Aerobic exercise and water loss

Having recently moved to Singapore, the change in temperature has been hard to adjust to, and training outside in the high humidity is proving very challenging. I am also finding I am consuming lots of water after a 1 hour training session compared to the same training and intensity back in my home country which is a much colder climate. I am therefore interested to find out more about how the heat affects the body during training.

Body mass will decrease due to athletes sweating in response to an aerobic run over various terrains. There will be a significant amount of water loss as respiration will lead to heat loss from the body via the evaporation of water/sweat from the surface of the body. Harvey A, Merira, Brooks B, and Hollway A in the Journal of Science and Medicine in Sport (2008, 11, 6 – 603) state there is a direct correlation with change in body mass and water loss.

Research Question:

What is the effect of an aerobic run over an undulating terrain of approximately 5.2 km (±0.2km) at 75% -85% of maximum heart rate on body mass (kg±0.2kg) in relation to water loss?

Conduction, convection and radiation can be pathways of both heat loss and heat gain depending upon the gradient between skin temperature and the environment.

| Conduction     | ...is the transfer of heat from one object to another through direct contact |
| Convection     | ...involves the transfer of heat between the body and a liquid or gas that moves around the warm body or body parts |
| Radiation      | ...is the loss of heat through the emission of infrared radiation from the skin to the environment |
| Evaporation    | ...can only result in heat loss (transfer) from the body to the environment. It is the process via which water on the skin is transformed into water vapour. E.g. sweating |

Method of Investigation

Independent Variable:
- Exercise intensity measured at 75% - 85% of maximum heart rate. Participants to monitor own target heart rate (THR) zone on their own heart rate watch though wearing the receiver in the form of a chest strap.

Dependent Variable:
- Body mass measured on electronic scales at 5 different times: 5 minutes prior to run, after lap number 1, 2, 3, 4 in addition to 5 and 10 minutes after completing the run.
Confounding variables

- Hydration levels – participants will be asked to drink at least 500 cm³ of water in the 30 minutes prior to test as no water can be consumed throughout the run.
- Health – participants who report feeling unwell will be asked to retake the run on another day.
- Atmospheric pressure/temperature/humidity – all data to be collected on the same day at 10.30am as far as possible.
- Fitness level – participants will work between 75% - 85% of maximum heart rate to control the effect of exercise intensity.
- Shoes/dirt after run – participants will be asked to bang their shoes together after completion of the 5.2 km run (lap 4) and prior to the mass being recorded at 5 minutes and 10 minutes after completing the run to try and remove any dirt/soil that has attached to the bottom of their running shoes.
- Wiping off sweat – Participants informed they must wipe off sweat from all parts of the body including the face, arms, legs, chest and back using the towel provided before weighing.

Safety

- Completion of PAR-Q questionnaire to ensure there are no pre-existing health issues which can affect the results.
- Footwear is important to ensure friction on the ground and the foot does not slip and results cuts, grazes or blisters.
- Hydration -1 litre water bottle passed to all participants to drink after completion of the test.

Apparatus/Equipment

- 12 participants
- 2 × electronic scales (± 0.2 kg = mechanical error)
- 12 hand towels (different patterns/colours)
- 12 singlets
- 1 test conductor
- 2 mass readers and two recorders
- 12 × stop watches (± 0.5 s = human error) and 12 time keepers
- 12 polar heart rate monitors and strap (± 2 bpm = mechanical error))
- Pen and paper for recording data
- 12 ×1 litre bottle of water

Method:

1. The names of all sports exercise health science male volunteers aged 16 to 18 years who are happy to take part in the investigation are keyed into the mini web tool site (http://www.miniwebtool.com).

2. The 12 selected participants are asked to sign a consent form and PAR-Q.

3. Participants will be passed the heart rate monitor to ensure familiarity and to record their own resting heart rate in a seated position. Resting heart rate recorded by test conductor and running training zone of 75-85% heart rate zone calculated for all athletes and shared with participant.

