

Heart Rate Monitoring – Cost vs. Risk

Overview

For many people, selecting the correct HRM (HRM) is a very challenging task. The decision involves not only what HRM manufacturer model to purchase, but how much learning and how to accurately determine heart rate ranges. Here is a simple discussion based on the total cost of using a HRM vs the risk of failing to meet your athletic goals.

Introduction

Since 2001, many athletes have contacted me with questions about which HRM to purchase. They usually have questions ranging from which manufacture is the best to which store to purchase the HRM from. Before the athlete considers spending their money on a device that may or may not help them, I suggest they determine what problem they are trying to solve first.

Determining the problem.

If the athlete is satisfied with their current level of improvement, then their training program is meeting their goals. This athlete may not benefit from using a HRM.

If the athlete is NOT satisfied with their current level of improvement, then a HRM may help them reach that next level of improvement. The improvements can include: faster event finish times, weight loss, injury prevention or just general fitness improvement.

Determining the athletic goal.

Goal #1: Reduce the finish time for the next running event.

There are three (3) general measurements for determining an athlete's event improvements. They are: completion time, distance and workload. For example: since all marathons are the same distance (26.2 miles), most marathoners use their finish time to determine their improvement, without any regard for the workload required to complete the marathon. The problem with disregarding the workload is that an athlete may have had to increase their workload in order to get the same finish time. Only measuring the distance and time may lead the athlete to believe they are not improving. When the workload measurement is included with the distance and completion time, a more complete improvement will be recognized. If a marathoner can complete the same marathon at a lower workload with the same finish time, then they have improved. The workload can be measured accurately and objectively by using a HRM.

Goal #2: Reduce body fat by 10%.

Most people understand that working harder (higher workload) burns more calories than working easier (lower workload). Unfortunately, working harder causes the athlete to utilize more glycogen for fuel than fat. This athlete will usually start gaining body fat instead of reducing their body fat. The person gains body fat because the only way the body determines that enough calories have been ingested to replace the number that were utilized is by the size of the stomach. The athlete will tend to ingest more carbohydrates (which the body changes to glycogen) than are needed. Excess carbohydrates are then stored as body fat. When a person is trying to reduce their body fat by exercise, they need to make sure that their body is utilizing the correct percentage of fat with the glycogen. This workload is different for everyone and can only be determined through proper VO2 testing or using a trial and error process. The workload can be measured accurately and objectively by using a HRM.

Goal #3: Prevent chronic injuries.

A chronic injury is one that appears to get better for a period of weeks or months and then reoccurs for no apparent reason to the athlete. The human body is a very complicated combination of bones,

ligaments, tendons and muscles. When a particular muscle is tired of doing its job, other muscles that are not as efficient at the job, are recruited to help get the job done. Chronic injuries usually occur from overuse. The injury may be caused by a muscle, ligament, tendon or bone failing to complete its job. The injury may be just a symptom of some other body part not working properly. When a body part is not working properly, the brain and heart work to send the proper nutrients to the body part for repair and waste removal. When the workload is too high for the heart, it leaves the repair work for a later time and only has enough volume to keep the properly working parts going. The athlete's heart rate is a direct measurement of the body's workload. If the workload is high, than the athlete's heart rate will be high. The workload can be measured accurately and objectively by using a HRM.

Goal #4: Improve a person's quality of life by improving general fitness.

Improving a person's general fitness can take the form of many different activities such as: running, cycling, swimming, dancing, basketball, soccer, etc. The list of activities is quite large to select from. The activity should require usage of the body's cardiovascular system (heart and lungs). When the cardiovascular system is stressed with the correct workload and then allowed to rest for the correct amount of time, the system will improve its own general fitness. Every time the stress and rest cycle is repeated the body improves. When too much workload and too little rest is applied, the fitness will deteriorate. The workload can be measured accurately and objectively by using a HRM.

Steps to accomplishing your athletic goal.

Here are five (5) steps to accomplish your athletic goal:

1. Determine your goal.
2. Create a plan to accomplish your goal.
3. Execute your plan.
4. Accomplish your goal!
5. Return to step #1 for your next goal.

Steps to use a HRM to accomplish your goal.

