RESEARCH REPORT ON PHYSICAL FITNESS OF 3-6 YEARS OLD CHILDREN IN MACAO SAR IN 2002

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Macao Sport Development Board, Macao SAR

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Preface

Preschool years are important stages for growth and development, during which children's physique develops rapidly and movement skills tend to be formed. Good health and fitness at early age will help to ensure healthy life in adolescents and adults. Therefore, to monitor growth and development of children is considered as an important method to study growth process of human, and a window for observing effect of factors such as social economy, culture, nutrition status, exercise on growth of children. In a word, for individual and community, it is important to monitor and grasp the changes in physical fitness of preschoolers. The study in the field has been highlighted all over the world.

In 2001, Macao Sport Development Board, Health Bureau, Macao Polytechnic Institute, and China Institute of Sports Science conducted the survey on fitness of Macao adults and acquired the basic data on the physical fitness of adults, which accumulated experiences for further research on physical fitness on a large scale. Considering there is no research on physical fitness of early children in Macao yet, Macao Sport Development Board and China Institute of Sports Science undertook the research on physical fitness of 3-6 years children in Macao in 2002. Testing work, supported by Health Bureau, Education and Youth Affairs Bureau, Social Welfare Institute and Macao polytechnic Institute, has been completed in December 2002. The objectives of this survey and research are:

1. To comprehensively obtain physical fitness status of 3-6 years old children in Macao, and establish database about physical fitness and lay the foundation for dynamic monitor for the future.
2. To develop further research on the basis of testing results and to provide scientific references for decision-making of relatively functional departments, thereby promoting physical fitness and health of children more effectively.
3. To conduct comparative analysis of physical fitness among different regions in order to grasp the features of physical fitness of preschoolers in different societies and life styles.

In order to strength attention from all the society to the physical health of children, we compile and publish the research report so that Macao citizens may know our research results of physical fitness of children in Macao. We hope this research report can make a humble effort to health development of early children in Macao.

We owe a special debt of gratitude to the above-mentioned institutes and personnel for their support of our research work. Please give our great respect to them.

Editor

Part Ⅰ
The Subjects and Methods of the Survey

PART Ⅰ The Subjects and Methods of the Survey

1.1 The Subjects of the Survey

1.1.1 Subjects

Research subjects are children of 3-6 years old in Macao. Qualified subjects should meet the following requirements: Chinese origin without nation difference, birth and living in Macao or no more than 6 months outside, healthy children who can engage in physical activities. Children with serious diseases (heart disease, high blood pressure, hepatitis, nephritis, tuberculosis, asthma, chronic bronchit, anemia, ect.), or who are suffering acute and chronic diseases, or with unrestrictive physical fitness because of suffering fever or laxness during last two week, or physical abnormality are excluded.

1.1.2 Grouping of the subjects

There are totally 16 groups by sex (male and female) and age (3.0~3.4、3.5~3.9、4.0~4.4、4.5~4.9、5.0~5.4、5.5~5.9、6.0~6.9). But the subjects are divided by one year (3.0~3.9, 4.0~4.9, 5.0~5.9, 6.0~6.9) for a valid amount of sample when analyzing the factors affecting growth of the subjects.

1.2 The methods of the survey

1.2.1 Method for Sampling

Having assisted by Education and Youth Affairs Bureau and Social Welfare Institute, we selected 60 boys and girls respectively from each age group at random from 3-6 years old children at schools and nurseries in Macao who accord with the requirements of sampling. After checking, 902 samples were chosen to form a valid amount of sample. See the table 2.1.1 for the sample distribution in detail.

1.2.2 Items for survey

Items for survey include questionnaire and test items.

1. Questionnaire items: personal information of the child, such as birth height and weight, disease history, sleep time, participating condition about sports and literature activity. Parents' information, including height, weight, occupation, education, participating condition about sports. (See details for appendixes-survey questionnaires)

2. Testing items: there are 7 physique indices, 1 physiological function index, 6 physical fitness indices, 1 health care index and 6 derivative indices.

- Physique: height, weight, sitting height, chest circumference, upper arm skinfold thickness, subscapular skinfold thickness, abdomen skinfold thickness.
- Physiological function: resting pulse rate
- Physical fitness: standing long jump, throwing distant tennis ball, sit and reach, 10m shuttle run, walking on balance beam, successional jump with both feet

- Decayed tooth
- Derivative indices

  Ratio of sitting height to stature= sitting height ÷ stature × 100

  Quitelet Index=[(weight ÷ stature) × 1000]

  Ratio of chest circumference to stature= chest circumference ÷ stature × 100

  Verwaeck Index=[(weight+ chest circumference) × 100] ÷ stature

  BMI= weight/height^2

  The sum of skinfold thickness=subscapular skinfold thickness+ upper arm skinfold thickness+ abdomen skinfold thickness

1.2.3 Testing methods

1. Height

Testing equipments: Children hypsometers.

Testing methods: Barefooted, testee stands at attention on the soleplate of the hypsometer (upper limbs prolapsing, two heels closing, and two toes disjoining at 60°), with his heels, the sacrum part, and the part between two shoulder blades should be in touch with the upright pole. Square his shoulders, keep looking forward, and hold the upper fringes of the auricles and the lower rims of the eyes at the same level. The tester stands at the right side of the testee, presses the level board lightly at the head top and reads out the numerical value when his eyes are at the same level of the level board. Records should be in centimeter as a measure unit, and be exact to the first decimal digits.

Points for the testers' attention:

1) The hypsometer should be placed on a flat place against the wall. The scale on the pole should face the source of light.
2) Check strictly if the heel, sacrum and shoulder blades of the testee are leaning against the rod, and eyes are at the same level of the level board. The eyes of the tester must be at the same level of level board when reading number value. If his eyes are higher than level board, he should squat down, and if lower than that, stand in a higher place.
3) The level board should not be pressed too hard or too light at the head top. Plaited or coiled hair on top of the head should be loosened, and accouterments should be unrigged.
4) After reading out, push the level board lightly to safe enough not to be bang up.
5) Before testing, it is not suitable for the testee to practice any sports.

2. Sitting Height

Testing equipments: Children hypsometers.

Testing methods: the testee sits on the seat of hypsometer, with the sacrum part, and the part between two shoulder blades in touch with the upright pole. Sit tight, keep looking forward, and hold the upper fringes of the auricles and the lower rims of the eyes at the same level. Close two lower limbs, and keep two thighs parallel with the land and cruses at the right angle. Let the upper limbs prolapsed, neither hand can touch the surface of the seat, and both feet stand on the ground. If cruses of the testee are shorter, we should adjust the height of footplate to maintain right testing pose. The tester stands at the right side of the testee, presses the level board lightly at the head top and reads out the numerical value, when his eyes are at the same level of the level board. Records

should be in centimeter as a measure unit, and be exact to the first decimal digits.

Points for the testers' attention:

1) When testing, first of all, the testee should stoop down in order to make the sacrum part in touch with the pole, and then sit down, which can assure the right testing pose.
2) Younger child should choose suited width of seat and suited height of the footplate, which can keep the testee from slipping forward, and ensure veracity of testing value.
3) Other points for attention are the same as those of the height test.

3. Weight

Testing equipments: electronic weight scale

Testing methods: When testing, place the weight scale on the flat floor and adjust it to "zero" degree. Male testee should wear shorts, and female ones should wear shorts and sleeveless garments to stand at the center of the weight scale in a natural manner until the scale gets balanced and then reads out the degree. Records should be in kilogram as a measure unit, and be exact to the first decimal digits.

Points for the tester's attention: The testee stands at the center of the pan. Keep gentle movement when stepping up and down the scale.

4. Chest circumference

Testing equipments: fabric tape

Testing methods: The testee stands naturally with his feet apart at the width paralleled with his shoulders' width, relaxes his shoulders, drops his arms naturally, and breathes calmly. The tester stands facing the testee, and measurement will be made with the upper edge of the tape going around the chest through the back and the lower fringe of the shoulder blades. Record the girth at the state of calmness toward the end of breathing. The value of the point in the fabric tape that intersects with "zero", is the value of chest circumference. Records should be in centimeter as a measure unit, and be exact to the first decimal digits.

Points for the testers' attention:

1) The tester should check if the testee stands naturally with his arms dropped, and does not lean forward, or hunch his back or take a deep breath.
2) The tester should stand behind the testee to make sure that the tape is in its right place without any twist or loop. During the entire test, the tester must assure continuity to minimize the number of errors.
3) If the tester can't touch the lower angles of the shoulder blades, let the testee square his shoulders. The testee can restore true testing pose until the tester touches clearly.
4) If two scapular angles are not the same as each other, use the lower one as the standard. If their distance is big, cards should be rejected.

5. Skinfold thickness

Testing equipments: Skinfold thickness measure

Testing position: The upper arms, the lower angle of the shoulder blades, and the abdomen

Testing methods: The testee stands naturally with tested parts should be undressed completely. The tester vertically pinches up the skins and endermic tissues of tested parts with the thumb and

the index finger, and place the heads of the skinfold thickness measure about 1 cm down the skin pinched up by fingers to measure the skinfold thickness, repeatedly three times. Use the medium value or the same value of two tests. Records should be in millimeter as a measure unit, and be exact to the first decimal digits.

The upper arm skinfold thickness: Test skinfold thickness at the point between acromion and eagle mouth after the right upper buttock, which parallels with the prosenchyma of the upper limbs. Test lengthways.

The subscapular skinfold thickness: Test skinfold thickness at the place of about 1cm under the right angle of shoulder blades, where skinfold direction is 45°angle with vertebral column.

The abdomen skinfold thickness: At the point of intersection between the navel horizontal line and the right collarbone midline (about the right part with 2 cm from the navel), test lengthways.

Points for the testers' attention:

1) The testee stands naturally, the muscles relax, and his weight should fall on two legs averagely.
2) When testing, the tester should pinch up the skins and endermic tissues together, not the muscles.
3) During the test, the long axis of skinfold thickness measure should keep consistency with the one of skinfold, preventing increasing tissue tension to affect testing precision.
4) Before testing, the tester should calibrate the skinfold thickness measure. During the test, caliper dial and caliper mouth should often be calibrated.

6. Heart rate

Testing equipments: stethoscope, stopwatch

Testing methods: After the tested child wakes up and continues lying on the bed (in the morning or at noon), the tester places the stethoscope at the left front area of the heart to auscultate and test the heart rate. To begin with, use 10 seconds as a measure unit, and continue doing the test for three times. If two values are the same as each other, and the third one is not less or more than the other values, we can assure the testee is at the quiet state. Therefore, test the heart rate for 30 seconds, use time as a measure unit, and the value should multiply by 2 to produce the heart rate of 1 minute.

Points for the testers' attention:

1) The testee should not practice strenuous exercise on the testing day or just before the test.
2) Let the testee rests over 10 minutes before the test.

7. Sit and reach

Testing equipments: Sit-and-reach apparatus

Testing methods: Facing the platform of the apparatus, the testee sits on the floor with his legs stretched straight and his heels set separately against the platform, two hands hold together, two arms and fingertips stretches straight, and slowly bends his trunk forward. The fingertips of his hands can push the vernier of the apparatus to glide forwards as far as possible (don't vibrate forwards suddenly). Repeat the test once again. The better record is used. Before the zero of measurer testing value is negative, after the zero, it is positive. Recording: Centimeters is used as a measure unit, exact to the first decimal digits.

Points for the testers' attention:

1) The fingertips of the testee's hands should push the vernier of the apparatus while at the same time keeping his knees straight.
2) If the testee pushes the vernier suddenly, or his knee joint is flexural, the test should be repeated.

8. 10m shuttle run

Fields and equipments: Several 10m×1m straight and flat shuttle runways, no limit on quality. At the shuttle point of 10m track, there is a hand touch object (box or wall). Draw a target line at the 3m from finish line (see figure 1-1). And several stopwatches.

Testing methods: With the "start" signal from starting person at the skew front area of starting line, the testee starts to run with all his effort, which should stand behind the starting line, and not touch the line, with two feet separately and stand-up run. The testee starts to run, and the time should be recorded. At the end of the 10-meter-track, press another button and then run back. Don't run to error runway in course of the test. When the chest of the testee reaches the vertical of the finish line, the tester can stop the stopwatch. Test only once. Record the time interval between the starting time and the finish time. Records should be in seconds as a measure unit, and be exact to the first decimal digits.

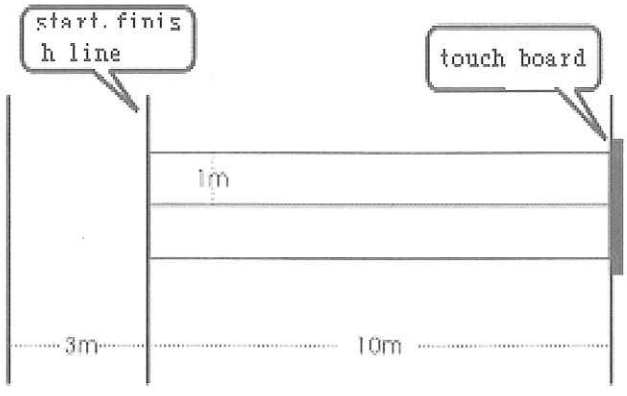

Figure 1.1 Field picture of 10 m shuttle run

Points for the testers' attention:

1) When the testee start to run, a tester stand behind him. When the testee does not notice starting signal, the tester should push the testee lightly to ensure him to start with signal.
2) Clearly tell the testee to run with all his effort in course of the test toward target line, and don't slow down while is almost close to the end point. At the end point, it is suggested to arrange persons to protect the testees.
3) When testing, the testee should wear sport shoes.

9. Standing long jump

Fields and equipments: a flat field, where there is a take-off line (or a rope). Jumping pit or soft land lies before the take-off line, which is perpendicular to the take-off line. Use inner edge of

take-off lines as "zero" point, from which we place a tape ruler with 1.5 m to 2 m long. There is also a set square used to measure.

Testing methods: The testee stands behind the take-off line without touching the line. When ready, after a preparatory backward swinging movement with the arms and bending the knees, the testee swings the arms forward and taking off from both feet simultaneously jump forward as far as possible, without running up and sequential jump. Two trials are allowed, the best will be counted.

Recording: Distance is measured from take-off line to the rearmost mark made by the heels of the testee. Record should be in centimeter as a measure unit, except decimal fraction.

Points for the tests' attention:

1) When start to jump, the testee can't run up and sequential jump.
2) Once child fouls, the testing result will be void. Trials may be repeated in succession until result acquired.
3) The testee will swing the arms forward and take off from both feet, simultaneously jump forward as far as possible. The tester can shout "1, 2, 3" to encourage the testee.
4) Sport shoes are worn, not leather shoes and sandals.

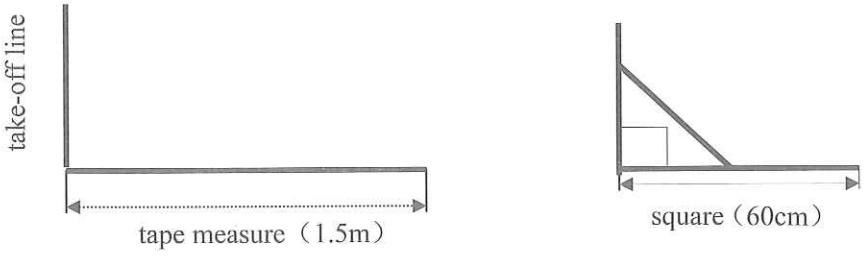

Figure 1.2 Field picture of standing long jump

10. Throwing distant tennis ball

Field and equipments: a 20m×6m flat field, tape measure, and several standard tennis ball (which circumference: 20.54cm, weight: 56.62-58.50g), a take-off line, and a horizontal line every 0.5m. (See figure 1-3)

Testing methods: The testee stands behind the take-off line, with both feet detaching forward and backward. A tennis ball is thrown from shoulder's upside by one hand, while back foot may stride one step ahead but not step on the line. Two trials are allowed, the best will be counted.

Recording: Distance is measured from take-off line to the rearmost mark of fall point made by the tennis ball. Distance record is in meters, except for score less than 0.5 meters.

Points for the tests' attention:

1) A tennis ball must be thrown from shoulder's upside, without running up and sequential jump. One foot may leave ground but not step on the line, without running up.
2) If points of fall go beyond the width of the field with 6 meters, another throwing is required, and if beyond the length of field with 20m, use tape measure to test.
3) Assign a special person to observe the point of fall by the tennis ball.

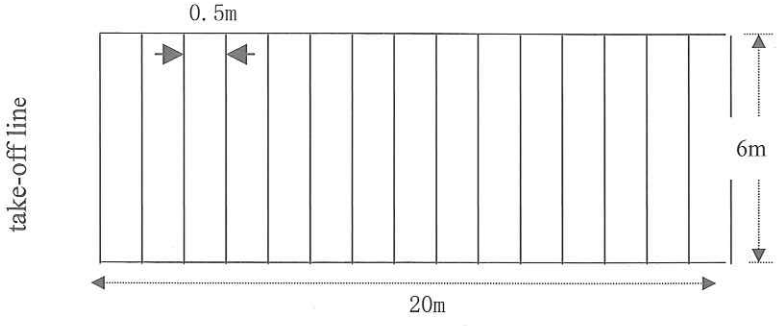

Figure1.3 Field picture of throwing distant tennis ball

11. Walking on a balance beam

Field and equipments: a 30cm×10cm×3m balance beam with 20cm×20cm×30cm of platforms on both ends, make a clear mark on starting and ending points.

Testing methods: The testee stands behind the take-off line. On the signal 'Ready-Go', His both hands raised to keep body balance and both feet move forwards by turns. The testee who can not walk forward may move sideward. Two trials are allowed. If in the midway, the testee falls to the ground, re-test is allowed.

Recording: accomplishing pattern: walking forward is recorded '1', moving sideward '2', undone '3'. Time is recorded from starting to stepping on the ends-line in seconds.

Points for the tests' attention:

1) The testee's two hands may rise up or sway to keep body balance.
2) Sports shoes are worn.

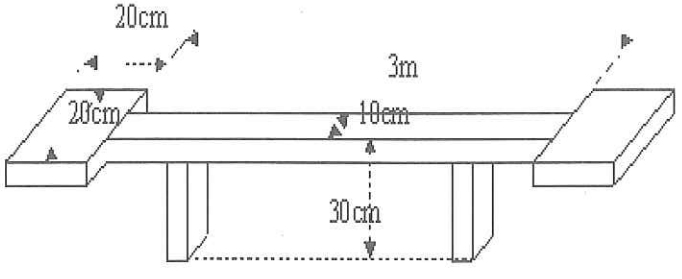

Figure 1.4 Field picture of walking on a balance beam

12. Successional jump with both feet

Field and equipments: a flat field with over 4.5m long, ten soft and quadrate packages with 10cm×5cm×5cm (set a package every 50 centimeters, 20 centimeters distance from the first package to take-off line), tape measure, stopwatch (See figure 1-5).

Testing methods: The testee stands behind the take-off line. On the signal 'Ready-Go', the testee takes off from both feet simultaneously. The recorder stops the watch after the subject continuously jumps over 10 packages. The followings are not allowed: Jump over 10 packages by one foot. Step on the packages or make the packages disordered. Two trials are allowed, only the

Points for the tests' attention:

1) The testees are required to have a correct method of jumping, then the speed of jump.
2) The testees are required to jump continuously like a rabbit, with successional jump.
3) If the subjects can not jump over a package once, try twice.

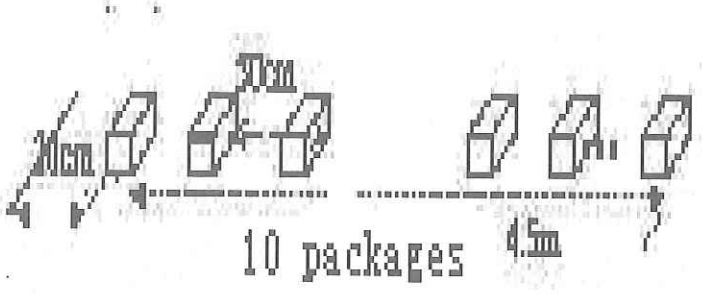

Figure 1.5 Field picture of Successional jump with both feet

13. Decayed tooth

Caries should be examined by the dentist.

Instrument: Plate-odontoscope, probe Ⅴ (no more than 60 people can be examined by one probe). After every examination, all the instruments should be disinfected with high temperature in order to keep off cross-infection.

Method: We should examine the tooth one by one in each quadrant. Before the final diagnosis, the general areas such as pit, fossa and groove where decays start should be checked with probes more carefully.

Diagnostic standards:

1) Undecayed: The teeth with no filling or no needs of filling.
2) Decayed: The pit, groove and smooth surface of teeth have changes in color, shape and character. We should get final diagnosis mainly according to the change of shape and character. When the procedure which begins with enamel demineralization, then disintegration and finally cavitation happens, the shape changed; when the bottom and wall of cavity become soft while the probe gets into it, the character changed. Under the situation described below, the teeth will not be diagnosed as caries: no hard tissues become soft, although there is white chalk or colored rough point on the enamel or the probe can stick in the pit and groove. The symbol of primary tooth is "d" while the fixed tooth is symbolized by "D".
3) Missing: Before replaced by fixed tooth, the missing primary tooth caused by caries is symbolized by "m", the extracted fixed tooth caused by caries is symbolized by "M". Caution: Before a final diagnosis, you should exclude the tooth missing by other causes such as physical replacement.
4) Filled: with no primary caries (caries not connected with the filling) or second caries, the symbol of primary tooth is "f"; the symbol of fixed tooth is "F".
5) The filled teeth with primary caries or second caries are diagnosed as caries. Record method: to fill the diagnosis result into the quadrant tooth by tooth, then record the number of the teeth symbolized by "d", "D", "m", "M", "f", "F" into the corresponding blanks.

Points for the test's attention:
For the filled teeth, we should pay more attention to check if there are any new primary caries on other surfaces or if there are second caries under the filling. The purpose is to avoid the missing diagnosis and the missing record.

1.3 Check and Accept the Testing Work and Cards

The work of check and accept is a key determinant to assure veracious and credible data. It includes:

1. Checking on Reliability

(1) observation of testing procedure and cards
To secure test data's effectiveness and reliability, the research team had appointed special testers for field observation. Their primary responsibility was to check the test card to find irrational or missed data and whether the items are clear or accord with prescript.

(2) Testers were checking on each test card everyday according to test-retest critical value reference table. Once any test data on physique and function was out of the cut-off points, retest was required at the spot so as to ensure the veracity of the test. After re-testing, 'having re-tested' should be noted in front of the item. As for physical fitness indices, the irrational data was to be eliminated and no retest was required. Besides, once missed items are found, re-test is required. Observing the testee's physique, for example, a testee is shorter or thinner but his weight value is very high, this value is doubtful and re-test is required.

(3) Choose 10% of all the testee at random and give them test-retest on all test items. Compare the two results of the same testee to see where the differences are. No more than 5% of errors bound are required.

2. Checking on data input

Sort the test data by sex and age on computer, print the data which are out of the cut-off points according to test-retest critical value reference table and compare questionable data and the source value. Correct the mistakes due to incorrect input. Discard the data based on their illogicality. Therefore, the wrong data were cleaned up before they were entered into the statistical analysis.
Note: Test-retest critical value reference table is not a standard for normal value but a means by which to find questions.
If data are out of the cut-off points and re-test have to be done and noted, the data should be included into statistics. If not note 're-test', discard or accept the data based on their illogicality. For example, some physique data are rather large or small but the proportion of each part of the body is normal, the data should be included into statistics and not be replaced at will.

Table1.1 Retesting Reference of Testing Items (Male)

Retesting Indices	3 Years old	4 Years old	5 Years old	6 Years old
Heart Rate (bmp)	70-120	70-120	70-120	70-120
Height (cm)	85-125	90-135	95-140	108-145
Weight (kg)	10-25	11-27	13-34	15-40
Sitting height (cm)	45-70	50-75	53-80	55-85
Chest circumference(cm)	48-60	49 -65	51-75	52-80
Upper arm skinfold thickness (mm)	2-30	2-30	2-30	2-30
Subscapular skinfold thickness (mm)	2-30	2-30	2-30	2-30
Abdomen skinfold thickness (mm)	2-30	2-30	2-30	2-30
Sit and reach (cm)	-5-20	-5-20	-5-20	-5-20
10m shuttle run (s)	7.0-20.0	6.0-18.0	6.0-15.0	5.0-12.0
StandingLong jump (cm)	20-100	30-130	40-150	50-160
Throwing distant tennis ball (m)	1.0-8.0	1.0-10.0	2.0-13.0	2.5-16.0
Successional jump with both feet (s)	5.0-38.0	4.0-20.0	3.0-15.0	3.0-13.0
Walking on balance beam(s)	5.0-80.0	3.0-70.0	3.0-50.0	2.0-30.0

Table 1.2 Retesting Reference of Testing Items (Female)

Retesting Indices	3 Years old	4 Years old	5 Years old	6 Years old
Heart Rate (bmp)	72-130	70-130	70-120	70-120
Height (cm)	85-120	90-130	95-140	108-145
Weight (kg)	10-25	12-28	13-35	15-40
Sitting height (cm)	45-70	50-79	53-80	55-85
Chest circumference(cm)	40-65	42-70	45-75	48-80
Upper arm skinfold thickness (mm)	2-30	2-30	2-30	2-30
Subscapular skinfold thickness (mm)	2-30	2-30	2-30	2-30
Abdomen skinfold thickness (mm)	2-30	2-30	2-30	2-30
Sit and reach (cm)	-5-20	-5-21	-5-22	-5-22
10m shuttle run (s)	7.0-20.0	6.0-18.0	6.0-15.0	5.0-12.0
Standing Long jump (cm)	20-100	30-120	40-130	50-140
Throwing distant tennis ball (m)	1.0-6.0	2.0-10.0	2.0-12.0	2.0-16.0
Successional jump with both feet (s)	5.0-35.0	5.0-20.0	4.0-15.0	4.0-13.0
Walking on balance beam(s)	5.0-100.0	4.0-70.0	3.0-50.0	2.0-30.0

1.4 The Method of Statistics

SPSS statistics software mix is applied to conduct statistical operation on data.

Part Ⅱ
Results and Discussions

PART II Results and Discussions

2.1 Results and Analysis of the Questionnaire

2.1.1 Personal Information of the Subjects

1. Sample distribution

The valid number of samples in this survey is 902 young children of 3-6 years old. See the table2.1.1 for the distribution by sex and age.

