga/Stretching	10
Fitness/Body-building (multi-gym)	4	Aerobic(dance)/Dancing	11
Walking	5		
Hiking	6		
Cycling	7	Others: _____	98

Q17 In some cases, you may not participate or reduce participation in sports activities due to some barriers. What are the major barriers? **【choose up to 3 items】**

Tired	1	No need as being healthy	10
Lazy	2	Lack of guidance	11
Lack of spare time	3	Lack of organizing (such as training course)	12
Not interested	4	Constrained by economic status	13
Not suitable to participate for health concern	5	Afraid of being derided	14
Lack of venue and facility	6	Do not know/ not sure	15
No need as having plenty of physical activities on work	7		
No company	8	Others:_____	98
Bad weather	9		

Q18 In the recent past year, on how many days did you do vigorous intensity physical activities for at least 10 minutes at a time in an average week? Vigorous intensity physical activities cause feeling of being exhausted. They also induce significantly rapid breathing and profuse sweating. You find difficult to talk to others when doing the activities. Vigorous intensity physical activities should be in similar intensity level with running or removing heavy weights of 10 kg (such as 20 lunch boxes, 5 bottles of soft drinks in 2 liters).

Other examples of vigorous intensity physical activity are playing ball games (such as basketball, soccer, single tennis), continuous swimming (excluding slow swimming), fast and continuous ice-skating, rope skipping, uphill climbing, non-stop walking upstairs, aerobic dance, fast cycling, judo, taekwondo, rock climbing. In the Rating of Perceived Exertion (RPE), vigorous intensity physical activities are scored 8-9 meaning the intensity between very strong and extremely strong.

0 day	0	→ **【skip to Q20】**	
1 day	1	5 days	5
2 days	2	6 days	6
3 days	3	7 days	7
4 days	4		

Q19 **[Answered only by those did vigorous intensity physical activities for at least 10 minutes at a time in an average week (i.e. Q18≠0)]** How much time did you spend on vigorous intensity physical activities in a week?

				minutes

Q20 In the recent past year, on how many days did you do moderate or above including vigorous intensity physical activities for at least 10 minutes at a time in an average week? Moderate intensity physical activities cause little feeling of being fatigued. They also induce quicker-than-normal breathing and little sweating. You find difficult to croon when doing the activities. Moderate intensity physical activities should be in similar intensity level with fast walk or walking with weights of 4.5-9kg carried (such as a heavy schoolbag, 2 packs of A-4 size paper, 2-4 bottles of soft drink in 2 liters, 24 cans of soft drink).

Other examples of moderate intensity physical activity are playing ball games (such as baseball, softball, badminton, volleyball, table-tennis, double tennis), downhill climbing, swimming in normal speed, cycling in normal speed, non-stop walking downstairs, dancing (such as Hip Hop, Social dance, Ballet, Folk), skateboarding, horizontal bar gymnastics, playing frisbee, hard cleansing work (such as removing desks and chairs in classroom, floor cleansing by hand, window cleansing). In the Rating of Perceived Exertion (RPE), moderate intensity physical activities are scored 4-7 meaning the intensity over moderate and up to very strong.

0 **day** 0	→ **【skip to Q22】**		
1 day 1		5 days 5	
2 days 2		6 days 6	
3 days 3		7 days 7	
4 days 4			

[Logic check: Response of Q20 should not be less than response of Q18]

Q21 **【Answered only by those did moderate or above including vigorous intensity physical activities for at least 10 minutes at a time in an average week (i.e. Q20≠0)】** How much time did you spend on moderate or above including vigorous intensity physical activities in a week?

				minutes

【Logic check: Response of Q21 should not be less than response of Q19】

Q22 How long have you maintained the above-mentioned exercise habits ?

Less than 6 months 1	Not applicable/Do not have exercise habits 6
6 months or above, but less than 12 months 2	
1 year or above, but less than 3 years 3	
3 years or above, but less than 5 years 4	
5 years or above 5	

Q23 Is your current level of exercise affected by the COVID-19 pandemic?

