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YOUNG PEOPLE, PHYSICAL ACTIVITY AND PHYSICAL FITNESS: A CASE STUDY OF CHINESE AND PORTUGUESE CHILDREN

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Introduction

Non-communicable diseases (NCDs) such as cardiovascular disease, hypertension, obesity, diabetes, chronic respiratory diseases, and some types of cancer—are increasingly significant causes of disability and premature death across many countries. In 1999 these diseases contributed to about 60% of deaths in the world and 43% of the global burden of disease. On the basis of current estimates, these deaths are expected to account for 73% of deaths and 60% of the disease burden by the year 2020 (WHO, 2002a).

Regular physical activity is associated with a healthier, longer life and with a lower risk of NCDs (USDHHS,1996). The World Health Organization's report, *Diet, Physical Activity and Health*, indicated that unhealthy diet and insufficient physical activity are among the major causal risk factors in NCDs (WHO, 2002b).

Never before has the public been more aware of the enormous health and fitness benefits of physical activity, which have been highlighted in both the Surgeon General's report (USDHHS, 1996) and in the Healthy People 2010 study (USDHHS, 2000). The most prominent finding of the Surgeon General's report is that people of all ages can improve their quality of life through a lifelong practice of moderate physical activity. Yet, despite knowledge of these benefits, most people are still more sedentary. Worldwide, it is estimated that over 60% of adults are simply not active enough to benefit their health (WHO, 2003). In the United States, only 25% of adults reported

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engaging in recommended physical activity levels, 29% reported no regular leisure-time physical activity (CDC, 2000). The prevalence of physical activity during leisure time in the European adult population was similar to the U.S. estimates. Nevertheless, the amount of physical activity is low, and a wide disparity between countries exists. The highest prevalence of physical activity was found in Finland (91.9%) and the lowest in Portugal (40.7%) (Martinez-Gonzalez *et al.*, 2001).

Regular physical activity levels have also been declining dramatically both in the United States (USDHHS, 1996) and in European Countries (Freedson and Rowland, 1992). In the United States, 27% of children in grades 9–12 engaged in moderate physical activity for at least 30 minutes on 5 or more of the previous 7 days in 1999 (USDHHS, 2000). A large-scale investigation of 6903 Portuguese children in grades 6, 8 and 10 showed that 38.3% of them participated in physical activity 4 times or more weekly (Matos *et al.*, 2000).

A recent meta-analysis compared the results of 55 reports of the performance of children and adolescents aged 6–19 years who used the 20m shuttle run test. All data (129,882 children and adolescents) were collected in the period 1981–2000. Tomkinson *et al.*'s (2003) longitudinal comparative study confirmed that children and adolescent's aerobic fitness was declining

Both obesity and physical inactivity are the major determinants of many NCDs. Though children and young adults have very low rates of NCDs, which are leading causes of death, it is true that these diseases develop over time, and quite often begin with habits and behaviours developed earlier in life (Gilliam *et al.*, 1977). The major problem associated with child obesity is its persistence into adult life. Obese children will most likely become obese adults and carry all the extra risks for NCDs, such as heart attacks, strokes, high blood pressure, and diabetes (Wright *et al.*, 2001). In the United States, physical inactivity has contributed to the 100% increase in the prevalence of childhood obesity since 1980 and most of this increase occurred in the last 10 years (CDC, 2000). There is a worldwide trend towards inactivity. It has become increasingly clear that physical inactivity and unhealthy diets are a global public health issue (WHO, 2002a).

Earlier assessment methods of physical activity and fitness have focused on vigorous leisure time physical activity and related fitness. According to recent research, physical activity needs to be only of moderate intensity for a protective effect (Pratt, 1999). Health-enhancing physical activity (at least moderate intensity physical activity 5 or more days per week for 30 minutes or more per occasion) and health-related physical fitness are new concepts

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developed primarily in the 1990¥s based on research evidence on the relationship between physical activity, fitness and health (Bouchard and Shephard, 1994). So the aim of this case study was mainly designed to disclose and compare children's habitual physical activity levels (MVPA-moderate vigorous physical activity) and their health-related physical fitness between the Chinese and Portuguese children.

