Key Message 3

Be physically active everyday
Be physically active every day

1. Terminology

**Duration**

Duration represents the temporal length of the activity, often quantified in minutes.

**Frequency**

Frequency represents the number of times a person engages in an activity over a pre-determined period.

**Intensity**

Intensity refers to the degree of overload an activity imposes on physiological systems compared to resting states.

The intensity of physical activity can be described as light, moderate and vigorous. These terms correlate to the absolute amount of energy expenditure or oxygen consumption associated with specific types of activity. Oxygen consumption is expressed in metabolic equivalents (METs), which are multiples of the resting rates of oxygen consumption during physical activity (Ainsworth et al., 2000). In general, **light intensity** activity is physical activity carried out at 1.0 to less than 3.0 METs; **moderate intensity** activity is defined as 3.0 to 6.0 METs; and more than 6.0 METs is categorised as **vigorous intensity** activity.

**Physical activity**

Physical activity is defined as any bodily movement produced by skeletal muscles that result in energy expenditure. Physical activity is a complex behaviour that involves many aspects. It can be described by four parameters: type, frequency, duration and intensity. It is closely related to, but distinct from, exercise and physical fitness. Exercise, on the other hand, means any planned, structured and repetitive bodily movements that are performed to improve physical fitness.

**Physical activity has three main components:**

- **Occupational work:** activities undertaken during the course of work.

- **Household and other chores:** activities undertaken as part of day to day living.

- **Leisure-time physical activity:** activities undertaken in the individual’s discretionary or free time. Activity is selected on the basis of personal needs and interest. It includes exercise and sports.

  - **Exercise**: a planned and structured subset of leisure-time physical activity that is usually undertaken for the purpose of improving or maintaining physical fitness.
Sports: its definition varies around the world. It implies a form of physical activity that involves competition and also embraces general exercise and a specific occupation.

Physical inactivity

Physical inactivity, or sedentary behaviour, as it is otherwise known, can be defined as “a state when body movement is minimal and energy expenditure approximates resting metabolic rate”. However, physical inactivity represents more than an absence of activity. It also refers to participation in physically passive behaviours such as television viewing, reading, working at computer, talking with friends on the telephone, driving a car, meditating or eating.

Physical activity level

Physical activity level (PAL) is a method of quantifying or characterising physical activity, commonly according to its type, frequency, duration and intensity (Welk, 2002).

2. Introduction

The majority of the world population, including Malaysia, is sedentary, with only a small percentage involved in regular and adequate exercise (Poh et al., 2008). General levels of physical activity have declined due to urbanisation and industrialisation, where machines now do most of the work previously done by human hands (WCRF/AICR, 2007). Lack of physical activity is a global health hazard and is increasing rapidly in both developed and developing countries (WHO, 2003a). Generally, physical inactivity is estimated to cause 1.9 million deaths globally. People who do not achieve the minimum physical activity recommendation may increase their risk of getting cardiovascular disease by up to 1.5 times. About 22% of ischaemic heart disease and about 10% to 16% of diabetes mellitus and cancer death cases reported yearly are caused by physical inactivity (WHO, 2003b).

Physical activity is important for the health and well-being of people of all ages. It has long been recognised as an important factor in enhancing health and reducing the risk of various chronic diseases (DHHS, 1996). People who are physically active tended to be healthier than their physically inactive counterparts: they experience less health problems, such as obesity, cardiovascular disease, type 2 diabetes, osteoporosis and cancer particularly colon, breast and prostate cancer (Powell & Blair, 1994; Friedenreich, 2001; Rastogi et al., 2004). Regular physical activity also appears to promote a sense of well-being (West et al., 2004; Motl et al., 2004), helps in releasing tension and decrease the likelihood of anxiety (Broocks et al., 1998) and depression (Paffenbarger, Lee & Leung, 1994).