4. All participants are asked to consume 500ml of water prior to turning up for the investigation on Monday at 10am. Requested clothing includes trainers, socks, shorts and the singlet provided by the test conductor. Participants informed that the results will be kept confidential and they have a right to withdraw themselves or their results from the experiment at any time.
5. On arrival participants’ clothing is checked by the test conductor and that all participants are wearing the allocated singlet and passed their own personal towel to wipe off sweat on arms and legs at the end of every lap and before being weighed. Heart rate monitors checked and participants reminded of their own training zone and to keep within this zone throughout the run.

6. 10 minute warm up led by the test conductor to include cardio and dynamic stretches for all participants.

7. Reliability and accuracy of the scales is tested using a 5kg weight.

8. Participants informed that after the completion of each lap to go straight to one of the two scales to be weighed before carrying on with the next lap (same process until all laps are completed). Participants informed they must wipe off sweat from all parts of the body including the face, arms, legs, chest and back using the towel provided before weigh in. Each participant will have his own towel.

9. Participants asked to indicate their own perceived level of fatigue on a 5 point scale prior to the first weigh 5 minutes before the race

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Feeling fresh and ready to go</td>
</tr>
<tr>
<td>2</td>
<td>Not feeling tired but not as fresh as I could be</td>
</tr>
<tr>
<td>3</td>
<td>Feeling a little tired, coping, but could do with a little more rest prior to the run</td>
</tr>
<tr>
<td>4</td>
<td>Definitely feeling very tired (e.g. poor sleep/physically drained) and would like to do the run later in the day</td>
</tr>
<tr>
<td>5</td>
<td>Absolutely shattered and everything is a huge effort and draining. Batteries are flat and would rather do the run on another day</td>
</tr>
</tbody>
</table>

Adapted from [http://www.intelligent-triathlon-training.com](http://www.intelligent-triathlon-training.com)

10. All 12 participants called to the start line, watches/heart rate checked and race started with the command “take your marks” followed by a long whistle.

11. Upon completion of every lap mass recorded by external recorder who is standing at the 1.3 km mark.
- Lap one (1.3 km ±0.1 km) and body mass measured/recorded
- Lap two (1.3 km ±0.1 km) and body mass measured/recorded
- Lap three (1.3 km ±0.1 km) and body mass measured/recorded
- Lap four (1.3 km ±0.1 km) and body mass measured/recorded

12. At the end of lap 4 and weigh in, each runner has their own timekeeper to record the 5 minute rest and 10 minute rest. During the 5 minute rest period participants informed they need to bang shoes together to remove excess dirt, however, all clothing remains intact.
- After 5 minutes rest, the body mass measured/recorded
- After 10 minutes rest, the body mass measured/recorded
13. 1 litre water bottle passed to each participant to drink over the next 30 minutes. Participants thanked for participating in the run and once again informed results will be anonymous and they have a right to withdraw their results from the experiment at any time.

Results

Table 1. Fatigue reading and body mass prior to, during and after a 5.2 km (±0.2 km) aerobic run at 75% - 85% of maximum heart rate.

