CityU Briefing Session for Standard Chartered Hong Kong Marathon 2017-2018

Coach: Wong Tak Shing
<table>
<thead>
<tr>
<th>Year</th>
<th>Coaching</th>
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<tbody>
<tr>
<td>1984-1987</td>
<td>Coach (middle &amp; long distance) of Colgate Women Athletics Training Course</td>
</tr>
<tr>
<td>1987-now</td>
<td>Teacher-in-charge of Athletics and Cross Country Team at school</td>
</tr>
<tr>
<td>1996-1998</td>
<td>Coach (middle &amp; long distance) of HKAAA Athletics Junior Squad</td>
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<tr>
<td>1996-2001</td>
<td>Coach (middle &amp; long distance) of TCAA Summer Athletics Training Course</td>
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<tr>
<td>1997-Feb</td>
<td>Team Manager of Hong Kong Junior Cross Country Team for the 4th Asian Cross Country Championships</td>
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### About me...

<table>
<thead>
<tr>
<th>Year</th>
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<tr>
<td>1997-2002,</td>
<td>Lecturer of Level 1, 2, and 3 (Sports Psychology) Sports Coaching Courses of the Hong Kong Coaching Committee</td>
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<td>2006-2014</td>
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<td>2006-2010</td>
<td>Tutor/Coach of Joint Sports Centre* Running Classes</td>
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<td>2007-2008</td>
<td>Tutor/Coach of CityU Quali-run for Wellness 2007</td>
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<td>2007-now</td>
<td>Tutor/Coach of CityU Standard Chartered Hong Kong Marathon Running Classes</td>
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<tr>
<td>2009-2012</td>
<td>Tutor/Coach of BU Standard Chartered Hong Kong Marathon Running Classes</td>
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</tbody>
</table>

* Joint Sports Centre – BU, CityU, and PolyU
Is Running Safe?

### Sudden Deaths in the SCHK Marathon*

<table>
<thead>
<tr>
<th>Year</th>
<th>Gender</th>
<th>Age</th>
<th>Occurrence</th>
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<tbody>
<tr>
<td>2006</td>
<td>Male</td>
<td>53</td>
<td>13 Km after the start of the Marathon</td>
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<tr>
<td>2012</td>
<td>Male</td>
<td>26</td>
<td>40 m after crossing the finishing line of the Half-Marathon</td>
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<tr>
<td>2015</td>
<td>Male</td>
<td>24</td>
<td>Before the finishing line of the 10 K race</td>
</tr>
<tr>
<td>2017</td>
<td>Female</td>
<td>52</td>
<td>300 m before the finishing line of the 10 K race</td>
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</tbody>
</table>

* From Apple Daily 2017-02-14
Definition of Sudden Death

Adabag, et. al (2010)

- Unexpected death that occurs within 1 h from the start of symptoms when death is witnessed, and within 24 h of being seen alive and well when it is unwitnessed.
Risks of Sudden Death

Standard Chartered HK Marathon

- Over 860,000 participants since 1997.
- 4 deaths since 1997.
- 4/860000 or 1 in 215,000.

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<thead>
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<td>1,076</td>
<td>6,400</td>
<td>6,954</td>
<td>7,154</td>
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<td>13,574</td>
<td>18,386</td>
<td>24,324</td>
<td>31,330</td>
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<td>59,113</td>
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<td>73,953</td>
<td>73,334</td>
<td>73,805</td>
<td>73,895</td>
<td>74,402</td>
<td>74,000</td>
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</table>
Risks of Sudden Death

Earlier Research Results

• Maron, et. al (1996)
  • Risk of sudden cardiac death (SCD) with marathons is 1 in 50,000 finishers.

• Pedoe (n.d.)
  • London Marathon, from 1981 to 2003, 7 deaths or 1 in 67,414.