The bottom line is that physical activity reaps health benefits that far outweigh the risks of adverse events for almost everyone (DHHS, 2008), hence it is vital to emphasise the importance of physical activity in order to encourage the nation and provide them with achievable steps of becoming more physically active.
3. **Scientific basis**

3.1 **Physical activity and chronic disease prevention**

*Cardiovascular disease, diabetes, cancer and all cause mortality*

A large prospective study of 17,265 men and 13,375 women aged 20 to 93 years in Copenhagen found that subjects who spent three hours per week commuting to work by bicycle have a substantial decrease in the risk of death compared to those who did not commute by bicycle (Andersen et al., 2000). Blair (2007) concluded, based upon the studies mentioned above, that there is sufficient evidence-base for understanding the benefits of physical activity and chronic disease prevention.

Lee, Blair & Jackson (1999), in their observational cohort study, examined the interrelation of cardio-respiratory fitness and body fatness to cardiovascular disease and all-cause mortality. They interestingly observed a lower relative risk (RR) for death among fit, obese subjects (RR 0.98) compared to unfit, normal weight individuals (RR 4.71). They concluded that being fit decreases the high risk of cardiovascular diseases and all-cause mortality, even among obese individuals.

Regensteiner (2007) stated that a wealth of strong data is available to support the use of physical activity in the prevention and treatment of type 2 diabetes mellitus. Randomised controlled trials by Eriksson et al., (1999), Tuomilehto et al., (2001), Knowler et al., (2002) shared the same findings that intensive lifestyle modifications, including diet and exercise interventions display a strong evidence in reducing the risk of developing diabetes. Bassuk & Manson (2005) reported that body weight maintenance, insulin sensitivity and glycemic control, blood pressure, dyslipidaemia, inflammation and endothelial function are all impacted by the level of physical activity.

Studies of physical activity assessed with objective measures of cardiopulmonary fitness reported that better fitness reduced the risk of developing diabetes (Lynch et al., 1996; Wei et al., 1999). Thomas, Elliott & Naughton (2006) reported that a meta-analysis provided evidence that regular moderate intensity exercise benefits cardio-respiratory fitness in persons with diabetes, while a higher intensity exercise would introduce greater effects.

Friedenreich & Orenstein (2002) noted that nearly 170 observational epidemiologic studies have examined the relation between physical activity and cancer prevention at specific cancer sites, including colon, breast, prostate, endometrial and lung.

These studies evidently showed that decreased risk with increased physical activity is classified as convincing for breast and colon cancers, probable for prostate cancer, possible for lung and endometrial cancers and insufficient for cancers at all other sites.

Similarly, Kruk & Aboul-Enein (2006) concluded that there is convincing epidemiological evidence that physical activity reduces colon and breast cancers, whilst evidence is probable for prostate cancer. Evidences for prevention of lung and endometrial cancers are weaker and insufficient for cancers at all other sites. The World Cancer Research Fund and the American Institute for Cancer Research in a 2007 report concluded that evidences for the protection of physical activity against colon cancer is convincing and probable against postmenopausal breast cancer and cancer of...
the endometrium (WCRF/AICR, 2007). However, evidence suggesting that it protects against pre-menopausal breast cancer, cancers of the lung and pancreas is limited.

**Obesity and weight management**

Williamson et al., (1993) utilised data from the NHANES-I Epidemiologic Follow-up Study (1971-1975 to 1982-1984) to examine the relationship between self-reported recreational physical activity level and measured ten-year weight change among 3,515 men and 5,810 women aged 25 to 74 years. The cross-sectional analyses at both baseline and follow-up surveys revealed that recreational physical activity was inversely related to body weight.

Regular physical activity can buffer the risks associated with being overweight or obese, independently of its effect on body weight. He & Baker (2004) described a prospective study with a large sample size documenting relationships between physical activity and health outcomes in middle-aged adults. They found that being overweight or obese was associated with declines in physical health and development of a new physical difficulty (such as mobility difficulties). However, physical activity as defined by regular light or vigorous exercise or household chores reduced the risk of declining physical health independently of ability to achieve ideal body weight and other confounds (such as age, race, sex, socioeconomic status, smoking and alcohol use).