Table2.1.1 Sample Distribution in Each Age Group

Age	3.0-3.4	3.5-3.9	4.0-4.4	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.9	Total
Male	53	53	57	58	55	59	113	448
Female	45	58	61	54	62	54	120	454
Total	98	111	118	112	117	113	233	902

2. Birth Place of the Subjects

Because of sampling, 7.4% of the subjects were not born in Macao. However, these children account for small proportion and have no significant effect on the average level of every testing item, so they are included in the subjects of statistics.

Table2.1.2 Birth Place of the Subjects

	Macao	Mainland China	Portugal	Hong Kong	Other	Total
N	822	38	1	12	15	888
%	92.6	4.3	0.1	1.3	1.7	100.0

3. The Number of Siblings in the Subjects' Family and the Subjects' Rank in Siblings

Most subjects' family has two children (46%). The percentage of one or three children is respectively 34.3% and 15.3%. See table for the subjects' rank in siblings.

Table2.1.3 The Number of Siblings in the Subjects' Family and the Subjects' Rank in Siblings

The Number of Siblings	% (n)	Rank first	Rank second	Rank third	Rank fourth	Rank fifth	Rank sixth
1	34.3% (310)	34.3% (310)					
2	46% (415)	11.0% (99)	35.0% (316)				
3	15.3% (138)	0.4% (4)	3.7% (33)	11.2% (101)			
4	3.4% (31)		0.3% (3)	1.0% (9)	2.1% (19)		
5	0.7% (7)			0.1% (1)	0.2% (2)	0.4% (4)	
6	0.2% (2)						0.2% (2)

4. The Feeding Patterns of the Subjects within Four Months after Birth

Mothers' milk is the best for babies' physical development, especially within four months after birth. This investigation shows the rate of breastfeeding, artificial feeding and mixed feeding of preschool boys within four months after birth in Macao is 14.2%、65.4% and 20.4%. As for girls, the percentage of mentioned-above is 14.5%、61.9% and 23.6%, respectively. Thus it is obvious that the main pattern of feeding for Macao preschoolers within four months after birth is artificial feeding, followed by mixed feeding, and breastfeeding.

Table2.1.4 The Feeding Patterns within Four months after Birth of the Subjects

Gender		Breastfeeding	Artificial feeding	Mixed feeding	Total
Male	n	62	286	89	437
	%	14.2	65.4	20.4	100.0
Female	n	64	273	104	441
	%	14.5	61.9	23.6	100.0

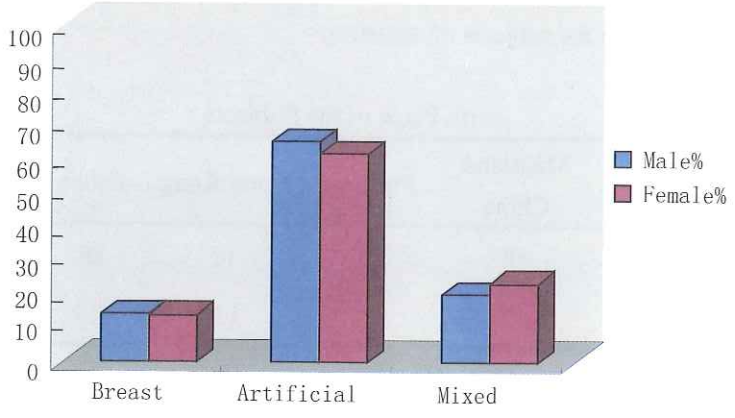

Figure2.1.1 The Feeding Patterns within Four Months after Birth

5. Birth Height and Weight of the Subjects

As table2.1.5 shows, birth height of preschool boys is apparently higher than preschool girls ($P<0.05$). There is no gender difference in birth weight. The data on birth height and weight are based on self-report, uniform measure when born was not available. So the results can only be considered as reference.

Table2.1.5 Birth height and weight of 3 to 6 years old children in Macao ($\overline{X} \pm S$)

Gender	Birth weight (kg)	Birth height (cm)
Male	3.3±0.5	49.2±4.0*
Female	3.3±0.5	48.5±4.5

gender difference $P < 0.05$

Table2.1.6 Birth height and weight by age of 3 to 6 years old children in Macao

			Age group						
			3.0-3.4	3.5-3.9	4.0-4.4	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.9
Birth weight	Male	N	49	50	53	57	55	57	103
(kg)		$\overline{X}$	3.3	3.3	3.3	3.4	3.3	3.3	3.3
		SD	0.3	0.5	0.4	0.5	0.4	0.5	0.5
	Female	N	43	52	60	50	59	52	111
		$\overline{X}$	3.4	3.2	3.3	3.2	3.4	3.3	3.2
		SD	0.5	0.4	0.5	0.5	0.5	0.5	0.5
Birth height	Male	N	48	48	52	57	53	56	98
(cm)		$\overline{X}$	49.9	49.7	48.6	48.9	49.3	49.5	48.9
		SD	2.8	2.7	4.6	4.6	3.7	2.8	5.1
	Female	N	44	54	59	49	59	51	107
		$\overline{X}$	48.7	49.2	48.8	47.0	49.3	48.7	48.3
		SD	3.8	3.0	3.2	5.5	4.4	5.2	4.9

6. Incidence of Diseases

The incidence rate of various diseases responded by the preschoolers is no more than 20%. The incidence rate of boys is a little higher in compare to the girls. Table2.1.8 shows chronic bronchitis, pneumonia, asthma and accidental injury are the most commonly reported diseases among the preschoolers.

Table 2.1.7 Incidences of Diseases Responded by 3 to 6 Years Old Children in Macao

Gender	Age group	No. of Samples	Incidences of Diseases	Incidence Rate
Male	3.0~	53	10	18.9
	3.5~	53	6	11.3
	4.0~	57	12	21.1
	4.5~	58	11	19.0
	5.0~	55	16	29.1
	5.5~	59	12	20.3
	6.0~6.9	113	21	18.6
	Total	448	88	19.6
Female	3.0~	45	5	11.1
	3.5~	58	11	19.0
	4.0~	61	5	8.2
	4.5~	54	12	22.2
	5.0~	62	14	22.6
	5.5~	54	12	22.2
	6.0-6.9	120	15	12.5
	Total	454	74	16.3

Table2.1.8 Frequencies and Percentage of the Diseases Experienced by 3 to 6 Years Old Children in Macao

		Chronic Bronchit	Pneumonia	Asthma	Accidental injury	Heart disease	Anemia	Hypothyroidism	Hematic Disease	Tuberculosis	Hyperthyroidism	Falling sickness	Other	Total
Male	n	40	22	13	13	2	2	2	—	—	—	1	17	112
	%	35.7	19.6	11.6	11.6	1.8	1.8	1.8	—	—	—	0.9	15.2	100
Female	n	27	18	7	7	6	1	1	2	1	—	—	14	84
	%	32.1	21.4	8.3	8.3	7.1	1.2	1.2	2.4	1.2	—	—	16.7	100
Total	n	67	40	20	20	8	3	3	2	1	1	1	31	197
	%	34	20.3	10.2	10.2	4.1	1.5	1.5	1	0.5	0.5	0.5	15.7	100

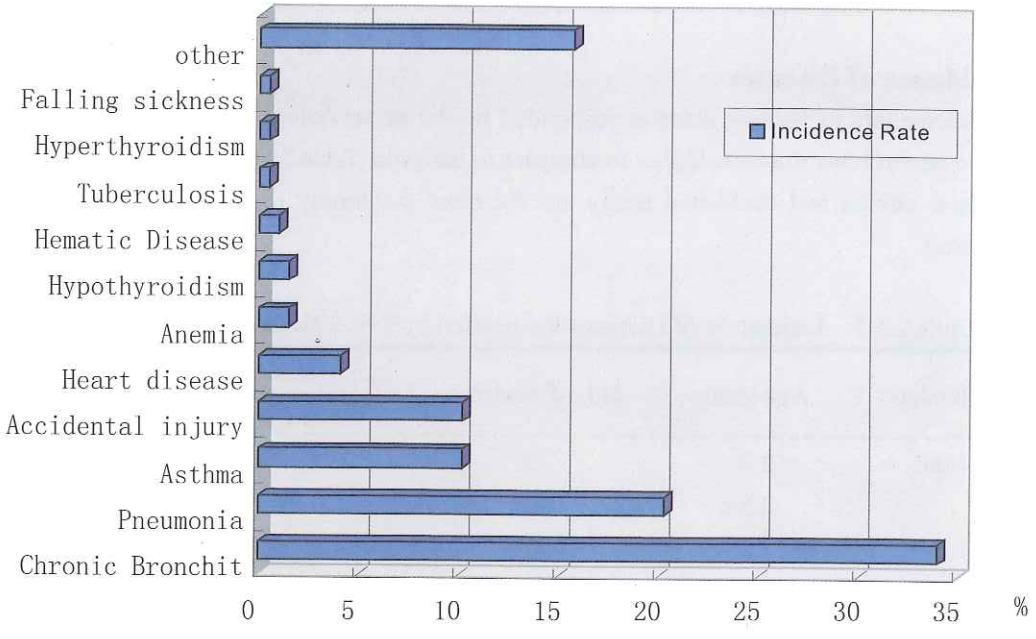

Figure2.1.2 Rank order of diseases of children

7. Physical Activities In the Subjects

33.3% preschool boys and 34.1% preschool girls participate in physical activities (such as swimming, gymnastics, ball sports, et al) after kindergarten at least once a week. Activities that preschool boys often participate are, in order of precedence, ball sports, swimming and gymnastics. As for girls, the most popular activities are, in order of precedence, dancing, swimming and gymnastics.

Table2.1.9 Physical Activity Participation Rate of 3 to 6 Years Old Children in Macao

Gender		Participating	Non-participating	Total
Male	N	149	299	448
	%	33.3	66.7	100
Female	N	155	299	454
	%	34.1	65.9	100
Total	N	304	598	902
	%	33.7	66.3	100

Table 2.1.10 Physical Activity Items for 3 to 6 Years Old Children in Macao

Gender		Swimming	Dancing	Gymnastics	Ball sports	Other	Total
Male	N	59	15	48	74	43	239
	%	24.7	6.3	20.1	31	18	100
Female	N	49	65	49	41	36	240
	%	20.4	27.1	20.4	17	15	100
Total	N	108	80	97	115	79	479
	%	22.5	16.7	20.3	24	16.5	100

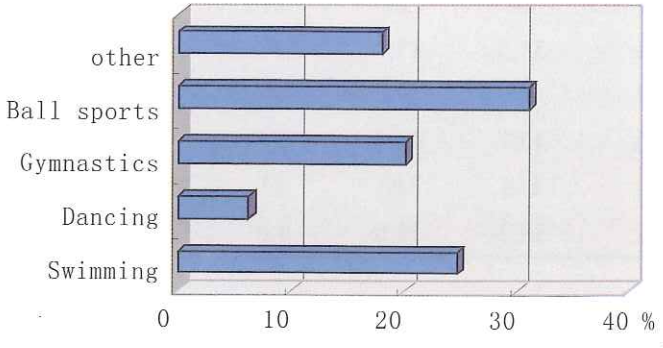

Figure 2.1.3 Physical Activity Items for Boys

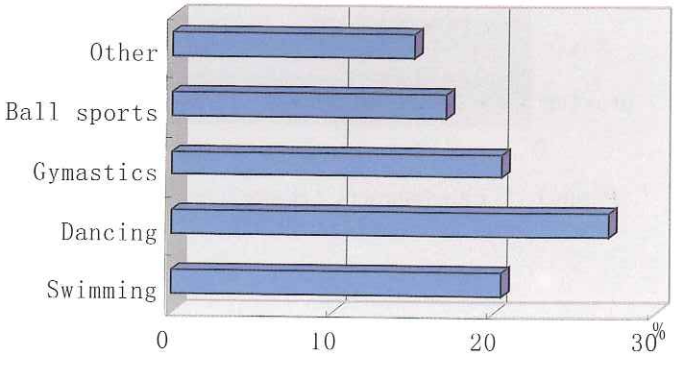

Figure 2.1.4 Physical Activity Items for Girls

8. Entertainment Activities in the Subjects

30.1% preschool boys and 33.7% preschool girls participate in literature activities (such as drawing, music, playing chess et al) after kindergarten at least once a week. The above-mentioned activities that boys and girls often participate are, in order of precedence, drawing, literacy class, music, playing chess and others.

Table 2.1.11 Entertainment Activity Participation Rate of 3 to 6 Years Old Children in Macao

Gender		Participating	Not participating	Total
Male	N	135	313	448
	%	30.1	69.9	100
Female	N	151	303	454
	%	33.7	66.7	100
Total	N	286	616	902
	%	31.6	68.4	100

Table2.1.12 Entertainment Activity Items for 3 to 6 Years Old Children in Macao

Gender		Drawing	Music	Playing Chess	Literacy Class	Other	Total
Male	N	66	33	21	45	21	186
	%	35.5	17.7	11.3	24.2	11.3	100
Female	N	87	67	11	38	11	214
	%	40.7	31.3	5.1	17.8	5.1	100
Total	N	153	100	32	83	32	400
	%	38.3	25.0	8.0	20.8	8.0	100

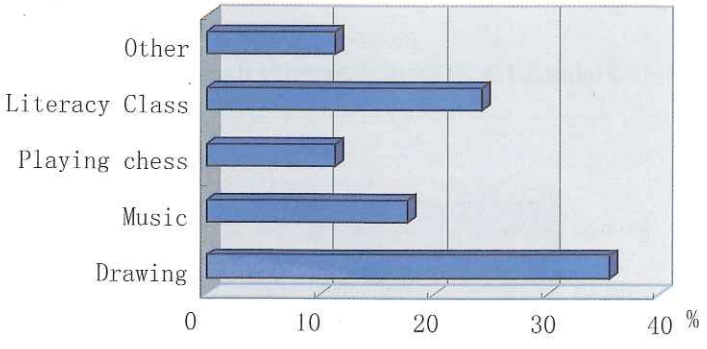

Figure2.1.5 Entertainment Activity Items for Boys

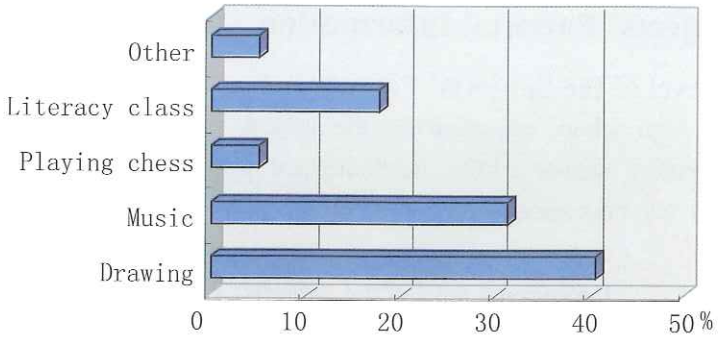

Figure2.1.6 Entertainment Activity Items For Girls

9. Sleeping time for preschoolers

Table2.1.13 shows that most preschoolers in Macao sleep 9 to 10 hours in average per day. Sleeping less than 8 hours is relatively low (2%).

Table2.1.13 Sleeping Time of Macao children in Average Per Day

	Less than 8 Hours	8 Hours	9 Hours	10 Hours	Over 10 Hours	Total
Male%	2.0	14.3	43.0	31.2	8.0	100
Female%	2.0	14.8	44.1	27.3	10.8	100

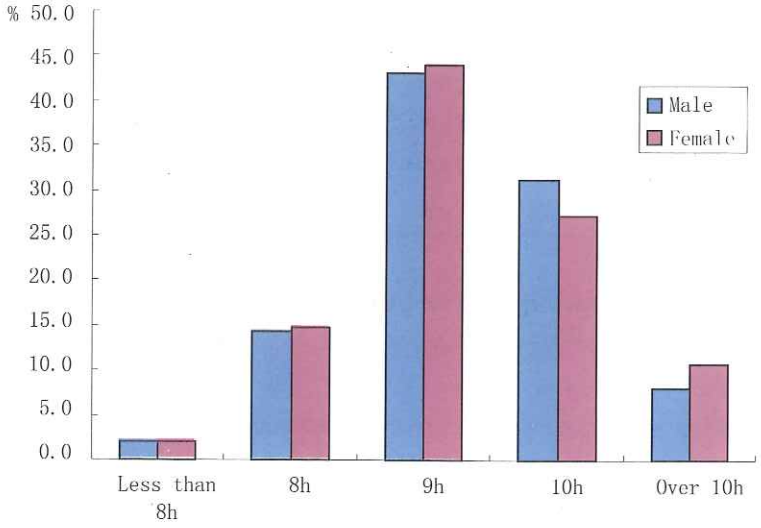

Figure2.1.7 Sleeping Time of Macao Children In Average Per Day

2.1.2 The Subjects' Parental Information

1. Educational level of the Subjects' Parents

The percentage of high school education for the subjects' fathers is relatively high (61.4%), followed by elementary school 22.0%, technological academy and above (12.3%), below elementary school 4.3%. Educational level of the subjects' mother is similar to fathers.

Table2.1.14 Educational level of the Subjects' Parents

		below elementary school	elementary school	high school	technological academy and college	Master	Doctor	Total
Father	N	38	193	538	87	19	1	876
	%	4.3	22.0	61.4	9.9	2.2	0.1	100
Mother	N	37	177	557	94	7	1	873
	%	4.2	20.3	63.8	10.8	0.8	0.1	100

2. Occupation of the Subjects' Parents

As table2.1.15 shows, the percentage of service and sales is relatively the highest among fathers' all kinds of jobs (18.3%), followed by manufacture and architecture worker 14.8%, Official 13.8%. As for mothers, housework is at the top of the job lists (42.0%), followed by service and sales.

Table2.1.15 Occupation of the Subjects' Parents

		Fishing, Agriculture	Manufacture, Architecture	Machine operation, Motor man and Assembly man	Civil servant	Special technician	Service and Sales	Official	Employer	Manager, Administrative office	Unemployment	Other	House work	Total
Father	n	5	130	78	40	84	161	121	97	51	73	35	5	880
	%	0.6	14.8	8.9	4.5	9.5	18.3	13.8	11.0	5.8	8.1	4.0	0.6	100
Mother	n	2	37	3	96	27	164	70	30	17	48	16	370	880
	%	0.2	4.2	0.3	10.9	3.1	18.6	8.0	3.4	1.9	5.5	1.8	42.0	100

3. Physical Activity Participation for the Subjects' Parents

Table2.1.16 shows that 33.5% subjects' fathers and 21.4% subjects' mothers participate in physical activity; the participation rate for the Subjects' fathers is higher than mothers. The activities that fathers often participate are, in order of precedence, swimming, track and field, basketball, football, badminton and instrument-fitting, gymnastics. As for mothers, the most popular activities are, in order of precedence, badminton, track and field, swimming and gymnastics, et al.

Table2.1.16 Physical Activity Participation Rate of the Subjects' Parents

		Participating	Not Participating	Total
Father	N	302	601	903
	%	33.5	66.5	100.0
Mother	N	193	707	900
	%	21.4	78.6	100.0

Table2.1.17 Physical Activity Events for the Subjects' Parents

Father	N	%	Mother	N	%
Basketball	50	10.5	Basketball	13	4.4
Volleyball	12	2.5	Volleyball	12	4.1
Football	48	10.1	Table Tennis	13	4.4
Table Tennis	22	4.6	Badminton	54	18.3
Badminton	39	8.2	Swimming	38	12.9
Tennis	8	1.7	Track and Field	42	14.2
Swimming	87	18.2	Gymnastics	32	10.8
Track and Field	74	15.5	Martial Art	2	0.7
Gymnastics	27	5.7	Instrument fitting	14	4.7
Martial Art	7	1.5	Fence-play	1	0.3
Taiji boxing or sword	9	1.9	Kickboxing	5	1.7
Instrument fitting	29	6.1	QiGong	3	1.0
Boxing	5	1.0	Yoga	5	1.7
Judo	4	0.8	Dancing	20	6.8
QiGong	5	1.0	Others	33	11.2
Yoga	2	0.4	Football	4	1.4
Dancing	8	1.7	Tennis	2	0.7
Others	36	7.5	Karate	1	0.3
Karate	3	0.6	Taiji boxing or sword	1	0.3
Kickboxing	2	0.4			
Total	477	100		295	100

2.2 The Testing Results and Analysis

2.2.1 The Testing Results of Physique

Children's growth is affected by many factors such as heredity and their living environment. Although, each child's growth pattern is unique, there are common features[14]. Study shows that

children's growth slow down compared to their infant period, but the growth continues[2]. At the age of 3 years old, a child becomes stronger. His weight increases 1.5-2 kg per year and height increases about 7-8 cm per year between 3-6 years old. It is very important to know changes of a child in his growth periodically since we could acquire the earliest information about him and then take effective treatment on malnutrition or obesity in time if necessary. The growth of a child is measured by the increase of his weight, height, sitting height, and chest circumference.

Height

Height reflects stature, feature of body growth and is an important sign of skeleton development and nutrition condition. Table 2.2.1, figure2.2.1 shows that height of the preschoolers in Macao increases along with their age. Boys and girls' height averagely increases 6.4 cm and 6.1 cm respectively each year. From the age of 3 to 6 years old, the total increase of a child's height is an average of 20.7 cm (boys) and 21.2 cm (girls), increasing by 21.3% and 22.2%. Boys are taller than girls at certain ages and gender difference is significant ($P<0.05$) in the group of 4.5~ 5.0 years old.

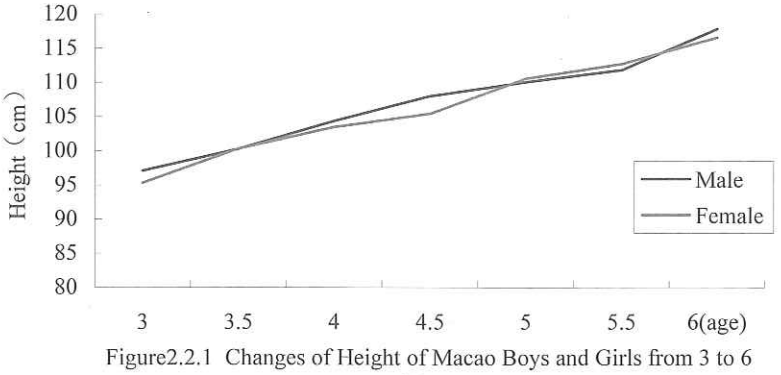

Figure2.2.1 Changes of Height of Macao Boys and Girls from 3 to 6 Years

Sitting Height

Sitting Height refers to vertical height from head to the testee's sitting board. It includes the whole length of testee's head, neck and trunk. Table2.2.1, figure2.2.2 shows that sitting height of the preschoolers in Macao increases along with their age. Boys and girls' sitting height increases averagely 2.7cm and 2.5cm respectively each year. From the age of 3 to 6 years old, the total increase of a child's sitting height is an average of 8.6 cm, increasing by 15.3% (boys) and 15.5% (girls). There is no apparent gender difference in major groups except the group of 4.5~, 6.0~ years old where boys are significantly taller than girls ($P<0.05$).

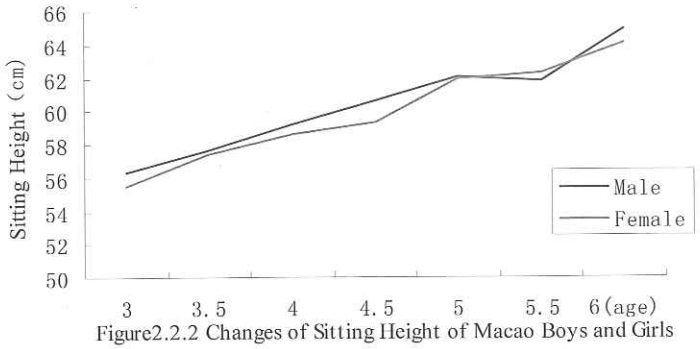

Figure2.2.2 Changes of Sitting Height of Macao Boys and Girls from 3 to 6 Years

Sitting height/ Height Index

Sitting height/ Height Index (Sitting height/ Height×100) indicates the proportion of trunk and lower limbs. Table2.2.1, figure 2.2.3 shows that sitting height/ Height Index of the preschoolers in Macao decreases along with their age, suggesting the growth pace of lower limbs exceeds the trunk during this period. It conforms to the tendency. of physiological changes from trunk-figure of infants to lower limb -figure of children.

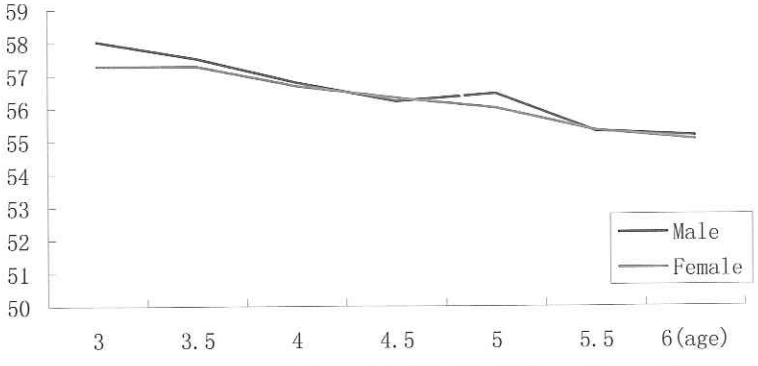

Figure2.2.3 Changes of Sitting Height/ Height of Macao Boys and Girls from 3 to 6 years

Table 2.2.1 Mean and SD of Three Length Indices of 3 to 6 Years Old Children in Macao

Age group	Height (cm)		Sitting Height(cm)		Sitting Height/Height	
	Male	Female	Male	Female	Male	Female
3.0~	97.0±3.8	95.3±6.5	56.3±2.4	55.5±2.3	58.0±1.1	57.2±8.7
3.5~	100.2±3.7	100.3±4.5	57.6±2.1	57.4±2.8	57.5±0.9	57.2±1.7
4.0~	104.3±4.1	103.4±4.0	59.2±2.6	58.6±2.3	56.7±1.3	56.6±0.9
4.5~	107.9±3.8**	105.4±4.1	60.6±2.2**	59.3±2.3	56.2±1.1	56.3±1.1
5.0~	110.2±4.8	110.5±4.8	62.1±4.7	61.8±4.3	56.4±3.7	56.0±3.4
5.5~	111.7±4.4	112.6±5.6	61.9±2.5	62.3±2.7	55.3±1.5	55.3±1.0
6.0~6.9	117.7±4.9	116.5±5.2	64.9±2.6*	64.1±2.5	55.1±1.1	55.0±1.1

* Boys VS girls P<0.05 ** Boys VS girls P<0.01

Weight

Weight refers to the total weight of skeleton, muscle, fat and organs. It reflects the substantial degree of body and a child's nutritious status. Now it has been universally recognized that many serious diseases threatening human health are related to excessive body weight. Conversely, an over light weight is a sign of malnutrition and some diseases.