• Pedoe (2000)
  • New York Marathon, 3 in 400,000.
Risks of Sudden Death

Earlier Research Results

• Frere, et al. (2004)
  • 5 deaths in 1,636,720 finishers or 1 in 327,344.
  • Compared with the combined marathon results from Maron, et al (1996) and Pedoe (2000),
    • Risk of shorter races in their study: 3.1 in 1,000,000.
    • Risk of Marathon races: 14 in 1,000,000.
    • No significant differences among the shorter races.
Risks of Sudden Death

Roberts (2005): SCD Rates from the Twin Cities and Marine Corps Marathons

- 1976 to 1995: among 221,318 finishers, 1 in 55,000.
- Both subsets have virtually identical numbers of finishers.
- “This decrease in mortality observed among race participants experiencing cardiac arrest since 1995 is largely attributable to the expanded access to external defibrillators now available on many road racing courses, including the marathon.”
Risks of Sudden Death


• 1 in 57,000 for SCA and 1 in 171,005 for SCD (28 or 93% male with a mean age 49.7 year).
• The majority occurring in middle- to late-age males.
• Most common in the late stages of the race.
• Resuscitation is most successful when there are early responders and an AED (Automated External Defibrillator) is used.
Risks of Sudden Death

AED (Automated External Defibrillator)
Risks of Sudden Death


- **Mortality** after SCA, with no intervention, is greater than 95%.
- After initial collapse, survival decreases by 7%–10% with each minute that defibrillation is delayed.
- Defibrillation within 3 min of SCA can produce survival rates as high as 67%–74%.
Causes of Sudden Death

Semsarian, et. al (2016)

• Below 35 years
  • Hypertrophic cardiomyopathy
    • Unexplained left ventricular hypertrophy, which can lead to ventricular tachycardia/fibrillation and sudden cardiac death.
  • Congenital coronary artery abnormalities

• Aged 35 years and older
  • Atherosclerotic coronary artery disease
Causes of Sudden Death

Atherosclerosis

A Normal artery

B Plaque and fat build up in the walls causes artery to narrow

C Walls of the artery raptures as a result of continued build up of plaque and fat and forms blood clot.

D Blood clot grows and causes a blockage in the artery, preventing oxygenated blood to the brain and other parts.
PAR-Q

PAR-Q & YOU

(A Questionnaire for People Aged 15 to 69)

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
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<tbody>
<tr>
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PAR-Q

If you answered

YES to one or more questions

Talk with your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered YES.

- You may be able to do any activity you want — as long as you start slowly and build up gradually. Or, you may need to restrict your activities to those which are safe for you. Talk with your doctor about the kinds of activities you wish to participate in and follow his/her advice.
- Find out which community programs are safe and helpful for you.

NO to all questions

If you answered NO honestly to all PAR-Q questions, you can be reasonably sure that you can:

- start becoming much more physically active — begin slowly and build up gradually. This is the safest and easiest way to go.
- take part in a fitness appraisal — this is an excellent way to determine your basic fitness so that you can plan the best way for you to live actively. It is also highly recommended that you have your blood pressure evaluated. If your reading is over 144/94, talk with your doctor before you start becoming much more physically active.

DELAY BECOMING MUCH MORE ACTIVE:

- if you are not feeling well because of a temporary illness such as a cold or a fever — wait until you feel better; or
- if you are or may be pregnant — talk to your doctor before you start becoming more active.

PLEASE NOTE: If your health changes so that you then answer YES to any of the above questions, tell your fitness or health professional. Ask whether you should change your physical activity plan.

Informed Use of the PAR-Q: The Canadian Society for Exercise Physiology, Health Canada, and their agents assume no liability for persons who undertake physical activity, and if in doubt after completing this questionnaire, consult your doctor prior to physical activity.

No changes permitted. You are encouraged to photocopy the PAR-Q but only if you use the entire form.

NOTE: If the PAR-Q is being given to a person before he or she participates in a physical activity program or a fitness appraisal, this section may be used for legal or administrative purposes.