**Bone, joint and muscle health and performance**

Kohrt (2007) has reported that many studies show positive effects of either a physically active lifestyle or exercise interventions on intermediate markers of bone health such as bone mineral content (BMC) and bone mineral density (BMD) (Bonaiuti et al., 2002; Wallace & Cumming, 2000). Four possible mechanisms that may explain the beneficial effects of physical activity in reducing the risk of osteoporosis are that it (1) increases bone mineral accrual during maturation, (2) attenuates the rate of bone mineral loss during aging, (3) enhances bone strength and (4) reduces the risk of falls by improving muscle strength, flexibility, coordination and balance.

Literature has provided moderate to strong evidences on the importance of physical activity in optimising bone health during the developmental years (Kohrt, 2007). Even though the beneficial effects of physical activity in the long-term is not well known, observational studies do suggest of its strong role in preventing fractures during adulthood. This is possibly due to the benefits of physical activity on BMD, as indicated by various randomised controlled trials. However, at this point of time, there is still a lack of information to claim a dose-response relationship between physical activity and bone health.

There is a wealth of evidence depicting the impact of high-intensity resistance exercise in inducing muscle hypertrophy, through the enhancement of muscle mass and strength. However, studies have shown little or no anabolic effects on muscle through aerobic exercise and have concluded that aerobic fitness does not have an impact on fat-free mass (Hawkins et al., 2001).

Kohrt (2007) summarised that there is moderate to strong evidence that physical activity plays an essential role in the maintenance of bone health, although information is lacking to define the type and dose of activity required to optimise the
benefits. Physical activity has also successfully shown beneficial effects on pain and disability management in people with knee osteoarthritis (Roddy et al., 2005). It is evident that strength training has the ability to preserve muscle mass with aging of an individual, whilst aerobic exercise exudes multiple favourable effects on muscle quality despite having little effect on the preservation of muscle mass.

**Mental and neurological health**

Multiple studies (Ross & Hayes, 1988; Babyak et al., 2000; Paffenbarger et al., 1994) indicate that physical activity improves mood and reduces symptoms of depression and anxiety, while aerobic-exercise intervention showed significant improvements in depression comparable to individuals receiving psychotropic treatment and individuals in the aerobic-exercise condition had significantly lower relapse than those in the medication group. O’Connor (2007) stated that the size of literature is large for studies providing high-quality evidence about the role of physical activity in relation to anxiety, depression, alcohol use and smoking. However, a moderate amount of high-quality information is available about sleep, Alzheimer’s disease and feelings of fatigue.

3.2 Physical activity recommendations for general population

The Physical Activity Guidelines for Americans (DHHS, 2008) recommends that all adults should avoid inactivity and do at least 150 minutes a week (5 days X 30 minutes per day) of moderate-intensity, or 75 minutes a week of vigorous-intensity aerobic physical activity for substantial health benefits. The US Surgeon General’s Report (DHHS, 1996) stated that significant health benefits can be obtained by including a moderate amount of physical activity (such as 30 minutes of brisk walking or raking leaves, 15 minutes of running, or 45 minutes of playing volleyball) on most, if not all, days of the week.

Physical activities need not be performed for a continuous 30 minute period. It can be carried out in a combination of several bouts of at least 10 minutes each to achieve a total duration of 30 minutes or more, as research has shown that such accumulation can be just as effective as continuous activities in improving one’s health (Schmidt, Biwer & Kalscheuer, 2001). Additional health benefits can be gained through greater amounts of physical activity. People who can maintain a regular activity that is of longer duration or of more vigorous intensity are likely to derive greater benefits.

An average of 60 minutes of daily moderate intensity physical activity or shorter periods of more vigorous exertion was associated with a normal BMI and is therefore recommends for normal weight individuals (IOM, 2005). Whereas WHO (2004) recommends at least 30 minutes of regular, moderate-intensity physical activity on most days to reduce the risk of CVD and diabetes, colon cancer and breast cancer. Similarly, the 2005 Dietary Guidelines for Americans (DHHS, 2005) echoes that to reduce the risk of chronic disease in adulthood, adults should engage in at least 30 minutes per day of moderate intensity physical activity. For managing body weight and preventing gradual unhealthy weight gain in adulthood, DHHS recommends that adults engage in approximately 60 minutes per day of moderate to vigorous intensity activity.