Table2.2.2, figure2.2.4 shows that weight of the preschoolers in Macao increases along with their age. Boys and girls' weight increases averagely 2.3 kg and 1.9 kg respectively each year. The total increase is 7.3 kg (boys) and 6.2 kg (girls) from 3 to 6 years old, averagely increasing by 50.7% and 43.9%. There is no apparent gender difference in weight in major groups except the group of 4.5~, 6.0~ yeas old where boys are significantly heavier than girls (P<0.05).

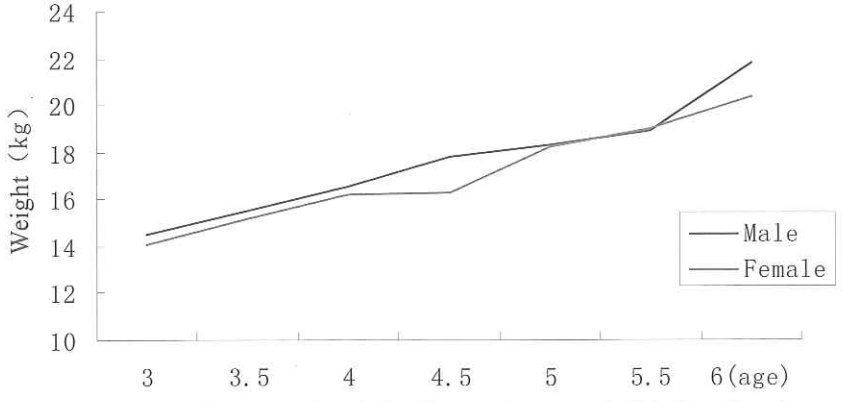

Figure2.2.4 Changes of Weight of Macao'Boys and Girls from 3 to 6 years

Quitelet Index

Quitelet Index (weight/height×1000)expresses relative weight. It can better reflect substantial degree of body by removing the influence of height and indicate a child's growth and nutritious status. Quitelet Index has a slowly increasing tendency while those preschoolers get older, suggesting weight per height (cm) tend to increase and children's body become stronger during the age period of 3-6. In the groups of 4.5~, 6.0~ years old, Quitelet Index of boys is significantly higher than girls (P<0.05).

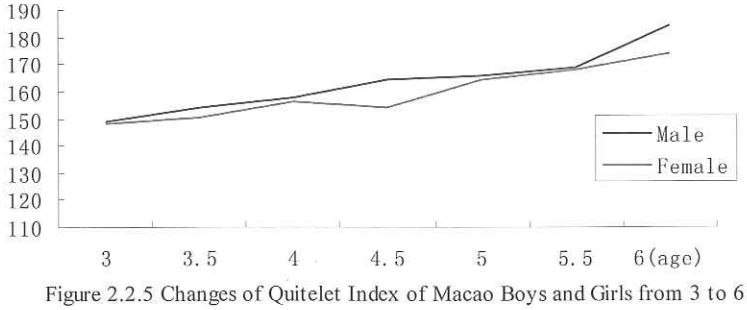

Figure 2.2.5 Changes of Quitelet Index of Macao Boys and Girls from 3 to 6 years

BMI

BMI (weight/height^2) refers to weight per cm^2. It is little influenced by gender and age and so it is universally recognized as an ideal index to evaluate weight level and nutritious status. Table2.2.2, figure 2.2.6 shows that BMI of boys in Macao has a decreasing tendency along with their growth in age, but from 6 years old, the index begins to increase and surpass the average level of 3 years old group. As for girls, BMI has a fluctuant decrease before 4.5 years old and after that the index goes up again and keeps almost stable after 5 years old. The curves of changes of BMI for boys and girls have a cross point at 3.0~ age group. Before 3.0, the index level of girls is higher than that of boys. From 3.5, the index of boys gradually exceeds girls and the gender difference reaches significant level at 4.5~ and 6.0~ age groups ($p<0.05$).

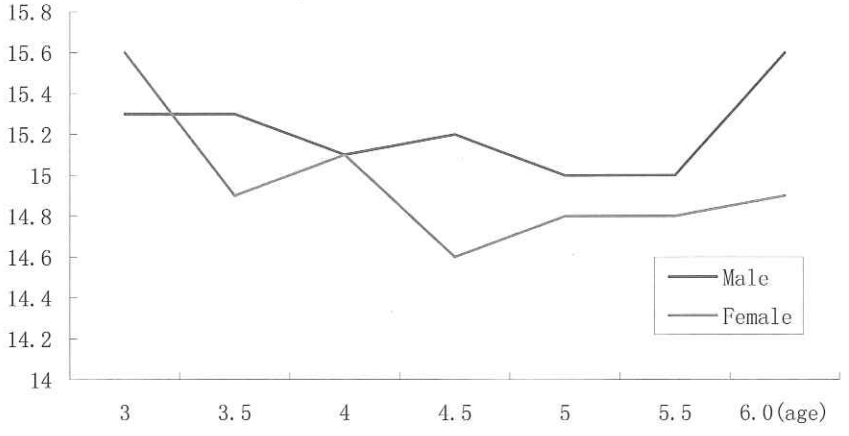

Figure 2.2.6 Changes of BMI of Macao Boys and Girls from 3 to 6 years

Table 2.2.2 Mean and SD of Three Weight Indices of 3 to 6 Years Old Children in Macao

Age group	Weight(kg)		Quitelet Index		BMI	
	Male	Female	Male	Female	Male	Female
3.0~	14.4±2.1	14.1±1.8	148.7±17.0	148.0±16.6	15.3±1.3	15.6±2.9
3.5~	15.4±2.4	15.1±2.3	154.0±20.4	150.5±17.9	15.3±1.7	14.9±1.4
4.0~	16.5±2.3	16.2±2.0	157.8±19.1	156.4±15.6	15.1±1.6	15.1±1.3
4.5~	17.8±2.3**	16.3±2.4	164.6±18.3**	154.2±18.4	15.2±1.4*	14.6±1.4
5.0~	18.3±3.0	18.2±2.8	166.3±21.6	164.4±19.6	15.0±1.6	14.8±1.4
5.5~	18.9±3.1	19.0±3.3	168.8±23.7	168.0±22.4	15.0±1.8	14.8±1.5
6.0~6.9	21.7±3.9**	20.3±3.3	184.2±27.8**	173.8±23.4	15.6±2.0**	14.9±1.7

* Boys VS girls $P<0.05$ ** Boys VS girls $P<0.01$

Chest Circumference

Chest circumference is the circumference of thorax. It indicates the growth of a child's thorax and back muscles. It is also an indication of cardiopulmonary capacity. Table2.2.3, 2.2.4, figure2.2.7 shows that chest circumference of the preschoolers in Macao increases along with their age. Boys and girls' chest circumference increases averagely 1.9 cm and 1.6 cm respectively each year. The total increase is 6.5cm (boys) and 5.1cm (girls) from 3 to 6 years old, averagely increasing by

12.7% and 10.1%. Chest circumference of boys is significantly larger than that of girls ($P<0.05$), except for 3.0~, 5.5~ age groups.

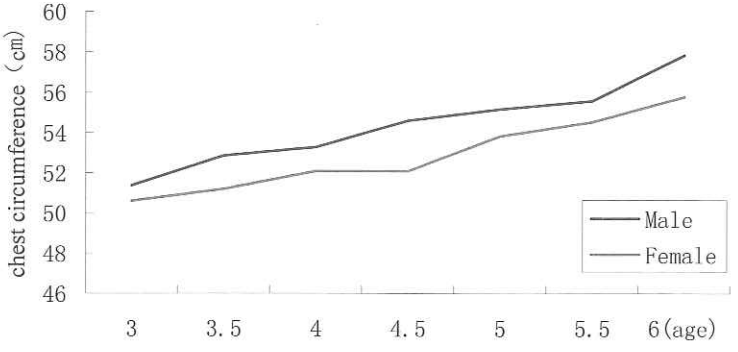

Figure2.2.7 Changes of Chest Circumference of Macao Boys and Girls from 3 to 6 years

Chest Circumference / Height Index

Chest circumference/height index (chest/height×100) indicates a relative circumference measured by the proportion of chest circumference and height. Table2.2.3, figure2.2.8 shows that chest circumference/height index of the preschoolers in Macao decreases along with their growth in age. The tendency is due to the increase of height which exceeds the chest circumference during this period and the children of 3-6 years old tend to become taller and thinner. Chest circumference/height index of boys is significantly larger than girls ($P<0.05$), except for 3.0~ age group.

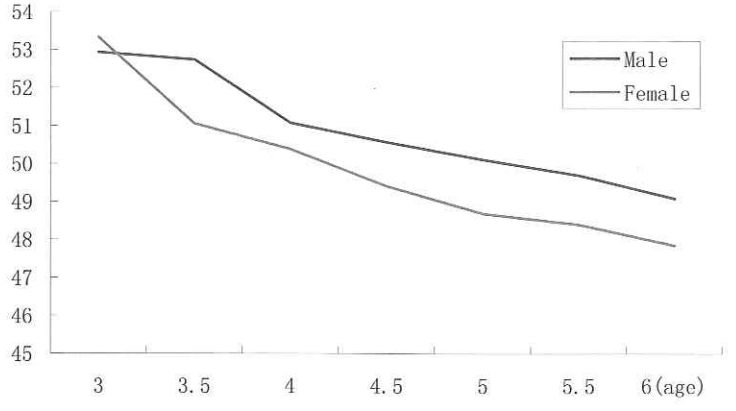

Figure2.2.8 Changes of Chest Circumfefence/height of Macao Boys and Girls from 3 to 6 years

Verwaeck Index

Verwaeck Index [(weight+ chest circumference)/height × 100] refers to the length, width, circumference, and density of a body, and can better indicate its physical status. Results show that Verwaeck index of the preschoolers in Macao decreases while they are growing up. The

decreasing tendency shows the increase of height which exceeds the chest circumference and weight during this period. Verwaeck Index of boys is significantly higher than girls at 3.5~, 4.5~, 5.0~, 6.0~ age groups (P<0.05).

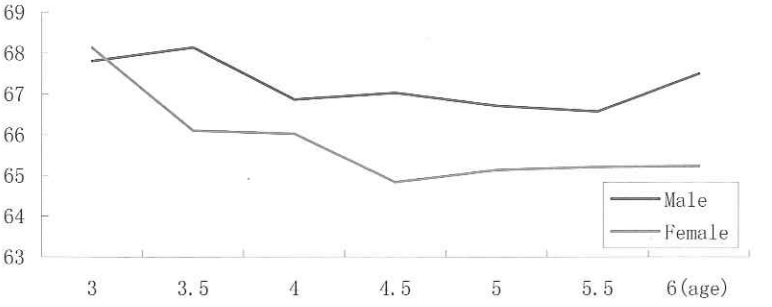

Figure2.2.9 Changes of Verwaeck Index of Macao Boys and Girls from 3 to 6 years

Table 2.2.3 Mean and SD of Three Circumference Indices of 3 to 6 Years Old Children in Macao

Age group	Chest circumference(cm)		Chest circumference/height		Verwaeck index	
	Male	Female	Male	Female	Male	Female
3.0~	51.3±2.6	50.6±2.5	52.9±2.1	53.3±4.6	67.8±3.3	68.1±5.7
3.5~	52.8±3.3**	51.1±3.1	52.7±2.9**	51.0±2.5	68.1±4.6*	66.1±3.8
4.0~	53.2±3.1*	52.0±2.3	51.0±2.7	50.3±2.2	66.8±4.2	66.0±3.2
4.5~	54.5±2.5**	52.0±2.7	50.5±2.1**	49.4±1.9	67.0±3.3**	64.8±3.3
5.0~	55.1±3.3*	53.8±3.1	50.1±2.1**	48.6±2.1	66.7±3.8*	65.1±3.6
5.5~	55.5±3.6	54.5±3.4	49.7±2.7**	48.4±2.3	66.5±4.7	65.2±4.0
6.0~6.9	57.8±4.4**	55.7±3.8	49.0±3.1**	47.8±2.7	67.5±5.5**	65.2±4.6

* Boys VS girls P<0.05 ** Boys VS girls P<0.01

Table 2.2.4 Increase of Four Physique Indices per Year

Age group	Height(cm)		Weight(kg)		Sitting height(cm)		Chest circumference(cm)	
	Male	Female	Male	Female	Male	Female	Male	Female
3.0-4.0	7.5	6.2	2.2	1.6	3.0	2.3	1.8	1.1
4.0-5.0	4.9	7.2	1.5	2.3	2.1	3.1	1.5	2.1
5.0-6.0	6.8	5.0	3.1	1.7	2.9	2.0	2.4	1.6
Average	6.4	6.1	2.3	1.9	2.7	2.5	1.9	1.6

Skinfold Thickness

The composition of a human body can be divided into two components----fat and fat-free. Body weight combines fat weight and fat-free weight. The fat weight and fat distribution in body are essential factors for physical fitness. Many studies have shown that excessive body fat is harmful to health. Skinfold thickness measures hypodermic fat content of a human body and indirectly reflects body fat weight and distribution features. Results show from 3 to 6 years old, skinfold

thickness at the three parts of body have a tendency of increasing on the whole. The Skinfold thickness at the upper arm is earlier than the other two parts, although the increase at this part is the smallest-- boys 7.7% and girls 11.6%. Skinfold thickness at the shoulder blade and abdomen begins to increase by a large margin from 4.5 year old for girls and 5 year old for boys. Especially, the increase of skinfold thickness at the abdomen is the biggest, which is 33.3% for boys and 21.1% girls respectively. Besides, the average level of skinfold thickness at the upper arm is the highest, followed by abdomen and shoulder blade in both gender.

Skinfold thickness level of girls is larger than boys of the same age, especially at abdomen, and this difference keeps increasing after 4.5.

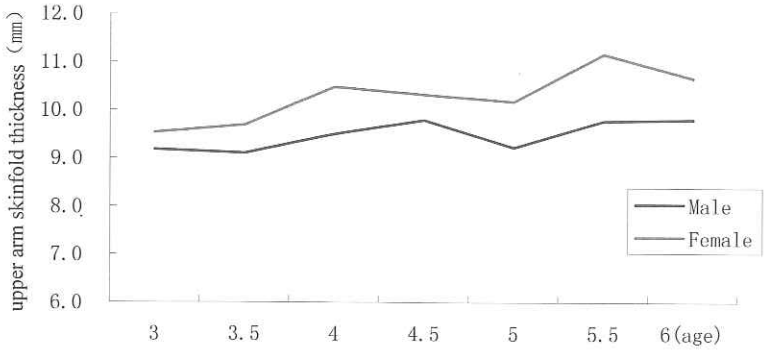

Figure2.2.10 Changes of Upper Arm Skinfold Thickness of Macao Boys and Girls from 3 to 6 years

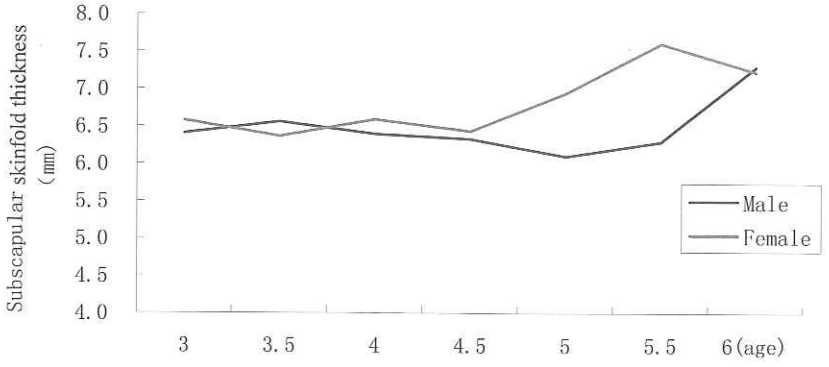

Figure 2.2.11 Changes of Subscapular Skinfold Thickness of Macao Boys and Girls from 3 to 6 years

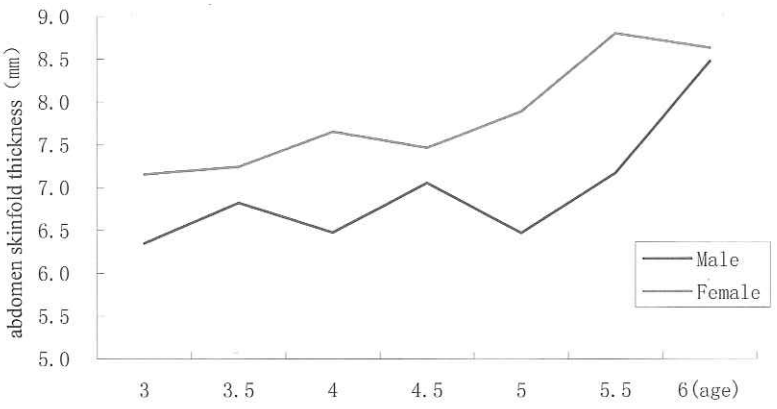

Figure 2.2.12 Changes of Abdomen Skinfold Thickness of Macao Boys and Girls from 3 to 6 years

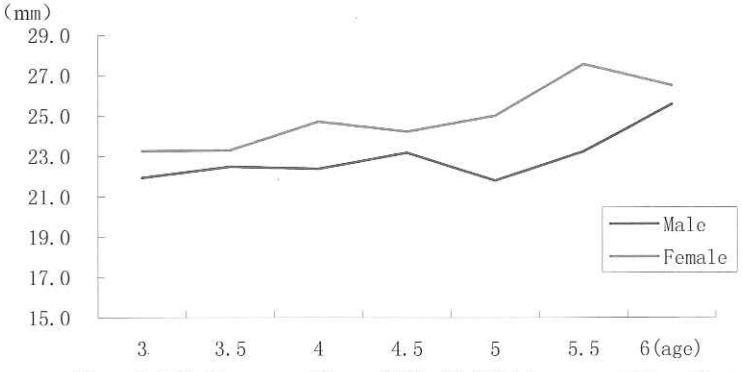

Figure2.2.13 Changes of Sum of Skinfold Thicknesses at Three Parts of Macao Boys and Girls from 3 to 6 years

Table 2.2.5 Mean and SD of Skinfold Thickness of 3 to 6 Years Old Children in Macao

Age group	Upper arm (mm)		Shoulder blade (mm)		Abdomen (mm)		The sums at three parts (mm)	
	Male	Female	Male	Female	Male	Female	Male	Female
3.0~	9.1±2.7	9.5±2.1	6.4±2.5	6.5±1.7	6.3±3.0	7.1±2.2	21.9±7.7	23.2±5.6
3.5~	9.1±2.3	9.6±2.9	6.5±2.8	6.3±2.2	6.8±3.0	7.2±2.7	22.4±7.6	23.2±7.3
4.0~	9.4±3.1	10.4±2.6	6.3±3.1	6.5±2.1	6.4±3.1	7.6±3.3	22.2±8.9	24.7±7.4
4.5~	9.7±2.7	10.3±2.4	6.3±2.4	6.4±1.7	7.0±3.0	7.4±2.9	23.1±7.9	24.2±6.4
5.0~	9.2±3.7	10.1±3.1	6.0±2.2	6.9±2.8	6.4±3.6*	7.8±3.1	21.9±9.0*	25.0±8.5
5.5~	9.7±2.8*	11.1±4.0	6.2±3.1*	7.6±2.9	7.1±4.4*	8.7±4.0	23.2±9.6*	27.5±10.2
6.0~6.9	9.8±4.1	10.6±3.4	7.2±4.1	7.2±3.4	8.4±5.3	8.6±4.2	25.5±12.9	26.5±10.4

* Boys VS girls $P<0.05$ ** Boys VS girls $P<0.01$

2.2.2 The Testing Results of Physiological Function

Heart rate refers to the times of heart beating in a minute. Heart rate is an indication of cardio-capacity and physical fitness. People of different gender and age have different heart rate.

Newborn babies' heart rate is faster. Their heart rate decreases while they are growing, and becomes similar to adults' heart rate when they enter the puberty period[14]. Heart rate of the preschoolers in Macao decreases when they grow older. However, there is no significant difference between genders at each age group.

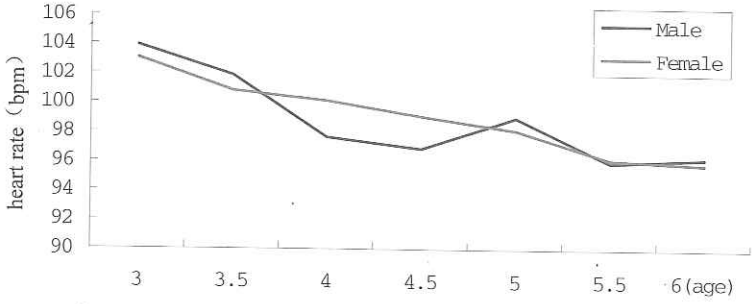

Figure2.2.14 Changes of Heart Rate of Macao Boys and Girls from 3 to 6 years

Table 2.2.6 Mean and SD of Heart Rate of 3 to 6 Years Old Children in Macao

Age group	Male	Female
3.0~	103.8±8.1	103.0±9.8
3.5~	101.8±8.7	100.7±10.1
4.0~	97.5±9.1	100.1±9.6
4.5~	96.8±9.8	99.0±11.5
5.0~	99.8±10.3	98.1±9.5
5.5~	95.9±8.5	96.1±9.3
6.0~6.9	96.2±9.4	95.8±10.0

2.2.3 The Testing Results of Physical Fitness

Physical fitness refers to the ability of motor activities when people are engaged in various physical activities. It is an index to evaluate fitness status. Physical fitness is complex and multifaceted, involving many components. Among them, strength, endurance, flexibility, speed and agility are conceived to be fundamental ones needed for physical activities. Motor skills begin to develop since the period of baby's decumbence. At one year old, the baby can walk, at 2, he can run smoothly, at 3, he can jump, and at 6-7 years old, the child can perform complex movements. The development follows the disciplinarian from low to high and from simple to complex. With the development of skeleton muscle and brain's control capacity, as well as of a great deal of practice on daily living, at about 3 years old, a child has obtained nearly all kinds of gross motor skills and fine motor skills. He can run around a corner, hop on one foot, climb stairs, step over obstacles, walk on a low balance beam, kick, throw and catch ball. At the age of 5-6, he can walk, run and jump more dexterously. Cooperation of eyes and hands as well as reaction of nerve system

also improves. He can play rope skipping, catch a ball with hands, kick a ball exactly and drive a ball with patting. The function of small muscles also enhances. He can draw and write freely[3]. The present study selects long jump, throwing a ball, sit and reach, shuttle run, jumping by both feet, and walking on balance beam as testing indices for preschoolers.

Standing Long Jump

Standing long jump measures burst-out strength of lower limbs. Table2.2.7, figure2.2.15 shows the score of preschoolers in Macao on long jump gets higher with their growth in age. Obviously, the strength of lower limbs and the coordination of body improve gradually. The strength of lower limbs of boys is better than girls after the age of 4.5, reaching a high level at 4.5 and 6.0 age groups ($P<0.05$).

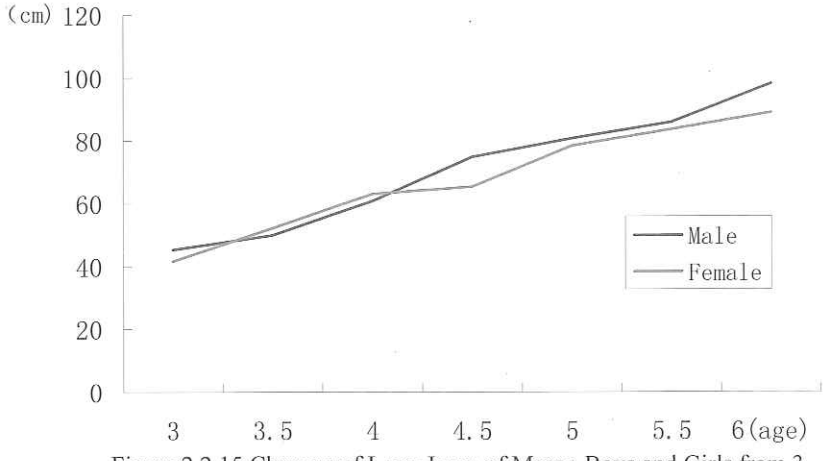

Figure 2.2.15 Changes of Long Jump of Macao Boys and Girls from 3 to 6 years

Throwing Distant Tennis Ball

Throwing distant tennis ball measures the strength of upper limbs, waist and abdomen and the coordinative ability. Table2.2.7,2.2.8, figure2.2.16 shows the score of preschoolers in Macao on throwing distant tennis increases with their growth in age, suggesting the strength of upper limbs and the coordination of body improve gradually. The strength of upper limbs of boys is greater than the girls of the same age and this difference keeps enlarging, and reaches a high level after 3.5 years old($P<0.05$).

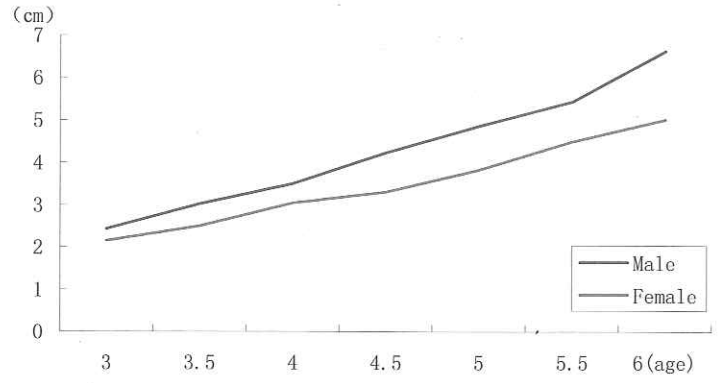

Figure2.2.16 Changes of Throwing Distant Tennis Ball of Macao Boys and Girls from 3 to 6 years

Sit and Reach

Sit and reach measures the flexibility and stretch of muscle, ligament, and joint of trunk, waist and leg. Table 2.2.7, 2.2.8; figure 2.2.17 shows the average level of sit and reach of the preschoolers in Macao which decreases with their growth in age, reflecting body flexibility decrease when child grows older. Girls are better at sit and reach than boys at all age groups. The difference is remarkable except for the 3.0 age group.