"I have read, understood and completed this questionnaire. Any questions I had were answered to my full satisfaction."
Reasons for Running

• Others are running
• My friends are running
• My boss is running
• My boss told me to run
• My love is running
• I love running
• As an elective programme
Reasons for Running

Ng & Lonsdale (2010)

- **Five main reasons** for running:
  1. Physical health
  2. Mental health
  3. Social factors
  4. Achievements
  5. Fun
Reasons for Running

**Curtis & McTeer (1981)**

- For *most* marathon runners,
  - At the beginning
    - Physical and mental health
  - Eventually
    - Achievements and challenges
Reasons for Running

Ogles & Masters (2000)

- Matured runners (50+)
  - Health
  - Weight control
  - Meaningfulness
  - Socialization
- Younger runners
  - Personal goals
Goals for Running

• Just for **health & fitness**
• Just to **finish** the race
• To achieve **personal best**
• To obtain **medals**

*Singer (1986, p. 31)*

• “If you don’t know where you’re going, it is difficult to select a suitable **means** of getting there.”
What is Training?

Klafs & Arnheim (1981)

- Training is a **systematic** process of **repetitive** and **progressive** exercise of work.

- Through systematic training and constant repetition, movements become more **automatic** and require less concentration by the higher nerve centers.

  - As a result, the amount of **energy** expended is **reduced**.
How to Train?

• **What** to train?
  • Running, cycling, swimming, weight training

• **How much?**
  • More is better?
  • Practice makes perfect?

• **How hard?**
  • No pain, no gain?
More is Better?


- Mileage↑ ⇒ Performance↑ (but, $r^2 = 0.1444$)
- 74% of runners who trained an average of 60 km/week claimed that they had different degrees of overuse injuries.

Fredericson, et al. (2007)

- Risks of running injuries **significantly increase** when the weekly mileage **exceeds 40 miles (64 km).**
Practice Makes Perfect?

Vernacchia, McGuire & Cook (1992, p. 105)

- “Practice does not make perfect; perfect, planned, purposeful practice makes perfect.”
No Pain, No Gain?
No Pain, No Gain?

Achilles Tendonitis

Heel Bone (Calcaneus)

Plantar Fasciitis

Most Injured Award
The Scientific Basis of Training
The Scientific Basis of Training

- Rest and nutrition are too often neglected.
- The longer the race, the more important is nutrition.
The Scientific Basis of Training

• **Sports Psychology**
  • **Psychological skills:** goal setting, arousal management, concentration & relaxation, imagery, building up confidence, ...
  • **Cognitive strategies:** association and dissociation

• **Motor Learning**
  • Acquisition of skills
  • Transfer of learning
The Scientific Basis of Training

- **Biomechanics**
  - Analysis of *running skills*
  - Running economy
  - Wind resistance & equipment
The Scientific Basis of Training

- **Nutrition**
  - Energy systems of the human body
  - Balanced diet & weight control
  - **Water replacement** and **fuel supply** during training and competition
  - **Pregame meal** & carbohydrate loading
The Scientific Basis of Training

- Exercise Physiology
- Principles of Training
- Training Methods
Mo Farah – London Olympics 2012
5000 m Final

Body Position

• Upper body erects, without leaning too much to the front.
• Eyes look forward at a distance far away.
• Face and neck muscles relax.
Mo Farah – London Olympics 2012
5000 m Final

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Body Position

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Mo Farah – London Olympics 2012
5000 m Final

Drive and Swing

- As the swinging leg moves forward and upward, the driving leg impulsively extends its hip joint, followed by the knee and ankle joints.
Mo Farah – London Olympics 2012 5000 m Final

Drive and Swing

• As the swinging leg moves forward and upward, the driving leg impulsively extends its hip joint, followed by the knee and ankle joints.
Mo Farah – London Olympics 2012
5000 m Final

Drive and Swing

• Finally, push-off the ground with the toes.
Mo Farah – London Olympics 2012 5000 m Final

Drive and Swing

• The lower leg of the swinging leg should be relaxed all the time, hanging loosely from the knee.