Adults aged 65 years and older also gain substantial health benefits from regular physical activity (DHHS, 2008). Older adults
are advised to avoid inactivity, and should do at least 150 minutes a week of moderate-intensity, or 75 minutes a week of vigorous-intensity aerobic physical activity. The US CDC and the American College of Sports Medicine (Pate et al., 1995) recommended older adults to participate in moderate intensity aerobic activities three to five days a week for at least 30 minutes each session for cardio-respiratory health. For flexibility, it was recommended that stretching exercises should be done every day. While for strength training, it is recommended that older adults should do strength building activities on two to three days in a week. WHO (2004) emphasises that muscle strengthening and balance training are important to reduce falls among older adults and suggested that more physical activity is required for weight control.

Based on the current health situation and prevalence of obesity, the Technical Committee on Strategies for the Prevention of Obesity Malaysia (MASO, 2005) had adopted the key recommendation by Saris et al., (2003) that were presented in the International Association for The Study of Obesity (IASO) 1st Stock Conference and Consensus Statement. The recommendations are:

a. 30 minutes of moderate activity per day, or 1.7 PAL, is important for limiting health risks for a number of chronic diseases, including coronary heart disease and diabetes.

b. 45 to 60 minutes of moderate activity per day, or 1.7 PAL is required to prevent the transition to overweight or obesity.

c. 60 to 90 minutes of moderate activity per day, to prevent weight gain and regain.

d. For children, even more time is recommended.

3.3 Physical activity recommendations for specific groups

Children and adolescents

The National Association for Sports and Physical Activity, NASPE (2006) US had come out with a physical activity guideline for toddlers and preschoolers. The recommendations are that toddlers should accumulate at least 30 minutes in a day and preschoolers should accumulate at least 60 minutes in a day of structured physical activity. Besides that, it was recommended that toddlers and preschoolers should also engage in at least 60 minutes and up to several hours per day of unstructured physical activity and should not be sedentary for more than 60 minutes at a time except when sleeping.

In the Dietary Guidelines for Americans (DHHS, 2005), the recommendation for children and adolescents are to participate in at least 60 minutes of moderate intensity physical activity most days of the week, preferably daily. The Department of Health and Aging, Australia also recommends a minimum of 60 minutes of physical activity every day for children and adolescents (DHAA 2004a, b).

Sallis & Patrick (1994) at the International Consensus Conference on Physical Activity Guidelines for Adolescents had made recommendations specifically for adolescents that stated all adolescents should be physically active daily, or nearly every day, as part of play, games, sports, work, transportation, recreation, physical education or planned exercise, in the context of family, school and community activities.
Adolescents should engage in three or more sessions per week of activities that last 20 minutes or more at a time that require moderate to vigorous levels of exertion.

Pregnant women

The National Clinical Guideline for Antenatal Care, Norway (Holan, Mathiesen & Petersen, 2005) had established physical activity recommendations for pregnant women. Pregnant women, who are not previously active, are encouraged to be moderately active for up to 30 minutes per day. For those pregnant women who are regularly active, it is recommended that they should continue at an appropriate level of physical activity and continue with high intensity activities. Muscle training, especially for the back, stomach and pelvic floor, is important to bear the weight of the baby.

However, activities that are at high risk of falling (such as riding) and contact sports (such as basketball) should be avoided. The guideline also suggested that overheating of the body should be avoided by doing the activities in short periods, for example doing exercises in intervals of 15 minutes. Warning signs to terminate exercise during pregnancy are vaginal bleeding, dizziness, headache, chest pain, decreased foetal movement, and amniotic fluid leakage. Contraindications to aerobic exercise during pregnancy include placenta praevia, persistent bleeding, multiple pregnancy, severe anaemia, extreme obesity or underweight, premature labour and pre-eclampsia (ACOG, 2009).