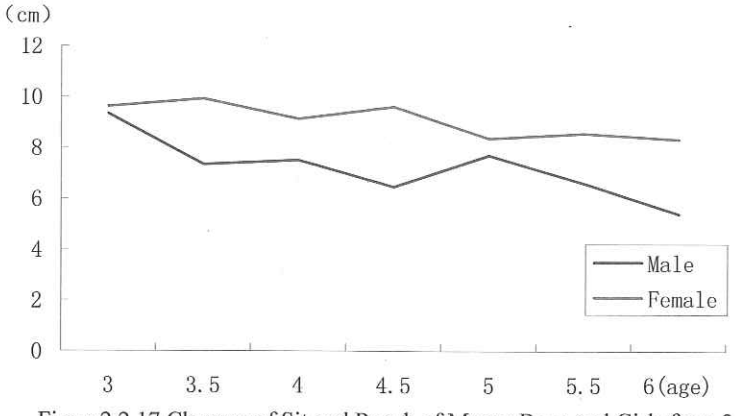

Figure2.2.17 Changes of Sit and Reach of Macao Boys and Girls from 3 to 6 years

10m Shuttle Run

The test of 10 m shuttle run is used to measure children's speed and agility. Table2.2.7, 2.2.8, figure 2.2.18 shows the average speed of Macao children of 3-6 years old in 10m shuttle run increases when they grow older. It reflects the gradual maturation of nerve system and the increase of speed during this period. Averagely Macao boys shuttle ran faster than girls and the difference is remarkable after 4.5 ($P<0.05$).

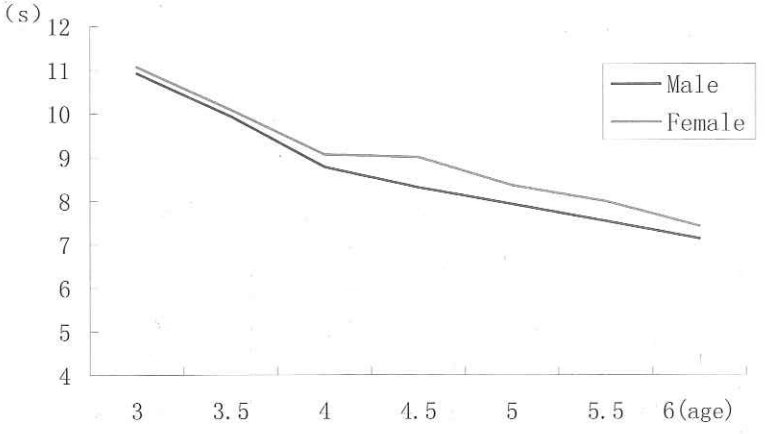

Figure2.2.18 Changes of 10m Shuttle Run of Macao Boys and Girls from 3 to 6 years

Successional Jump with Both Feet

Successional jump with both feet measures strength of lower limbs and body coordination. Table 2.2.7, 2.2.8; figure 2.2.19 shows the score of preschoolers in Macao on successional jump with both feet increases with their growth in age. There is no apparent difference for gender of all age groups.

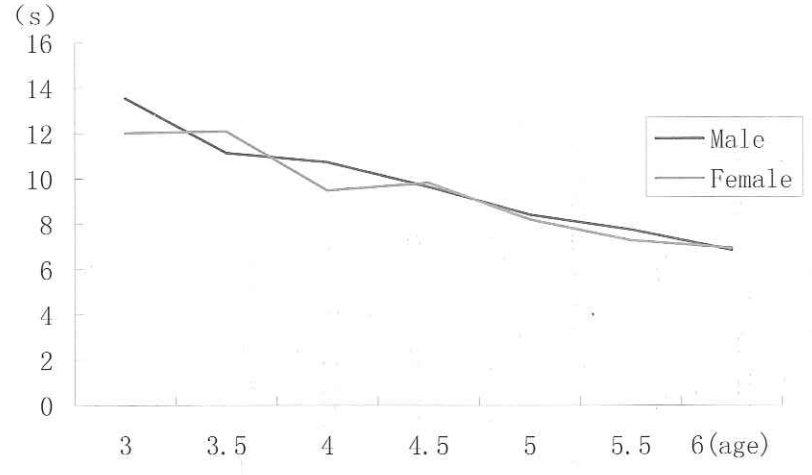

Figure2.2.19 Changes of Successional Jump with Both Feet of Macao Boys and Girls from 3 to 6 years

Walking on Balance Beam

Walking on balance beam is taken to measure the balance ability. Time and type taken in walking on balance beam are the items for evaluating children's balance ability. There are three types of movement—walking forward, moving sidelong, and undone. The ability of preschoolers' walking forward on balance beam in Macao keeps improving. Among girls of 5 years old and boys of 5.5 years old, 98% can accomplish this test by walking forward. In addition, the average time needed decreases as the preschoolers grow in age. It reflects the improvement of balance ability from 3 to 6 years old. Before 4.5 years old, girls have better balance ability than boys. However, after the

age of 4.5, girls' balance ability tends to drop lower than boys.

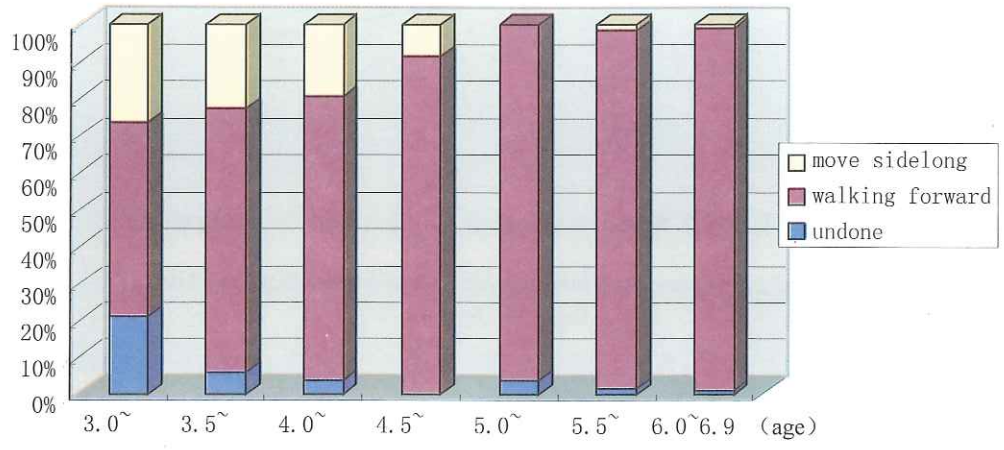

Figure 2.2.20 Types of Walking on Balance Beam of 3 to 6 years old Boys in Macao

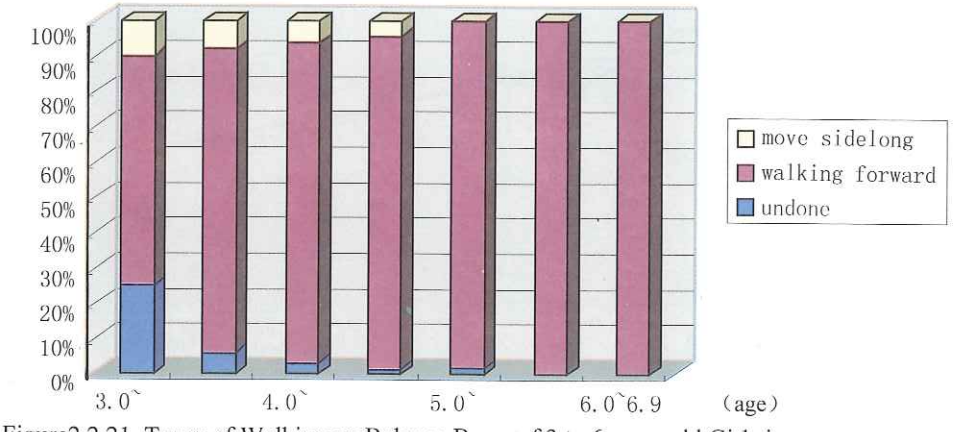

Figure2.2.21 Types of Walking on Balance Beam of 3 to 6 years old Girls in Macao

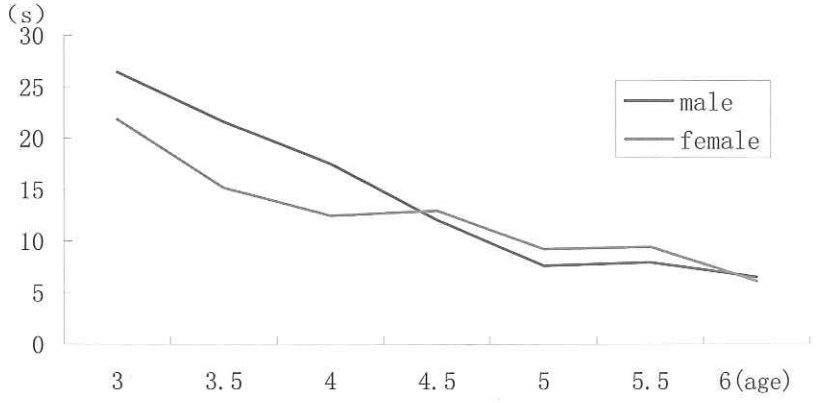

Figure2.2.22 Time of Walking on Balance Beam of Macao Boys and Girls from 3 to 6 years

Table 2.2.7 Mean and SD of Physical Fitness Indices of 3 to 6 Years Old Boys in Macao

Age group	Standing Long jump(cm)	Throwing distant tennis ball(m)	Sit and reach (cm)	10m shuttle run(s)	Time of walking on balance beam(s)	Successional jump with both feet(s)
3.0~	45.3±17.7	2.4±1.0	9.3±3.3	10.9±1.5	26.4±13.7	13.5±4.0
3.5~	49.8±18.1	3.0±1.1**	7.3±3.6**	9.9±1.5	21.5±12.6**	11.1±4.3
4.0~	60.7±17.9	3.5±0.9*	7.4±3.7*	8.7±1.3	17.4±12.3*	10.6±3.6
4.5~	74.8±18.2**	4.2±1.2**	6.4±4.0**	8.3±1.3**	12.0±7.1	9.6±3.4
5.0~	81.2±18.6	4.8±1.2**	7.7±4.1	7.9±0.9*	7.8±3.7	8.3±2.2
5.5~	85.8±15.9	5.4±1.9**	6.5±3.8*	7.5±0.9**	7.9±5.8	7.7±2.4
6.0~6.9	98.1±16.8**	6.6±2.0**	5.3±5.0**	7.1±0.7**	6.5±4.0	6.8±1.9

* Boys VS girls P<0.05 ** Boys VS girls P<0.01

Table 2.2.8 Mean and SD of Physical Fitness Indices of 3 to 6 Years Old Girls in Macao

Age group	Standing Long jump(cm)	Throwing distant tennis ball(m)	Sit and reach (cm)	10m shuttle run(s)	Time of walking on balance beam(s)	Successional jump with both feet(s)
3.0~	41.6±13.7	2.1±0.7	9.6±3.4	11.0±1.4	21.8±15.1	12.0±3.5
3.5~	52.1±18.9	2.5±0.8	9.9±4.6	10.1±2.1	15.1±8.5	12.0±4.3
4.0~	63.0±16.8	3.0±1.0	9.1±3.3	9.0±1.5	12.4±7.9	9.4±3.0
4.5~	65.3±14.5	3.3±0.9	9.5±3.3	9.0±1.1	12.9±9.4	9.8±2.9
5.0~	78.4±16.8	3.8±1.1	8.3±3.9	8.3±0.9	9.2±6.6	8.2±1.8
5.5~	83.5±15.1	4.5±1.0	8.5±5.2	7.9±0.9	9.4±5.2	7.2±1.8
6.0~6.9	88.9±14.4	5.0±1.3	8.3±4.2	7.4±0.8	6.1±3.8	6.9±2.0

2.2.4 Dental Caries in Macao Preschoolers

Dental caries is the most common disease in children. Dental caries may affect children's ingestion and assimilation of nutriment and affect their growth finally. In addition, untreated decayed milk tooth for long time may bring many kinds of stomatitis and then affect the growth of

permanent tooth and the appearance of face[4]. The rate of dental caries in a region can reflect the hygiene level of this place from one aspect.

Results of this survey show the rate of dental caries of preschoolers in Macao increases with their growth in age. Similar tendency can be seen in the survey on 0-7-year-old children's dental caries in 9 cities of mainland in 1995[1]. The rate of filled milk tooth in Macao is less than 10%. The rate of tooth falling caused by serious erosion keeps increasing from 3 to 6 years old. Preschoolers of all age groups have no dental caries in permanent tooth. The above findings reveal that Macao' preschoolers have a higher rate of dental caries. Health department must adopt proper oral hygiene practices for early children as soon as possible and promote parental awareness on how to protect their children's dental health.

Table2.2.9 The Prevalence of Dental Caries of 3 to 6 Years Old Children in Macao

Age group	No. of sample	No. of dental caries	Rate of Decayed%	No. of Filled	Rate of Filled%	No. of Missed	Rate of Missed %
3.0~	98	21	21.4	2	9.5	0	0
3.5~	111	27	24.3	0	0	0	0
4.0~	118	40	33.9	2	5.0	1	2.5
4.5~	112	38	33.9	1	2.6	2	5.3
5.0~	117	49	41.9	4	8.2	2	4.1
5.5~	113	61	53.9	5	8.2	3	4.9
6.0~6.9	233	124	53.2	12	9.7	8	6.5

2.2.5 Conclusions

1. The average level of height, weight, sitting height, chest circumference and skinfold thickness of the children increase along with their growth in age. Weight, height and abdomen skinfold thickness increases by a large margin. There is no great difference between gender in height and weight. Chest circumference of boys is larger than girls, while skinfold thickness at three parts of girls is greater than boys. In addition, with the increase of height, lower limbs grow faster than the other parts. Due to the increase of height exceeds the chest circumference, children of 3-6 years old tend to be taller and thinner.

2. Heart rates of 3 to 6 years old children in Macao decrease when they grow older. There is no great gender difference of the same age.

3. Macao children aged 3 to 6 have significant improvement in strength, speed, agility and balance. Although strength, speed and agility of boys are better than girls, their flexibility is apparently weak.

4. The rate of dental caries of 3 to 6 years old children in Macao increases with their growth in age. Health department should strengthen oral hygiene practices for early children's healthy growth.

2.3 Analysis of Factors Affecting Macao 3-6 Years Old Children's Growth

Children' growth is influenced by many factors such as genetic heredity, living conditions, nutritious status, disease, physical activities, etc. There into, acquired environmental factors can be transformed. Favorable growth environment not only provides the condition for growth potential of hereditary, but also makes up the bugs of hereditary. Contrarily, bad growth environment may limit growth potential. Height and weight are two important indices to evaluate children's growth level. We intend to study factors affecting growth condition of 3-6 years old children in Macao from the aspects of parental height, education and occupation, mother' s pregnant age, babies' postnatal feeding pattern, birth height and weight, sports and dental caries.

2.3.1 Correlation of Parents' Height and Babies' Height

It is well recognized that hereditary and acquired environmental factors contribute to children's growth. Obviously, children's height is mostly determined by their parents' gene [5.14]. This study reveals that correlation coefficients of Macao's children's height and their parents' height have statistical significance for boys of most age groups and girls of 5.0 above age group($p<0.05$). However, the correlation degree between parents and their 3-6 years old children seems to be so small that it has little practical value. When a child grows older, heredity of height tends to be more apparent. The study on the physical fitness of teenagers in China and Japan in 1987 has shown that height of 7-20 year-old children is significantly correlated with their parents and the correlation coefficients for 15 above year-old teenagers is higher[6].

Table 2.3.1 Correlation of the Coefficients of Macao Children' s Height with Their Parental Height

		3.0-3.4	3.5-3.9	4.0-4.4	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.9
Boys	Fathers' Height	0.326*	0.187	0.171	0.456**	0.294*	0.333*	0.392**
	Mothers' Height	0.450**	0.459**	0.209	0.303*	0.330**	0.281*	0.302**
	Parental Average Height	0.482**	0.439**	0.235	0.437**	0.373**	0.430**	0.450**
Girls	Fathers' Height	0.176	0.216	0.200	0.056	0.369**	0.532**	0.180
	Mothers' Height	0.169	0.193	0.370**	0.059	0.309*	0.515**	0.398**
	Parental Average Height	0.180	0.259	0.326*	0.086	0.399**	0.648**	0.356**

* Significant level 0.05, ** Significant level 0.01

2.3.2 Analysis of Relationship between Women's Pregnant Age and Their Children's Growth

According to Eugenics, the best pregnant age is 25-30 years old. During this period, women's physical function reaches the highest level of their life and their babies may grow stronger[7]. A

research on physical fitness of Chinese children of 3-6 years old (1998) shows that the children whose mother gives their birth after 25 years old scored higher on height, weight and Quitelet Index than those whose mother gives their birth before 25years old[8] ($P<0.05$). This indicates that women's pregnant age significantly influences the physical growth of 3-6 years old children[8]. In this present study, distribution of pregnant age of the mothers surveyed can be seen at table2.3.2. There is no significant difference in physical growth between groups of bearing age among the children of the same sex and age. The discrepancy in these results may have many reasons. First, besides pregnant age, many other factors may be responsible for children' growth, such as mother' nutrition during pregnancy, nutrition and family conditions of children after birth, etc. Second, the present study is limited with respect to a smaller sample size.

Table2.3.2 Distribution of Pregnant Age of the Subjects' Mothers

	Grouping of Pregnant age			
	Below 25	25.1~30.0	Over 30.1	Total
N	167	320	395	882
%	18.9	36.3	44.8	100

Table 2.3.3 Comparative Results of Height Between Pregnant Age Groups (cm)

Age group	Grouping of Pregnant age	Male			Female		
		No.of sample	Means	SD	No.of sample	Means	SD
3.0-3.9	Below 25	23	98.8	4.8	15	98.1	6.0
	25.1~30.0	35	98.1	4.1	35	98.5	4.5
	Over 30.1	44	99.1	3.9	53	97.9	6.9
4.0-4.9	Below 25	11	104.9	5.2	18	104.1	3.6
	25.1~30.0	50	106.4	4.4	37	103.8	4.8
	Over 30.1	49	106.4	4.4	57	104.7	3.9
5.0-5.9	Below 25	22	111.2	4.0	21	111.2	5.6
	25.1~30.0	39	110.2	4.9	41	110.9	4.9
	Over 30.1	49	111.3	5.0	53	112.3	5.6
6.0-6.9	Below 25	26	118.7	6.0	31	116.1	7.0
	25.1~30.0	40	117.4	4.7	43	115.9	4.5
	Over 30.1	46	117.7	4.6	43	117.6	4.4

Table 2.3.4 Comparative Results of Weight Between Pregnant Age Groups (kg)

Age group	Grouping of Pregnant age	Male			Female		
		No. of Sample	Means	SD	No. of sample	Means	SD
3.0-3.9	Below 25	23	14.9	1.6	15	14.6	2.2
	25.1~30.0	35	14.9	2.9	35	15.1	2.5
	Over 30.1	44	15.1	2.2	53	14.5	1.9
4.0-4.9	Below 25	11	17.1	2.0	18	16.4	2.7
	25.1~30.0	50	17.1	2.3	37	15.9	2.3
	Over 30.1	49	17.5	2.7	57	16.5	2.0
5.0-5.9	Below 25	22	18.2	2.2	21	19.1	3.3
	25.1~30.0	39	18.2	2.7	41	18.0	2.2
	Over 30.1	49	19.0	3.1	53	18.9	3.5
6.0-6.9	Below 25	26	21.9	4.7	31	20.0	3.2
	25.1~30.0	40	22.3	4.4	43	19.8	2.8
	Over 30.1	46	21.3	3.0	43	21.1	3.9

2.3.3 Analysis of Relationship between Parents' Education Degree, Occupation and Their Children's Growth

In the present study, we do not find any relationship of parents' education degree and occupation to their children's growth. There is no significant difference in children' physique, although their parent have different education degree and occupation.

2.3.4 Analysis of Relationship between Feeding Pattern during Infants' First 4 Months and Their Growth

Breastfeeding is acknowledged by WHO professionals as the ideal source of nutrition for infants especially during the postnatal four months[1]. Mother's milk contains all the nutrition needed for physical growth of 4-6 month-old infants. When infants grow older, they will need more nutrition and then adequate supplementary food will be necessary for them [1]. Many researches have been involved in the effect of different feeding pattern on infants' physical growth, indicating breastfeeding during the first half year after birth and mixed feeding during the second half year contribute to the growth of infants[1]. The present study intents to investigate whether feeding pattern within 4 months after birth can influence the physical growth of early children in Macao. Results show that the height of boys aged 4.0-4.9 and weight of boys aged 6.0-6.9 at mixed feeding group is greater than those at breastfeeding or artificial feeding group. As for girls, there is no difference in physique indices. Moreover, we observed that feeding pattern has no relationship with the incidence rate of disease for Macao' children. In summary, it appears that feeding pattern during infant's first 4 months has no effect on the physical growth in their early childhood in Macao.

Table 2.3.5 Comparative Results of Physical Growth of Boys in Macao Between Feeding Patterns

Age group	Feeding Patterns	No. of Sample	Height (cm)	Weight (kg)	Quitelet Index
3.0-3.9	Mixed feeding	19	98.5	15.2	153.9
	Breastfeeding	18	98.7	15.1	152.6
	Artificial feeding	68	98.7	14.9	150.3
4.0-4.9	Mixed feeding	21	108.2*	17.5	161.7
	Breastfeeding	22	104.9*	16.5	156.7
	Artificial feeding	67	105.8	17.1	160.6
5.0-5.9	Mixed feeding	21	110.1	18.0	162.7
	Breastfeeding	10	111.5	19.1	171.3
	Artificial feeding	80	111.3	18.7	167.4
6.0-6.9	Mixed feeding	28	119.1	23.4#	196.1#
	Breastfeeding	12	116.5	21.5	183.1
	Artificial feeding	71	117.6	21.3#	180.3#

One-way ANOVA analysis * Mixed feeding VS breastfeeding $P<0.05$

\# Mixed feeding VS artificial feeding $P<0.05$

Table 2.3.6 Comparative Results of Physical Growth of Girls in Macao between Feeding Patterns

Age group	Feeding Patterns	No. of Sample	Height (cm)	Weight (kg)	Quitelet Index
3.0-3.9	Mixed feeding	27	96.4	14.4	149.5
	Breastfeeding	13	100.4	15.2	150.9
	Artificial feeding	60	98.1	14.6	148.2
4.0-4.9	Mixed feeding	33	104.6	16.1	154.1
	Breastfeeding	14	103.1	15.9	153.4
	Artificial feeding	64	104.5	16.4	156.7
5.0-5.9	Mixed feeding	18	112.6	19.4	171.4
	Breastfeeding	15	111.9	18.9	168.7
	Artificial feeding	82	111.1	18.4	164.5
6.0-6.9	Mixed feeding	26	115.6	19.8	170.9
	Breastfeeding	22	117.1	20.7	176.4
	Artificial feeding	67	117.0	20.5	174.4

Table 2.3.7 Comparative Results of Incidence Rate of Diseases between Feeding Patterns

Disease	Breastfeeding	Artificial feeding	Mixed feeding
Yes	17.5%	18.2%	17.0%
No	82.5%	81.8%	83.0%

2.3.5 Analysis of Relationship between Birth Height, Weight and Their Growth

Some research report that women's health and nutrition status during pregnancy will have an effect on their babies' height and weight, which may influence children's physical growth further in their early ages. A research report on physical fitness of Chinese children of 3-6 years old (1998) shows that when a child has a bigger birth height and weight, he will get higher and more weight at 3-6 years old [8]. In the present study, according to 33 and 66 percentile of the subjects' birth height and weight, children of each age group are divided into three sub-groups and the difference in height and weight is compared between sub-groups. This results, consistent with the above-mentioned study of 1998, reveal significant difference in physical growth between the sub-groups of the same gender and age ($P<0.05$).It can be concluded that good health and nutrition condition before and during women's pregnancy period may promote the physical growth of their children in early ages.

Table 2.3.8 Comparative Results of Height Between Birth Height Groups (cm)

	Birth Height Group	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9
Male	(1)31.0-48.9	97.6	104.6* (1..3)	109.2*(1..3)	117.1
	(2)49.0-50.1	97.7	105.7	110.2*(2..3)	116.4*(2..3)
	(3)50.2-60.0	99.7	107.6	113.3	119.6
Female	(1)31.0-48.9	97.7	103.0*(1..3)	109.0*(1..3)	115.3
	(2)49.0-50.1	98.2	104.5	111.2	117.0
	(3)50.2-60.0	98.7	106.3	113.7	117.4

One-way ANOVA Statistics: * $P<0.05$

Table 2.3.9 Comparative Results of Weight Between Birth Weight Groups (kg)

	Birth Weight Group	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9
Male	(1)1.8-3.0	14.5	17.4	17.6*(1.3)	20.8
	(2)3.1-3.5	15.1	17.0	18.6	21.8
	(3)3.6-5.0	15.3	17.3	19.9	22.5
Female	(1)1.8-3.0	14.5	15.6	17.4*(1.2)	19.7
	(2)3.1-3.5	14.6	16.1	19.0	20.2
	(3)3.6-5.0	15.2	17.3	18.9	21.3

One-way ANOVA Statistics: * $P<0.05$

2.3.6 The Effect of Dental Caries on Physical Growth of 3-6 Years Old Children in Macao

Dental caries is the most common disease in children. It may affect children's ingestion and assimilation of nutriment and affect their growth finally. [4]. Few studies examined the relationship between dental caries and physical growth of children and teenagers. Ma You-Sheng et al reported that physical growth of 3 years old children were almost the same no matter whether they suffered dental caries[16]. This study finds that the average level of weight and Quitelet index of Macao boys with decayed teeth is lower than those without decayed teeth, and the difference reaches a remarkable level at 5.0-5.9 age group($p<0.05$). As for Macao girls, the relationship between dental caries and physical growth is not found in the present study.