• At the end of the drive phase, the driving leg (i.e., the support leg) extends almost completely
Mo Farah – London Olympics 2012
5000 m Final

Recovery

• As the driving leg breaks ground-contact, the heel of this foot rises towards the hip.

• The knee of the other leg (i.e., the swinging leg) has to relax, getting ready for the landing.
Mo Farah – London Olympics 2012
5000 m Final

Recovery

• As the driving leg breaks ground-contact, the heel of this foot rises towards the hip.

• The knee of the other leg (i.e., the swinging leg) has to relax, getting ready for the landing.
Recovery

- As the driving leg breaks ground-contact, the heel of this foot rises towards the hip.
- The knee of the other leg (i.e., the swinging leg) has to relax, getting ready for the landing.
Recovery

• As the driving leg breaks ground-contact, the heel of this foot rises towards the hip.

• The knee of the other leg (i.e., the swinging leg) has to relax, getting ready for the landing.
Mo Farah – London Olympics 2012
5000 m Final

Landing and Support

• The foot forward of the body should make ground-contact (with knee slightly bent) within 30 cm in front of the projection of the body’s centre of gravity
Mo Farah – London Olympics 2012
5000 m Final

Landing and Support

• The outer edge of the ball of the foot makes ground-contact first.

• Immediately afterward, the foot rolls inward and the heel comes to the ground to bear the full weight of the body, preparing for the drive.

Remarks:
1. The ground-contact can also be made with flatted foot.
2. Do not deliberately avoid the heel from touching the ground.
Mo Farah – London Olympics 2012
5000 m Final

Landing and Support

• The knee of the supporting leg is slightly bent when the foot rests flat on the ground.

• The swinging leg should be flexing towards the hip as it advances forward.
Mo Farah – London Olympics 2012 5000 m Final

Landing and Support

- The knee of the supporting leg is slightly bent when the foot rest flat on the ground.
- The swinging leg should be flexing towards the hip as it advances forward.
Mo Farah – London Olympics 2012
5000 m Final

**Landing and Support**

- The knee of the supporting leg is slightly bent when the foot rests flat on the ground.
- The swinging leg should be flexing towards the hip as it advances forward.
Mo Farah – London Olympics 2012
5000 m Final

Arm Movement

• Hold the fists lightly, with the thumbs resting on the index fingers.

• Elbows bend at 90 degrees or smaller.
Arm Movement

- Hold the fists lightly, with the thumbs resting on the index fingers.
- Elbows bend at 90 degrees or smaller.
Mo Farah – London Olympics 2012
5000 m Final

Arm Movement

• Arms keep close to the body.
• Shoulders and chest should be relaxed, and arms should be swinging naturally just to counterbalance the momentum of the leg movements.
Mo Farah – London Olympics 2012
5000 m Final

Arm Movement

• No forceful arm actions should be emphasized.
Landing

Lieberman, et al. (2010)

1. Rear-foot (heel) strike，RFS
2. Mid-foot strike，MFS
3. Forefoot strike，FFS
Landing

Lieberman, et al. (2010)

• Landing with the heel (with or without shoes)
  • Have to repeatedly overcome a spike resulting from the normal reaction force, which is about 1.5 to 3 times the body weight.
  • Increase the risk of running injuries.
Landing

*Do not* prevent the *heel* from touching the ground even when using the *forefoot* strike.
Landing

Payne (1983)

• In a group of 18 international sprinters competing in events up to 200 m, only one did not lower the heel to the track.

