

CHAPTER 5

Should I use a GPS watch or heart rate monitor to pace my effort?

Developing a sense of feeling for intensity

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“I’m running too quickly! That last mile was too slow; I can’t seem to get my heart rate high enough today!” Turn up at most races and you will inevitably see masses of runners either waiting for their watches to pick up a GPS signal or mid-race clock watching in an attempt to pace their efforts. Whilst there are undoubted benefits to using such technology to help you run at your desired race pace, becoming over-reliant on your watch to pace your effort poses a number of potential problems.

Not every run is a race!

Running to a set pacing strategy is a great method for trying to achieve a running goal and/ or following a training programme that uses pace and heart rate zones derived from a physiological assessment. However, come race day and despite your best intentions, it is remarkably difficult to gauge how fast or hard you are running. There are other runners; some will be fast and others will be slow, and the terrain could be undulating terrain or weather conditions such as wind could make it difficult to judge. For example, you might be running on the flat, and running a lot slower than you expect, but running into a strong wind. When you look at your watch and see the pace, will you say to yourself, “that’s too slow, I need to speed up?” If you told all your friends that the goal is to complete the race in a certain time, and you are behind that time, you will think you need to speed up.

If we stick with running with other people, then I would suggest that for most runners it is probably not best to run at someone else’s pace and just see what happens. On the face of it, a GPS watch can prevent this from happening. You see the pace you are running at and adjust your speed accordingly. Yet running with a GPS watch alone creates unnecessary anxiety around trying to religiously stick to a pre-determined pace that could be unrealistic, for example, if the weather changes. Tucking in at the beginning of the race or running with a group of runners could in fact be an effective strategy for decreasing the perception of effort required to sustain the pace you are trying to run. Learning to develop a sense of feeling for what easy, moderate and hard intensity is like will allow you to run at a pace that is sustainable for your current level of fitness.

Training by feel will develop confidence that you can exercise at intensities that are uncomfortable and require the body to meet the demands of the exercise, for example supply more oxygen to the working muscles or increase lactate production. Running to a watch beeping with pace alerts can place barriers to achieving your best performance. For example if you are trying to run 10 miles in under 1 hour and you constantly monitor your pace to run at 6 minutes per mile in the knowledge that you are running quicker than last time you ran 10 miles, running sub-6 minute pace could be seen as a barrier. Running at 6-minute pace last time was uncomfortable and so running at this pace automatically brings back memories of unpleasant emotions and unwanted thoughts around being able to sustain this type of effort. These responses are also likely to increase the perception of effort.

Use your watch to monitor fitness gains

That is not to say you shouldn’t wear a GPS watch. Many runners report that the first miles of a race feel easy as they are often run in the company of others and so the perceived effort is reduced. In this case a quick glance at the watch could trigger a reminder that you are running ahead of goal pace. If you want to run 10 miles in under an hour then at some point you are going to have to practice running at that pace. Using a GPS watch to record your progress could be useful. If you do choose to wear a GPS watch or heart rate monitor then it was worth undergoing some form of physiological testing to establish training zones and ensure you train at a variety of intensities. The temptation to chase times using a GPS watch could mean you overlook recovery and easy running which has an important place in a programme.

Many universities offer sport science testing including a battery of physiological tests. Well-known tests include a lactate threshold test. The results are used to establish training zones for optimal adaptations and guide training. Pace and heart zones are established and a GPS watch allows the user to run to these zones.

Spotting the early signs of fatigue, overreaching and overtraining

Arguably, one of the best gains to be had from using heart rate monitors is to prevent overtraining. By measuring exercise intensity, athletes and coaches can plan training and recovery and monitor the training response. Fatigue following an individual bout of hard training is normal and gains in fitness can be expected when appropriate rest follows. You can expect to see a lower resting heart rate following a period of endurance training; this is normal. Equally, you can expect to see lower heart rates for a range of exercise intensities; again this is normal and any changes will be relatively small. However, if you are struggling to raise your heart rate for a given workload, and performance begins to suffer, it could be a sign that your nervous system is fatigued. More specifically, your sympathetic nervous system, which is responsible for releasing hormones for a “flight or fight” response could be underactive as your parasympathetic nervous system begins to take control. This system conserves energy by inhibiting the release of stress hormones involved in the flight or fight response, such as cortisol which is responsible for raising blood glucose levels.