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Fatigue Reading (Scale 1-5)</th>
<th>5 minutes prior to run</th>
<th>After lap 1</th>
<th>After lap 2</th>
<th>After lap 3</th>
<th>After lap 4</th>
<th>5 minutes after run</th>
<th>10 minutes after run</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>75.9</td>
<td>76.2</td>
<td>76.1</td>
<td>76.1</td>
<td>75.9</td>
<td>75.8</td>
<td>75.9</td>
<td>75.9</td>
</tr>
<tr>
<td>2</td>
<td>75.8</td>
<td>75.8</td>
<td>75.8</td>
<td>75.6</td>
<td>75.6</td>
<td>75.6</td>
<td>75.6</td>
<td>75.4</td>
</tr>
<tr>
<td>3</td>
<td>79.2</td>
<td>79.1</td>
<td>79.1</td>
<td>79.1</td>
<td>78.9</td>
<td>78.6</td>
<td>78.9</td>
<td>76.7</td>
</tr>
<tr>
<td>4</td>
<td>79.8</td>
<td>79.6</td>
<td>79.5</td>
<td>79.4</td>
<td>79.2</td>
<td>79.2</td>
<td>79.4</td>
<td>79.4</td>
</tr>
<tr>
<td>5</td>
<td>81.9</td>
<td>81.9</td>
<td>81.8</td>
<td>81.7</td>
<td>81.6</td>
<td>81.3</td>
<td>81.3</td>
<td>81.3</td>
</tr>
<tr>
<td>6</td>
<td>81.8</td>
<td>82.0</td>
<td>81.7</td>
<td>81.6</td>
<td>81.4</td>
<td>81.0</td>
<td>81.1</td>
<td>81.1</td>
</tr>
<tr>
<td>7</td>
<td>71.2</td>
<td>71.3</td>
<td>71.4</td>
<td>71.2</td>
<td>71.0</td>
<td>70.7</td>
<td>70.9</td>
<td>71.0</td>
</tr>
<tr>
<td>8</td>
<td>71.7</td>
<td>71.6</td>
<td>71.5</td>
<td>71.4</td>
<td>71.4</td>
<td>71.1</td>
<td>71.1</td>
<td>71.2</td>
</tr>
<tr>
<td>9</td>
<td>81.9</td>
<td>82.0</td>
<td>81.7</td>
<td>81.6</td>
<td>81.4</td>
<td>81.0</td>
<td>81.1</td>
<td>81.1</td>
</tr>
<tr>
<td>10</td>
<td>67.9</td>
<td>68.0</td>
<td>67.9</td>
<td>67.8</td>
<td>67.7</td>
<td>67.5</td>
<td>67.6</td>
<td>67.6</td>
</tr>
<tr>
<td>11</td>
<td>82.5</td>
<td>82.3</td>
<td>82.1</td>
<td>81.8</td>
<td>81.5</td>
<td>81.5</td>
<td>81.8</td>
<td>81.8</td>
</tr>
<tr>
<td>12</td>
<td>101.2</td>
<td>101.0</td>
<td>101.0</td>
<td>100.8</td>
<td>100.6</td>
<td>100.5</td>
<td>100.5</td>
<td>100.5</td>
</tr>
<tr>
<td>Average body mass (kg)</td>
<td>78.7</td>
<td>79.2</td>
<td>79.1</td>
<td>79.0</td>
<td>78.9</td>
<td>78.7</td>
<td>78.2</td>
<td></td>
</tr>
<tr>
<td>SD (kg)</td>
<td>6.7</td>
<td>8.4</td>
<td>8.4</td>
<td>8.3</td>
<td>8.3</td>
<td>8.3</td>
<td>7.7</td>
<td></td>
</tr>
</tbody>
</table>

Error margin: Electronic scales - mechanical error margin of (± 0.2 Kg)

Qualitative data

Participant 1
- Did not wipe off sweat after any lap and before being weighted
- Did not eat breakfast and asked if they could run on a different day (fatigue level 4).

Participant 6
- Did not wipe off sweat after lap 1 prior to weigh in and then he only wiped his face

Participant 7
- First run after coming back from an ankle injury
- Cross country runner

Participant 9
- Recovering from a knee injury
- Did not wipe of sweat after any lap and before weigh in
- Cross country runner

Anomalies highlighted in yellow
Participant 10

- 1st team football captain

Graph 1 Processed data to show changes in bodyweight prior, during and after a 5.2km (±0.2km) aerobic run at 75% - 85% of maximum heart rate.

Conclusion

The investigation looked into the effect of a 5.2 km aerobic run in relation to water loss on body mass (±0.2 kg). The prediction that body mass will decrease due to athletes sweating in response to the 5.2km aerobic run over various terrains at an intensity between 75% - 85% of maximum height rate was accepted and supported by the calculated mean data. The average weight prior to the run was 78.7 kg (±6.7 kg) and 5 minutes after the run the mean score was the same 78.7kg (±8.3), however, the largest difference was evident 10 minutes of the run with a mean weight of 78.2 kg (±7.7 kg) with a total mean loss of 0.5 kg being recorded. There are examples where the weight of individuals remained the same or slightly increased between testing trials, however, these results may be difficult to explain due to the limited qualitative data.