METHODS

Sample and Data Collection

A sample of 264 Portuguese children (boys 49.6% vs. girls 50.4%) aged between 10 and 15 were selected from the public middle schools in Braga, Portugal; a similar sample of 317 Chinese children (boy 51.1% vs. girl 48.9%) aged between 11 and 15 were selected from the public middle schools in Shanghai, China. All subjects completed the health-related physical fitness test FITNESSGRAM and answered the questionnaire during physical education classes. Survey procedures were designed to protect the children' privacy by allowing for anonymity.

Instrumentation

Assessment of health-related physical fitness (FITNESSGRAM)

The FITNESSGRAM was selected because of its ease of administration to large numbers of subjects, and in addition its choice of reliable and valid health-related physical fitness measures (Cooper Institute of Aerobics Research, 1999). Six components of health-related physical fitness were evaluated: body composition, aerobic capacity, overall flexibility, upper body strength, abdominal strength and endurance, and trunk extensive strength. Physically fit means passing all of the minimum level for health of all six items in FITNESSGRAM.

(a) Body composition (BC) was assessed by the sum of triceps and calf skinfolds. Triceps skinfold was measured at the midpoint and back of the upper right arm. Calf skinfold was measured on the side of right leg with the knee bent at a 90 degree, the skinfold being measured at the maximal girth of the calf. Three measures were taken at each skinfold site and averaged and the average of the two sites were then calculated. Body composition was determined by skinfolds according to Slaughter *et al.* (1988).

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(b) Aerobic capacity (AC) was assessed by one mile run. All subjects were instructed to complete one mile in the fastest time possible by either running or walking. The mile course was completed on a 250–m track. The researchers and the PE staff counted laps, motivated the children during the test, and recorded their results. The cardiovascular fitness is depended on children's test in aerobic capacity.

(c) Overall flexibility (OF) was assessed by the test of Back-saver sit-and-reach (Patterson *et al.*, 1996). Subjects were asked to remove their shoes, with one leg fully extended and another knee bent with the sole on the floor and 5–8cm to the straight leg, children were asked to reach forward on a standardized sit-and-reach box four times and hold the position of the fourth stretch for at least one second for measuring.

(d) Upper body strength (UBS) was assessed by the right angle push-ups (cadence). Subjects were asked to complete as many push-ups as possible (at a rhythm of 20 times per minute). Researchers and PE staff counted the push-ups until the student could no longer maintain the rhythm.

(e) Abdominal strength and endurance (ASE) was assessed by sit-up (cadence). Subjects were asked to complete as many sit-ups as possible up to a maximum of 75 at a rhythm (20 times per minute). The subject lied down on a mat with the knees bent, the arms straight and parallel to the trunk, then did the sit-up with both arms across the cardboard strip (11.4cm), and back each time. The researchers and the PE teachers counted the correct push-ups until the student could no longer maintain the rhythm.

(f) Trunk extensive strength (TES) Subjects were asked to lie on the mat in a prone position and lift their upper body off the floor to allow the researcheror PE teacher to measure the trunk length.

Assessment of Overweight and Obesity

Body Mass Index (BMI) is widely used in adult populations, and a cut off point of 25 and 30 kg/m2 is recognized internationally as a definition of adult overweight and obesity respectively (WHO, 1997). The BMI in childhood changes substantially with age (Cole *et al.*, 1995). The Childhood Obesity Working Group of the International Obesity Task Force (IOTF) has developed cut-off criteria with relative (age-specific) BMI centile charts for children (2–18 yrs). The IOTF authors point out that although these cut-off points are less arbitrary, they are more internationally acceptable than others that have been used (Cole *et al.*, 2000). Height and weight were measured to an accuracy of 0.1cm and 0.1kg respectively without shoes or jumpers.

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BMI was calculated as body in kilograms divided by height in meters squared (kg/m2).

Assessment of physical activity

The International Physical Activity Questionnaire (IPAQ) is a relatively questionnaire for the assessment of health-enhancing physical activity. Eight versions of the instrument were tested for feasibility, reliability and validity (Craig *et al.*, 2003). The short version IPAQ were selected and translated into Portuguese and Chinese. All participants completed the questionnaire during their PE classes; the researchers and PE staff explained the detail of the questionnaire. Children's physical activity levels (moderate to vigorous physical activity-MVPA) were divided into four categories (sedentary: 0–2 times/week, low: 3–4 times /week, moderate: 5–6 times/week, vigorous: 7+ times/week). To assess the instrument reliability, the two-week test-retest assessment was assessed with a random sub-sample of 28 Portuguese children. The reliability was 0.84.