Here are six (6) steps to use a HRM to accomplish your goal:

1. **Determine if a HRM can help you accomplish your goal.** Training for a marathon requires many miles of running. In order to maximize the training effect, every mile run, needs to move the athlete toward their goal. All three factors: time, distance and workload need to be included in the training program for every training mile. Time & distance are easily measured with a watch and odometer. The workload can be measured with a HRM.
2. **Gather information from others that have used a HRM to accomplish a similar goal. Ignore sources that have failed using a HRM to accomplish their goal.** Many runners and cyclists have tried a HRM at one time and then given up using it, because they did not see any noticeable improvement. A HRM, when used properly, will provide information that will help the athlete accomplish their goal with the most efficient workouts possible.
3. **Attend a *Maximizing Performance with a HRM Workshop Weekend*.** The workshop material covers the basic physiological principles and applications to maximize the athlete's training program utilizing a HRM. The material is HRM manufacturer independent. It covers both measuring the stress side (workouts) and the rest side of the performance improvement cycle.
4. **Get a VO2 Test completed.** The VO2 test is the most complete and accurate method of determining the proper heart rate ranges to train in. Generic formulas such as ***220 – Age*** and ***Maximum Heart Rate – Resting Heart Rate*** formulas are not accurate for improving

performance. A formula may work to determine heart rate ranges for the first couple of weeks, but the body will start improving in four (4) to six (6) weeks, which will obsolete the heart rate ranges that were determined by the formula.

5. **Acquire a HRM that will help with your goal and fits your budget.** It is not always necessary to use a physical HRM. Just the process of monitoring your heart rate will improve your performance. Many experienced athletes have already determined what heart rate to use for maximizing their training through a trial and error process. This process is usually referred to as “experience”. The process may take years to develop with many wrong steps that resulted in injuries and missed goals. A HRM provides everyone with a tool that can replace years of “experience” when used properly. The HRM can be a very inexpensive (\$50) model that only measures and displays the athlete’s heart rate or a more expensive (\$500) model that records heart rate, time and distance for downloading and analyzing on a computer. There is no correlation to the cost of the HRM and the athlete’s performance. The cost is usually related to the number of features available on the HRM. Some features help “coach” the athlete to a meet their goals.
6. **Modify your goal plan to include using a HRM.** Most training plans will use general descriptions for describing each workout’s workload. A workout may be referred to as “easy”, “hard”, “goal pace”, etc. When modifying the plan to use a HRM, a workout with the “easy” description now becomes: “aerobic range”. Using the VO₂ test results, the athlete can find their specific aerobic range in beats per minute (bpm). For example: 125 to 150 bpm. The athlete would complete all “easy” workouts with their heart rate between 125 and 150 bpm. The VO₂ test results will indicate the athlete’s heart rate range for burning the maximum percentage of fat and the range for improving the athlete’s speed.

HRM Costs vs. Goal Failure Risk

Now that you have a better understanding of your problem and the steps to utilize a HRM to solve that problem, let’s look at the costs vs. goal failure risk. There are three areas of cost to consider when making a decision to utilize a HRM. The costs include: hardware, knowledge and testing.

Hardware Costs vs. Failure Risk

An athlete will have a lower risk of failure when their workload is measured accurately and recorded using a downloadable Polar HRM.

When evaluating the HRM costs, there are really only three (3) options to consider. The first option is the low cost HRM (i.e. Polar FS1) that only displays the athlete’s current heart rate. The main advantage is the low cost. The main disadvantage is the athlete must be constantly watching the HRM and may lose interest because the workout is not fun anymore. Other disadvantages include:

1. No automatic recording of the training data
2. No alarms that tell the athlete when they are outside of their optimum training range
3. Failure risk is high because there is no record of any of the athlete’s training.

The second option is a HRM (i.e. Polar RS100) that includes features that help maximize the athlete’s training. One of the most important features is an alarm that sounds when the athlete is outside of their optimum training range. The athlete can complete their workout without constantly watching their HRM. Their workouts can return to being fun again. The main disadvantages include:

1. No automatic recording of the training data
2. Failure risk is high because there is no record of any of the athlete’s training.

The third option is a downloadable Polar HRM (i.e. Polar S625X) that records the training data automatically. Training data that includes: heart rate, speed, pace, temperature, time and elevation are very important when determining if the actual workout met the planned workout. The main advantages to using a downloadable Polar HRM are:

1. Training data is automatically recorded and available to download to a PC
2. Not only alarms for alerting the athlete, they are outside the optimum training ranges, are available, but exercise parameters can be programmed into the HRM to control the training aspects of the workout.
3. Failure risk is low because there is a complete record of the athlete's training. This record can be reviewed and analyzed for future training modifications.

When an athlete is very knowledgeable about heart rate monitoring and dedicated to the process, they may see improvements using a low cost HRM. The incremental cost required to move to the next level of reducing the failure risk is very small compared with cost of training time lost due to using the low cost HRM. More athletes will succeed with the Medium cost option over the Low cost option. When an athlete uses a downloadable Polar HRM, they can reduce the Failure Risk significantly.

| <u>Hardware</u> | <u>Cost</u> | <u>Failure Risk</u> |
|---|--------------------|---------------------|
| Polar FS1 | Low (\$70) | High |
| Polar RS100 | Medium (\$120) | Medium |
| Polar S-Series (i.e. S625X w/IrDA) or RS-Series (RS800cx) | High (\$450 - 500) | Low |

Knowledge Costs vs. Failure Risk

An athlete will have a lower risk of failure when they learn how to utilize a HRM correctly by attending a *Maximizing Performance with a HRM Workshop Weekend*.