The similarity in the data is reflected in graph 1 as all data points are close together with the trend line showing an initial increase after lap 1 followed by a slight negative gradient. It was not expected that the mean body mass would increase by 0.5kg from a reading of 78.7kg 5 minutes prior to the race to 79.2kg after the first lap of approximately 1.3km. This increase could have been due to the mud sticking to the bottom of the shoes of the participants as on the day prior to the run we did have heavy rain and the field was muddy in some places. Another reason for the increase could be the reliability of the scales. Unfortunately, due to time constraints it was not possible to gain 3 recordings for the participants mass and in turn the first reading had to be accepted. All recordings after lap one dropped from 79.2kg to 78.9kg at the end of the final lap (4) recording a mean loss of 0.3kg. However,
it is interesting to highlight that this is an increase of 0.2kg from the first reading of 78.7kg. 5 minutes after the run was completed the first mean reading of 78.7kg signified no decrease in weight from the mean recorded (78.7kg) 5 minutes prior to the start of the race. However, if we look at the reading after the first lap it is evident there is a reduction of 0.5kg from 79.2kg to 78.7kg, and a 1 kg loss from 79.2kg (after lap 1) to 78.2kg 10 minutes after the run had ended. It is clear that once exercising has stopped, the body still continues to sweat to cool down as body mass dropped from 78.7kg after the first 5 minute rest period to 78.2kg 10 minutes after the run had ended. For the purpose of the investigation it is crucial that the weight loss is calculated from the mean weight recorded 5 minutes prior to the race and the final reading, which clearly demonstrates a decrease in body weight of 0.5 kg from the mean score of 78.7kg to 78.2kg.

The trends recorded in the investigation are supported by Maughan in the article ‘water balance and salt losses in competitive football’ in the International Journal of Sport Nutrition and Exercise Metabolism (2007). The results recorded a mean loss of 1.68kg in body weight after a game of professional competitive football due to sweat loss. However, they did find a wide range of values in comparison to the mean reflecting a large standard deviation (SD). This is similar to the current investigation where the standard deviation prior to the start of the run was 6.7kg with the highest SD value of 8.4kg being recorded after lap 2 and the final SD of 7.7kg 10 minutes after the end of the run. Despite data being widely spread around the mean, it is possible to state that the findings support those of Maughan as there was a decrease in body weight following a 5.2 km aerobic run.

The wide spread of data could have been a result of many data points not supporting the hypothesis as we did not always see a reduction in recorded individual body mass readings. Participant 1, 6, 7, 9 and 10 all recorded higher readings after lap one to the reading 5 minute prior to the start of the run and this was not expected as readings should stay the same or slightly decrease. Readings increased from 73.9kg to 76.2 kg for participant (P1) 1, 81.8kg to 82.0kg (P6), 71.2kg to 71.3kg (P7), 81.9kg to 82.0kg (P9) and 67.9kg to 68.0kg (P10). As discussed earlier this could be due to the mud on the bottom of their shoes or scales not being too reliable. Another possibly reason for the anomaly with participant 1 is that they did not wipe of their own sweat with a towel after any lap and before the weigh in which could explain the same reading of 75.9kg being recorded 10 minutes after the run had completed. They also recorded a score of 4 on the perceive scale and this could explain their inability to follow the protocol and possible lack of effort and especially as they asked twice if they could run on another day. Participant 1 was offered the opportunity to withdraw completely from the experiment, however, they decided to run and be part of the experience. Participant 6 too did not wipe their sweat off after lap one and this could help explain the increase from 81.8kg to 82.0kg after lap one. Fortunately, this was noticed and they were reminded to do this after completing the remaining laps. Participant 7 and 9 were coming back from injury and were a little apprehensive during the run and from an observers point of view they did not appear to push themselves as hard as they normally run. This was evident as usually they are the first two to three runners over the line and this was not the case. It was also not possible to monitor during the run to see if participants kept within the allocated heart rate zone and intensity level assigned to them. The combined impact of these weaknesses are likely to have had an effect on the trend line, however, a strong negative correlation of -0.62 is still recorded for the correlation of exercise/time and decrease in body mass.