Television Viewing

The amount of time spent watching television was estimated over a typical week in the questionnaire. It was expressed on a daily basis (min/day).

Statistical methods

Data were collected and analyzed by using the Statistical Package for the Social Sciences (SPSS) v. 11.0. The subject sample was described using descriptive statistics. Data are showed as means and standard deviations or percentage. Pearson Correlation Coefficients and Partial Correlation were used to describe the relationships of the variables to performance, and two-way ANOVA was performed across height, weight, BMI, the sum of skinfold thicknesses, MVPA, and TV Time to determine the effects of age and gender.
Statistical significance was set at $p<0.05$.

Results

A total of 264 Portuguese and 317 Chinese children participated in FITNESSGRAM test and questionnaire. The characters of the sample, results of FITNESSGRAM test, body composition, physical activity levels, and television viewing time of the sample, organized by gender and age, are described in the tables and figures below.

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We observed that children's height, weight, and BMI generally increased with their age in both countries. But at the same age, Portuguese boys' height, weight, and BMI were higher than those of Chinese boys and Portuguese girls BMI were bigger than those of Chinese girls (see Table 1).

According to the cut-off criteria with relative (age-specific) BMI centile charts for children, we found 22.1% of the Chinese children and 27.3% of the Portuguese children suffered from being either overweight or obese, 6.0% of the Chinese children and 6.8% of the Portuguese children suffered from obesity (seeTable 2).

The results of the health-related physical fitness test (FITNESSGRAM) showed most children (Chinese: 92.7% vs. Portuguese: 82.6%) failed to meet all 6 minimum standards that would classify them as physically fit (see Table

Table 1 Characteristics of the Chinese and Portuguese middle school children

		Number	Height (m)		Weight(kg)		BMI(kg/m^2)	
Gender	Age (yrs)	China/ Portugal	China	Portugal	China	Portugal	China	Portugal
Boys	10	0/9	-	1.47±0.04	-	41.1±6.7	-	18.8±2.4
	11	13/43	1.46±0.04	1.48±0.06	37.0±4.9	42.2±7.1	17.4±2.2	19.8±3.4
	12	48/18	1.54±0.08	1.57±0.10	48.3±12.7	51.3±12.3	20.2±4.4	20.6±3.7
	13	45/13	1.61±0.07	1.62±0.07	53.8±11.3	59.1±8.6	20.7±4.1	22.7±3.5
	14	30/33	1.66±0.08	1.68±0.07	57.7±15.5	58.3±9.3	20.9±5.1	20.5±2.7
	15	26/15	1.68±0.07	1.70±0.12	60.1±12.1	63.1±13.8	21.2±3.4	21.5±2.6
Girls	10	0/12	-	1.44±0.09	-	40.1±12.2	-	20.3±4.3
	11	21/40	1.50±0.06	1.49±0.07	41.5±9.1	45.4±10.9	18.3±3.4	20.3±4.3
	12	35/22	1.53±0.07	1.54±0.05	41.5±8.4	48.9±7.8	17.6±2.9	20.4±3.1
	13	41/13	1.58±0.06	1.55±0.05	47.6±7.2	48.6±8.3	19.1±2.5	20.2±3.3
	14	42/37	1.60±0.06	1.62±0.06	53.7±12.2	54.0±7.9	20.9±4.1	20.6±2.7
	15	16/9	1.59±0.05	1.61±0.07	53.3±9.5	54.9±9.9	21.2±3.3	21.3±3.6

Table 2 Children's body composition (by age-specific BMI centile charts for children)

	Chinese (M=162, F=155)	Portuguese (M=131, F=133)
Healthy weight	77.9%(M=71.0%, F=85.2%)	72.7%(M=71.2%, F=75.2%)
Overweight	22.1%(M=29.0%, F=14.8%)	27.3%(M=29.8%, F=24.8%)
Obesity	6.0%(M=8.6%, F=3.2%)	6.8%(M=6.1%, F=7.5%)