It is easy to think that running at a lower heart rate is a sign of improved fitness. But if your normal heart rate for threshold type efforts is 170bpm and you can only raise your heart rate to 155bpm, and you perceive the effort the same, you may be overreaching. Although it is hard to differentiate between overreaching and overtraining, generally speaking, overreaching compromises performance anywhere from several days to several weeks, whereas overtraining compromises performance capacity long-term and may take several months before performance capacity is restored (Meeusen et al., 2013). One way in which you could record whether you are achieving a balance between appropriate stress and recovery is to monitor your mood levels and desire to train, subjectively. This skill is often overlooked in favour of recording running metrics and comparing objective results, but paying attention to how you think and feel before, during and after training will give you an idea of how hard you are working in relative terms as well as absolute terms.

Physiological systems are likely to be affected during the latter stages of overreaching and so recognising symptoms that your body is under increased stress can be useful in the early stages to prevent underperformance. This data can be used when planning your training and how much rest and recovery you need to factor in around key sessions and in the lead up to a race. Practically this skill is more valuable and less invasive for an athlete than taking physiological measurements.

Figure 1. Heart rate monitor used to assess resting heart rate.



Develop a sense of feeling for intensity

With the above in mind, pay attention to aspects of your running performance which normally operate on autopilot, for example, your breathing, stride rate and running form. Ask yourself: how hard does this pace feel? Am I struggling to stay relaxed? Is my breathing erratic? One effective way to regulate pace is to rate perceived effort. For example, you could use a simple scale to gauge how hard you are working against the intensity of exercise you are trying to perform.

Type of training	Recovery	Easy	Steady	Tempo	Intervals/ Race effort
Intensity	Very easy	Easy	Comfortable	Uncomfortable	Very Stressful/ Maximal
Perceived Exertion (RPE)	1-2	3-4	5-6	7-8	9-10
Talk test	Very easy to talk; e.g., Full conversation	Easy to talk; e.g., Normal conversation	OK to talk; e.g., Can string together a sentence	Hard to talk; e.g., One word responses	Cannot talk!

In practice this might be running a marathon at a perceived effort level of 5-6. Ask yourself: Can I talk to the person running alongside me? You know that if you are working at 8 out of 10, then you will struggle to sustain this type of effort.

CASE STUDY: The experienced runner

In this case study, I recall my own experiences of running a marathon by feel.

I have been running competitively since 2006. I have tended to favour the shorter track races but in 2013, I ran my first ever marathon. For me, the challenge of running a marathon was about learning to accept that I would be running for long periods of time at a pace I perceived to feel “steady”. I would have to resist the temptation to want to run faster. I set myself the goal of running 6 minutes 10 seconds per mile, based on my training zones. I said to myself, “Running around 90 seconds per mile slower than what I can run for one mile will feel easy on race day!” However, ask anyone who has completed a marathon what the last few miles feel like and it most certainly does not feel easy! But from my point of view, by reminding myself that I could run considerably faster than my goal pace I would remain confident that I could complete the distance feeling strong and not “hit the wall”.

As part of my preparations I decided to run a half marathon to develop a feel for what running at goal pace feels like. I ran with a plan to run the first 8 miles at marathon pace, followed by 5 miles at “tempo” pace. Not only was it a good to develop pace awareness, it was a good exercise in self-control: I knew that the start would be much faster than 6 mins 10s per mile pace and I would see runners around me who I perceived to be slower and so I would have to resist running with them! I knew that by learning to relax at that pace in race conditions would serve me well. It would also help me learn to develop a feeling of what marathon pace feels like in relation to running at tempo pace; a pace that starts to burn carbohydrates quickly and so cannot be sustained in a marathon. As it was a half marathon I knew lots more people would be running quicker than this pace and so I would have the benefit of running with others which feels easier; it is like having lots of pacemakers. As soon as I got to the 8-mile mark, I had certainly warmed up and began to leave the big group of runners I was with. I went from running 81-minute pace to finishing in 78 minutes. I finished the race confident that I would be able to exert self-control at the beginning of my marathon the following month.

When I ran my first marathon, I had developed a race strategy to use the first 4-5 miles to warm-up, running 5-10 seconds slower than goal pace. I would then run the next 15 or so miles at a perceived effort rating of 5-6 and then see what I had left at the end – I was prepared to take a risk if I felt good but not before then. The important thing was that the first few miles were going to feel easier as I would likely be joined by other runners and then once the race settled down I would aim to get into my own rhythm and run by feel. I thought that the middle section of the race would be a true reflection of my perceived effort in relation to the actual

intensity and by the end it would likely become harder to maintain pace and my effort would begin to feel harder.



After 3 miles I had the choice to run with a group. I asked myself: “Can I maintain their pace?” I answered no; they were running inside 6 minutes. I then asked myself: “Can they maintain their pace?” I answered: “No, I can’t see more than 10 runners running under 2 hours 36 minutes. So I said to myself: “Run your own race.” As it happened by four miles I had caught that group and found myself running alone, just as planned.