Increased due to COVID-19 1	Not affected 3
Decreased due to COVID-19 2	

Q24 When you want to do sports, how long will it usually take from your home or workplace to the sports venues listed below?

c. **Sports venues ran by the government,** e.g. park, LCSD's sports center/stadium/sports grounds/ball-game grounds, etc.:

15 minutes or less 1	1 hour 1minute - 1 hour 30 minutes 5

16-30 minutes 2
31-45 minutes..... 3
46 minutes - 1hour..... 4
Over 1 hour 30 minutes 6
I don't do sports at these locations..... 7

d. **Private fitness/sports venues**, e.g. clubhouse, private fitness room, etc.:

15 minutes or less..... 1
16-30 minutes 2
31-45 minutes..... 3
46 minutes - 1hour 4
1 hour 1minute - 1 hour 30 minutes..... 5
Over 1 hour 30 minutes..... 6
I don't do sports at these locations..... 7

Section 4 - Demographic information

Q25 Gender

Male ..... 1 Female..... 2

Q26 Age

【please record exact age; counting no. of birthday passed】 | | |

Q27 What is your current smoking status?

Never smoked..... 1 → **【Skip to Q29】**

1 or fewer cigarette per day..... 2
2-6 per day..... 3
7-12 per day..... 4
13-20 per day..... 5
21-40 per day (1-2 packs)..... 6
41 or more per day (2 packs or more)..... 7
Quit smoking for less than 6 months..... 8
Quit smoking for 6 months to 2 years..... 9
Quit smoking for more than 2 years..... 10

Q28 **【only answered by (used to be) smokers (i.e. Q27≠1)】** How long have you been smoking?

Less than 5 years 1
5 years - less than 10 years 2
10 years - less than 15 years 3
15 years or above..... 4

Q29 What is your highest level of education attainment?

Pre-school education / No schooling..... 1
Primary School (P1-P6) 2
Junior Secondary (S1- S3) 3
Senior Secondary (S4 - S6)..... 4
Post-secondary (diploma/ certificate course) 5
Tertiary education (non-degree) (higher diploma/ associate degree courses) 6
Tertiary education (bachelor's degree courses) 7
Graduate school or higher (above bachelor's degree courses)..... 8

Q30 What is the total monthly household income (in HKD) of all your family member(s)?

< $4,000 1
$4,000 - $5,999 2
$6,000 - $7,999 3
$30,000 - $34,999 9
$35,000 - $39,999 10
$40,000 - $44,999 11

$8,000 - $9,999 4	$45,000 - $49,999 12
$10,000 - $14,999 5	$50,000 - $59,999 13
$15,000 - $19,999 6	$60,000 - $79,999 14
$20,000 - $24,999 7	$80,000 - $99,999 15
$25,000 - $29,999 8	≧$100,000 16
	Do not know/ not sure 17

Q31 How many family members in all age are there in your household, including yourself but not the domestic helper(s)?

1 person 1	5 persons 5
2 persons 2	6 persons 6
3 persons 3	7 persons or more 7
4 persons 4	

Q32 Which district do you live in?

Hong Kong Island	Central and Western 1
	Wan Chai 2
	Eastern 3
	Southern 4
Kowloon	Yau Tsim Mong 5
	Sham Shui Po 6
	Kowloon City 7
	Wong Tai Sin 8
	Kwun Tong 9
New Territories & Islands	Kwai Tsing 10
	Tsuen Wan 11
	Tuen Mun 12
	Yuen Long 13
	North 14
	Tai Po 15
	Sha Tin 16
	Sai Kung 17
	Islands 18

The end.