Overweight/Obese

A consensus statement formed in 2002, as reported by Saris et al., (2003), recommends approximately 45 to 60 minutes, or 1.7 PAL (Physical Activity Level) per day of moderate intensity activity to prevent the transition from overweight to obesity. For preventing weight gain or regain in formerly obese individuals, 60 to 90 minutes of moderate intensity activity or lesser amounts of vigorous activity is required.

The Surgeon General’s Call to Action to Prevent and Decrease Overweight and Obesity 2001 (DHHS, 2001) suggest that individuals who are either overweight or obese should initiate physical activity slowly, with gradually increased intensity (such as start with a 10-minute walk three times a week and increase to 30 minutes of brisk walking or other form of moderate activity five times a week).

Activities for this specific group can also be done in several short periods (such as 10 minutes three times a day) as opposed to one single, long period (such as 30 minutes once a day).

The 2008 Physical Activity Guidelines for Americans (DHHS, 2008) stated that moderate-intensity aerobic physical activity of more than 150 minutes a week would be necessary to lose weight or keep the weight off. Some overweight or obese individuals would require the equivalent of 300 or more minutes of moderate-intensity physical activity a week to meet their weight-control goals. The guidelines also added that for weight-control, vigorous intensity activity is far more time-efficient than moderate intensity activity.

4. Current status

In Malaysia, the National Health and Morbidity Survey (NHMS II) conducted in year 1996 found that only 11.6% of 32,936 adults surveyed were doing regular physical
activity or adequate exercise (IPH, 1997). Twice as many men (16.2%) than women (7.7%) had adequate exercise (at least 15 minutes three times a week). There were no significant difference observed between rural (11.0%) and urban (12.1%) population. However, the NHMS only reported data on exercise and did not discuss physical activity pattern or levels.

The Malaysian Adults Nutrition Survey (MANS) 2003 also reported that the adult population of Malaysia were generally sedentary (Poh et al., 2008). Only 14.4% had adequate exercise, corresponding to 19.5% among men and a mere 9.1% among women. MANS 2003 also studied daily physical activity pattern from 24-hour physical activity recall and reported that Malaysian adults spent 89.3% of their day on light activities (that is $1286 \pm 1.30$ minutes), and only 10.3% on moderate activities ($148.68 \pm 1.31$ minutes) and 0.4% on vigorous activities ($5.12 \pm 0.26$ minutes).

Ten years after NHMS II, NHMS III conducted in year 2006 found that about 5.5 million Malaysian adults were physically inactive, which represented 43.7% of adult population (IPH, 2008). Women were significantly more inactive (50.5%) compared to men (35.3%).

Significant difference between urban and rural populations were also observed whereby urban adults were found to be more inactive (45.6%) as compared to rural adults (40.1%).

In view of such poor levels of physical activity among Malaysians, it is therefore important to include and highlight physical activity in the revised Malaysian Dietary Guidelines as a measure to promote physical activity amongst our population.
Key Message 3

Physical Activity Pyramid

Figure 3.1. Physical Activity Pyramid
5. Key recommendations

Key recommendation 1

Be active everyday in as many ways as you can.

How to achieve

1. Always attempt to incorporate more physical activities in daily life, as a form of exercise. Think of each movement as an opportunity for improving health, rather than as an inconvenience.

2. Do these activities whenever possible so as to be more active:
   
i. Choose to walk up the stairs, instead of taking the lift or escalator.
   
   ii. Choose to walk to the shop, surau or other places of worship, instead of driving.
   
   iii. Do housework manually, such as sweeping and mopping the floor and hand washing clothes, instead of using automated machines.
   
   iv. Park car a distance away and walk to intended destination.
   
   v. Gardening, such as moving pots or trimming plants.

Key recommendation 2

Accumulate at least 30 minutes of moderate intensity physical activity on at least five to six days a week, preferably daily. When fitness improves, the intensity level of physical activity and the amount of time spent on physical activity can be gradually increased.
How to achieve

1. Start off by doing moderate intensity physical activities, such as playing badminton, brisk walking, aerobic exercise, sepak takraw, cycling medium-paced, swimming medium-paced or indoor activities in gymnasium.