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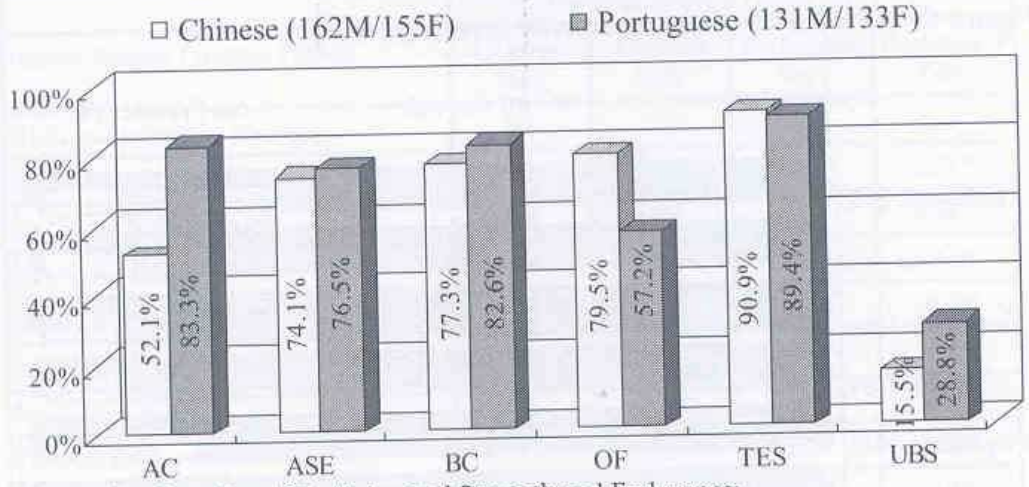
3 and Figure 1). A further breakdown of the results showed that the strongest category across all ages was in trunk strength (tested by trunk lift), where 90.9% of the Chinese children and 89.4% of the Portuguese children met the minimum standard, the weakest category across all ages was upper body strength (tested by push-ups), where only 16.1% of the Chinese children and 28.8% of the Portuguese children met the minimum standard.

Table 3: Summary of Fitness Standards Achieved (%)

Item in FITNESSGRAM	Chinese (162B/155G)	Portuguese (131B/133G)
(1) Aerobic capacity	52.1% (B: 64.2%, G: 39.4%)	83.3% (B: 87.0%, G: 79.7%)
(2) Abdominal strength and endurance	74.1% (B: 70.4%, G: 78.1%)	76.5% (B: 80.9%, G: 72.2%)
(3) Body composition (Skinfolds)	77.3% (B: 68.5%, G: 86.5%)	82.6% (B: 74.8%, G: 90.2%)
(4) Overall Flexibility	79.5% (B: 85.2%, G: 73.5%)	57.2% (B: 65.7%, G: 48.9%)
(5) Trunk extensive strength	90.9% (B: 93.2%, G: 88.4%)	89.4% (B: 90.8%, G: 88.0%)
(6) Upper body strength	15.5%(B: 29.6%, G: 0.6%)	28.8% (B: 36.6%, G: 21.1%)
Physical fit (passing all 6 items)	8.2% (B:15.4%, G: 0.6%)	17.4% (B: 22.2%, G: 12.8%)
Not physical fit (not passing all 6 items)	91.8%(B: 84.6%, G: 99.4%)	82.6% (B: 77.8%, G: 87.2%)

B: Boys, G: Girls

Figure 1: Summary of Fitness Standards Achieved (%)



AC: Aerobic Capacity; ASE: Abdominal Strength and Endurance;
BC: Body CompositionOF: Overall Flexibility;
TES: Trunk Extensive Strength; UBS: Upper Body Strength

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According to the results of the IPAQ (see Table 4 and Figure 2), we found that only 27.1% of the Chinese children and 44.4% of the Portuguese children engaged in regular basis MVPA; 15.8% of the Chinese children and 19.2% of the Portuguese children did not participate in any kind of spare-time physical activity beyond school physical education (twice a week). We found a significant difference in the children's physical activity levels (MVPA) between boys and girls in both countries, which showed that girls were less active than boys (r= -0.36 to -0.28, p< .001). Between two countries the Portuguese children were more active than Chinese children.