Table2.3.10 The Effect of Dental Caries on The Physical Growth of Boys in Macao

Age group	Dental Caries	No.of Sample	Height (cm)	Weight (kg)	Quitelet Index
3.0-3.9	No	76	98.7	15.2	153.2
	Yes	30	98.7	14.5	146.9
4.0-4.9	No	78	105.9	17.2	161.8
	Yes	37	106.7	17.1	160.1
5.0-5.9	No	53	111.7	19.4*	173.0*
	Yes	61	110.5	18.0	162.9
6.0-6.9	No	51	118.8	22.6	189.5
	Yes	62	117.0	21.1	179.8

t test * $P<0.05$

Table2.3.11 The Effect of Dental Caries on The Physical Growth of Girls in Macao

Age group	Dental Caries	No. of Sample	Height (cm)	Weight (kg)	Quitelet Index
3.0-3.9	No	85	97.7	14.5	148.0
	Yes	18	100.2	15.7	156.2
4.0-4.9	No	74	104.4	16.4	156.5
	Yes	41	104.3	16.0	153.4
5.0-5.9	No	67	111.3	18.4	165.1
	Yes	49	111.8	18.8	167.6
6.0-6.9	No	58	116.7	20.7	176.5
	Yes	62	116.4	20.0	171.3

2.3.7 The Effect of Physical Activities on the Growth of 3-6 Years Old Children in Macao

Exercises are important for keeping people healthy. But in recent years, people have less and less physical activities, having been accustomed to sedentary living. The rapid decrease of physical activity level for children is linked to the present epidemic of children obesity. Obesity do not only affects body and mind health of children, but also will cause chronic diseases in their adulthood such as heart disease, hypertension, and osteoporosis. In addition, children who do not participate

in adequate physical activities are much likely to be sedentary as adults than children who are active, which may increase the risk of those diseases. Adopting a physically active lifestyle in childhood is good for their health in a long-term. Benefits from regular exercises include physical strengthening, diseases prevention, improvement of mentality and sensibility, and strengthening of confidence.

In recent years, the problem of physical activities decreasing has been highlighted by many researchers. The 1995 Physical Activities Monitor in Canada reveals young children aged 1 to 4 spend 22 hours each week in different kinds of physical activities, while children aged 13 to 17 spend 15 hours[9]. A professor in Germany insists that "children need play, children like play" and encourages children to engage themselves in different kinds of physical activities to promote their movements skills. A survey on obesity rate of 0 to 7 years old children in Nanjing, China (1996) shows that such factors, as lack of exercises, sedentary preferences, watching television and playing computer games, contribute to obesity[10].

1. Physical activities and physical growth of children in Macao

This study shows 33.3% preschool boys and 34.1% preschool girls participate in physical activities after kindergarten at least once a week. The height, weight and Quitelet index of participants of both genders after 5 years old is slightly higher than those of non participants. The finding suggests participating in certain physical activities may promote the physical growth of children in Macao, although the effect is not statistically remarkable. The reason may be that preschoolers are inherently active and do a great lot of movements daily, so the effect of certain physical activity on children's physical growth in this study is not quite informative. Therefore, some investigators of physical activity in children have identified time outdoors a day as a strong determinant for evaluating physical activity level and its relationship to health. NASPE released a guideline of physical activities specifically for preschoolers (2002)—preschoolers should carry out at least 60 minutes of structured physical activities every day and should have at least 60 minutes and up to several hours of unstructured physical activities and should not be sedentary for more than 60 minutes at a time except for sleeping. Moreover, children should be encouraged to practice movement skills in varieties of activities [15].

2. Physical activities and physical fitness of children in Macao

Our results also find participating in certain physical activities regularly may promote the physical fitness of children in Macao. Although there is no statistically significant improvement in physical fitness for boy participants, balance ability of participants is slightly superior to the non participants. Girl participants have higher scores on standing long-jump and throwing distant ball than non participants, despite the difference is not so great. Besides daily play, early adoption to structured physical activity will promote children's motor skills and help them in a wide variety of activities in their adulthood and establishing good exercises habits.

3. Physical activities and incidence of illness of children in Macao

This analysis of the relationship between participating in certain sports and incidence rate of disease shows the incidence rate of disease is 20.7% and 19.3% for boy and girl activity participants respectively, 19.3% and 15.1% for non participants. Chi-square test on the incidence

rate didn't find significant difference between participants and non participants. There is no relationship between participating in certain sports and the incidence rate of disease because first, the physical activities covered by this study can not reflect children's daily physical activities level; second, common illnesses such as chronic bronchitis, pneumonia, asthma and heart disease are related to heredity and physiological features in childhood. Future study is badly needed for examination of the benefits of regular exercise on reducing the risks of illness for children.

In conclusion, our study finds physical activities after kindergartens at least once a week has a slight effect on the growth of Macao children. A few studies also indicate the benefits of regular exercises, for example, physical activities help increase height by stimulating the growth hormone and promote the balance and agility abilities of nerve system[14]. Studies show that many factors can affect children's participation in physical activities. Parents play a significant role in developing children's exercise habits and interests [11]. In the present study, we also observe the significant influence of parents' sport habit on their children's physical activities involvement ($P<0.05$). Typically, children of active parents are more likely to participate in physical activities than those whose parents are not active. So, the best way to promote physical activities level and health of children is to have the families involved. In addition, the relationship between parents' physical activities level and the time their children spend per week on physical activities and their activity patterns is needed to be studied.

Table 2.3.12 The Effect of Physical Activities on Physical Growth of Boys in Macao

Age group	Participating in Physical activities	No. of Sample	Height (cm)	Weight (kg)	Quitelet Index
3.0-3.9	Yes	24	99.7	15.8	157.2
	No	82	98.4	14.8	149.7
4.0-4.9	Yes	37	105.9	17.2	162.0
	No	77	106.3	17.2	161.1
5.0-5.9	Yes	36	111.7	19.0	169.3
	No	79	110.6	18.5	166.6
6.0-6.9	Yes	52	118.0	22.2	187.7
	No	61	117.6	21.4	181.3

Table 2.3.13 The Effect of Physical Activities on Physical Growth of Girls in Macao

Age group	Participating in Physical activities	No. of Sample	Height (cm)	Weight (kg)	Quitelet Index
3.0-3.9	Yes	31	98.1	14.5	147.1
	No	72	98.1	14.8	150.5
4.0-4.9	Yes	33	104.0	16.0	153.5
	No	82	104.5	16.4	156.2
5.0-5.9	Yes	45	112.2	19.2	170.5
	No	71	111.1	18.2	163.4
6.0-6.9	Yes	46	116.9	20.5	174.6
	No	74	116.3	20.2	173.4

Table 2.3.14 The Effect of Physical Activities on Physical Fitness of Boys in Macao

Age group	Participating in Physical activities	Standing Long jump (cm)	Throwing distant tennis ball (m)	Sit and reach (cm)	10m shuttle run (s)	Time of walking on balance beam(s)	Successional jump with both feet (s)
3.0-3.9	Yes	45.3	3.0	8.5	10.5	23.2	12.4
	No	48.3	2.7	8.3	10.4	23.9	11.8
4.0-4.9	Yes	67.4	3.7	6.5	8.5	12.9	9.7
	No	67.9	4.0	7.2	8.6	15.6	10.3
5.0-5.9	Yes	83.4	5.3	7.2	7.6	7.5	8.5
	No	83.8	5.1	7.1	7.8	8.1	7.9
6.0-6.9	Yes	98.2	6.6	5.2	7.2	6.5	6.8
	No	98.1	6.6	5.5	7.1	6.7	6.9

Table 2.3.15 The Effect of Physical Activities on Physical Fitness of Girls in Macao

Age group	Participating in Physical activities	Standing Long jump (cm)	Throwing distant tennis ball (m)	Sit and reach (cm)	10m shuttle run (s)	Time of walking on balance beam(s)	Successional jump with both feet (s)
3.0-3.9	Yes	51.2	2.4	10.4	10.7	15.5	11.2
	No	46.2	2.3	9.5	10.5	15.4	12.4
4.0-4.9	Yes	68.0	3.4	9.7	8.9	12.6	9.4
	No	62.5	3.1	9.2	9.1	12.7	9.7
5.0-5.9	Yes	81.6	4.2	7.9	8.0*	7.5*	7.8
	No	80.3	4.1	8.8	8.3	10.5	7.8
6.0-6.9	Yes	91.0	5.2	8.6	7.4	5.7	6.7
	No	87.7	4.9	8.1	7.4	6.4	7.1

T test * $P<0.05$

Table 2.3.16 Children's Physical Activities Involvement and Incidence of Diseases (Boys)

	Incidence of Disease	No. of Sample	Incidence Rate of Disease
No. of Participants	31	150	20.7%
No. of not-Participants	58	299	19.3%
Total	89	449	19.8%

Table 2.3.17 Children's Physical Activities Involvement and Incidence of Diseases (Girls)

	Incidence of Disease	No. of Sample	Incidence Rate of Disease
No. of Participants	29	155	19.3%
No. of non-participants	45	299	15.1%
Total	74	454	16.3%

Table 2.3.18 The Relationship Between Fathers' and Children' s Physical Activities Involvement

		Fathers' Physical activities Involvement		x^2	P
		Yes	No		
Boys' Physical activities Involvement	Yes	72	78	21.56	P<0.01
	No	78	221		
Girls' Physical activities Involvement	Yes	86	69	51.17	P<0.01
	No	66	233		

Table 2.3.19 The Relationship Between Mothers' and Children's Physical Activities Involvement

		Mothers' Physical activities Involvement		x^2	P
		Yes	No		
Boys' Physical activities Involvement	Yes	55	95	42.62	P<0.01
	No	32	265		
Girls' Physical activities Involvement	Yes	68	86	56.08	P<0.01
	No	38	261		

2.3.8 Conclusion

This study discusses such factors as parents' height, postnatal feeding pattern, babies' birth height and weight, children's sports and dental caries affecting the growth condition of 3-6 years old children in Macao. We observed (a) The correlation of parents' height and children's height is statistically significant. (b) The birth height and weight of children can influence physical growth further during early childhood. (c) Physical activities after kindergartens at least once a week have a slight effect on the promotion of physical fitness of Macao children. (d) The relationship between dental caries and physical growth of boys is found in the present study. Generally, the factors that mentioned above won't have much impact. The reason may be that the period of 3 to 6 years old is the early stage of life, while many factors affecting physical growth is a long-term accumulating process. Thus, it may be difficult to observe the growth changes caused by these factors in early childhood. Of course, many important factors which have not been covered in this study such as eating habits, families' economic condition, and time spent outdoors, should be studied in the future research.

2.4 Comparative Analysis of Physical Fitness of 3-6 Years Old Children between Macao and Mainland China

China is a country with expansive territories and many ethics. Heredity and environmental conditions of different areas may affect people's fitness. As a part of China, Macao has her own

character in social development, politics, economy, culture etc. In order to analyze the features of physical fitness of Macao children, we made a comparative analysis on the indices of physique, function and fitness of the children in Macao, and the indices in the mainland China including Beijing city and Guangdong city (data from 2000 China physical fitness survey.)

2.4.1 Comparative Analysis of Physique Indices of 3-6 Years Old Children between Macao and Mainland China

Height: For boys, Beijing ranks the first in height. Macao shares similar features to the mainland and Guangdong. But boys aged 3.0, 6.0 in Macao are higher than those in Guangdong, and boys aged 4.5, 6.0 in Macao are higher than those in the mainland ($P<0.05$). For girls, Beijing ranks the first in height. The average level of height in Macao is close to the mainland, but higher than its counterparts in Guangdong at 3.5, 4.0, 5.0, and 6.0 age groups($P<0.05$).

Weight: For boys, Beijing ranks the first in weight. Macao shares similar features to the mainland and Guangdong before 6 years old, but tending to exceed the latter afterwards ($P<0.05$). For girls, Beijing ranks the first weight. The average level of weight in Macao is close to the mainland, but at the 6.0 age group ($P<0.05$), the children in Macao are heavier. The average level of weight in Macao is more than Guangdong at most of age groups, and reaches a significant level at 4.0, 5.0, and 6.0 age groups ($P<0.05$).

Quetelet Index (weight/height×1000): It expresses the relative weight. It can better reflect the substantial degree of body by excluding the influence of height and indicate the growth and nutritious status. Children in Beijing have the highest level of Quetelet Index at all age groups. Boys in Macao share similar features to the mainland and Guangdong before 6 years old, but tending to exceed the latter afterwards ($P<0.05$). Quetelet Index of Macao girls is close to that of mainland except for 4.5 years old. Quetelet Index of Macao girls is apparently lower than the mainland and Guangdong at the age of 4.5~($P<0.05$), and higher than Guangdong at the age of 4.0 and 6.0 ($P<0.05$).

Sitting height: For boys, Beijing ranks the first in sitting height. Macao shares similar features to the mainland and Guangdong before 5 years old, but has lower level than mainland and Guangdong at 5.5age group ($P<0.05$). Beginning from 6 years old, sitting height of Macao boys is higher than their counterparts in Guangdong ($P<0.05$).For girls, Beijing ranks the first in sitting height. The average level of sitting height in Macao is close to the mainland and Guangdong, but it is higher than Guangdong at the 4.0 age group ($P<0.05$).

Sitting height/height: From 3 to 6 years old, sitting height/ Height Index of the preschoolers in the four regions decreases along with their growth in age, suggesting the growth of lower limbs exceeds the trunk during this period. Macao children have the lowest level of the index. Significant differences are found in boys of most of age groups and girls of 3.5 and 6.0 age groups

when Macao is compared with Guangdong, and in boys of 4.5, 5.5 and 6.0 age groups and girls of 4.0-4.9 and 5.5-6.9 age groups when compared with the mainland ($P<0.05$). Preschoolers in Beijing have a relatively low level in the sitting height/ Height Index, which indicates the growth of long lower limbs is responsible for their advantage in height.

Chest Circumference: The children in Beijing have the highest level of chest circumference, followed by Macao. The boys of 4.5 and 6.0 ages in Macao have greater chest circumference than those in Guangdong and the mainland ($P<0.05$). Chest circumference of Macao girls is greater than those in Guangdong at the 3.5, 6.0 age groups and the mainland at the 6.0 age group ($P<0.05$).

Chest Circumference/Height: From 3 to 6 years old, chest circumference/height index of the preschoolers in different regions decreases along with their growth in age because height increases faster than chest circumference. The index of Macao boys is similar to Beijing, while higher than Guangdong and the mainland at the most age groups ($P<0.05$). As for girls, Beijing ranks the first. Macao has a similar trend with the mainland and Guangdong after 3.5 years old. There is no significant difference in chest circumference/height index among those regions.

Table 2.4.1 Statistical Results of Height of Boys in Macao, Beijing, Guangdong, and Mainland (cm)

	Macao	Beijing	Guangdong	Mainland
3.0~	97.0±3.8	99.2±4.2*	92.7±6.0**	97.6±5.2
3.5~	100.2±3.7	103.3±4.4*	99.6±4.5	100.4±5.2
4.0~	104.3±4.1	106.6±3.8**	103.7±5.9	103.9±5.2
4.5~	107.9±3.8	109.8±3.9**	107.3±3.6	106.5±5.2*
5.0~	110.2±4.8	114.4±4.2**	110.0±4.4	110.0±5.5
5.5~	111.7±4.4	115.2±4.5**	113.3±5.3	112.3±6.0
6.0~6.9	117.7±4.9	120.1±5.7**	114.2±4.9**	115.6±5.9**

Compared with Macao * $P<0.05$ ** $P<0.01$ (the same for the followed)

Table 2.4.2 Statistical Results of Height of Girls in Macao, Beijing, Guangdong, and Mainland (cm)

	Macao	Beijing	Guangdong	Mainland
3.0~	95.3±6.5	97.7±3.6	94.6±4.9	96.5±5.1
3.5~	100.3±4.5	101.7±3.5	97.2±6.0**	99.3±5.1
4.0~	103.4±4.0	105.9±4.3**	100.9±4.8*	102.7±5.1
4.5~	105.4±4.1	108.6±3.1*	106.7±4.8	105.6±5.4
5.0~	110.5±4.8	112.9±3.5**	107.2±5.3*	108.8±5.6
5.5~	112.6±5.6	115.8±4.7**	111.3±4.5	111.5±5.6
6.0~6.9	116.5±5.2	119.4±5.9**	113.0±6.1**	114.3±5.8**

Compared with Macao * $P<0.05$ ** $P<0.01$

Table 2.4.3 Statistical Results of Weight of Boys in Macao, Beijing, Guangdong, and Mainland（kg）

	Macao	Beijing	Guangdong	Mainland
3.0~	14.4±2.1	15.4±1.4**	13.3±1.8	15.1±1.9*
3.5~	15.4±2.4	17.0±1.9**	15.4±1.7	15.8±2.0
4.0~	16.5±2.3	17.9±2.1**	16.4±2.5	16.7±2.2
4.5~	17.8±2.3	18.6±2.2*	17.3±1.6	17.6±2.4
5.0~	18.3±3.0	21.1±3.1**	18.7±3.2	18.6±2.9
5.5~	18.9±3.1	20.8±2.9**	19.6±3.7	19.4±3.1
6.0~6.9	21.7±3.9	23.3±4.1**	19.9±3.1**	20.5±3.2**

Table 2.4.4 Statistical Results of Weight of Girls in Macao, Beijing, Guangdong, and Mainland（kg）

	Macao	Beijing	Guangdong	Mainland
3.0~	14.1±1.8	15.0±1.5*	13.9±1.7	14.5±1.9
3.5~	15.1±2.3	15.9±1.8	14.8±1.8	15.2±1.9
4.0~	16.2±2.0	17.5±2.2**	14.9±2.0*	16.2±2.2
4.5~	16.3±2.4	18.2±2.0**	16.4±2.3	16.8±2.3
5.0~	18.2±2.8	19.4±2.2**	17.1±2.0*	17.8±2.5
5.5~	19.0±3.3	20.4±2.7*	19.0±2.6	18.6±2.7
6.0~6.9	20.3±3.3	22.2±3.8**	18.5±3.1**	19.6±3.0*

Table 2.4.5 Statistical Results of Quitelet Index of Boys in Macao, Beijing, Guangdong, and Mainland

	Macao	Beijing	Guangdong	Mainland
3.0~	148.7±17.0	155.3±11.0*	143.9±12.9	154.7±15.3*
3.5~	154.0±20.4	164.8±13.6**	154.3±13.2	157.2±15.5
4.0~	157.8±19.2	168.3±15.3**	158.0±16.3	161.0±16.7
4.5~	164.6±18.3	169.6±15.6	161.8±11.9	164.7±17.5
5.0~	166.3±21.6	184.4±23.2**	169.8±24.1	169.4±21.2
5.5~	168.8±23.7	180.5±20.2*	172.8±25.0	172.8±21.4
6.0~6.9	184.2±27.8	193.6±28.6*	174.3±21.2*	177.3±21.8*

Table 2.4.6 Statistical Results of Quitelet Index of Girls in Macao, Beijing, Guangdong, and Mainland

	Macao	Beijing	Guangdong	Mainland
3.0~	148.0±16.6	153.1±12.1	147.3±13.5	150.6±15.8
3.5~	150.5±17.9	156.6±14.4	152.6±16.0	152.8±15.0
4.0~	156.4±15.6	165.0±16.7*	147.8±14.8*	157.2±16.8
4.5~	154.2±18.4	167.7±16.9**	163.2±17.1**	159.3±17.1*
5.0~	164.4±19.6	171.8±15.9*	159.2±13.7	163.9±17.6
5.5~	168.0±22.4	176.0±19.0	170.9±19.2	167.1±19.0
6.0~6.9	173.8±23.4	185.7±25.2**	163.0±20.0**	171.0±21.5

Table 2.4.7 Statistical Results of Sitting Height of Boys in Macao, Beijing, Guangdong, and Mainland （cm）

	Macao	Beijing	Guangdong	Mainland
3.0~	56.3±2.4	57.5±2.2*	54.6±3.3	56.3±3.2
3.5~	57.6±2.1	59.6±2.3**	57.7±2.4	57.5±3.2
4.0~	59.2±2.6	60.6±2.6**	59.5±3.1	59.3±3.0
4.5~	60.6±2.2	61.6±2.4*	60.9±2.1	60.5±3.1
5.0~	62.1±4.7	64.4±2.2**	61.8±2.7	62.1±3.2
5.5~	61.9±2.5	64.5±2.1**	63.4±3.1**	63.2±3.3**
6.0~6.9	64.9±2.6	66.6±2.7**	63.7±2.9**	64.5±3.3

Table 2.4.8 Statistical Results of Sitting Height of Girls in Macao, Beijing, Guangdong, and Mainland （cm）

	Macao	Beijing	Guangdong	Mainland
3.0~	55.5±2.3	56.8±2.0*	55.0±3.0	55.6±3.2
3.5~	57.4±2.8	58.2±1.9	56.4±2.5	56.9±3.1
4.0~	58.6±2.3	59.9±2.4**	57.0±2.6**	58.5±3.1
4.5~	59.3±2.3	61.6±2.3**	60.4±2.7	59.8±3.1
5.0~	61.8±4.3	63.2±2.1*	60.5±2.7	61.3±3.1
5.5~	62.3±2.7	64.5±2.5**	62.0±2.6	62.6±3.1
6.0~6.9	64.1±2.5	66.1±2.8**	63.0±3.1*	63.8±3.2

Table 2.4.9 Statistical Results of Sitting Height/Height of Boys in Macao, Beijing, Guangdong, and Mainland

	Macao	Beijing	Guangdong	Mainland
3.0~	58.0±1.1	57.9±1.2	58.9±1.3**	57.7±2.4
3.5~	57.5±0.9	57.7±0.8	57.9±1.1*	57.3±2.1
4.0~	56.7±1.3	56.8±2.0	57.4±0.9*	57.0±2.1
4.5~	56.2±1.1	56.1±1.3	56.8±1.0*	56.8±1.8**
5.0~	56.4±3.7	56.3±0.9	56.2±0.8	56.4±1.8
5.5~	55.3±1.5	56.0±1.1*	56.0±1.0*	56.3±1.8**
6.0~6.9	55.1±1.1	55.5±1.2	55.7±1.3**	55.8±1.8**

Table 2.4.10 Statistical Results of Sitting Height/Height of Girls in Macao, Beijing, Guangdong, and Mainland

	Macao	Beijing	Guangdong	Mainland
3.0~	57.2±8.7	58.1±0.8	58.2±2.2	57.6±2.4
3.5~	57.2±1.7	57.3±1.0	58.1±1.9*	57.3±2.1
4.0~	56.6±0.9	56.6±1.6	56.5±1.5	56.9±2.1*
4.5~	56.3±1.1	56.7±1.4	56.6±1.2	56.6±1.9*
5.0~	56.0±3.4	56.0±1.0	56.4±1.1	56.4±1.7
5.5~	55.3±1.0	55.7±1.2	55.7±1.3	56.2±1.6**

Table 2.4.11 Statistical Results of Chest Circumference of Boys in Macao, Beijing, Guangdong, and Mainland（cm）

	Macao	Beijing	Guangdong	Mainland
3.0~	51.3±2.6	52.6±2.2*	51.2±1.7	51.4±2.9
3.5~	52.8±3.3	54.3±2.6*	51.6±2.1	52.0±2.8
4.0~	53.2±3.1	54.7±2.8*	52.6±2.5	52.9±3.0
4.5~	54.5±2.5	55.1±2.6	53.0±1.6*	53.5±2.9*
5.0~	55.1±3.3	57.6±3.9**	54.7±3.2	54.5±3.2
5.5~	55.5±3.6	57.1±2.9*	55.4±4.0	55.2±3.6
6.0~6.9	57.8±4.4	59.3±3.9*	55.7±3.1**	56.0±3.6**

Table 2.4.12 Statistical Results of Chest Circumference of Girls in Macao, Beijing, Guangdong, and Mainland（cm）

	Macao	Beijing	Guangdong	Mainland
3.0~	50.6±2.5	51.7±2.3	49.2±2.5	50.2±3.0
3.5~	51.1±3.1	52.4±2.6	49.8±2.6*	50.7±30
4.0~	52.0±2.3	53.6±2.8**	50.8±2.9	51.5±3.0
4.5~	52.0±2.7	54.4±3.0**	52.6±2.5	52.1±3.1
5.0~	53.8±3.1	55.4±2.5**	52.6±2.4	52.9±3.1
5.5~	54.5±3.4	56.0±3.2*	53.7±2.8	53.5±3.3
6.0~6.9	55.7±3.8	57.6±4.2**	53.7±2.8**	54.3±3.5**

Table 2.4.13 Statistical Results of Chest Circumference/Height of Boys in Macao, Beijing, Guangdong, and Mainland

	Macao	Beijing	Guangdong	Mainland
3.0~	52.9±2.1	53.0±2.0	55.4±3.1**	52.7±3.2
3.5~	52.7±2.9	52.6±2.4	51.9±2.8	51.8±2.9*
4.0~	51.0±2.7	51.3±2.0	50.8±2.5	50.9±2.9
4.5~	50.5±2.1	50.2±1.8	49.4±2.0*	50.2±2.7
5.0~	50.1±2.1	50.3±2.8	49.7±2.3	49.6±2.7
5.5~	49.7±2.7	49.6±2.3	48.9±2.9	49.2±2.8
6.0~6.9	49.0±3.1	49.3±2.8	48.7±2.3	48.4±2.8*

Table 2.4.14 Statistical Results of Chest Circumference/Height of Girls in Macao, Beijing, Guangdong, and Mainland

	Macao	Beijing	Guangdong	Mainland
3.0~	53.3±4.6	52.9±1.8	52.1±2.8	52.1±3.2
3.5~	51.0±2.5	51.6±2.0	51.3±3.0	51.1±3.0
4.0~	50.3±2.2	50.6±2.6	50.3±2.6	50.2±2.8
4.5~	49.4±1.9	50.1±3.0	49.3±2.1	49.3±2.8
5.0~	48.6±2.1	49.0±2.0	49.1±2.5	48.7±2.7
5.5~	48.4±2.3	48.4±2.5	48.3±2.0	48.1±2.8
6.0~	47.8±2.7	48.2±3.0	47.5±2.2	47.5±2.8

2.4.2 Comparative Analysis of Physiological Function of 3-6 Years Old Children between Macao and Mainland China

The survey shows that the resting heart rate of children in four regions decreases along with their growth in age. Beijing children have the lowest level in heart rate. The heart rate of Macao children, similar to Guangdong, is slightly faster than their counterparts in the mainland. Statistics results of the four regions are shown in table 2.4.15, 2.4.16.