2. Remember moderate intensity activities, such as brisk walking can be incorporated into daily life (such as walk 10 minutes on the way to work and 10 minutes on the way home, and use stairs whenever possible instead of the lift or escalator).

3. As fitness improves, aim for 60 minutes or more of moderate intensity activities, or for 30 minutes or more of vigorous physical activity that makes you “huff and puff” such as brisk walking (faster pace), jogging, playing football, squash, tennis, netball and basketball every day.

For a more comprehensive list of moderate and vigorous intensity activities, refer to Appendix 1.

Key recommendation 3

Participate in activities that increase flexibility, strength and endurance of the muscles, as frequent as two to three times a week.

How to achieve

1. For flexibility activities, all major muscle groups such as legs, hips, back, chest, abdomen, shoulders and arms should be exercised. Flexibility exercise should be performed in at least four repetitions for each muscle group. Flexibility exercises include stretching exercises, yoga and tai chi.

2. Resistance and strength training exercises should be performed in sets of eight to 12 repetitions of eight to ten different types of exercises that condition the major muscle groups. As muscle strength improves, the number of sets performed can also be increased accordingly. Strength exercises include push-up, weight training (dumb bells) and boxing.

3. Endurance activities are characterised by high intensity and long duration. These activities should be spread out across the week in order to avoid excessive fatigue and to reduce the risk of injury. Endurance physical activities include running, marathon and distance bicycling.

For a more comprehensive list of flexibility and strength training activities, refer to Appendix 2.
Key recommendation 4

Limit physical inactivity and sedentary habits.

How to achieve

1. Limit sedentary activities to a maximum of two hours or less in a day. For example, watching television, playing video games or at the computer, surfing the internet and sitting or lying down (except when sleeping).

2. Always attempt to perform some simple activities such as stretching or sit-ups during intervals of watching television or working at the computer.

Additional recommendations: Specific groups

Children and adolescents

Toddlers should accumulate at least 30 minutes a day, while preschoolers should accumulate 60 minutes a day of structured physical activity. In addition, toddlers and preschoolers should also engage in a minimum of 60 minutes to several hours per day of unstructured physical activity. Examples of structured and unstructured physical activities are as in Appendix 3.

Children and adolescents should do 60 minutes or more of either moderate or vigorous intensity physical activity daily. Children and adolescents are also recommended to include muscle and bone strengthening activities as part of their 60 minutes or more daily physical activity.

Pregnant women

Healthy pregnant women who are not previously active should engage in moderate intensity activity for up to 30 minutes a day during pregnancy and during postpartum period. For healthy pregnant women who are habitually active, it is recommended that they continue to stay active at an appropriate level of physical activity throughout their pregnancy and the postpartum period. Muscle training especially for strengthening the back, stomach and pelvic floor is also important and is recommended for bearing the weight of the baby.

Pregnant women should avoid activities at high risk of falling (such as riding) and contact sports (such as basketball). They should also avoid overheating the body by doing activities in short periods, for example, in intervals of 15 minutes. Women with complicated pregnancy are not advised to exercise, but may instead benefit from rest. These include placenta previa, pregnancy induced hypertension, heart disease, multiple pregnancy and women who have a history of miscarriages and bleeding.

Overweight/ Obese

To lose weight, a total of more than 30 minutes a day of moderate-intensity physical activity is recommended, whilst approximately 45 to 60 minutes per day of moderate intensity physical activity is required to prevent the transition from overweight to obesity. For weight control and for preventing weight gain or regain among formerly obese individuals, a total of 60 to 90 minutes a day of moderate intensity activity or lesser amount of vigorous activity is recommended.
References


Appendix 1. For the second level of physical activity pyramid, examples of moderate and vigorous activities defined by level of intensity are as follows:

<table>
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<tr>
<th><strong>Moderate activity</strong></th>
<th><strong>Vigorous activity</strong></th>
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<tbody>
<tr>
<td>3.0 to 6.0 METs</td>
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<td>(3.5 to 7 kcal/min)</td>
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**Aerobic exercise:**