Gathering the correct knowledge for using a HRM can be a difficult task. In the Portland, Oregon metropolitan area, *HeartFit* promotes heart rate monitoring with a one (1) hour presentation called *Heart Rate Monitoring Overview*. Attending such a presentation, will create an awareness of the benefits of heart rate monitoring, but the one (1) hour presentation is not long enough to provide the athlete with the knowledge that they need to maximize their performance with a HRM.

There are a lot of books that have some HRM information, but not enough to really maximize the athlete's performance. Each different book has some of the same knowledge, but is different enough to confuse the athlete about how to maximize their performance with a HRM. Some books claim that a formula using their age can be used to determine their proper training heart rate ranges (HRR). Other books recommend getting a lactate test to determine HRR. Another book has a process to estimate HRR by running up a hill. Unfortunately with all the contradicting and confusing information the process of maximizing the athlete's performance with a HRM gets derailed.

HeartFit created the *Maximizing Performance with a HRM Workshop Weekend* to educate athletes with the latest heart rate monitoring information. Many workshop attendees have reduced their marathon finish times by 30 to 90 minutes after attending the workshop and using a downloadable Polar HRM correctly. The disadvantage to the workshop is the \$195 dollar cost and the time to attend.

| <u>Knowledge</u> | <u>Cost</u> | <u>Failure Risk</u> |
|--|---------------|---------------------|
| Attend one (1) hour <i>HRM Overview</i> | Low (Free) | High |
| Learn from heart rate monitoring books. | Medium (\$50) | Medium |
| Attend <i>Maximizing Performance with a HRM Workshop Weekend</i> | High (\$195) | Low |

Testing Costs vs. Failure Risk

An athlete will have a lower risk of failure, when they utilize VO2 test results at the start of their training program and then six (6) months later complete a new VO2 test to measure the improvements.

Determining the proper training HRR is a very important step for minimizing the risk of failure when attempting to reach an athletic goal. The proper HRR will allow the athlete to maximize their training while minimizing the potential for over training. Here are three different levels of testing.

Self Test - One low dollar cost method of determining the proper HRR is to train in a series of different HR ranges over a four (4) to eight (8) week period. Here are a couple disadvantages to this method:

1. The HR data for each workout has to be logged and analyzed to determine the proper HRR.
2. The process is a difficult one to administer by a layperson even with training.
3. During the testing period, the athlete may be over training, due to collecting data in non-optimal HRR.
4. The accuracy of the data is questionable, because the athlete is the tester.

The only advantage to the Self-Test is the low dollar cost.

VO2 Test – A VO2 test will provide the athlete with accurate HRR to train in. A typical VO2 Test would include: equipment hookup, tester instructions, warm-up, actual VO2 test, cool-down, test results review and coaching. The actual VO2 test usually only takes 8 to 12 minutes. The total VO2 test process takes less than an hour. The only disadvantages to the VO2 test is the dollar cost and the time it takes to get the test completed. The major advantage is that the athlete will have the HRR that will maximize their training program.

Re-Test – Six (6) months after the initial VO2 Test and the athlete has successfully completed their six (6) months of training, another VO2 Test should be completed. This allows the athlete to see the effects of training with the proper HRR has done for them. The Re-Test helps reduce the risk of failure by making sure the athlete is training optimally. The Re-Test will also confirm the new improved changes in the HRR. The only disadvantages is the dollar cost and the time it takes to get the test completed.

| <u>Testing</u> | <u>Cost</u> | <u>Failure Risk</u> |
|--|--------------------|---------------------|
| Self test | Low (Free) | High |
| VO2 Testing | Medium (\$195) | Medium |
| Re-test VO2 after six (6) months of training | High (\$195 + 145) | Low |

The cost vs. risk of failure decision is totally dependent on the athlete and their budget. Many athletes have successfully improved their performance through a trial and error process for many years. They have learned from their failures by trying different levels of training. Athletes that don't have the years to improve by using trial and error can use a HRM, VO2 testing and attendance at a *Maximizing Performance with a HRM Workshop Weekend* to maximize their training.

About the Author: Eric Lewis is an Instructor for *HeartFit* (www.StressThenRest.com). *HeartFit's* mission is to educate athletes and would-be athletes on maximizing their performance with a heart rate monitor. He has been training marathon runners and long distance cyclists since 1999 on utilizing body fat, improving speed and eliminating chronic injuries with a heart rate monitor.