Table 2.4.15 Statistical Results of Heart Rate of Boys in Macao, Beijing, Guangdong, and Mainland (bpm)

	Macao	Beijing	Guangdong	Mainland
3.0~	103.8±8.1	96.1±10.8**	105.2±9.7	98.8±12.4**
3.5~	101.8±8.7	93.9±9.2**	101.4±8.6	98.1±12.0**
4.0~	97.5±9.1	91.2±7.4**	100±12.5	97.6±12.2
4.5~	96.8±9.8	92.1±9.1*	100.5±9.6	96.5±11.9
5.0~	99.8±10.3	87.5±9.9**	97.8±11.0	96.4±12.2
5.5~	95.9±8.5	90.5±9.7**	96.8±11.5	94.6±11.7
6.0~6.9	96.2±9.4	87.5±9.2**	95.9±10.7	94.5±11.6

Table 2.4.16 Statistical Results of Heart Rate of Girls in Macao, Beijing, Guangdong, and Mainland (bpm)

	Macao	Beijing	Guangdong	Mainland
3.0~	103.0±9.8	99.0±10.7	100.8±12.5	100.3±12.8
3.5~	100.7±10.1	96.3±9.0*	98.9±9.1	99.3±12.4
4.0~	100.1±9.6	93.5±7.7**	102.1±10.6	98.1±12.7*
4.5~	99.0±11.5	93.9±10.1*	100.0±11.5	97.6±12.2
5.0~	98.1±9.5	91.4±9.5**	97.0±12.5	96.4±11.9
5.5~	96.1±9.3	89.6±10.2**	97.6±11.7	95.6±11.9
6.0~6.9	95.8±10.0	89.4±8.6**	97.4±10.3	95.3±11.5

2.4.3 Comparative Analysis of Physical Fitness of 3-6 Years Old Children between Macao and Mainland China

The research shows that the preschoolers in Macao are weak in standing long jump, throwing distant ball, sit and reach, shuttle run, and successional jump with both feet than those in other regions and the difference is found to be a significant level at most of age groups($P<0.05$). Although the time needed in walking on balance beam by Macao girls is shorter than the other regions before 4.0 years old, girls in Macao tend to fall behind the girls of the other regions gradually due to their slow development in balance ability afterwards. Macao boys are inferior in balance ability to those of the other regions at all age groups, even though difference tends to diminish after 4.5years old.

Physical fitness refers to such capabilities as strength, speed, endurance, and flexibility to participate in a variety of physical activities. Although physical fitness is not the meaning of entire health, it is an embodiment of well-being. In the present study, the main cause of weakness of Macao' children in physical fitness may be the heredity, but it is also subject to the influence of acquired factors such as social and economic condition, the awareness of children's parents on physical activities, the plan of physical activities at kindergartens, the setting and quality of physical courses by schools[14]. There was a study reporting that some kindergartens promote motor skills of children through game teaching. According to the study[12], after half a year of training in running, jumping, throwing etc, children significantly enhanced their interests in sports, abilities of exercise, and willpower. In summary, it is badly necessary for the society, families and schools in Macao to work out on intensive program plans to promote the physical activities level of theirs preschoolers.

Table 2.4.17 Statistical Results of Standing Long Jump of Boys in Macao, Beijing, Guangdong, and Mainland（cm）

	Macao	Beijing	Guangdong	Mainland
3.0~	45.3±17.7	60.3±16.5**	40.6±23.1	51.8±18.3*
3.5~	49.8±18.1	77.0±17.5**	68.4±22.8**	61.0±18.7**
4.0~	60.7±17.9	86.4±16.2**	77.5±24.0**	71.5±18.8**
4.5~	74.8±18.2	97.1±11.9**	91.1±18.5**	80.0±19.1*
5.0~	81.2±18.6	107.0±17.6**	94.4±18.5**	88.4±18.6**
5.5~	85.8±15.9	113.3±13.7**	102.5±15.2**	95.2±19.7**
6.0~6.9	98.1±16.8	122.2±18.6**	108.3±18.6**	101.9±20.1*

Table 2.4.18 Statistical Results of Standing Long Jump of Girls in Macao, Beijing, Guangdong, and Mainland（cm）

	Macao	Beijing	Guangdong	Mainland
3.0~	41.6±13.7	59.4±14.3**	45.2±17.4	49.3±17.3*
3.5~	52.1±18.9	72.7±13.4**	61.9±19.6**	58.4±18.2**
4.0~	63.0±16.8	83.6±13.8**	63.4±20.4	66.9±17.5
4.5~	65.3±14.5	94.7±13.3**	79.4±17.9**	74.2±17.7**
5.0~	78.4±16.8	99.8±13.3**	84.3±19.2	81.6±17.1
5.5~	83.5±15.1	105.3±15.2**	92.5±16.2**	88.6±17.6*
6.0~6.9	88.9±14.4	110.1±18.7**	97.3±20.9**	93.5±18.2**

Table 2.4.19 Statistical Results of Throwing Distant Tennis Ball of Boys in Macao, Beijing, Guangdong, and Mainland（m）

	Macao	Beijing	Guangdong	Mainland
3.0~	2.4±1.0	3.0±0.9**	2.7±1.2	3.4±1.4**
3.5~	3.0±1.1	3.7±1.2**	3.6±1.4**	3.9±1.5**
4.0~	3.5±0.9	4.2±1.3**	4.8±2.1**	4.8±1.9**
4.5~	4.2±1.2	5.7±1.7**	5.5±1.5**	5.5±2.0**
5.0~	4.8±1.2	6.5±1.9**	6.2±2.3**	6.4±2.3**
5.5~	5.4±1.9	7.1±2.1**	6.9±2.2**	7.1±2.5**
6.0~6.9	6.6±2.0	8.2±2.2**	7.6±2.2**	8.4±3.0**

Table 2.4.20 Statistical Results of Throwing Distant Tennis Ball of Girls in Macao, Beijing, Guangdong, and Mainland（m）

	Macao	Beijing	Guangdong	Mainland
3.0~	2.1±0.7	2.4±0.7	2.9±1.4*	2.9±1.2**
3.5~	2.5±0.8	3.1±0.8**	3.3±1.2**	3.2±1.2**
4.0~	3.0±1.0	3.4±0.8*	3.5±1.3	3.8±1.3**
4.5~	3.3±0.9	4.3±1.1**	4.4±1.3**	4.2±1.4**
5.0~	3.8±1.1	4.9±1.4**	4.3±1.2	4.9±1.6**
5.5~	4.5±1.0	5.7±1.3**	5.1±1.1*	5.2±1.6**
6.0~6.9	5.0±1.3	5.9±1.7**	5.5±1.8*	5.9±2.0**

Table 2.4.21 Statistical Results of Sit and Reach of Boys in Macao, Beijing, Guangdong, and Mainland（cm）

	Macao	Beijing	Guangdong	Mainland
3.0~	9.3±3.3	11.0±3.4*	10.5±4.4	10.0±3.9
3.5~	7.3±3.6	10.8±4.5**	10.5±3.8**	10.0±3.9**
4.0~	7.4±3.7	10.4±3.7**	10.9±3.6**	9.8±3.9**
4.5~	6.4±4.0	9.4±4.1**	10.0±3.8**	9.4±4.0**
5.0~	7.7±4.1	8.5±3.3	10.0±3.3*	9.1±4.2*
5.5~	6.5±3.8	10.4±4.3**	9.7±3.3**	9.1±4.2**
6.0~6.9	5.3±5.0	9.1±4.5**	8.2±3.8**	8.8±4.3**

Table 2.4.22 Statistical Results of Sit and Reach of Girls in Macao, Beijing, Guangdong, and Mainland（cm）

	Macao	Beijing	Guangdong	Mainland
3.0~	9.6±3.4	12.7±4.4**	11.6±3.2	11.1±3.9*
3.5~	9.9±4.6	12.9±3.5**	11.7±3.1**	11.3±3.8**
4.0~	9.1±3.3	12.4±3.4**	11.3±3.2**	11.2±3.9**
4.5~	9.5±3.3	12.7±3.8**	11.8±3.8**	11.2±3.9**
5.0~	8.3±3.9	12.8±4.3**	12.0±2.9**	11.2±4.2**
5.5~	8.5±5.2	12.7±4.8**	11.5±3.9**	11.3±4.3**
6.0~6.9	8.3±4.2	13.1±4.9**	12.0±3.8**	11.1±4.3**

Table 2.4.23 Statistical Results of 10m Shuttle Run of Boys in Macao, Beijing, Guangdong, and Mainland（s）

	Macao	Beijing	Guangdong	Mainland
3.0~	10.9±1.5	9.1±1.4**	9.3±1.1**	10.0±2.3**
3.5~	9.9±1.5	8.0±0.8**	8.1±1.1**	9.1±1.9**
4.0~	8.7±1.3	7.3±0.7**	7.9±1.3**	8.3±1.6
4.5~	8.3±1.3	6.8±0.5**	7.1±0.9**	7.9±1.4*
5.0~	7.9±0.9	6.7±0.5**	6.8±0.7**	7.4±1.2**
5.5~	7.5±0.9	6.4±0.6**	6.8±1.2**	7.2±1.2*
6.0~6.9	7.1±0.7	6.2±0.6**	6.6±0.7**	6.8±1.0**

Table 2.4.24 Statistical Results of 10m Shuttle Run of Girls in Macao, Beijing, Guangdong, and Mainland（s）

	Macao	Beijing	Guangdong	Mainland
3.0~	11.0±1.4	9.5±1.4**	10.2±1.6	10.4±2.4*
3.5~	10.1±2.1	8.3±0.8**	8.8±1.4**	9.5±2.0*
4.0~	9.0±1.5	7.7±0.7**	8.8±1.9	8.8±1.8
4.5~	9.0±1.1	7.1±0.7**	7.7±1.2**	8.3±1.6**
5.0~	8.3±0.9	6.7±0.4**	7.6±1.5**	7.8±1.3**
5.5~	7.9±0.9	6.5±0.5**	6.6±0.6**	7.5±1.2**
6.0~6.9	7.4±0.8	6.4±1.1**	7.1±1.4	7.2±1.1

Table 2.4.25 Statistical Results of Time to Accomplish Walking on Balance beam of Boys in Macao, Beijing, Guangdong, and Mainland（s）

	Macao	Beijing	Guangdong	Mainland
3.0~	26.4±13.7	25.2±25.9	15.1±11.9*	21.1±14.9*
3.5~	21.5±12.6	15.5±12.8*	14.7±11.1**	17.7±12.5*
4.0~	17.4±12.3	11.2±8.4**	9.2±6.9**	13.6±10.7*
4.5~	12.0±7.1	8.1±9.9*	9.8±8.2	10.8±8.9
5.0~	7.8±3.7	6.4±7.5	5.9±3.5	8.5±7.0
5.5~	7.9±5.8	4.5±3.0**	7.1±6.7	7.4±7.3
6.0~6.9	6.5±4.0	4.9±4.8**	5.6±2.7	5.8±4.7

Table 2.4.26 Statistical Results of Time to Accomplish Walking on Balance beam of Girls in Macao, Beijing, Guangdong, and Mainland（s）

	Macao	Beijing	Guangdong	Mainland
3.0~	21.8±15.1	26.1±25.5	13.7±7.3	22.1±16.5
3.5~	15.1±8.5	19.1±18.6	14.5±9.6	18.0±14.1*
4.0~	12.4±7.9	9.4±7.0*	10.3±6.4	14.1±11.1
4.5~	12.9±9.4	10.2±14.3	11.5±8.7	11.5±9.5
5.0~	9.2±6.6	4.7±2.7**	5.9±2.5**	8.7±6.6
5.5~	9.4±5.2	6.7±11.4	6.4±3.0	7.7±6.7
6.0~6.9	6.1±3.8	4.4±2.6**	6.0±3.1	6.6±5.5

Table 2.4.27 Statistical Results of Successional Jump with Both Feet of Boys in Macao, Beijing, Guangdong, and Mainland（s）

	Macao	Beijing	Guangdong	Mainland
3.0~	13.5±4.0	13.1±6.0	9.2±3.1**	12.1±5.4
3.5~	11.1±4.3	9.4±3.9	9.4±4.7	10.6±4.5
4.0~	10.6±3.6	7.0±2.0**	7.9±2.9**	8.7±3.2**
4.5~	9.6±3.4	6.4±2.0**	6.7±1.5**	7.8±2.7**
5.0~	8.3±2.2	5.4±1.0**	6.5±2.2**	7.0±2.2**
5.5~	7.7±2.4	5.3±1.0**	6.5±1.6*	6.6±2.1**
6.0~6.9	6.8±1.9	5.1±1.2**	5.4±1.1**	6.2±1.7**

Table 2.4.28 Statistical Results of Successional Jump with Both Feet of Girls in Macao, Beijing, Guangdong, and Mainland（s）

	Macao	Beijing	Guangdong	Mainland
3.0~	12.0±3.5	12.0±5.1	10.8±4.7	12.6±5.4
3.5~	12.0±4.3	8.8±3.2**	9.7±4.5**	10.7±4.5
4.0~	9.4±3.0	7.1±2.1**	9.6±3.6	9.0±3.3
4.5~	9.8±2.9	6.0±1.2**	7.2±2.1**	8.1±2.7**
5.0~	8.2±1.8	5.4±1.0**	6.8±2.3**	7.2±2.3**
5.5~	7.2±1.8	5.2±0.9**	6.1±1.7**	6.7±2.1*
6.0~6.9	6.9±2.0	5.1±1.5**	6.2±1.5**	6.3±1.8**

2.4.4 Comparative Analysis of Nutrition Status of 3-6 Years Old Children between Macao and Mainland China

Weight for height can be used to compare with the weight level for the same height. It is universally recognized as an ideal index to evaluate weight level and nutritious status since it excludes the influence of height[2]. According to weight for height standard for 3-6 Years Old children based on 2000 National Physical Fitness Surveillance data, the weight of children in each region are categorized into 5 levels(Median-Z Method) as malnutrition（≤-2Z）,low-weight（-2Z~-Z）, normal-weight（-Z~+Z）, overweight（+Z~+2Z）, and obesity（≥+2Z）.

For boys, Beijing has the similar percentage of normal-weight with Guangdong and the mainland, which is about 76%. The percentage of normal-weight in Macao is comparatively low(71.3%). Correspondingly, the percentages of malnutrition (3.3%) and obesity (9.8%) in Macao rank first respectively, and the percentage of low-weight 10.2% is only lower than Guangdong.

As for the percentage of normal-weight of girls, the order of the four regions is Beijing > mainland >Macao> Guangdong, while in the aspect of malnutrition, it is Guangdong>Macao >mainland > Beijing. Macao has the highest rate of low-weight (16.1%), and the lowest rate of obesity (2.9%). There are more overweight children in Beijing than other regions.

The above finding shows that there is a problem in the nutrition condition of Macao preschoolers. For example, the percentage of normal-weight among boys in Macao is lower and they have problems of malnutrition and obesity. The percentage of low-weight among girls in Macao is higher among the four regions. Moreover, the percentage of malnutrition among girls in Macao is also higher than those at the average level of mainland.

Table 2.4.29 Comparative Results of Nutrition Status of Boys in Macao, Beijing, Guangdong, and Mainland（%）

Category	Beijing	Guangdong	Mainland	Macao
Malnutrition	1.6	1.5	2.4	3.3
Low-weight	3.9	11.9	7.6	10.2
Normal-weight	76.3	75.8	75.6	71.3
Overweight	9.1	3.5	6.7	5.3
Obesity	9.1	7.3	7.8	9.8
Total	100.0	100.0	100.0	100.0

Table 2.4.30 Comparative Results of Nutrition Status of Girls in Macao, Beijing, Guangdong, and Mainland（%）

Category	Beijing	Guangdong	Mainland	Macao
Malnutrition	3.8	18.3	9.3	9.9
Low-weight	9.6	11.4	11.2	16.1
Normal-weight	75.6	56.7	70.9	65.4
Overweight	6.4	4.9	5.5	5.7
Obesity	4.5	8.7	3.1	2.9
Total	100.0	100.0	100.0	100.0

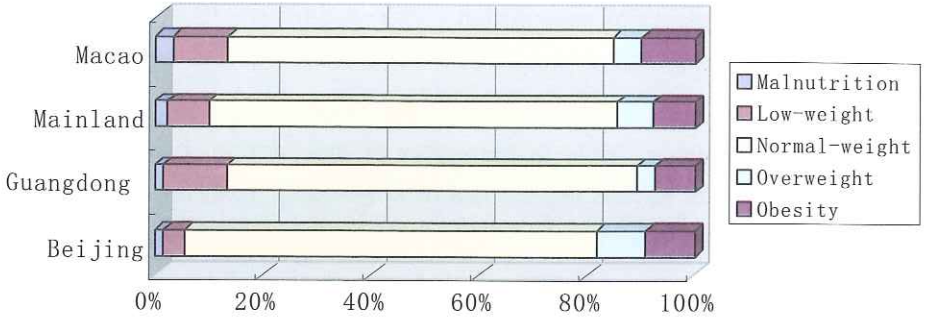

Figure 2.4.1 Nutrition Status of Boys in Four Regions

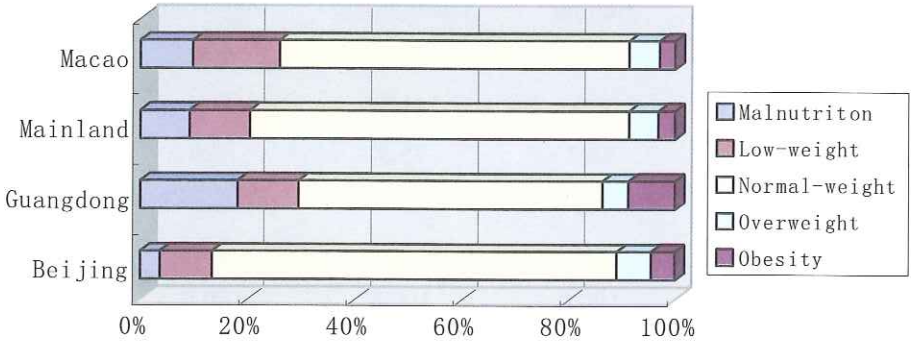

Figure 2.4.2 Nutrition Status of Girls in Four Regions

2.4.5 Comparative Analysis of General Fitness Level of 3-6 Years Old Children between Macao and Mainland China

The total scores of all the testing items for 3-6 years old children are categorized into 'excellent' (28~35 points), 'good' (25~27 points), 'average' (18~24 points), and 'poor' (below 17 points) [13]. We may have a comprehensive understanding of physical fitness condition by assessing general fitness and comparing the percentage of each fitness category among different regions. Results show the children in Beijing have the highest level of general fitness. General fitness level of the children in Guangdong is better than those of the mainland. The percentage of 'poor' category in Macao is the highest (18.7%) in comparison with the other regions. Among Macao children whose total score is above 18, the percentage of 'excellent' and 'good' categories is respectively lower than Beijing, Guangdong and Mainland, while the percentage of 'average' category 55.2% is the highest.

Table 2.4.31 Comparative Analysis of General Fitness Level in Macao, Beijing, Guangdong, and Mainland (%)

Category	Beijing	Guangdong	Mainland	Macao
Excellent	66.8	29.4	40.2	9.1
Good	15.7	23.6	22.2	17.0
Average	16.7	39.6	32.1	55.2
Poor	0.8	7.4	5.5	18.7
Total	100.0	100.0	100.0	100.0

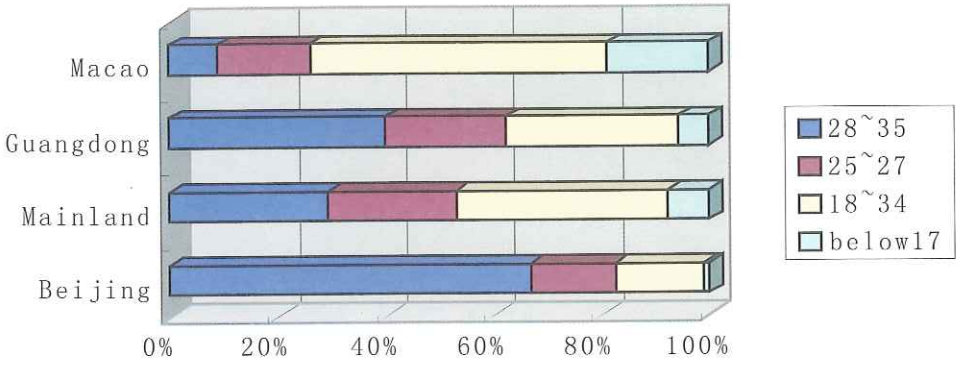

Figure 2.4.3 General Fitness Level in Four Regions

2.4.6 Conclusion

Among four regions, the children in Beijing have the highest level of physical development from 3 to 6 years old. Physical development of Macao boys is close to their counterparts in Guangdong and mainland. As for girls, the physical development in Macao, is similar to the average level of the mainland, and is a little higher than Guangdong at most of age groups. In term of nutrition status measured by weight for height, the problems of boys in Macao are caused by malnutrition and obesity, while girls' malnutrition is of concern. Compared with their counterparts in Beijing and mainland, the heart rate of children in Macao is faster. Compared with their counterparts in Beijing, Guangdong, and mainland, the general physical fitness level of preschoolers in Macao is apparently lower.

PartIII
Statistic Data

PartIII Statistic Data on Research in Physical Fitness of 3 to 6 Years Old Children in Macao

3.1 Statistic Data on Inquire Items for 3 to 6 Years Old Children in Macao

Table 3.1.1 Sample Distribution in Each Age Group

Age	3.0-3.4	3.5-3.9	4.0-4.4	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.9	Total
Male	53	53	57	58	55	59	113	448
Female	45	58	61	54	62	54	120	454
Total	98	111	118	112	117	113	233	902

Table3.1.2 Birth Place of the Subjects

Gender	Age group	Mainland China		Macao		Hong Kong		Portugal		Other		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Male	3.0~	2	3.8	50	94.3					1	1.9	53	100.0
	3.5~	5	9.8	43	84.3	2	3.9			1	2.0	51	100.0
	4.0~	2	3.6	53	94.6	1	1.8					56	100.0
	4.5~	1	1.8	54	96.4					1	1.8	56	100.0
	5.0~	2	3.7	52	96.3							54	100.0
	5.5~	1	1.7	55	93.2	1	1.7			2	3.4	59	100.0
	6.0-6.9	7	6.3	102	91.1	1	0.9			2	1.8	112	100.0
Female	3.0~	1	2.2	42	93.3	1	2.2	1	2.2			45	100.0
	3.5~	4	7.0	51	89.5					2	3.5	57	100.0
	4.0~	1	1.6	57	93.4	1	1.6			2	3.3	61	100.0
	4.5~			50	96.2	1	1.9			1	1.9	52	100.0
	5.0~	2	3.3	57	93.4	1	1.6			1	1.6	61	100.0
	5.5~	1	1.9	49	90.7	2	3.7			2	3.7	54	100.0
	6.0-6.9	9	7.7	107	91.5	1	0.9					117	100.0
Total		38	4.3	822	92.6	12	1.3	1	0.1	15	1.7	888	100.0

Table 3.1.3 The Number of Siblings in the Subjects' Family and the Subjects' Rank in Siblings

The number of Siblings	% (n)	Rank first	Rank second	Rank third	Rank fourth	Rank fifth	Rank sixth
1	34.3% (310)	34.3% (310)					
2	46% (415)	11.0% (99)	35.0% (316)				
3	15.3% (138)	0.4% (4)	3.7% (33)	11.2% (101)			
4	3.4% (31)		0.3% (3)	1.0% (9)	2.1% (19)		
5	0.7% (7)			0.1% (1)	0.2% (2)	0.4% (4)	
6	0.2% (2)						0.2% (2)

Table 3. 1.4 The Feeding Patterns within Four months after Birth of the Subjects

Gender	Age group	Breastfeeding		Artificial Feeding		Mixed feeding		Total	
		N	%	N	%	N	%	N	%
Male	3.0~	8	15.4	36	69.2	8	15.4	52	100.0
	3.5~	10	18.9	32	60.4	11	20.8	53	100.0
	4.0~	14	25.5	36	65.5	5	9.1	55	100.0
	4.5~	8	14.5	31	56.4	16	29.1	55	100.0
	5.0~	6	11.3	36	67.9	11	20.8	53	100.0
	5.5~	4	6.9	44	75.9	10	17.2	58	100.0
	6.0~6.9	12	10.8	71	64.0	28	25.2	111	100.0
	Total	62	14.2	286	65.2	89	20.4	437	100.0
Female	3.0~	3	6.7	29	64.4	13	28.9	45	100.0
	3.5~	10	18.2	31	56.4	14	25.5	55	100.0
	4.0~	6	10.2	37	62.7	16	27.1	59	100.0
	4.5~	8	15.4	27	51.9	17	32.7	52	100.0
	5.0~	6	9.7	44	71.0	12	19.4	62	100.0
	5.5~	9	17.0	38	71.7	6	11.3	53	100.0
	6.0~6.9	22	19.1	67	58.3	26	22.6	115	100.0
	Total	64	14.5	273	61.9	104	23.6	441	100.0

Table 3.1.5 Birth height and weight of 3 to 6 Years Old Children in Macao

			Age group						
			3.0-3.4	3.5-3.9	4.0-4.4	4.5-4.9	5.0-5.4	5.5-5.9	6.0-6.9
Birth weight (kg)	Male	N	49	50	53	57	55	57	103
		Means	3.3	3.3	3.3	3.4	3.3	3.3	3.3
		SD	0.3	0.5	0.4	0.5	0.4	0.5	0.5
	Female	N	43	52	60	50	59	52	111
		Means	3.4	3.2	3.3	3.2	3.4	3.3	3.2
		SD	0.5	0.4	0.5	0.5	0.5	0.5	0.5
Birth height (cm)	Male	N	48	48	52	57	53	56	98
		Means	49.9	49.7	48.6	48.9	49.3	49.5	48.9
		SD	2.8	2.7	4.6	4.6	3.7	2.8	5.1
	Female	N	44	54	59	49	59	51	107
		Means	48.7	49.2	48.8	47.0	49.3	48.7	48.3
		SD	3.8	3.0	3.2	5.5	4.4	5.2	4.9

Table 3.1.6 Incidences of Diseases Responded by 3 to 6 Years Old Children in Macao