• In another group of 41 international runners competing over 400-1500 m, only 6 used the same technique.
Wong-Sir’s Comments on Running Skills

- Vertically aligned head and body.
- Look forward and further away.
- Arms bent at 90° or smaller at the elbow.
- Do not over stride.
- Use forefoot strike or mid-foot strike, avoid heel strike.
- Land within 30 cm in front of the projection of the C.G. on the ground.
- Run in a steady and relax manner.
- Do not overemphasis arms movement.
Principles of Training

• Principle of Specificity
  1. Energy system
  2. Exercise mode

• Principle of Progressive Overload

• Principle of Hard and Easy Days

• Principle of Periodization
Principle of Specificity

1. Specificity of Energy System
   - ATP-PC system: Less than 10 s
   - Lactic acid system: 30 s to 2 min
   - Oxygen system: Over 3 min

The Energy Continuum for Selected Track Events

<table>
<thead>
<tr>
<th>Sprint (m)</th>
<th>ATP-PC System and Lactic Acid System</th>
<th>Oxygen System</th>
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<tr>
<td>100</td>
<td>0</td>
<td>80</td>
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<td>400</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>800</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>1500</td>
<td>50</td>
<td>% Aerobic</td>
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<tr>
<td>5000</td>
<td>20</td>
<td>80</td>
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<td>10000</td>
<td>10</td>
<td>90</td>
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<tr>
<td>42200</td>
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<td>100</td>
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</table>
Principle of Specificity

2. **Specificity of Exercise Mode**
   - Cyclists should pedal
   - Swimmers should swim
   - Runners should **RUN**
Principle of Progressive Overload

• Once the athlete has adapted to a workload of the training program, the workload should be increased.

• The workload should be increased progressively throughout the training program whenever the condition of the athlete has been improved so that the workload is always near to the maximal fitness capacity of the athlete.
Principle of Progressive Overload

- Normal performance capacity before training
- Fatigue
- Overcompensation
- Recovery periods
- Too easy workload
- Appropriate workload
- Extremely heavy workload

Time to train again:
- A -- Too early
- B -- Appropriate
- C -- Too late
Principle of Hard and Easy Days


• Prolonged, exhaustive endurance exercise can induce skeletal muscle damage and temporary impairment of muscle function.

Knitter, et al. (2000)

• If the exercise involves a large eccentric component, such as downhill running, damage is generally more severe.
Principle of Hard and Easy Days

**Gómez, et al. (2002)**
- It took about *48 hours* to recover from a 10-Km race.

**Grobler, et al. (2004)**
- Evidence suggested that the repairing process after a 42.2 Km Marathon race might take *1 to 10 weeks* to be completed.
Principle of Periodization

Different phases of periodization:
- General Preparation
- Specific Preparation

Preparation Period

Competition Period

Transition Period

Training volume, intensity, and performance capacity:
- Volume
- Performance capacity
- Intensity
Training Methods

- Continuous Running Training
- Interval Training
- Fartlek
- Hill running
- Time trial
- ...

Continuous Running Training

Fox, Bowers, & Foss (1993)

1. Continuous Slow-Running Training

- Generally, athletes should cover from 2 to 5 times of their race distance at a pace that can bring their heart rate to 80 to 85% of the $HR_{max}$ (i.e., maximal heart rate).

- Use as foundation training before moving up to continuous fast-running training, or as easy running sessions on recovery days.

$$HR_{max} = 220 - \text{age}$$
Continuous Running Training

Fox, Bowers, & Foss (1993)

2. Continuous Fast-Running Training

- The intensity of the run should bring the athlete’s heart rate to 85 to 95% of the $HR_{\text{max}}$.