- Walking at a moderate or brisk pace of 5 to 7 km/h on a level surface inside or outside
- Walking (to class, work, store; for pleasure; for break; down stairs or down a hill)
- Walking while carrying a child
- Walking while pushing or pulling a child in a stroller or an adult in a wheelchair
- Race-walking - less than 8 km/h
- Actively playing with children - walking, running, or climbing while playing with children
- Carrying a child up a flight of stairs
- Child care: handling uncooperative young children (such as chasing, dressing, lifting into car seat), or handling several young children at one time
- Race-walking and aerobic walking at 8 km/h or faster
- Race-walking or jogging while pushing a stroller designed for sport use
- Jogging or running
- Vigorously playing with children - running longer distances or playing strenuous games with children
- Carrying an adult or a child up a flight of stairs
- Standing or walking while carrying an adult or a child
- Wheeling your wheelchair
- Walking and climbing briskly up a hill
- Roller skating or in-line skating at a brisk pace
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### Aerobic exercise (continued):

- Bathing and dressing an adult
- Hiking, jungle tracking
- Playing Frisbee
- Roller skating or in-line skating at a leisurely pace
- Bicycling 8 to 15 km/h, level terrain, or with few hills
- Stationary bicycling-using moderate effort
- Aerobic dancing-high impact
- Ballroom dancing
- Line dancing
- Traditional dancing such as *joget, mak yong*
- Modern dancing, disco-moderately fast
- Ballet
- Horseback riding-general
- Saddling or grooming a horse

- Bicycling more than 16 km/h or bicycling on steep uphill terrain
- Stationary bicycling-using vigorous effort
- Aerobic dancing-high impact
- Step aerobics
- Teaching an aerobic dance class
- Professional ballroom dancing—energetically Traditional dancing—such as *zapin, joget lambak, kuda kepang*
- Modern dancing, disco-energetically
- Horseback riding-trotting, galloping, jumping, or in competition
- Playing polo
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### Aerobic exercise (sports):
- Coaching children’s or adults’ sports
- Table tennis-competitive
- Tennis-doubles
- Golf, wheeling or carrying clubs
- Softball-fast pitch or slow pitch
- Basketball-shooting baskets
- Volleyball-competitive
- Netball
- Cricket-batting and bowling
- Badminton
- Archery (non-hunting)
- Fencing

### Aerobic exercise (water activities):
- Water aerobics
- Swimming-recreational
- Treading water-slowly, moderate effort
- Diving-springboard or platform
- Snorkelling
- Canoeing or rowing a boat at less than 4 mph
- Rafting-white water
- Sailing-recreational or competition

### Aerobic exercise (sports):
- Most competitive sports
- Tennis-singles
- Wheelchair tennis
- Football and futsal
- Basketball
- Wheelchair basketball
- Rugby
- Hockey
- Beach volleyball-on sand court
- Handball-general or team
- Racquetball
- Squash
- *Sepak takraw*

### Aerobic exercise (water activities):
- Water jogging
- Swimming-steady paced laps
- Synchronised swimming
- Treading water-fast, vigorous effort
- Water polo
- Water basketball
- Scuba diving
- Canoeing or rowing-6 or more km/h
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**Aerobic exercise (water activities) (continued)**
- Paddle boating
- Kayaking-on a lake, calm water

**Aerobic exercise (house chores):**
- General household tasks requiring considerable effort
- Moderate housework: scrubbing the floor or bathtub while on hands and knees, hanging laundry on a clothes line, sweeping an outdoor area, cleaning out the garage, washing windows, moving light furniture, packing or unpacking boxes, walking and putting household items away, carrying out heavy bags of trash or recyclables (such as glass, newspapers, and plastics), or carrying water
- Gardening and yard work: raking the lawn, bagging grass or leaves, digging, hoeing, light shovelling or weeding while standing or bending
- Planting trees, trimming shrubs and trees, hauling branches, stacking wood