The overall trend supports the scientific fact that when exercising the body responds to the increase in heat by trying to cool down. At the start of the run body temperature rises due to the increased heart rate as the body requires more oxygen at the working muscles to keep up with the demands of aerobic exercise, thus increasing cardiac output and blood pressure. Core body temperature increases and the eccrine sweat glands are activated by the brain’s hypothalamus to initiate the cooling process. Evaporation will lead to heat loss from the body via the evaporation of water/sweat from the surface.
of the body. The process of heat loss via evaporation is the most important way of attempting to
maintain term homeostasis (36-38°C) during exercise. Sweat allows the body to regulate its
temperature and is secreted by sweat glands in the skin. Smooth muscle in the skin arterioles can cause
blood vessels to vasodilate to direct blood to the skin for heat transfer out of the body. We ventilate
more during exercise and we activate the eccrine sweat glands the cover the surface of the skin. These
glands are innervated by the sympathetic nervous system and are activated by the thermoregulatory
center (hypothalamus in the brain)

Singapore is a very humid environment and a high humidity decreases the rate of evaporation of the
sweat and reducing body heat. Water content in the air is already high in our humid conditions and so
the effectiveness of sweating is reduced even though large quantities of sweat beads on the skin. Instead
evaporating, water will drop off the skin without removing the heat it was meant to dissipate. The
practice of removing sweat with a towel before sweat evaporates will hinder evaporative cooling, since
lack of moisture on the skin will mean that no evaporative cooling can take place and this is something
which would need to be addressed if the experiment was to be repeated.

In conclusion, the prediction that body mass will decrease due to athletes sweating in response to
the 5.2 km aerobic run over various terrains at an intensity between 75% - 85% of maximum heart
rate was accepted and supported by the calculated mean data.

Evaluation

Strengths

Group randomization is controlled to try and achieve fair groups by asking for male volunteers aged
16 to 18 years who were happy to take part in the investigation. Names were keyed into the mini web
tool site and the first 12 selected invited to participate in the run.

A lot of time and effort was spent reviewing the variables to ensure that the only thing that was changed
was the THR zone for each participant. A key strength of the investigation was that each participant
was asked to work at the same rate and equal intensity between 75-85% of their maximum heart rate
with their resting heart rate being incorporated into the final calculation. This meant that each
participant had their own personalized zones to work within throughout the run. Key variables also
included using the same model for the two scales with both being calibrated with a 5kg weight prior to
the first weigh in. Participants were required to wear the same type of singlet to try and reduce the

Maximal sweat rates can reach 2-3 L per hour which means the body undergoes a range of physiological adaptations:
- Loss of fluid
- Loss of body mass
- Decrease in plasma volume
- Altered electrolyte balance
- Less urine production due to the retention of sodium and fluids
- Decreased central blood volume and stroke
- Decreased stroke volume
- Increased heart rate and thus more cardiac work
portion of water/sweat that is absorbed into the clothing throughout the run. Participants were informed to consume at least 500ml of water in the morning prior to the run, as they were not able to consume any water after the first weigh until the final recording 10 minutes after the end of the run. A Par-Q questionnaire was undertaken by all participants to ensure all were healthy and fit, and if anybody had a current injury they would have been asked to not participant in the experiment.

Weaknesses and Improvements

**Weakness 1: Monitoring of Intensity Levels (THR Zones)**
Participants were asked to monitor their own intensity level by ensuring their heart rate stayed within 75-85% of their maximum heart rate throughout the run by monitoring their own heart rate on the watch.

**Significance of Error:** High
High significance due to monitoring of intensity levels being reliant upon self-monitoring with no external check. It is not possible to determine if participants are being honest and are affected by their current mood when they filled in the fatigue questionnaire. The investigation could also be criticised for validity and reliability. If a test is to be reliable it should produce the same results when repeated and not tested only once, which was the case.

**Suggested Improvement**
A more reliable indicator to monitor intensity levels could be to inform participants that heart rate data would be downloaded, analysed and data omitted if the THR range was not maintained. To address the reliability issues, the run could also have been conducted with the same participants on an additional 2 days.

**Weakness 2: Removal of sweat prior to weigh in**
Removal of sweat with a hand towel was not consistent across all participants and this was not just in terms of wiping sweat from face, arms, legs, chest and back.

**Significance of Error:** High
Significance of error could be high when using this method to remove sweat from the skin as participant 1 did not wipe off sweat after any lap and before weigh in, and participant 6 did not wipe sweat away after lap 1 prior to weigh in and then only wiped his face.