- Simulates the race situation better than continuous slow-running training.
Interval Running Training

- Refers to a series of repeated bouts of runs alternated with periods of recovery.
  - e.g. 1, 20 x 200 m, 60 s each, jog 1 min between each.
  - e.g. 2, 8 x 1000 m, 5 min each, jog 3-4 min between each.
- The intensity or speed of the runs is usually greater or faster than that can be done continuously for the whole training session.
- The recovery periods are usually occupied by light or mild exercise (e.g., walking or jogging) rather than complete rest.
- Advantage: quantity of the runs can be increased while quality can be maintained.
Interval Running Training

Åstrand et al. (1960)

<table>
<thead>
<tr>
<th></th>
<th>Workload</th>
<th>Work</th>
<th>Rest</th>
<th>Total Time</th>
<th>Blood Lactate Concentration</th>
<th>Feeling of Subject</th>
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<td>Continuously</td>
<td>350W</td>
<td>-</td>
<td>-</td>
<td>9 min</td>
<td>16.5 mM</td>
<td>Exhausted</td>
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<tr>
<td>Intermittently</td>
<td>3 min</td>
<td>3 min</td>
<td>30 s</td>
<td>30 min</td>
<td>13.2 mM</td>
<td>Exhausted</td>
</tr>
<tr>
<td></td>
<td>30 s</td>
<td>30 s</td>
<td>30 s</td>
<td>30 min</td>
<td>2.2 mM</td>
<td>Not too tired</td>
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</table>
Interval Running Training

Christensen et al. (1960)

• Running on a treadmill at a speed of 20 km/h (i.e., 2:06 marathon time)
  • The subject could only run continuously for 4 min (covering a distance of about 1300 m)
  • The blood lactic acid level at the end of the test was 16.5 mM.
• When the activity was conducted as alternating periods of 10-s run and 5-s rest
  • the subject completed 20 minutes of running at 20 Km/hr in a 30-min period (covering a distance of 6670 m) without undue fatigue.
  • The blood lactic acid level at the end of the test was only 4.8 mM.
Interval Running Training

Sharkey (1986)

• Approximately equal work and rest intervals between 2 to 5 min seemed to produce the greatest aerobic improvements.

• Shorter work intervals (e.g., 15 s) with a work-rest ratio of 1:1 are also effective in developing the aerobic system.

• For anaerobic training, the maximum duration for any work interval should not exceed 90 s, or the body might switch to the aerobic system to support the ongoing activity.
Training for Health and Fitness

USDHHS (2008) and WHO (2012)

• For Health Benefits

  • Adults should do **at least 150 minutes** (2 hours and 30 minutes) a week of **moderate**-intensity, or **75 minutes** (1 hour and 15 minutes) a week of **vigorous**-intensity **aerobic** physical activity, or an **equivalent combination** of **moderate**- and **vigorous**-intensity **aerobic** activity.

  • Aerobic activity should be performed in episodes of **at least 10 minutes**, and preferably, it should be spread throughout the week.
Training for Health and Fitness

USDHHS (2008) and WHO (2012)

- For Additional and More Extensive Health Benefits
  - Adults should increase their aerobic physical activity to 300 minutes (5 hours) a week of moderate-intensity, or 150 minutes a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity activity.
  - Additional health benefits are gained by engaging in physical activity beyond this amount.
Training for Health and Fitness

USDHHS (2008) and WHO (2012)

• Moderate-intensity
  • At 3 to 5.9 METs (i.e., 3 to 5.9 times the intensity of rest).
  • About 5 or 6 on a scale of 0 to 10 relative to an individual’s personal capacity, where 0 is the level of effort of sitting, and 10 is maximal effort.
  • 2.5 mph or 4 km/h (3 METs) or faster.
Training for Health and Fitness

**USDHHS (2008) and WHO (2012)**

- **Vigorous-intensity**
  - 6 METs or above (i.e., 6 or more times the intensity of rest).
  - About 7 or 8 on a scale of 0 to 10 relative to an individual’s personal capacity.
  - 4 mph or 6.4 km/h (6 METs) or faster.
  - 1 minute of vigorous-intensity activity counts the same as 2 minutes of moderate-intensity activity.
Ainsworth, Haskell, & Leon et al. (2011)

The compendium of physical activities (體力活動綱要)