**Aerobic exercise (water activities) (continued)**
- Kayaking in white water rapids

**Aerobic exercise (house chores):**
- Heavy housework: moving or pushing heavy furniture, carrying household items up a flight or stairs
- Standing, walking, or walking down a flight of stairs while carrying objects
- Gardening and yard work: heavy or rapid shovelling, digging ditches, or carrying heavy loads
- Climbing and trimming trees
- Home repair or construction: very hard physical labour, standing or walking while carrying heavy loads up a flight of stairs or ladder (such as carrying roofing materials onto the roof), or concrete or masonry work
- Hand-sawing hardwoods
- Outdoor carpentry, sawing wood with a power saw
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**Aerobic exercise (house chores): (continued)**

- Home repair: cleaning gutters, refinishing furniture, sanding floors with a power sander, or laying or removing carpet or tiles
- General home construction work: roofing, painting inside or outside of the house, wall papering, scraping, plastering, or remodelling
- Automobile bodywork
- Hand washing and waxing a car

**Modified from:** Ainsworth *et al.*, (2000)
Appendix 2. For the third level of physical activity pyramid, examples of flexibility and strength training activities defined by level of intensity are as follows:

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<td>(3.5 to 7 kcal/min)</td>
<td>(more than 7 kcal/min)</td>
</tr>
</tbody>
</table>

**Flexibility exercises:**

- Yoga
- *Tai Chi*
- Gymnastics
- General home exercises, light or moderate effort, getting up and down from the floor
- Jumping on a trampoline
- Using a stair climber machine at a light-to-moderate pace
- Using a rowing machine-with moderate effort

**Aerobic exercise:**

- Karate, taekwondo, judo
- *Silat*
- Jump rope
- Performing jumping jacks
- Using a stair climber machine at a fast pace
- Using a rowing machine-with vigorous effort
- Using an arm cycling machine-with vigorous effort

**Strength training:**

- Putting groceries away-walking and carrying especially large or heavy items

**Strength training:**

- Carrying several heavy bags of groceries at one time up a flight of stairs
- Grocery shopping while carrying young children and pushing a full grocery cart, or pushing two full grocery carts at once

**Strength training (exercise & sports):**

- Weight training and bodybuilding using free weights or Universal-type weights
- Boxing - punching bag

**Strength training (exercise & sports):**

- Circuit weight training
- Boxing - in the ring, sparring

*Modified from: Ainsworth et al., (2000)*
Appendix 3. For additional recommendations for children, examples of structured and unstructured physical activities are as follows:

<table>
<thead>
<tr>
<th>Structured physical activity(^1)</th>
<th>Unstructured physical activity(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Playing instruments</td>
<td>- Playing on school playground</td>
</tr>
<tr>
<td>- Playing in a marching band</td>
<td>- Moving about, swinging, or climbing</td>
</tr>
<tr>
<td>- Playing guitar or drums in a rock band</td>
<td>- Walking</td>
</tr>
<tr>
<td>- Twirling a baton in a marching band</td>
<td>- Helping around the house</td>
</tr>
<tr>
<td>- Singing and dancing as a co-curricular activity in school</td>
<td>- Taking the stairs</td>
</tr>
<tr>
<td>- Playing a musical instrument while actively running in a marching band</td>
<td>- Tidy up room</td>
</tr>
<tr>
<td>- Badminton</td>
<td>- Skateboarding</td>
</tr>
<tr>
<td>- Football</td>
<td>- Roller-skating or in-line skating</td>
</tr>
<tr>
<td>- Swimming</td>
<td>- Running</td>
</tr>
<tr>
<td>- Basketball</td>
<td>- Skipping</td>
</tr>
<tr>
<td>- Netball</td>
<td>- Jumping rope</td>
</tr>
<tr>
<td>- Futsal</td>
<td>- Performing jumping jacks</td>
</tr>
<tr>
<td>- Volleyball</td>
<td>- Bike riding</td>
</tr>
<tr>
<td>- Table tennis</td>
<td></td>
</tr>
<tr>
<td>- Karate, taekwondo, silat or other martial arts</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Activities done in a structured or organised environment (such as playing in a league, sports club, private facility)

\(^2\) Activities done in free play