Gender	Age group	No. of Samples	Incidences of Diseases	Incidence Rate
Male	3.0~	53	10	18.9
	3.5~	53	6	11.3
	4.0~	57	12	21.1
	4.5~	58	11	19.0
	5.0~	55	16	29.1
	5.5~	59	12	20.3
	6.0~6.9	113	21	18.6
	Total	448	88	19.6
Female	3.0~	45	5	11.1
	3.5~	58	11	19.0
	4.0~	61	5	8.2
	4.5~	54	12	22.2
	5.0~	62	14	22.6
	5.5~	54	12	22.2
	6.0-6.9	120	15	12.5
	Total	454	74	16.3

Table 3.1.7 Frequencies and Percentage of the Diseases Experienced by 3 to 6 Years Old Children in Macao

		Chronic Bronchit	Pneum onia	Asthma	Accidental injury	Heart disease	Anemia	Hypothyr oidism	Hematic Disease	Tubercul osis	Hyperth yroidism	Falling sickness	Other	Total
Male	n	40	22	13	13	2	2	2	—	—	—	1	17	112
	%	35.7	19.6	11.6	11.6	1.8	1.8	1.8	—	—	—	0.9	15.2	100
Female	n	27	18	7	7	6	1	1	2	1	—	—	14	84
	%	32.1	21.4	8.3	8.3	7.1	1.2	1.2	2.4	1.2	—	—	16.7	100
Total	n	67	40	20	20	8	3	3	2	1	1	1	31	197
	%	34	20.3	10.2	10.2	4.1	1.5	1.5	1	0.5	0.5	0.5	15.7	100

Table 3.1.8 Physical Activity Participation Rate of 3 to 6 Years Old Children in Macao

Gender	Age group	No. of Samples	No. of Participants	Participation Rate
Male	3.0~	53	12	22.6
	3.5~	53	12	22.6
	4.0~	57	17	29.8
	4.5~	58	20	34.5
	5.0~	55	16	29.1
	5.5~	59	20	33.9
	6.0~6.9	113	52	46.0
	Total	448	149	33.3
Female	3.0~	45	14	31.1
	3.5~	58	17	29.3
	4.0~	61	18	29.5
	4.5~	54	15	27.8
	5.0~	62	26	41.9
	5.5~	54	19	35.2
	6.0~6.9	120	46	38.3
	Total	454	155	34.1

Table 3.1.9 Entertainment Activity Participation Rate of 3 to 6 Years Old Children in Macao

Gender	Age group	No. of Samples	No. of Participants	Participation Rate
Male	3.0~	53	8	15.1
	3.5~	53	10	18.9
	4.0~	57	15	26.3
	4.5~	58	21	36.2
	5.0~	55	14	25.5
	5.5~	59	20	33.9
	6.0~6.9	113	47	41.6
	Total	448	135	30.1
Female	3.0~	45	9	20.0
	3.5~	58	11	19.0
	4.0~	61	15	24.6
	4.5~	54	15	27.8
	5.0~	62	24	38.7
	5.5~	54	22	40.7
	6.0~6.9	120	55	45.8
	Total	454	151	33.7

Table 3.1.10 Sleeping Time of Macao Children in Average per Day

Gender	Age group	Less than 8 Hours	8 Hours	9 Hours	10 Hours	Over 10 Hours	Total
Male %	3.0~	1.9	9.4	37.7	32.1	15.1	100.0
	3.5~	0	15.1	37.7	34.0	13.2	100.0
	4.0~	1.8	10.5	35.1	40.4	10.5	100.0
	4.5~	1.7	10.3	43.1	39.7	5.2	100.0
	5.0~	3.6	16.4	45.5	25.5	7.3	100.0
	5.5~	1.7	15.3	49.2	27.1	5.1	100.0
	6.0~6.9	2.7	18.6	47.8	24.8	4.4	100.0
	Total	2.0	14.3	43.0	31.2	8.0	100.0
Female %	3.0~	2.2	11.1	31.1	26.7	28.9	100.0
	3.5~	1.7	3.4	37.9	37.9	17.2	100.0
	4.0~	0	16.4	29.5	37.7	13.1	100.0
	4.5~	0	9.3	50.0	27.8	11.1	100.0
	5.0~	1.6	19.4	38.7	29.0	11.3	100.0
	5.5~	0	13.0	57.4	29.6	0	100.0
	6.0~6.9	5.0	21.7	53.3	15.0	4.2	100.0
	Total	2.0	14.8	44.1	27.3	10.8	100.0

Table3.1.11 Educational level of the Subjects' Parents

		Below elementary school	Elementary school	High school	Technological academy and College	Master	Doctor	Total
Father	N	38	193	538	87	19	1	876
	%	4.3	22.0	61.4	9.9	2.2	0.1	100
Mother	N	37	177	557	94	7	1	873
	%	4.2	20.3	63.8	10.8	0.8	0.1	100

Table3.1.12 Occupation of the Subjects' Parents

		Fishing, Agriculture	Manufacture, Architecture	Machine operation ,Motor man and Assembly man	Civil servant	Special technican	Service and Sales	Official	Employer	Manager, Administrative office	Unemployment	Other	House work	Total
Father	n	5	130	78	40	84	161	121	97	51	73	35	5	880
	%	0.6	14.8	8.9	4.5	9.5	18.3	13.8	11.0	5.8	8.1	4.0	0.6	100
Mother	n	2	37	3	96	27	164	70	30	17	48	16	370	880
	%	0.2	4.2	0.3	10.9	3.1	18.6	8.0	3.4	1.9	5.5	1.8	42.0	100

Table 3.1.13 Physical Activity Participation Rate of the Subjects' Parents

		Participating	Not Participating	Total
Father	N	302	601	903
	%	33.5	66.5	100.0
Mother	N	193	707	900
	%	21.4	78.6	100.0

Table 3.1.14 Physical Activity Events for the Subjects' Parents

Father	N	%	Mother	N	%
Basketball	50	10.5	Basketball	13	4.4
Volleyball	12	2.5	Volleyball	12	4.1
Football	48	10.1	Table Tennis	13	4.4
Table Tennis	22	4.6	Badminton	54	18.3
Badminton	39	8.2	Swimming	38	12.9
Tennis	8	1.7	Track and Field	42	14.2
Swimming	87	18.2	Gymnastics	32	10.8
Track and Field	74	15.5	Martial Art	2	0.7
Gymnastics	27	5.7	Instrument fitting	14	4.7
Martial Art	7	1.5	Fence-play	1	0.3
Taiji boxing or sword	9	1.9	Kickboxing	5	1.7
Instrument fitting	29	6.1	QiGong	3	1.0
Boxing	5	1.0	Yoga	5	1.7
Judo	4	0.8	Dancing	20	6.8
QiGong	5	1.0	Others	33	11.2
Yoga	2	0.4	Football	4	1.4
Dancing	8	1.7	Tennis	2	0.7
Others	36	7.5	Karate	1	0.3
Karate	3	0.6	Taiji boxing or sword	1	0.3
Kickboxing	2	0.4			
Total	477	100		295	100

3.2 Means, SD and Percentile of Testing Items for 3 to 6 Years Old Children in Macao

Table 3.2.1 Mean, SD and Percentile of Heart Rate of 3 to 6 Years Old Children in Macao(bpm)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	103.8	8.1	86.2	90.8	100.0	100.0	104.0	108.0	110.0	115.2	118.0
	3.5~	53	101.8	8.7	78.0	90.8	96.0	98.0	102.0	104.4	108.0	112.0	116.8
	4.0~	57	97.5	9.1	81.5	84.0	90.0	96.0	98.0	102.0	102.0	110.4	118.0
	4.5~	58	96.8	9.8	75.5	84.0	90.0	94.0	96.0	100.7	102.0	110.2	114.9
	5.0~	55	99.8	10.3	80.2	85.2	92.0	96.0	100.0	106.8	108.0	112.8	116.6
	5.5~	59	95.9	8.5	76.8	84.0	90.0	94.0	96.0	101.0	102.0	108.0	110.0
	6.0~6.9	113	96.2	9.4	77.3	84.0	90.0	92.9	96.0	100.0	102.0	110.0	114.0
Female	3.0~	45	103.0	9.8	84.8	88.0	98.0	98.2	102.0	108.0	110.0	115.6	123.2
	3.5~	58	100.7	10.1	84.0	89.8	92.0	96.0	98.0	104.7	110.0	114.0	124.0
	4.0~	61	100.1	9.6	79.7	88.0	93.0	96.0	100.0	108.0	108.0	110.0	120.0
	4.5~	54	99.0	11.5	72.0	84.0	90.0	94.5	98.0	104.0	108.0	113.0	120.0
	5.0~	62	98.1	9.5	77.3	85.2	90.0	96.0	99.0	102.0	106.0	110.0	112.7
	5.5~	54	96.1	9.3	80.0	82.0	90.0	90.0	96.0	100.0	102.0	110.0	112.7
	6.0~6.9	120	95.8	10.0	79.3	84.0	90.0	92.0	94.0	98.0	102.0	110.0	114.7

Table 3.2.2 Mean, SD and Percentile of Height of 3 to 6 Years Old Children in Macao (cm)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	97.0	3.8	88.7	91.5	94.7	96.1	97.1	98.2	99.1	102.8	105.2
	3.5~	53	100.2	3.7	93.0	95.3	97.2	98.4	100.6	101.8	102.7	105.7	107.7
	4.0~	57	104.3	4.0	95.9	99.4	101.6	102.8	103.7	105.5	107.4	110.9	112.4
	4.5~	58	107.9	3.8	100.0	104.1	105.4	106.5	107.5	108.5	110.7	113.5	115.8
	5.0~	55	110.2	4.8	102.8	104.2	106.5	107.5	109.8	112.0	114.0	115.9	122.3
	5.5~	59	111.7	4.4	103.5	105.1	109.1	110.2	111.5	113.6	114.6	116.8	123.0
	6.0~6.9	113	117.7	4.9	108.9	111.0	114.2	115.3	117.9	119.9	121.2	124.6	128.0
Female	3.0~	45	95.3	6.5	69.7	91.4	93.1	94.6	96.1	97.2	98.7	101.6	102.7
	3.5~	58	100.3	4.5	91.5	94.9	97.0	98.2	100.2	101.6	103.2	106.3	111.3
	4.0~	61	103.4	4.0	96.0	98.0	100.9	102.2	103.6	104.7	106.3	108.6	111.1
	4.5~	54	105.4	4.1	97.6	100.4	102.7	103.8	105.0	106.4	108.1	111.6	113.8
	5.0~	62	110.5	4.8	101.2	105.4	107.1	108.7	110.8	112.5	113.8	116.3	120.9
	5.5~	54	112.6	5.6	100.5	105.3	109.0	111.0	112.0	114.7	116.6	119.4	126.1
	6.0~6.9	120	116.5	5.2	106.0	110.5	113.1	114.7	117.0	118.9	119.8	122.2	126.5

Table 3.2.3 Mean, SD and Percentile of Weight of 3 to 6 Years Old Children in Macao (kg)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	14.4	2.1	11.7	12.5	12.9	13.4	14.2	15.0	15.4	16.6	21.5
	3.5~	53	15.4	2.4	12.3	12.8	14.1	14.7	15.2	15.7	16.4	17.8	23.3
	4.0~	57	16.5	2.3	13.2	14.2	15.0	15.3	15.9	16.5	17.2	20.5	23.2
	4.5~	58	17.8	2.3	13.3	15.0	16.5	16.9	17.6	18.5	19.5	20.7	23.7
	5.0~	55	18.3	3.0	14.1	14.7	16.4	17.1	17.5	19.1	20.0	22.9	25.6
	5.5~	59	18.9	3.1	14.9	15.7	16.6	17.5	18.1	19.6	20.6	23.4	25.8
	6.0~6.9	113	21.7	3.9	16.8	17.8	19.4	20.2	20.8	22.0	22.8	26.5	31.5
Female	3.0~	45	14.1	1.8	10.5	11.9	12.9	13.3	13.9	14.5	15.2	16.8	18.1
	3.5~	58	15.1	2.3	12.0	12.6	13.3	14.2	14.9	15.3	16.1	19.0	20.9
	4.0~	61	16.2	2.0	13.1	13.9	14.7	15.3	16.0	16.9	17.3	18.3	22.0
	4.5~	54	16.3	2.4	12.1	13.7	14.7	15.2	15.9	17.0	17.5	20.1	21.9
	5.0~	62	18.2	2.8	13.4	14.8	16.1	17.1	18.3	18.9	19.5	21.4	25.9
	5.5~	54	19	3.3	14.4	15.5	16.6	17.4	18.7	19.3	20.1	24.1	29.3
	6.0~6.9	120	20.3	3.3	15.2	16.8	18.0	18.8	20.1	21.0	21.7	24.6	28.3

Table 3.2.4 Mean, SD and Percentile of Sitting Height of 3 to 6 Years Old Children in Macao (cm)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	56.3	2.4	50.0	53.5	55.1	55.7	56.4	57.0	57.5	59.9	61.3
	3.5~	53	57.6	2.1	53.3	54.6	56.1	57.0	57.7	58.6	59.1	60.7	62.2
	4.0~	57	59.2	2.5	54.7	55.8	57.1	58.2	59.4	60.4	61.0	62.9	64.6
	4.5~	58	60.6	2.2	56.7	58.2	59.1	59.8	60.4	60.8	61.3	64.3	65.4
	5.0~	55	62.1	4.7	56.7	58.2	59.6	60.1	61.8	62.9	63.8	65.8	75.9
	5.5~	59	61.9	2.5	58.3	58.7	60.0	60.7	61.9	62.7	63.3	65.5	68.7
	6.0~6.9	113	64.9	2.6	60.3	61.3	63.2	63.9	64.7	66.1	66.6	68.5	70.6
Female	3.0~	45	55.5	2.3	49.6	53.0	54.0	54.5	55.5	56.2	57.2	58.9	60.2
	3.5~	58	57.4	2.8	52.3	54.0	55.3	56.3	57.4	58.0	59.2	61.4	63.3
	4.0~	61	58.6	2.3	54.8	55.7	56.7	57.7	58.4	59.4	60.4	61.6	63.5
	4.5~	54	59.3	2.3	54.7	55.9	58.0	58.4	59.4	60.2	61.2	62.7	63.7
	5.0~	62	61.8	4.3	56.0	58.0	60.2	60.9	61.6	62.2	62.9	64.7	69.6
	5.5~	54	62.3	2.7	56.4	59.1	60.6	61.2	62.3	63.5	64.0	65.8	68.7
	6.0~6.9	120	64.1	2.5	58.9	61.1	62.4	63.0	64.0	65.2	66.1	67.6	69.5

Table 3.2.5 Mean, SD and Percentile of Chest Circumference of 3 to 6 Years Old Children in Macao (cm)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	51.3	2.6	47.5	48.5	49.5	50.5	51.0	52.0	52.8	54.3	60.3
	3.5~	53	52.8	3.3	48.1	50.0	51.0	51.6	52.5	53.5	54.0	55.3	63.8
	4.0~	57	53.2	3.1	48.9	50.0	51.0	51.5	52.0	53.9	55.0	56.6	62.1
	4.5~	58	54.5	2.5	50.2	51.0	52.9	53.5	54.5	55.2	56.3	58.1	59.6
	5.0~	55	55.1	3.3	49.7	51.0	53.0	53.5	54.5	56.0	57.0	60.2	63.0
	5.5~	59	55.5	3.6	49.5	51.5	53.5	54.0	55.5	56.5	57.5	59.0	64.9
	6.0~6.9	113	57.8	4.4	52.2	53.5	55.0	56.0	57.0	58.0	59.0	64.4	70.9
Female	3.0~	45	50.6	2.5	46.0	47.0	48.8	49.5	50.5	52.0	52.3	54.9	56.0
	3.5~	58	51.1	3.1	47.5	48.0	49.0	49.5	51.0	51.5	52.5	55.1	59.8
	4.0~	61	52.0	2.3	47.9	49.0	50.5	51.0	52.0	53.0	53.5	55.3	57.7
	4.5~	54	52.0	2.7	48.3	49.0	50.0	51.0	51.3	53.0	53.6	56.5	58.7
	5.0~	62	53.8	3.1	48.9	50.0	51.5	52.5	53.5	54.5	55.0	57.7	61.2
	5.5~	54	54.5	3.4	49.0	51.0	52.4	53.0	54.0	55.0	56.0	60.3	63.2
	6.0~6.9	120	55.7	3.8	50.4	52.0	53.5	54.0	55.0	56.3	57.0	60.9	65.7

Table 3.2.6 Mean, SD and Percentile of Upper Arm Skinfold Thickness of 3 to 6 Years Old Children in Macao (mm)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	9.1	2.7	6.0	6.0	8.0	8.0	8.5	9.6	10.0	12.3	17.2
	3.5~	53	9.1	2.3	6.5	6.7	7.5	8.0	9.0	9.5	10.0	12.0	15.9
	4.0~	57	9.4	3.1	5.5	6.4	7.0	8.0	9.0	10.0	10.5	15.1	18.0
	4.5~	58	9.7	2.7	6.4	7.0	7.9	8.5	9.3	10.0	10.6	13.5	17.3
	5.0~	55	9.2	3.7	4.8	5.5	6.5	7.8	9.0	9.5	10.5	13.8	20.6
	5.5~	59	9.7	2.8	6.0	6.5	7.5	8.5	9.5	10.0	11.5	14.0	16.8
	6.0~6.9	113	9.8	4.1	5.0	6.0	7.0	7.5	8.5	10.0	11.0	16.3	21.2
Female	3.0~	45	9.5	2.1	5.9	7.0	8.0	8.5	9.5	10.0	11.0	12.0	15.9
	3.5~	58	9.6	2.9	6.0	7.0	8.0	8.5	9.0	10.0	11.0	13.1	18.5
	4.0~	61	10.4	2.6	6.4	7.6	9.0	9.0	10.5	11.5	11.8	13.3	17.4
	4.5~	53	10.3	2.4	6.4	7.7	9.0	9.0	10.0	11.0	12.0	14.0	16.3
	5.0~	62	10.1	3.1	5.5	6.5	8.0	8.5	9.8	11.0	12.0	14.0	19.6
	5.5~	54	11.1	4.0	5.7	7.0	8.0	9.1	10.5	12.0	13.0	15.5	23.7
	6.0~6.9	120	10.6	3.4	6.0	7.0	8.5	9.0	10.0	11.0	12.0	15.5	18.9

Table 3.2.7 Mean, SD and Percentile of Subscapular Skinfold Thickness of 3 to 6 Years Old Children in Macao (mm)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	6.4	2.5	4.0	4.5	5.0	5.5	5.5	6.0	6.8	9.8	14.9
	3.5~	53	6.5	2.8	4.0	4.5	5.0	5.0	5.5	6.1	7.0	10.3	17.5
	4.0~	57	6.3	3.1	3.9	4.5	5.0	5.0	5.5	6.0	6.8	9.0	20.6
	4.5~	58	6.3	2.4	3.9	4.5	5.0	5.0	5.5	6.0	7.0	9.1	14.7
	5.0~	55	6.0	2.2	3.5	4.0	4.5	5.0	5.5	6.2	7.0	9.4	13.0
	5.5~	59	6.2	3.1	3.3	4.0	5.0	5.0	5.5	6.5	7.0	8.0	16.4
	6.0~6.9	112	7.2	4.1	4.0	4.0	5.0	5.5	6.0	7.0	7.5	13.1	20.2
Female	3.0~	45	6.5	1.7	3.7	5.0	5.0	5.5	6.0	7.0	7.8	9.5	10.9
	3.5~	58	6.3	2.2	4.0	4.5	5.0	5.0	6.0	7.0	7.0	8.5	12.8
	4.0~	61	6.5	2.1	4.4	5.0	5.0	5.5	6.0	7.0	7.0	8.5	14.3
	4.5~	53	6.4	1.7	4.0	4.5	5.0	5.5	6.0	6.6	7.0	9.3	11.2
	5.0~	62	6.9	2.8	4.0	4.7	5.0	5.5	6.0	7.0	7.5	10.0	17.1
	5.5~	54	7.6	2.9	4.3	5.0	5.5	6.0	7.0	8.0	8.5	12.5	16.0
	6.0~6.9	120	7.2	3.4	4.0	5.0	5.0	5.5	6.3	7.0	8.0	11.0	14.7

Table 3.2.8 Mean, SD and Percentile of Abdomen Skinfold Thickness of 3 to 6 Years Old Children in Macao (mm)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	6.3	3.0	2.6	4.0	4.5	5.0	5.5	6.1	7.3	9.9	17.5
	3.5~	53	6.8	3.0	3.5	4.2	5.0	5.0	6.0	7.0	7.8	10.9	16.9
	4.0~	57	6.4	3.1	3.5	4.0	4.5	5.0	5.5	6.0	7.0	10.1	17.9
	4.5~	58	7.0	3.0	3.4	4.0	5.0	5.5	6.0	7.4	9.0	10.1	16.1
	5.0~	55	6.4	3.6	2.8	3.5	4.5	4.8	5.0	6.0	7.0	11.6	18.7
	5.5~	59	7.1	4.4	2.8	4.0	5.0	5.5	6.0	6.5	7.5	12.0	18.4
	6.0~6.9	113	8.4	5.3	3.5	4.5	5.0	5.5	6.5	8.0	9.0	19.5	22.8
Female	3.0~	45	7.1	2.2	3.7	4.0	5.5	6.0	7.0	8.0	8.8	10.0	12.9
	3.5~	58	7.2	2.7	4.0	4.5	5.4	6.0	6.5	7.0	7.6	11.5	14.9
	4.0~	61	7.6	3.3	4.4	5.0	5.5	6.0	7.0	7.5	8.5	11.0	19.7
	4.5~	53	7.4	2.9	3.8	4.7	5.3	6.0	6.0	7.6	9.0	12.0	14.7
	5.0~	62	7.8	3.1	4.0	5.0	5.5	6.0	7.0	8.5	9.0	11.7	17.1
	5.5~	54	8.7	4.0	4.3	4.8	5.5	6.5	8.0	9.5	11.0	14.0	20.0
	6.0~6.9	120	8.6	4.2	4.0	4.5	5.6	6.5	7.8	9.0	10.0	13.0	21.2

Table 3.2.9 Mean, SD and Percentile of Standing Long Jump of 3 to 6 Years Old Children in Macao (cm)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	50	45.3	17.7	20.5	23.0	31.0	37.7	43.0	50.0	55.5	64.9	99.0
	3.5~	53	49.8	18.1	24.6	27.0	37.5	40.0	48.0	55.0	61.5	77.2	92.7
	4.0~	57	60.7	17.7	30.7	34.4	49.0	54.3	62.0	67.0	72.0	82.0	100.3
	4.5~	57	74.8	18.2	35.5	52.4	61.0	65.0	74.0	83.4	88.5	97.2	111.1
	5.0~	54	81.2	18.6	39.2	57.5	67.8	74.3	81.0	89.5	96.3	107.0	118.0
	5.5~	59	85.8	15.9	48.2	67.0	75.0	80.0	88.0	92.0	95.0	106.0	122.2
	6.0~6.9	113	98.1	16.8	64.0	74.4	88.5	92.0	99.0	104.0	109.5	121.0	129.2
Female	3.0~	43	41.6	13.7	22.0	26.2	32.0	33.4	40.0	45.6	50.0	57.6	82.6
	3.5~	58	52.1	18.9	25.5	34.7	37.0	40.0	47.0	55.0	62.3	82.3	99.0
	4.0~	61	63.0	16.8	29.3	39.2	53.0	59.7	66.0	69.0	70.5	81.8	101.3
	4.5~	54	65.3	14.5	37.5	46.5	54.0	60.3	64.0	70.0	76.0	88.5	91.1
	5.0~	62	78.4	16.8	41.2	54.3	68.8	72.0	78.0	82.0	92.3	101.0	108.2
	5.5~	54	83.5	15.1	59.3	64.0	72.5	76.0	80.5	88.0	96.5	105.5	113.5
	6.0~6.9	120	88.9	14.4	61.6	72.0	80.0	83.4	90.0	94.0	97.0	106.0	119.1

Table 3.2.10 Mean, SD and Percentile of Throwing Distant Tennis Ball of 3 to 6 Years Old Children in Macao (m)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	2.4	1.0	0.5	1.5	1.5	2.0	2.0	2.6	3.5	4.0	5.0
	3.5~	53	3.0	1.1	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
	4.0~	57	3.5	0.9	1.9	2.0	2.8	3.0	3.5	3.9	4.5	5.0	5.6
	4.5~	58	4.2	1.2	2.4	2.5	3.5	3.5	4.0	4.5	5.0	6.1	7.1
	5.0~	54	4.8	1.2	2.8	3.3	4.0	4.0	5.0	5.5	6.0	6.5	8.0
	5.5~	59	5.4	1.9	2.4	3.0	4.0	4.5	5.0	5.5	6.5	8.5	10.2
	6.0~6.9	112	6.6	2.0	3.2	4.2	5.0	5.5	6.5	7.0	7.5	10.0	11.0
Female	3.0~	44	2.1	0.7	1.0	1.5	1.5	2.0	2.0	2.5	2.5	3.3	4.3
	3.5~	56	2.5	0.8	1.0	1.5	2.0	2.0	2.5	2.5	3.0	3.7	5.0
	4.0~	61	3.0	1.0	1.5	2.0	2.5	2.5	3.0	3.0	3.8	4.5	5.7
	4.5~	54	3.3	0.9	1.3	2.0	2.5	3.0	3.5	3.5	3.6	5.0	5.2
	5.0~	62	3.8	1.1	2.0	2.5	3.0	3.5	4.0	4.0	4.5	5.4	7.1
	5.5~	54	4.5	1.0	2.3	3.0	3.9	4.0	4.5	5.0	5.5	5.5	6.7
	6.0~6.9	120	5.0	1.3	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.7