<table>
<thead>
<tr>
<th>Speed</th>
<th>Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>mph</td>
<td>min/mile</td>
</tr>
<tr>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>5.2</td>
<td>11.5</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>6.7</td>
<td>9</td>
</tr>
</tbody>
</table>
Ainsworth, Haskell, & Leon et al. (2011)

**The compendium of physical activities**

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Speed (min/mile)</th>
<th>Speed (min/km)</th>
<th>Speed (min/400 m)</th>
<th>Intensity (MET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>8.5</td>
<td>5:17</td>
<td>2:07</td>
<td>11.0</td>
</tr>
<tr>
<td>7.5</td>
<td>8</td>
<td>4:58</td>
<td>1:59</td>
<td>11.5</td>
</tr>
<tr>
<td>8</td>
<td>7.5</td>
<td>4:40</td>
<td>1:52</td>
<td>11.8</td>
</tr>
<tr>
<td>8.6</td>
<td>7</td>
<td>4:21</td>
<td>1:44</td>
<td>12.3</td>
</tr>
<tr>
<td>9</td>
<td>6.5</td>
<td>4:02</td>
<td>1:37</td>
<td>12.8</td>
</tr>
</tbody>
</table>
### The compendium of physical activities

<table>
<thead>
<tr>
<th>Speed</th>
<th>Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>mph</td>
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</tr>
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<tr>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>13</td>
<td>4.6</td>
</tr>
<tr>
<td>14</td>
<td>4.3</td>
</tr>
</tbody>
</table>
Wong-Sir’s Comments on Training for Race Performance

• No definite answer from authorities
• Take part in a race for the first time
  • Goal: Finish the race
• Take part in the race again
  • Goal: PB or medal
• Pace judgement is extremely important
Determinants of Aerobic Performances

Joyner & Coyle (2008)

- Maximal oxygen consumption ($\dot{V}O_2\text{max}$), anaerobic threshold (AT) and running economy (RE) are the three main factors appear to play key roles in endurance performance.

Midgley, et al. (2007)

- These three determinants explain > 70% of the between-subject variance in long distance running performance.
**HR_{\text{max}}**

National Council on Strength & Fitness

<table>
<thead>
<tr>
<th>% VO_{2\text{max}}</th>
<th>% HR_{\text{max}}</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>70%</td>
<td>Very Slow (warm up, cool down, recovery)</td>
</tr>
<tr>
<td>60%</td>
<td>75%</td>
<td>Slow Running (early measure of a long run, recovery day)</td>
</tr>
<tr>
<td>70%</td>
<td>82%</td>
<td>Steady Running (off-season: maybe challenging for LIT runs)</td>
</tr>
<tr>
<td>80%</td>
<td>88%</td>
<td>Half Marathon Pace: Just above Marathon Pace</td>
</tr>
<tr>
<td>90%</td>
<td>95%</td>
<td>10K Speed</td>
</tr>
<tr>
<td>95%</td>
<td>98%</td>
<td>5k Speed</td>
</tr>
<tr>
<td>100%</td>
<td>100%</td>
<td>3K Speed</td>
</tr>
<tr>
<td>110%</td>
<td>100%</td>
<td>1500 Speed</td>
</tr>
</tbody>
</table>
Wong-Sir’s Comments on $\dot{V}V_{O_2}^{\text{max}}$ Running Prescription

<table>
<thead>
<tr>
<th>Major Distance Running Events</th>
<th>Training Speed (% $\dot{V}V_{O_2}^{\text{max}}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,500 m, 1 mile (1,609 m), 2K (2,000 m)</td>
<td>100 to 115%</td>
</tr>
<tr>
<td>3K (3,000 m), 5K (5,000 m)</td>
<td>95 to 105%</td>
</tr>
<tr>
<td>10K (10,000 m), 15K (15,000 m)</td>
<td>90 to 100%</td>
</tr>
<tr>
<td>Half Marathon (21,097 m)</td>
<td>85 to 95%</td>
</tr>
<tr>
<td>Marathon (42,195 m)</td>
<td>75 to 85%</td>
</tr>
</tbody>
</table>

**Remarks:**
1. Data adjusted (by me) for local runners.
2. 3000 m is considered as running close to 100% for elite runners.
One More Thing...