11.8 Appendix 8 List of the Sessions the Research Team Attended for Supervision

	Testing Date	Organisation/ Venue	Name(s)	Supervision Report
1	22-May-21	The Chinese University of Hong Kong	Prof. Stanley Hui, Dr. Jacky Chan and Mr. James Ho Pong Wan	No (Pilot Test)
2	29-May-21	Tsuen Wan Sports Centre	Prof. Stanley Hui, Dr. Jacky Chan and Mr. James Ho Pong Wan	No (Pilot Test)
3	6-Aug-21	Yan Oi Tong Ng Kam Yuk Memorial Neighbourhood Elderly Centre (Sham Shing Estate)	Prof. Stanley Hui, Dr. Jacky Chan and Ms. Cheung Ka Man	Yes
4	24-Aug-21	Hong Kong Institute of Vocational Education (Tuen Mun)	Mr. James Ho Pong Wan	Yes
5	6-Sep-21	The Kwai Hing Campus of Hong Kong Metropolitan University	Mr. Wong Chung Yan	Yes
6	7-Sep-21	Hong Kong Metropolitan University	Mr. Wong Chung Yan	Yes
7	15-Sep-21	Hong Kong Electric Company	Mr. Wong Chung Yan	Yes
8	20-Sep-21	Hong Kong Adventist Hospital	Mr. Wong Chung Yan	Yes
9	21-Sep-21	The Salvation Army Tai Po Integrated Home Care Services	Mr. Wong Chung Yan	Yes
10	28-Sep-21	Caritas District Elderly Centre - Yuen Long	Mr. Wong Chung Yan	Yes
11	4-Oct-21	Cathay Pacific	Mr. Wong Chung Yan	Yes
12	7-Oct-21	Hong Kong YWCA Chi Po Neighbourhood Elderly Centre	Mr. Wong Chung Yan	Yes
13	11-Oct-21	The Salvation Army Wah Fu Centre for Senior Citizens	Mr. Wong Chung Yan	Yes
14	10-Dec-21	Modern Terminals	Mr. Wong Chung Yan	Yes

15	14-Dec-21	Hong Kong Brands and Products Expo	Mr. Wong Chung Yan	Yes
16	1-Jan-22	Test Day (Siu Sai Wan Complex)	Mr. Wong Chung Yan	Yes
17	7-Jun-22	Fu Hong Society Rehabilitation Centre	Mr. Wong Chung Yan	Yes
18	11-Jun-22	Yuen Long Town Hall	Mr. Wong Chung Yan	Yes
19	14-Jun-22	Test Day (Tai Po Hui Sports Centre)	Mr. Wong Chung Yan	Yes
20	17-Jun-22	China Great Wall AMC (International) Holdings Company Limited	Mr. Wong Chung Yan	Yes
21	24-Jun-22	Smithfield Sports Centre	Mr. Chiu Wai Chun	Yes
22	28-Jun-22	Construction Industry Council	Mr. Chiu Wai Chun	Yes
23	30-Jun-22	Test Day (Tung Chung Man Tung Road Sports Centre)	Mr. Chiu Wai Chun	Yes
24	5-Jul-22	Manulife (International) Limited	Mr. Chiu Wai Chun	Yes
25	11-Jul-22	Free Duty	Mr. Chiu Wai Chun	Yes
26	13-Jul-22	Hong Kong and Macau Lutheran Church Primary School	Mr. Chiu Wai Chun	Yes
27	28-Jul-22	West Kowloon Parents Association (Cheung Sha Wan Sports Centre)	Prof. Stanley Hui	No
28	7-Sep-22	Ma On Shan Sports Ground	Ms. Cheung Ka Man	Yes
29	18-Nov-22	Precious Blood Primary School	Ms. Cheung Ka Man	No
30	2-Dec-22	The Chinese University of Hong Kong	Prof. Stanley Hui	No

11.9 Appendix 9 Template of Supervision Report

Supervision Report for Community Physical Fitness Test 2021-22

2021-22 社區體質測試巡視報告

Date of Supervision 巡視日期 ：_____

Time 時間 ：_____ To _____

Venue 地點 ：_____

A. Physical Fitness Tests 體質測試巡視報告

Number of Testers on site 測試員數目 ：_____

Name of Testing Coordinator 統籌員姓名 ：_____

Please mark a "✓" at the appropriate box 請在適當方格內加上"✓"