**Suggested Improvement**
A demonstration could be provided along with a more detailed explanation of the importance of wiping off sweat from all parts of the body including the face, arms, legs, chest and back.

**Weakness 3: Fatigue levels**
Participants perceived fatigue levels were recorded using a 5-point scale prior to the run.

**Significance of Error:** High
Significance of error could be high as participants are expected to monitor their own intensity levels, and as with participants 1, 5 and 12 who recorded a level 4 on the scale they may not be motivated to do this and work in the appropriate heart rate zone if they were feeling tired and would rather run at a later time in the day.

**Suggested Improvement**
Participants who did not record a score of 1 to 2 could be offered an alternative day to undertake the test to ensure reliability and consistency across the investigation.

**Weakness 4: Course**
1.3km route around the school grass fields

**Significance of Error:** High
Participant 1, 6, 7, 9 and 10 all recorded higher readings after lap one to the reading 5 minutes prior to the start of the run and this was not expected as readings should stay the same or slightly decrease. Readings increased from 75.9 kg to 76.2 kg for participant (P1) 1, 81.8 kg to 82.0 kg (P6), 71.2 kg to 71.3 kg (P7), 81.9 kg to 82.0 kg (P9) and 67.9 kg to 68.0 kg (P10). This increase could have been due to the mud on the shoes of the participants as on the day prior to the run we did have heavy rain and the field was muddy in some places, which could have stuck to the bottom of the participants shoes.

**Suggested Improvement**
Run performed on a 400m tartan running track to remove the variable of mud on the shoe.

<table>
<thead>
<tr>
<th>Weakness 5: Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant 7 and participant 9 were returning to training after an injury and this was their first competitive run.</td>
</tr>
</tbody>
</table>

**Significance of Error:** Medium

Participant 7 (ankle injury) and participant 9 (knee injury) were returning after an injury and were a little apprehensive during the run and from an observer's point of view. They did not appear to push themselves as hard, as normally they would be the first two to three runners over the line and this was not the case on the completion of each lap.

**Suggested Improvement**
Participants who were recovering from an injury could be replaced by participants who have experienced no injuries 2 weeks prior to the run.

<table>
<thead>
<tr>
<th>Weakness 6: Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample included only 12 participants</td>
</tr>
</tbody>
</table>

**Significance of Error:** Medium

Sample was of medium significance as the number of participants used was very small. Due to the sample being small, it only took one or two participants to underperform to affect the mean average.

**Suggested Improvement**
Increasing the sample size to 20 in each group, with the run being undertaken over 3 days may have resulted in more general trends being evident in the processed data.

<table>
<thead>
<tr>
<th>Weakness 7: 2 different Scales and Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two sets of scales were used as all runners were conducting the race at the same time.</td>
</tr>
</tbody>
</table>

**Significance of Error:** Medium

Error margin is recorded as only (± 0.2 kg) and so the error is of low significance. There was however, on a few occasions a delay as participants had to wait to be weighed in due to there only being two sets of scales and more people finishing the lap at the same time.

**Suggested Improvement**
One set of scales used with runners being set off at 30 second intervals to try and stagger the weigh in session at the end of each lap. A negative side of this could be that the rest time at the end of each run may not be consistent as there could still be a delay in waiting to be measured. The issue of reliability would also be an issue the more scales that are used.
Bibliography


Appendix: PAR-Q

PAR-Q and 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 to 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.

YES NO

1. Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?

2. Do you feel pain in your chest when you do physical activity?

3. In the past month, have you had chest pain when you are not doing physical activity?

4. Do you lose your balance because of dizziness or do you ever lose Consciousness?

5. Do you have a bone or joint problem (for example, back, neck, knee, or hip) that could be made worse by a change in your physical activity?

6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?

7. Do you know any other reason why you should not do physical activity?

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—so 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 to you.

If you answered 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 completion of this questionnaire, consult your doctor prior to physical activity.

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."

NAME:

SIGNATURE:

DATE:

SIGNATURE OF PARENT or GUARDIAN (for participants under the age of majority)

WITNESS:

NOTE: This physical activity clearance is valid for a maximum of 12 months form the date it is completed and becomes invalid if your condition changes so that you would answer YES to any of the seven questions.