**Anaerobic Threshold**
- Become more important when \( \dot{V}_{O_2} \text{max} \) has reached its plateau.
Wong-Sir’s Comments on Training for Race Performance

Pace Running

• Run at a **steady pace** as much as possible.
  • Newton’s 1st and 2nd laws of motion

• Most of the runs should be conducted at **race pace** or **slightly faster** than **race pace**.
  • To facilitate **Transfer of Learning**
## Constant Speed Tables for Selected Distances

| Distance (m) | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1200 | 1500 | 1800 | 2000 | 2500 | 3000 | 4000 | 5000 | 6000 | 7000 | 8000 | 9000 | 10000 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0.00-15     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-16     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-17     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-18     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-19     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-20     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-21     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-22     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-23     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-24     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-25     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-26     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-27     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-28     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-29     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|
| 0.00-30     | 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00| 0.00|

Published by Wong-Sir from [http://www.tswongsir-runners-guide/](http://www.tswongsir-runners-guide/)
Nutrition for Athletes

Fox, Bowers, & Foss (1993)
• The biggest difference in food requirements for the athlete versus the non-athlete is the total number of calories consumed; and the athlete will require more.

US National Research Council (1989)
• Recommended Dietary Allowances (RDAs)
  • Male: 2,900 kcal/day
  • Female: 2,200 kcal/day
Nutrition for Athletes

American College of Sports Medicine, American Dietetic Association, and Dietitians of Canada (2000)

• Unless athletes restrict themselves from energy intake or eliminate one or more food groups from their diet, supplementation of vitamins and minerals is generally not required.
Pregame Meal

ACSM, ADA, & DC (2000)

- **Sufficient** in fluid to maintain hydration.
- **Low** in fat and fiber to facilitate gastric emptying and minimize gastrointestinal distress.
- **High** in carbohydrate to maintain blood glucose and maximize glycogen stores.
- **Moderate** in protein, and composed of foods familiar to the athlete.
Pregame Meal

Wilmore & Costill (1994)

- Carbohydrates consumed either 5 minutes or 2 hours before, or during exercise enhance endurance performance (lasting over 1 hour).
- However, athletes should keep away from carbohydrates 15 to 45 minutes before exercise to avoid the secretion of insulin, which reduces blood glucose level and leads to premature fatigue.
Pregame Meal

**Competition in the Morning**
- High-carbohydrate dinner the night before.
- Light breakfast or some snacks in the morning on race day.

**Competition in the Afternoon**
- High-carbohydrate diets the night before and in the morning of race day.
- Light meal or some snacks only for lunch.

**Competition in the Evening**
- High-carbohydrate breakfast and lunch on race day.
- Some snacks only in the afternoon.
Hydration and Dehydration

• Water makes up almost **40 to 60%** of body weight.
• A Marathon runner may lose **6 to 10%** of her body weight simply due to **perspiration** in a race.

**Wilmore and Costill (1994)**

• Found that a runner, who had finished the 10,000 m in 35 minutes before, could run **2:48 slower** (i.e., by 4%) due to dehydration.
Hydration and Dehydration
ACSM, ADA, & DC (2000)

Before Exercise
• Drink an **extra 400 to 600 ml** of water within the **2 to 3 hours** before exercise starts.

During Exercise
• Consume **150 to 350 ml** of water at **15- to 20-minute intervals**, beginning at the start of exercise.
• also better for the drink to contain **4 to 8% of carbohydrate** if the event lasts over one hour.

After Exercise
• Continue to drink water up to **150%** of their **body weight loss**.
Running Training Q&A
Want to know more...

http://www.tswongsir-runners.guide