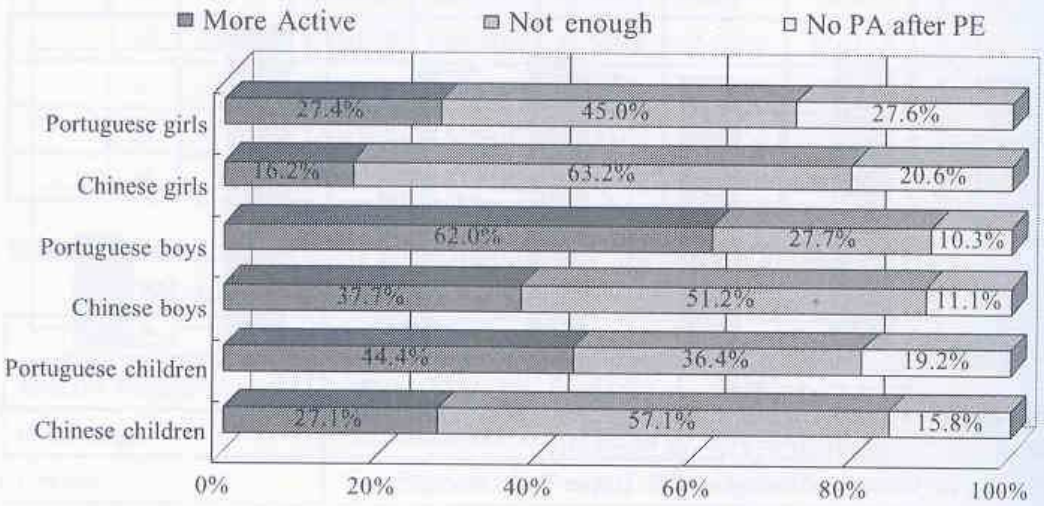
According to the self-report questionnaire, we found that 32.7% of the Chinese children and 67.4% of the Portuguese children watched television at least 2 hours per school day, 5.0% of the Chinese children and 23.0 % of

Table 4 Children's physical activity levels (MVPA)

Items	Chinese (B: 162, G: 155)	Portuguese (B: 131, G: 133)
More active	27.1% (B: 37.7%, G: 16.1%)	44.4%(B: 62.0%, G: 27.4%)
Not enough	57.1% (B: 51.2%, G: 63.2%)	36.4%(B: 27.7%, G: 45.0%)
No PA after SPE	15.8% (B: 11.1%, G: 20.6%)	19.2% (B: 10.3%, G: 27.6%)
PA by genders	r: — 0.28, p<0.001	r: — 0.36, p<0.001

B: Boys, G:Girls, PA:Physical Activity, SPE: School Physical Education,

Figure 2 Children's physical activity levels (MVPA)



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the Portuguese children even spent more than 4 hours per school day (see Table 5).

The Pearson correlation coefficients between physical activity levels (MVPA) and physical fitness of the sample are presented in Table 6. We found that the children's MVPA had a significant correlation with their physical fitness (especially among the Portuguese children; Portuguese boys: $r=0.26$, $p<0.05$; Portuguese girls: $r=0.31$, $p<0.01$), passing more fitness categories (Chinese girls: $r=0.22$, $p<0.05$; Portuguese boys: $r=0.29$, $p<0.05$; Portuguese girls: $r=0.39$, $p<0.01$) (see Table 6). Among the Chinese children the correlation was not as strong.

The Pearson correlation coefficients between body composition (overweight and obesity) and physical fitness of the sample are presented

Table 5 Children's television viewing in school day

	Chinese (B:162, G:155)	Portuguese (B:131, G:133)
X < 2h	71.0% (B:67.9%, G:74.2%)	32.6% (B:37.9%, G:27.6%)
2h ≤ X < 4h	23.6% (B:22.7%, G:24.6%)	44.4% (B:43.1%, G:45.6%)
X ≥ 4h	5.4% (B:7.4%, G:3.2%)	23.0% (B:77.8, G:87.2%)

X: Average Television viewing time in school day, B: Boys, G: Girls

Table 6 The relationship between children's physical activity levels (MVPA) and health-related physical fitness

	Physical Activity Levels (MVPA)			
Health-Related Physical Fitness	Chinese Boys	Chinese Girls	Portuguese Boys	Portuguese Girls
(1) Trunk extensive strength	NS	NS	NS	0.24**
(2) Abdominal strength & endurance	NS	NS	NS	0.31**
(3) Upper Body strength	NS	NS	0.20*	0.31**
(4) Overall flexibility	NS	NS	NS	NS
(5) Body composition	NS	NS	NS	0.18*
(6) Aerobic capacity	NS	0.21*	0.24*	NS
Passing more items	NS	0.22*	0.29*	0.39**
Physical fit (passing all 6 items)	NS	NS	0.26*	0.31**
VO_2 max	NS	0.17*	0.30*	0.30*

NS: not siginificant, *<0.05, **<0.01, ***<0.001,

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Table 7: The relationship between weight and obesity and health-related physical fitness