	Very Good 非常好	Good 良好	Average 一般	Below Average 標準之下	Poor 差劣
I Overall comment for the Testers 測試員整體評價					
1. Punctuality & Attendance 守時	☐	☐	☐	☐	☐
2. Professional & Work Knowledge 應用相關知識	☐	☐	☐	☐	☐
3. Explanation & Demonstration 講解及示範	☐	☐	☐	☐	☐
4. Organization Skill 組織能力	☐	☐	☐	☐	☐
5. Communication Skill 溝通技巧	☐	☐	☐	☐	☐
6. Appearance 儀容/裝束	☐	☐	☐	☐	☐
7. Attitude 工作態度	☐	☐	☐	☐	☐
8. Client Focus 關注客人需要	☐	☐	☐	☐	☐
9. Sense of Responsibility 責任感	☐	☐	☐	☐	☐
10. Familiarity with the IT system 對 IT 系統熟悉度	☐	☐	☐	☐	☐
II Overall comment for Coordinator 統籌員整體評價					
11. Venue Appropriateness for Test Equipment Setting 場地安排及測試用具設置	☐	☐	☐	☐	☐
12. Manpower and resource management 人力、物資管理	☐	☐	☐	☐	☐
13. Flow of the Test 測試流程	☐	☐	☐	☐	☐
14. Problem Solving 問題處理能力	☐	☐	☐	☐	☐
Overall Grading for Performance 整體表現評分	☐	☐	☐	☐	☐

Other Comments 其他意見

_____

_____

B. Supervision Report for Questionnaire Survey 問卷調查巡視報告

Please mark a "✓" at the appropriate box 請在適當方格內加上"✓"

Overall comment for the Surveyor 調查員整體評價	Very Good 非常好	Good 良好	Average 一般	Below Average 標準之下	Poor 差劣
1. Knowledge on questionnaire items 問卷相關知識	☐	☐	☐	☐	☐
2. Explanation 講解	☐	☐	☐	☐	☐
3. Communication Skill 溝通技巧	☐	☐	☐	☐	☐
4. Ability to answer questions 解答問題的能力	☐	☐	☐	☐	☐
5. Attitude 工作態度	☐	☐	☐	☐	☐
6. Familiarity with the IT system 對 IT 系統熟悉度	☐	☐	☐	☐	☐
Overall Grading for Performance 整體表現評分	☐	☐	☐	☐	☐

Other Comments 其他意見

_____

C. Supervision Report for IT Support 信息技術支援巡視報告

Numbers of IT Supports on site IT 技術人員數目: _____

Please mark a "✓" at the appropriate box 請在適當方格內加上"✓"

Overall comment for the IT Support 信息技術支援整體評價	Very Good 非常好	Good 良好	Average 一般	Below Average 標準之下	Poor 差劣
1. Wi-Fi connection 無線網絡鏈接	☐	☐	☐	☐	☐
2. Supply of Tablets 平板電腦供應	☐	☐	☐	☐	☐
3. Fluency of system operation 系統運行順暢度	☐	☐	☐	☐	☐
4. Pre-event set-up 活動前準備	☐	☐	☐	☐	☐
5. Timely support from staffs 及時提供支援	☐	☐	☐	☐	☐
6. Ability in problem solving 解決問題能力	☐	☐	☐	☐	☐
Overall Grading for Support 整體表現評分	☐	☐	☐	☐	☐

Other Comments 其他意見

_____

Signature 簽署 : _____	Signature 簽署 : _____
Reporting Officer 報告人員姓名 : _____	Countersigning Officer 加簽人員姓名 : _____
Post 職位 : _____	Post 職位 : _____
Date 日期 : _____	Date 日期 : _____
This part to be completed by CUHK	This part to be completed by LCSD

11.10 Appendix 10 List of the Primary Schools Involved in the Survey

School	**District**	
Hong Kong and Macau Lutheran Church Primary School	New Territories East	Sai Kung District
Ma On Shan Ling Liang Primary School	New Territories East	Sha Tin District
HKTA Yuen Yuen Institute Shek Wai Kok Primary School	New Territories West	Tsuen Wan District
Father Cucchiara Memorial School	New Territories West	Kwai Tsing District
S.K.H St. Micheal's Primary School	Hong Kong East	Eastern District
Sau Ming Primary School	Kowloon East	Kwun Tong District
Po Yan Oblate Primary School	Kowloon West	Kowloon City District
West Kowloon Parents Association	Kowloon West	Sham Shui Po District
Precious Blood Primary School	Hong Kong West	Wai Chi District