I proceeded to run the next 15 miles by feel, only looking at the race clock at the HM mark (which happened to be in the wrong place!). So I ignored thinking I was not going to run my goal time by using the If-Then plan I had developed beforehand: “If I am behind goal pace...then I will run at a pace that I can hold a conversation.” I repeatedly told myself: “Run faster and you are burning all of your matches!” Running a marathon is about managing your energy resources.

I finished the race in 6th position, having achieved a time of 2 hours 41 minutes; running exactly at the 6 minutes 10 seconds per mile pace I had planned to. I was extremely happy I achieved my goal. I had practiced running at goal pace lots in training and so physically I was prepared to achieve my goal. For me, the challenge of running a marathon was about managing my own expectations and that of others. It was about sticking to my own plan and not doubting my ability to deliver that plan.

Understand what your body is telling you

Accept that your body might be telling you it is unable to support the intensity. Despite all the will in the world, if you exhaust your body of energy you will be unable to perform. Consider the dialogue between mind and body; your body may be signalling to your mind that today it has had enough, please allow me time to adapt to this stress. Recognise the emotions and thoughts that accompany this stress and remember that mentally you are ready for them but give your body time to catch up. Next time, your body will be ready for this stress and you will be able to cope with it. However, if you try to push your limits again, then be conscious that your body will probably signal the message that the new stress needs time to adapt. And so the story continues.

There are many limiters to human performance. Endurance sport requires a unique blend of metabolic machinery to support such exercise (for example, fibre types, mitochondria, etc.) and a mind-set that is willing to support prolonged activity (ability to manage thoughts, emotions, attend to biofeedback, pacing); and of course many factors such as nutrition and temperature contribute to this interaction between the mind and body. For example, exogenous carbohydrate appears to involve an activation of areas of the brain involved with reward (thus, increasing motivation), and caffeine can reduce the perception of effort. You can simply not

override what your body is telling you but you can train your mind to alter the perception of boundaries that exist inside your body.

Remember, your body has been designed to cope with a variety of environmental stressors; disrupt that harmony and your body will begin to respond like it is in survival mode. Of course, if you don't listen to the signals be prepared to expect your body to not want to perform next time you place it under unwelcome stress.

Consider when you run a race for the first time. You have no idea of what speed you are capable of running at. Chances are you set off and try to follow the person nearest to you. Until that is, your body starts to ache and you think, "ouch, this is painful; I best slow down". Next thing you are walking with a horrible stitch or muscle cramp. Now consider the next time you line up to race. You set off but this time you go off a bit slower, but you don't consciously aim to run slower; you just so happen to be running slower because you know what it feels like to run faster. All of this appears to happen without thought; that is because your brain has stored a memory of the last race; everything from how your body coped with the stress (for example, was it able to supply enough oxygen to the muscles; could you clear lactate faster than you produced it) to how you responded psychologically (did you override the urge to quit? What emotions did you experience?). Dr Ross Tucker, a research physiologist from the University of Cape Town, has published extensively in this area and regularly blogs on the topics of pacing and exercise fatigue as well as offering scientific analysis of many sports performances on his website: www.sportscientists.com

Train to cope with the anticipated sensations

One interesting theory of self-control suggests that a person's perception of their level of self-control resource is a predictor of their subsequent self-control performance regardless of their actual level of resource. Thus, for runners who perceive that they are running at an easy intensity despite their watches telling them they are working at a steady state could mean that they are able to override emotions and thoughts telling them to slow down. Equally, perceiving the pace as too fast when your watch says you are running within yourself could mean that you struggle to manage your emotions and thoughts.

Mastering the skill of pacing is useful for races. Building confidence that you can run at your desired pace is likely to result in a successful performance. Worrying about what pace you can maintain could mean you fail to push your physical limits as a result of worrying whether or not you can run faster. Many top runners have perfected this art and are able to run entirely by feel. In fact in a recent study of the pacing strategies used by elite track runners, fastest times were recorded by an initial pace faster than average race pace, before running at slower than average race pace mid-race and then a final end spurt.

Equally, analysis of the pacing strategies used at the World Cross-Country championships showed that runners who won medals ran aggressively at the start and were prepared to hold on, similar to a time-to-exhaustion test in which participants are simply told to run to exhaustion. This is opposed to a conservative approach akin to a time trial in which one paces their efforts in anticipation of a known end-point. Trying to accurately anticipate the distance left and pace required to get to the end point as fast as possible with a watch is likely to result in a conservatively paced effort. Adopting the mind-set that you are running fast based on effort scales, is likely to result in an ability to override data that says to you, "you are running too fast!" Instead you running by feel and what you think you sustain without data-evoked thoughts and emotions trying to conserve energy.