	Chinese-Boys		Chinese-Girls		Portuguese-Boys		Portuguese Girls	
Health-related Physical Fitness	OW	OB	OW	OB	OW	OB	OW	OB
(1) Trunk extensive strength	-0.17*	NS	NS	NS	NS	NS	NS	NS
(2) Abdominal strength & endurance	NS	NS	NS	-0.17*	NS	-0.20*	-0.34***	-0.27**
(3) Upper Body strength	-0.20*	-0.20*	NS	NS	-0.29**	NS	-0.17*	NS
(4) Overall flexibility	NS	-0.26**	NS	NS	-0.34***	NS	.17*	NS
(5) Body composition	-	-	-	-	-	-	-	
(6) Aerobic capacity	-0.18*	-0.16*	-0.15*	-0.15*	-0.30**	-0.28**	-0.19*	NS
Passing more items	-0.38***	-0.34***	-0,26**	-0.30***	-0.48***	-0.38***	-0.27**	-0.32***
Physical fit (passing all 6 items)	NS	NS	NS	NS	-0.19*	NS	NS	NS
VO_2 max	-0.65***	-0.53***	-0.71***	-0.58***	-0.61***	-0.45***	-0.69***	-0.49***

in Table 7. We found that weight and obesity were negatively correlated with children with good VO2 max and who passed more FITNESSGRAM categories.

Discussion

The issue of physical fitness among children and adolescents is multi-facted. It includes documented relatively low levels of physical activity that are of great concern to health professionals. The results of numerous physical fitness studies among children and adolescents also indicate that the problem is one for public health policy, and policy related to promoting comprehensive school health education programs. The issue also calls for broad promotion of healthy lifestyles for young people.

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Tomkinson *et al.* (2003) compared the results of 55 reports of the performance of 129,882 children and adolescents aged 6–19 years in the period 1981–2000. The longitudinal comparative study confirmed that the aerobic fitness of children and adolescent's is declining. In this case study, we did a transverse comparison between the Chinese and Portuguese children, which showed that few of the children (Chinese: 8.2% vs. Portuguese: 17.4%) met all six minimum standards in FITNESSGRAM that define physical fitness. We also found that the result was skewed by the fact of the lower pass rate in upper body strength (Chinese:15.5% vs. Portuguese: 28.8%) whereas the percentage that passed the other component criteria ranged from 52.1% to 90.9%. Apart form upper body stength, the children did well in other areas (Trunk Extensive Strength, Body Composition, Aerobic Capacity, Abdominal Strength and Overall Flexibility). Comparing the other results of FITNESSGRAM between children in both countries, we found that the children had similar results in the tests of Trunk Extensive Strength, Body Composition and Abdominal Strength, but Portuguese children did well in Aerobic Capacity (Portuguese: 83.3% vs. Chinese: 52.1%), while Chinese children did well in the Overall flexibility (Chinese: 79.5% vs. Portuguese: 57.2%). This may be caused by their different school PE programs, for example the Portuguese school physical education programs included more endurance training, such as long distance running and football, while the Chinese PE programs include traditional sports like martial arts, which improve flexibility. So we suggest that future school PE programs in both countries not only need to reinforce children's overall health-related physical fitness but also their weaknesses (especially in upper body strength).

A large-scale investigation of 6903 Portuguese children and adolescents in grades 6, 8 and 10 (6903 subjects) showed that 36.1% of them (boys: 25.0% vs. girls: 45.7%) were overweight in 1998. This level declined a little in 2002, when 31.9% (boys: 23.9% vs. girls: 39.5%) of the them (6131 subjects) were overweight (Matos *et al.*, 2003). Our results agreed with these results, which showed a quarter of children (Chinese: 22.1% vs. Portuguese: 27.3%) either suffered from being either overweight or obese. It seemed that more Portuguese girls (24.8%) suffered from being overwieght and obese than the Chinese girls did (11.8%). We also found that overweight and obese children had a more negative correlation with their health-related physical fitness and VO2 max (see Table 7). These results also raise serious concerns about the current and future health of these children. The major problems associated with child obesity is its persistence into adult life; it is likely that

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obese children will become obese adults and carry all the extra risks for NCDs (Wright *et al.*, 2001).

Lifestyle changes and technological advancement have steadily reduced physical activity levels in many developed and developing countries. It is estimated worldwide that over 60% of adults are simply not active enough to benefit their health. Among children and adolescents, physical activity declines significantly from adolescence, girls are also less active than boys (WHO, 2003).