Table 3.2.11 Mean, SD and Percentile of Sit and Reach of 3 to 6 Years Old Children in Macao (cm)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	9.3	3.3	1.7	4.9	7.0	8.6	9.8	11.2	12.0	12.9	15.9
	3.5~	53	7.3	3.6	-0.6	3.2	4.9	5.9	7.3	8.0	9.7	12.0	16.1
	4.0~	57	7.4	3.6	-0.2	3.1	4.4	6.4	7.5	8.6	9.7	13.5	15.2
	4.5~	58	6.4	4.0	-0.4	1.0	3.2	4.7	6.2	7.7	9.6	12.2	13.5
	5.0~	55	7.7	4.1	-1.3	1.9	4.5	6.1	8.2	9.6	10.4	12.7	16.5
	5.5~	59	6.5	3.8	-0.4	2.1	3.8	4.7	6.3	8.5	9.5	12.0	13.6
	6.0~6.9	113	5.3	5.0	-4.8	-1.1	1.9	3.2	5.6	7.9	9.0	11.9	14.7
Female	3.0~	45	9.6	3.4	3.0	4.4	7.5	8.2	10.2	11.1	11.9	14.2	17.0
	3.5~	58	9.9	4.6	-3.6	4.4	7.9	9.4	10.5	12.0	12.5	15.0	17.9
	4.0~	61	9.1	3.3	2.7	5.3	6.8	7.5	8.7	10.4	11.2	14.2	16.4
	4.5~	54	9.5	3.3	2.3	4.6	8.0	8.8	10.2	10.6	11.4	13.8	17.3
	5.0~	62	8.3	3.9	0.4	3.8	5.1	6.2	8.9	10.2	11.1	12.6	16.6
	5.5~	54	8.5	5.2	-5.2	1.7	5.2	7.3	9.9	11.2	12.1	14.8	15.6
	6.0~6.9	120	8.3	4.2	-0.9	2.0	5.2	6.7	8.8	10.2	11.6	13.1	15.9

Table 3.2.12 Mean, SD and Percentile of 10m Shuttle Run of 3 to 6 Years Old Children in Macao (s)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	10.9	1.5	8.4	9.1	9.6	10.3	10.6	11.3	11.6	13.7	15.0
	3.5~	53	9.9	1.5	7.4	8.0	8.8	9.5	10.0	10.5	10.9	11.8	14.3
	4.0~	56	8.7	1.3	6.7	7.4	8.0	8.3	8.6	9.0	9.2	10.3	13.6
	4.5~	58	8.3	1.3	6.6	7.0	7.4	7.7	8.0	8.3	8.9	10.3	12.2
	5.0~	55	7.9	0.9	6.6	7.0	7.2	7.4	7.8	7.9	8.3	9.2	10.7
	5.5~	59	7.5	0.9	6.5	6.6	6.9	7.1	7.3	7.6	8.0	8.8	10.1
	6.0~6.9	113	7.1	0.7	6.1	6.3	6.6	6.7	7.0	7.3	7.5	8.3	9.2
Female	3.0~	44	11	1.4	8.7	9.4	10.0	10.6	10.9	11.5	12.0	13.3	14.7
	3.5~	57	10.1	2.1	5.7	8.2	9.1	9.5	9.9	10.6	11.1	12.9	15.0
	4.0~	61	9.0	1.5	6.4	7.2	8.1	8.5	8.7	9.5	10.3	11.0	13.5
	4.5~	53	9.0	1.1	7.1	7.6	8.2	8.4	9.0	9.4	9.7	10.7	12.1
	5.0~	62	8.3	0.9	7.1	7.4	7.7	7.8	8.2	8.6	8.9	9.5	11.1
	5.5~	54	7.9	0.9	6.5	7.0	7.3	7.4	7.9	8.3	8.6	9.4	10.3
	6.0~6.9	120	7.4	0.8	6.0	6.6	6.9	7.0	7.3	7.6	8.0	8.4	9.5

Table 3.2.13 Mean, SD and Percentile of Walking Time on Balance Beam of 3 to 6 Years Old Children in Macao (s)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	42	26.4	13.7	7.2	9.8	14.8	17.6	24.3	33.2	38.1	43.9	59.7
	3.5~	50	21.5	12.6	6.2	7.6	10.7	14.5	17.7	23.3	30.7	38.8	52.7
	4.0~	55	17.4	12.3	4.2	6.2	8.3	9.6	12.4	19.6	25.4	36.3	49.0
	4.5~	58	12.0	7.1	3.9	5.0	6.6	7.6	10.8	13.8	15.6	22.0	31.8
	5.0~	53	7.8	3.7	3.2	4.3	5.1	5.7	6.7	8.3	9.5	13.6	18.8
	5.5~	59	7.9	5.8	3.0	3.6	4.2	5.0	6.3	7.7	8.9	14.8	26.3
	6.0~6.9	112	6.5	4.0	2.7	3.1	3.8	4.5	5.5	6.6	7.5	12.3	17.6
Female	3.0~	32	21.8	15.1	6.5	7.4	10.4	12.3	17.4	21.2	30.3	50.1	63.2
	3.5~	54	15.1	8.5	5.6	6.1	8.3	10.4	13.2	17.1	19.7	29.4	37.5
	4.0~	59	12.4	7.9	4.5	5.5	7.6	8.8	10.5	11.9	14.7	21.8	38.4
	4.5~	53	12.9	9.4	4.1	5.1	6.7	7.6	9.3	12.8	14.4	28.6	44.0
	5.0~	62	9.2	6.6	4.0	4.8	5.6	6.0	7.6	8.4	10.0	14.8	33.7
	5.5~	54	9.4	5.2	3.1	3.7	5.0	6.2	8.2	10.8	12.7	18.1	21.2
	6.0~6.9	120	6.1	3.8	2.9	3.6	4.1	4.5	5.1	6.0	7.2	9.7	14.8

Table 3.2.14 Mean, SD and Percentile of Successional Jump with Both Feet of 3 to 6 Years Old Children in Macao (s)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	18	13.5	4.0	8.3	8.8	9.9	11.3	13.7	14.5	15.5	20.3	24.3
	3.5~	35	11.1	4.3	5.7	6.8	8.3	8.4	10.2	12.0	13.8	15.7	27.4
	4.0~	44	10.6	3.6	5.8	6.5	8.1	9.1	10.3	11.1	12.1	15.9	22.0
	4.5~	53	9.6	3.4	5.4	6.1	6.8	7.1	8.4	11.3	12.2	14.0	18.3
	5.0~	52	8.3	2.2	4.9	5.8	6.2	6.8	8.1	9.6	10.2	12.2	13.1
	5.5~	56	7.7	2.4	5.3	5.6	6.0	6.1	6.9	8.1	8.9	11.6	14.5
	6.0~6.9	111	6.8	1.9	4.6	4.9	5.5	5.8	6.3	7.1	7.8	9.5	12.5
Female	3.0~	26	12.0	3.5	6.6	7.2	9.1	10.2	11.9	12.8	14.3	17.9	18.2
	3.5~	46	12.0	4.3	5.2	6.6	8.3	9.5	11.7	14.0	16.0	18.4	21.0
	4.0~	57	9.4	3.0	5.5	6.0	7.2	7.7	9.4	10.2	11.4	14.1	17.0
	4.5~	53	9.8	2.9	5.5	6.3	7.3	7.8	9.8	11.1	12.3	13.7	16.0
	5.0~	60	8.2	1.8	5.3	5.9	6.8	7.6	8.3	8.7	9.2	11.0	13.0
	5.5~	54	7.2	1.8	5.1	5.5	5.9	6.2	6.6	7.6	8.1	10.2	12.2
	6.0~6.9	120	6.9	2.0	4.9	5.2	5.7	6.0	6.3	6.8	7.6	9.6	13.2

Table 3.2.15 Mean, SD and Percentile of Quitelet Index of 3 to 6 Years Old Children in Macao

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	148.7	17.0	126.5	133.0	136.7	141.0	148.0	151.5	155.5	166.3	204.6
	3.5~	53	154.0	20.4	127.8	133.1	144.5	146.8	151.1	156.4	158.9	174.0	216.9
	4.0~	57	157.8	19.1	131.8	139.9	148.2	150.1	153.2	157.3	161.4	187.0	212.9
	4.5~	58	164.6	18.3	129.2	140.9	153.3	156.4	162.0	172.0	178.2	184.1	205.6
	5.0~	55	166.3	21.6	131.4	140.0	152.2	156.3	162.9	169.0	178.0	198.5	216.3
	5.5~	59	168.8	23.7	137.8	147.1	152.5	155.3	161.5	173.8	179.4	196.8	224.1
	6.0~6.9	113	184.2	27.8	148.9	157.7	168.3	171.6	178.1	184.6	190.1	224.6	258.6
Female	3.0~	45	148.0	16.6	118.8	125.9	138.8	142.6	146.2	149.9	158.7	169.9	193.4
	3.5~	58	150.5	17.9	128.1	131.9	137.1	141.8	147.6	152.9	157.2	173.2	195.3
	4.0~	61	156.4	15.6	133.6	137.5	146.3	150.0	154.3	160.9	162.3	177.0	202.9
	4.5~	54	154.2	18.4	120.6	132.5	142.2	145.5	151.5	160.7	164.6	183.3	197.7
	5.0~	62	164.4	19.6	133.2	142.7	149.9	157.9	163.5	168.0	176.0	186.4	215.1
	5.5~	54	168.0	22.4	138.5	144.0	152.8	156.9	164.1	169.7	173.5	203.4	230.6
	6.0~6.9	120	173.8	23.4	138.0	150.9	159.9	162.7	172.2	178.1	181.8	200.0	231.9

Table 3.2.16 Mean, SD and Percentile of BMI of 3 to 6 Years Old Children in Macao

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	15.3	1.3	13.1	14.0	14.3	14.8	15.2	15.4	15.7	17.0	19.5
	3.5~	53	15.3	1.7	13.0	13.6	14.3	14.7	15.2	15.5	15.7	17.2	21.3
	4.0~	57	15.1	1.6	12.8	13.4	14.3	14.5	14.9	15.1	15.3	17.1	20.1
	4.5~	58	15.2	1.4	11.9	13.5	14.4	14.5	15.0	15.9	16.1	17.2	18.1
	5.0~	55	15.0	1.6	11.8	13.2	13.9	14.3	14.9	15.5	16.0	17.8	18.4
	5.5~	59	15.0	1.8	12.5	13.3	14.0	14.4	14.7	15.3	15.7	17.6	19.8
	6.0~6.9	113	15.6	2.0	13.3	13.7	14.3	14.7	15.1	15.6	16.0	19.0	21.3
Female	3.0~	45	15.6	2.9	12.9	13.6	14.5	14.9	15.4	15.7	15.9	17.1	27.7
	3.5~	58	14.9	1.4	13.1	13.6	14.0	14.3	14.7	15.1	15.7	16.7	18.8
	4.0~	61	15.1	1.3	12.8	13.7	14.4	14.6	15.1	15.4	15.6	16.8	18.6
	4.5~	54	14.6	1.4	11.8	12.7	13.7	13.9	14.4	15.0	15.5	16.8	17.9
	5.0~	62	14.8	1.4	12.4	13.0	13.9	14.2	14.7	15.2	15.7	16.8	17.9
	5.5~	54	14.8	1.5	12.4	13.1	13.9	14.2	14.5	15.1	15.8	17.2	19.1
	6.0~6.9	120	14.9	1.7	12.5	13.4	13.9	14.2	14.6	15.2	15.6	16.8	18.8

Table 3.2.17 Mean, SD and Percentile of Verwaeck Index of 3 to 6 Years Old Children in Macao

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	67.8	3.3	61.5	64.3	65.7	66.1	67.5	68.3	69.7	71.3	77.8
	3.5~	53	68.1	4.6	62.5	63.4	66.0	66.7	67.6	68.0	69.2	72.2	84.2
	4.0~	57	66.8	4.2	60.9	62.4	64.5	65.0	65.8	67.1	68.3	71.3	80.1
	4.5~	58	67.0	3.3	60.6	62.5	64.7	65.5	67.0	68.3	69.4	72.0	73.9
	5.0~	55	66.7	3.8	59.4	62.7	63.7	65.2	65.7	67.5	69.5	73.5	75.1
	5.5~	59	66.5	4.7	60.3	61.9	63.4	64.8	66.2	67.0	68.1	71.5	79.9
	6.0~6.9	113	67.5	5.5	61.4	62.1	63.8	64.9	66.4	67.2	68.4	77.3	83.5
Female	3.0~	45	68.1	5.7	61.4	62.8	65.6	66.3	67.4	69.1	69.8	71.6	90.3
	3.5~	58	66.1	3.8	61.5	62.7	63.9	64.6	65.5	66.5	67.4	70.5	77.0
	4.0~	61	66.0	3.2	61.0	62.4	63.8	64.4	66.1	66.9	67.6	69.8	75.1
	4.5~	54	64.8	3.3	59.8	60.9	62.3	62.8	64.6	65.7	66.8	70.2	72.3
	5.0~	62	65.1	3.6	59.1	61.1	62.6	63.7	65.0	65.9	66.9	69.5	72.4
	5.5~	54	65.2	4.0	58.1	60.7	62.5	63.4	65.0	66.3	67.1	71.1	76.0
	6.0~6.9	120	65.2	4.6	58.8	60.8	62.5	63.5	64.4	65.6	66.5	69.7	75.9

Table 3.2.18 Mean, SD and Percentile of Sitting height/ Height of 3 to 6 Years Old Children in Macao

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	58.0	1.1	55.1	56.3	57.4	57.7	58.3	58.7	58.9	59.3	59.5
	3.5~	53	57.5	0.9	55.7	56.3	56.8	57.0	57.4	58.0	58.3	59.0	59.5
	4.0~	57	56.7	1.3	54.4	55.3	55.9	56.4	56.7	57.0	57.3	58.2	60.6
	4.5~	58	56.2	1.1	53.6	54.9	55.6	55.8	56.2	56.6	57.0	57.7	58.3
	5.0~	55	56.4	3.7	53.6	54.7	55.2	55.6	56.1	56.4	56.6	57.7	66.0
	5.5~	59	55.3	1.5	51.6	53.8	54.8	55.0	55.3	55.8	56.4	56.8	57.7
	6.0~6.9	113	55.1	1.1	52.9	53.6	54.4	54.8	55.3	55.5	55.8	56.6	57.8
Female	3.0~	45	57.2	8.7	24.8	56.0	57.2	57.6	58.0	58.4	58.6	59.1	75.0
	3.5~	58	57.2	1.7	55.1	55.9	56.6	56.8	57.1	57.6	57.9	58.1	61.0
	4.0~	61	56.6	0.9	55.0	55.2	56.1	56.3	56.6	57.0	57.3	58.0	59.1
	4.5~	54	56.3	1.1	54.2	55.0	55.6	55.8	56.1	56.6	57.0	57.8	59.1
	5.0~	62	56.0	3.4	53.2	54.4	55.1	55.3	55.6	56.0	56.3	57.0	61.3
	5.5~	54	55.3	1.0	52.8	53.9	54.5	54.9	55.2	55.8	56.1	56.8	57.1
	6.0~6.9	120	55.0	1.1	53.0	53.6	54.3	54.7	55.0	55.4	55.7	56.4	57.4

Table 3.2.19 Mean, SD and Percentile of Chest circumference/Height of 3 to 6 Years Old Chiidren in Macao

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	52.9	2.1	48.3	50.4	51.5	51.8	52.9	53.8	54.2	56.0	57.5
	3.5~	53	52.7	2.9	48.9	49.4	51.1	51.6	52.5	53.2	53.9	55.9	62.7
	4.0~	57	51.0	2.7	47.1	48.0	49.3	49.9	50.6	51.7	52.5	53.8	58.8
	4.5~	58	50.5	2.1	46.5	48.0	49.0	49.9	50.3	51.6	51.8	53.5	56.0
	5.0~	55	50.1	2.1	45.2	47.7	48.9	49.2	49.9	50.3	51.5	53.5	54.4
	5.5~	59	49.7	2.7	44.9	46.5	48.1	48.7	49.5	50.0	50.8	52.1	57.5
	6.0~6.9	113	49.0	3.1	45.3	45.8	46.7	47.5	48.4	49.3	50.6	54.3	57.0
Female	3.0~	45	53.3	4.6	48.6	49.7	50.8	51.8	53.2	54.0	54.4	55.9	71.6
	3.5~	58	51.0	2.5	47.3	48.6	49.5	49.8	50.8	51.6	52.6	53.4	57.5
	4.0~	61	50.3	2.2	46.4	47.6	48.8	49.2	50.2	51.2	51.9	53.0	56.6
	4.5~	54	49.4	1.9	46.1	47.0	47.9	48.6	49.2	50.0	50.9	52.1	54.2
	5.0~	62	48.6	2.1	44.9	46.3	47.1	47.6	48.5	49.5	50.0	51.4	53.0
	5.5~	54	48.4	2.3	43.6	45.5	46.4	47.5	48.7	49.5	49.9	51.2	54.0
	6.0~6.9	120	47.8	2.7	44.0	45.2	46.2	46.7	47.5	48.2	48.6	51.3	54.8

Table 3.2.20 Mean, SD and Percentile of The Sum of Skinfold Thickness at Three Parts of 3 to 6 Years Old Children in Macao (mm)

Gender	Age Group	N	Mean	SD	P3	P10	P25	P35	P50	P65	P75	P90	P97
Male	3.0~	53	21.9	7.7	14.4	16.0	17.5	18.5	20.0	23.1	24.3	29.2	49.5
	3.5~	53	22.4	7.6	14.8	16.5	18.0	19.0	20.5	22.1	25.0	29.0	48.4
	4.0~	57	22.2	8.9	14.0	15.0	17.0	18.5	20.0	21.5	23.5	30.9	56.8
	4.5~	58	23.1	7.9	14.3	16.0	17.9	18.8	21.0	23.2	26.6	31.6	48.4
	5.0~	55	21.9	9.0	11.8	13.0	17.0	18.0	19.5	21.9	25.0	32.4	50.6
	5.5~	59	23.2	9.6	12.1	14.5	18.5	19.0	20.5	24.5	26.5	33.0	45.6
	6.0~6.9	113	25.5	12.9	13.2	15.2	18.0	19.0	20.5	24.1	27.5	49.0	60.3
Female	3.0~	45	23.2	5.6	14.3	16.8	19.0	20.1	22.5	24.5	26.5	31.5	38.6
	3.5~	58	23.2	7.3	15.9	16.5	18.9	20.0	21.8	23.0	26.0	31.7	44.3
	4.0~	61	24.7	7.4	15.0	18.1	20.3	21.5	23.5	25.5	27.0	32.0	52.6
	4.5~	53	24.2	6.4	14.7	18.2	19.5	21.0	22.0	25.1	27.8	34.8	42.1
	5.0~	62	25.0	8.5	14.4	16.5	19.0	20.5	24.5	25.5	28.1	34.2	51.8
	5.5~	54	27.5	10.2	15.3	16.5	20.4	22.5	24.8	28.9	31.6	41.8	60.2
	6.0~6.9	120	26.5	10.4	14.8	17.6	20.0	22.0	24.3	26.5	29.0	39.0	54.3

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Appendixes

Survey Questionnaires on Physical Fitness of Early Children in Macao

(3 - 6 Years old)

Every Paterfamilias:

To comprehensively obtain physical fitness status of 3-6 years old children in Macao and establish database, Macao Sport Development Board make preparations for this survey on fitness of Macao early children. Since physical development of children is influenced by many factors, we work out this questionnaire to obtain particular data, so in favor of conducting this survey.

Therefore, please take time to fill out this questionnaire, and all your data will be kept confidential. Thank you for your support.

If you have any queries on this questionnaire, please feel free to call Sports Medicine Centre of Macao Sport Development Board at 810896.

Basic information of the subjects

Name:_____ Age:_____ Telephone: _____

Address:_____

Name of kindergarten / Nursery:_____

Serial number (to be filled by the tester): ☐☐☐☐

Sort coding
（for multiple-choice, please fill in number corresponding with proper key）

1. Date of filling table: ☐☐☐☐☐☐☐☐

2. Date of birth: ☐☐☐☐☐☐☐☐

3. Sex: (1) Male (2) Female ☐

4. Birth place: ☐

(1) Mainland China (2) Macao (3) Hong Kong (4) Portugal (5) Others_____

5. Number of years living in Macao (the children who were not born in Macao need to fill out): ☐☐

6. ID card Number: ☐☐☐☐☐☐☐☐☐☐

7. Medical care card number of Macao Health Bureau: ☐☐☐☐☐☐☐☐

8. The number of siblings in the subject' s family: ☐☐ 9. The subject' s rank in siblings: ☐☐

For example：30th, September, 2002

2	0	0	2	0	9	3	0

Year/ Month / Day

Questionnaires Items
（for multiple-choice, please fill in number corresponding with proper key）

Father's information:

1. Date of birth: ☐☐☐☐☐☐☐☐

2. Birth place: ☐

(1) Mainland China (2) Macao (3) Hong Kong (4) Portugal (5) Others_____

3. Number of years living in Macao (who were not born in Macao need to fill out): ☐☐

4. Height(cm)： ☐☐☐.☐ 5. Weight(kg)： ☐☐☐.☐

6. Educational level: ☐

(1) Below elementary school (2) Elementary school (3) High school
(4) Technological academy and college (5) Master (6) Doctor

7. Occupation: ☐

(1) Manager and administrative office (2) Employer (3) Civil servant
(4) Service and sales (5) Special technican (6) Offical
(7) Machine operation, motorman and assembly man (8) Manufacture, architecture
(9) Fishing, agriculture (10) Housework
(11) Unemployed (12) Others_____

8. Do you participate in sports more than once a week? (If your answer is negative, please go to question No.12) ☐

(1) Yes (2) No

9. Sport items that you often participate in (in order of precedence, at best three items) : ☐☐☐

(1) Basketball (2) Volleyball (3) Football (4) Table tennis (5) Badminton
(6) Tennis (7) Swimming (8) Track and Field (9) Gymnastics (10) Martial Art
(11) Taiji boxing or sword (12) Instrument fitting (13) Boxing (14) Fence-play
(15) Kickboxing (16) Judo (17) Karate (18) QiGong
(19) Yoga (20) Dancing (21) Others_____

10. How many minutes do you spend in sports every time? ☐

(1) Over 60 minutes (2) 30-60minutes (3) less than 30 minutes

11. How many times do you spend in sports per week? ☐

(1) 1—2 (2) 3—4 (3) more than 5

Mother's information

12. Date of birth: ☐☐☐☐☐☐☐☐

13. Birth place: ☐

(1) Mainland China (2) Macao (3) Hong Kong (4) Portugal (5) Others_____

14. Number of years living in Macao (who were not born in Macao need to fill out): ☐☐

15. Height(cm) : ☐☐☐.☐ 16. Weight(kg) : ☐☐☐.☐

17. Educational level: ☐

(1) Below elementary school (2) Elementary school (3) High school
(4) Technological academy and college (5) Master (6) Doctor

18. Occupation: ☐

(1) Manager and administrative office (2) Employer (3) Civil servant
(4) Service and sales (5) Special technican (6) Offical
(7) Machine operation, motorman and assembly man (8) Manufacture, architecture
(9) Fishing, agriculture (10) Housework
(11) Unemployed (12) Others_____

19. Do you participate in sports more than once a week? (If your answer is negative, please go to question No.23) ☐

(1) Yes (2) No

20. Sport items that you often participate in (in order of precedence, at best three items) : ☐☐☐

(1) Basketball (2) Volleyball (3) Football (4) Table tennis (5) Badminton
(6) Tennis (7) Swimming (8) Track and Field (9) Gymnastics (10) Martial Art
(11) Taiji boxing or sword (12) Instrument fitting (13) Boxing (14) Fence-play
(15) Kickboxing (16) Judo (17) Karate (18) QiGong
(19) Yoga (20) Dancing (21) Others_____

21. How many minutes do you spend in sports every time? ☐

(1) Over 60 minutes (2) 30-60minutes (3) less than 30 minutes

22. How many times do you spend in sports per week? ☐

(1) 1—2 (2) 3—4 (3) more than 5

23. Birth Height of the subject (cm) ☐☐ · ☐ 24. Birth Weight of the subject (kg) ☐ · ☐

25. The feeding patterns of the subject within four months after birth: ☐

(1) Breastfeeding (2) Artificial feeding (3) Mixed feeding

26. Do the subject have any disease diagnosed by doctor (If your answer is negative , please go to question No.28) ☐

(1) Yes (2) No

27. Kinds of diseases experienced by the subject (in order of precedence, at best three diseases) ☐☐☐

(1) Chronic Bronchit (2) Pneumonia (3) Tuberculosis (4) Asthma
(5) Hematic Disease (6) Heart disease (7) Hypertension (8) Anemia
(9) Nephritis (10) Hepatitis (11) Hyperthyroidism (12) Hypothyroidism
(13) Rickets (14) Falling sickness (15) Accidental injury
(16)Others_____

28. Do the subject participate in sports more than once a week after kindergarten? ☐
(For example: swimming, ball sports) (if the answer is negative, please go to the question No.30)

(1) Yes (2) No

29. Sport items that the subject often participate in (in order of precedence, at best three items): ☐☐☐

(1) Swimming (2) Dancing (3) Gymnastics
(4) Ball sports (5) Others_____

30. Do the subject participate in entertainment activities more than once a week after kindergarten? ☐
(For example: drawing. Music) (if the answer is negative, please go to the question No.32)

(1) Yes (2) No

31. Entertainment activities items that the subjects often participate in (in order of precedence, at best three items): ☐☐☐

(1) Drawing (2) Music (3) Playing chess
(4) Literacy class (5)Others_____

32. The subject's average sleeping time per day: ☐

(1) Less than 8 hours (2) 8 hours (3) 9 hours (4) 10 hours (5) Over 10 hours

Test Items on Physical Fitness of Early Children in Macao

(3 - 6 Years old)

Name:_____ Age:_____ Serial number (fill by the tester): ☐☐☐☐

Test indices

1. Resting heart rate (beats/min) ☐☐☐ 2. Height (cm) ☐☐☐.☐

3. Weight (kg) ☐☐.☐ 4. Sitting height (cm) ☐☐.☐

5. Chest circumference (cm) ☐☐.☐ 6. Upper arm skinfold thickness(mm) ☐☐.☐

7. Subscapular skinfold thickness (mm) ☐☐.☐ 8. Abdomen skinfold thickness(mm) ☐☐.☐

9. Standing long jump (cm) ☐☐☐ 10. Throwing distant tennis ball(m) ☐☐.☐

11.Sit and reach (cm) ☐☐☐.☐ 12. 10 m shuttle run (s) ☐☐.☐

13. Walking on balance beam (types of walking on balance beam) ☐

(1) Walking forward (2) Moving sideward (3) Undone

Time of walking on balance beam (s) ☐☐☐.☐

14. Successional jump with both feet (s) ☐☐.☐

15. Decayed tooth