CASE STUDY: The elite runner

Not all races favour a pacing strategy which allows for an end spurt. For example, in 26 of the 28 World Records set for the 800m track event the second lap is the slowest. This is in contrast to the longer events in which runners favour a fast start and end spurt. Aggressive running from the start, knowing that you are going to slow down in the later stages of the race, requires the successful management of one's emotions and thoughts. I will focus this case study on how David Rudisha of Kenya front-ran his way to Olympic Gold at London 2012.

Sometimes the most effective pacing strategy is one which allows you to run to your strengths, especially if the goal is to win the race. Going into the 800m final and David Rudisha was the stand-out favourite. There was even talk of a possible World Record. To front run a race requires an enormous amount of confidence;

managing expectations and delivering a stand-out performance under intense pressure requires an ability to manage intense emotions and thoughts.

There is always the likelihood that athletes will follow closely in the hope they will get dragged around to a fast time and in the case of a championship race, they will also expend less energy by following a pacemaker. Evidence suggests that the energy cost of running is reduced when one does not have to overcome air resistance and so it makes sense to position yourself in a race where you can do less work at the front.

If following a pacemaker requires less physical effort, then we can assume that front running, which is self-paced, is more tiring, both mentally and physically. David Rudisha would have had to manage his emotions before the race, knowing he was the favourite and the fastest on paper, and then during the race when he was in the lead. His splits for the race were 23 seconds at 200m, 49.28 seconds at 400m, 1 minute 14.30 seconds at 600m. He crossed the line breaking the World Record in 1 minute 40.91 seconds and in doing so became the first man under the 1 minute 41 seconds barrier.

In an event such as the 800m which requires a large amount of energy to be supplied by anaerobic resources, an aggressive pacing strategy in which the athlete starts fast appears to be the only way she/ he can achieve her/ his best performance and deplete their anaerobic reserves. However, this type of strategy requires the athlete to cope with intense sensations of fatigue. The good news is that tolerating that burning pain, which is experienced when lactic acid is broken down into hydrogen ions, is trainable.

Training your body's buffering capacity to tolerate the build-up of breakdown products, as well as your mind's ability to cope with thoughts telling you to stop must be practiced in training and one does not achieve the sort of performance David Rudisha did, by chance. Since this strategy has the potential to cause premature fatigue (going too fast at the beginning can inhibit the athlete's aerobic capacity) athletes will train to develop a sense for when muscle pH is too low and reduce their pace to ensure that the critically low levels are only experienced near the very end of the race. Even elite athletes will rely on feelings to govern their efforts, especially in championship racing where there is no pacemaker and tactics are known to influence competitors' pacing strategies.

By understanding your event's energy demands, as well as your own strengths, you can develop an appropriate pacing strategy that to help you deliver your best performance.

Practical tips

- Focus on the effort
- Use time and effort rather than distance and pace. You will be surprised that you will work harder during the effort. Many runners pace their efforts based on how long they think it will take to cover the distance ahead of them if they can see it. Take that away and runners will commit to a pace and hold it for the duration. These sessions are great when a coach oversees the sessions and uses a whistle to mark the start and end of a repetition.
- If you do train with a monitor, then leave your watch at home for some of your training. Just go out and run for the sake of running; enjoy being outdoors. Running stress-free with no pressure to hit certain paces will surprise you. You will probably run faster and it will feel easier.
- Develop a pacing strategy that your current level of fitness is able to cope with.
- Develop strategies to manage increasing sensations of fatigue. This could include self-talk

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Commentary

Andrew M. Lane



Head bobbing! Is a behaviour I have noticed more runners do when observing them race. Why is this? The growth of GPS watches and technology that allows you to have a wealth of data from running speed, pace, gradient, lap speed and so on. Many watches have more than one screen and on each screen, there are multiple functions. All of this information is helpful in my opinion. However, when it is helpful is debateable. Chris Fullerton outlines how tricky it is to rely on your GPS to pace. I agree with the main sentiment of this chapter, but wish to go further. I suggest that rather than looking at the GPS in a race, that you study the feedback later. A positive feature of GPS watches is the ability to examine the run at a later stage. Looking at how the pace dipped or sped up, how you coped with hills, and remembering what your thoughts were during the run are much easier to do when studying the data. GPS watches are excellent pieces of equipment but you should learn to trust your inner feedback; to be able to trust yourself, you need to be able to read what your body or mind is saying. Chris Fullerton offers some excellent tips on how to do this.