The large-scale investigation among the Portuguese children and adolescents in grades 6, 8 and 10 (6903 subjects) found that 36.1% participated in physical activity four or more times a week in 1998. This activity level declined dramatically in all gender and age groups in 2002, when only 31.9% of the subjects (6131 children and adoelscents) of the same ages participated in physical activity four or more times a week (Matos, *et al.*, 2003). According to recent research, physical activity needs to be only of moderate intensity for a protective effect (Pratt, 1999). Health-enhancing physical activity means at least moderate intensity physical activity five or more days per week for 30 minutes or more per occasion. According to the results of the children's self-reported questionnaire, we found that less than half of the children reached recommended levels of physical activity (Chinese: 27.1% vs. Portuguese: 44.4%); nearly 20% of the children (Chinese:15.8% vs. Portuguese: 19.2%) did not participate any kind of leisure physical actvity after school physical education; girls were significantly less active than boys in both countries ($r=-0.36$ to -0.28, $p<0.001$). We found that more Chinese children (more than 50%) belonged to the category of "not enough" physical activity, while more Portuguese were "more active", and in general the Portuguese children were more active than the Chinese children.

School provides children opportunities for physical activity; additional opportunities for physical activity exist outside of school. We observed that children in both countries had their school physical education twice a week (total 135 minutes). However, there there are socioeconomic factors contributing to the lower levels of their physical activity. Many children said that their schools and communities did not have fitness rooms or equipment that they can use after school, many children (especially the girls) are required to stay indoors because their parents will not allow them to play at unsupervised areas due to safety concerns. It was found that in China, children were under extreme pressure to study and compete academically. They cited the quantity of home work they had to do after school as a constraint. The Portuguese children did not have this kind of pressure, but

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they spent more of their leisure time in sedentary activites such as watching television and playing video games.

There is convincing evidence that regular physical activity protects children against unhealthy weight gain whereas sedentary lifestyles, particularly sedentary occupations and inactive recreation such as watching television, promote it. Some studies indicated that the amount of time in watching television, is also associated with less physical activity, increased obesity, and lower physical fitness (Dietz and Gortmarker, 1993; Durant *et al.*, 1996). Our study confirmed that a large number of children especially the Portuguese children, spent much of their leisure time watching television for at least 2 hours per school day (Chinese: 29.0% vs. Portuguese: 77.4%). We did not find significant correlations between watching television, physical activity levels, sum of skinfolds, and BMI, but we did find that the Portuguese girls who watch television more than 4 hours per school day have a higher BMI than those Portuguese girls who watch less than 2 hours of television per school day. Stouffer and Dorman (1999) indicated that childhood obesity is a complex problem with a multifaceted aetiology. It is not merely a simple question of physical activity levels or television viewing time, but can also be associated with excess calorific intake, high fat diets, genes, parental influences, psychosocial contributors, and eating patterns; this is an area in need of further research.

Poor physical fitness levels, physical inactivity, and the rise in obesity have become a national concern in the United States. Physical inactivity is considered by health experts to be a major epidemic and a key public health challenge in the United States (NASPE, 1998). Extensive evidence, including the landmark 1996 Surgeon General's Report on Physical Activity and Health, has documented the health benefits of regular physical activity, i.e. regular moderate physical activity can substantially reduce the risk of developing chronic illnesses and improve mental health (USDHHS, 1996). Our study also showed that the children's physical activity levels (MVPA) were significantly correlated with the children's health-related physical fitness (less so with the Chinese boys).

Physical activity is a behavior, whereas physical fitness is an attribute. Inadequate physical activity is a behavior pattern that is typically established during youth, persists into a sedentary adulthood, and contributes to poor health (Morrow and Jackson, 1999). One of the most effective ways to prevent chronic diseases is to establish policies that encourage young people to develop healthy exercise habits early that they can maintain throughout their lives. Since virtually all youth attend school, school therefore is the logical

Wang, G., Pereira, B. and Mota. J. (2005). Young People, Physical Activity and Physical Fitness. A case study of Chinese and Portuguese Children. In Kevin Hylton, Jonathan Long and Anne Flintoff. *Evaluating Sport and Active Leisure for Young People*. LSA Publication, University of Briton, UK (pp.157-174).

place for the development of these patterns. In addition to being physically active, children need to learn fundamental motor skills and develop health related physical fitness (cardiovascular endurance, muscular strength and endurance, flexibility, and body composition). School PE is an ideal way to encourage activity and develop fitness among children and, for many children, will be their only preparation for an active lifestyle (Summerfield, 1998).

Despite a renewed emphasis on youth fitness, physical activity among youths has declined in recent years in the United States. According to statistics compiled by the Centre for Disease Control and Prevention (CDC, 2002) the percentage of adolescents who have opportunities for daily PE dropped from 42% in 1991 to 29% in 1999. Mckenzie *et al.* (2000) indicated that even in schools with daily PE classes, children were not receiving adequate amounts of physical activity. This situation is likely to be worse in many other schools, where physical education is not offered daily. A comprehensive survey in 25 European countries reveals that no European country offers a daily PE class (Armstrong and Astrand, 1997). In Portugal, before 2001, middle school children had 180 minutes PE/week, but now school PE has been reduced to 135 minutes/week. Studies also show that the quality of PE is uneven, diminishing its potential health and educational benefits. According to another study of ours among the sample of these 264 Portuguese middle school children (Wang, Pereira and Mota, 2004), we found that 7th grade Portuguese children only spent 32.0% of class time in 45–minute indoor classes and 31.0% of class time in 90–minute indoor classes exercising at recommended activity levels (50% class time in MVPA). The comparative study shows Chinese children (in Hong Kong) spent 32.4% of class time at recommended activity levels (Macfarlane and Kwong, 2003). We found that the most traditional school PE selected many competitive team sports programs rather than the health-enhancing exercise programs, children were not so active during the classes and a lot of PE time was spent changing and showering (Wang, Pereira and Mota, 2004).

Health promotion professionals have recognized the important role that school PE programs play in providing physical activity. Recommendations for increasing both the quantity and quality of school PE are included in Healthy People 2010 (USDHHS, 2000), which recommends that school PE programs need to develop comprehensive programs that promote enjoyable, lifelong physical activity (e.g., dance, strength-training, aerobics, jogging, swimming, tennis) rather than competitive team sports (Sallis *et al.*, 1992; USDHHS, 2000). In recent years school PE programs have placed a greater

Wang, G., Pereira, B. and Mota. J. (2005). Young People, Physical Activity and Physical Fitness. A case study of Chinese and Portuguese Children. In Kevin Hylton, Jonathan Long and Anne Flintoff. *Evaluating Sport and Active Leisure for Young People*. LSA Publication, University of Briton, UK (pp.157-174).

emphasis on health-related exercise or PE theory, focusing on the knowledge, skills and attitudes required to promote health and well-being and to encourage active lifestyles (Harris, 1994). Some appropriate school-based intervention programs increase the interest and activity levels of school children (USDHHS, 2000). In another study of ours, we found that most middle school children knew little about health-related physical fitness and health-enhacing physical activity before the intervention. After our one-year intervention, the children not only improved their knowledge, skill and attitude on health, but also improved their physical fitness and activity levels as well (Wang, Pereira, and Mota, 2004). It is argued here that school PE programs should improve children's knowledge, skills, and attitudes on health, and select some health-enhancing exercise programs. Considering the gender differences between children's habitual physical activity (girls are less active), school PE needs to provide programs that best meet the interests of all. For example, an aerobics course is likely to appeal to girls, just as football traditionally attracts boys, whereas a physical conditioning course might attract both boys and girls. There is not enough time in PE classes for children to get sufficient physical activity in most schools, so we suggest teachers at all levels should strive to encourage children to be physically active both in class and beyond the school environment. Students at all levels need to acquire the knowledge, attitudes, and skills necessary to develop patterns of daily participation in physical activity.

Conclusion

The study concludes that most of the sample of Chinese and Portuguese school children were not physically active and physically fit. Moreover, a quarter of them already suffered from being overweight and obesity. Inadequate physical activity is a behavior pattern that is typically established during youth. To help children understand, develop, and maintain a healthy lifestyle to reduce the risk of developing NCDs, government and schools need to reinforce comprehensive school health education, and to work with communites and families to maximize physical activity opportunities. Physical educators need to encourage children to live an active lifestyles and to maximize physical activity time during classes. Focused school health and PE programs should be applied to improve the knowledge, skills and attitudes of children on health and well-being, to promote enjoyable, lifelong physical activity.

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