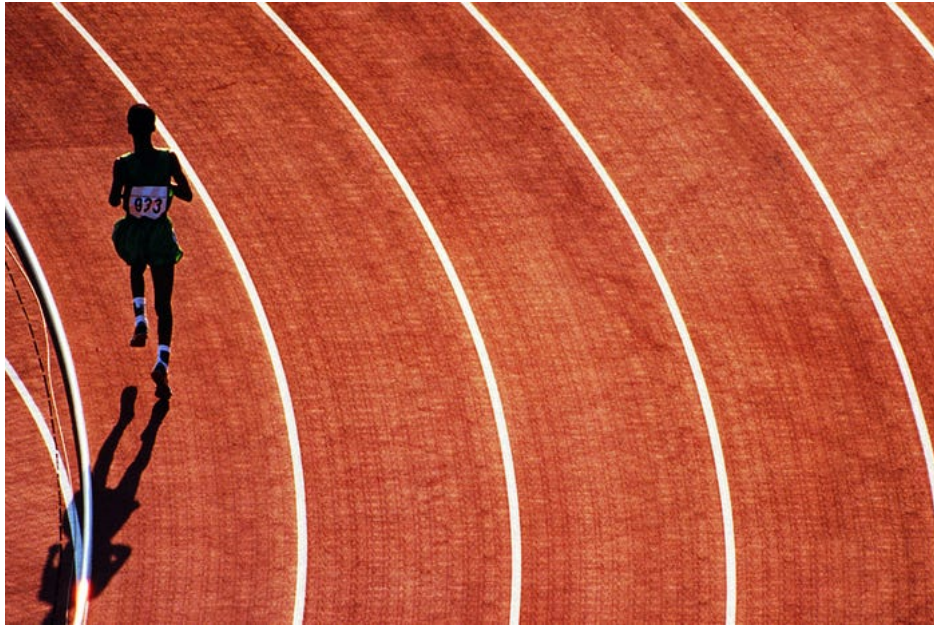


Notion 2.4km Coach

2.4km run article + sustainable growth:



TL,DR: This training plan will give you an outline, and a structure, as compared to running 2.4 all out every single time you run at the track. There's a **smarter** way to get fit, because simply running all out every time you want to train for 2.4 *doesn't work*. There are many articles giving you "hacks" or "tips", but the best way to be the most prepared is to train *smart*, to **completely understand the training**, and to train *consistently*.

Disclaimer: If you are unwilling to do the hard work by starting at least 3 months out from race day, you aren't going to maximise your full potential. If you're reading this 1–2 months out from your IPPT / 2.4 test date, jump to Phase 3. If you're willing to work hard, read on, I'm very sure that you'll benefit from this. If you have any questions on exactly what pace to run, or what the starting distances should be, contact me at my website here **preferably by email if you don't have my contact**. If you want to know my running experiences, you could check this out.

This training programme is relatively scalable (my [coach](#) has now pushed this out to batch after batch of wannabe cross country student runners) to runners at different levels, so wherever you are in fitness level, this probably works for you. **This article is updated as of Dec '22 (with additional tips on push-ups / sit-ups, and IPPT simulation).**

This training plan follows the rough structure from Jack Daniels' Running Formula (2nd Edition), utilised by many coaches around the world. Here in Singapore, we don't have the luxury of time to run through 6 months, operating on training volumes which would really require you to dedicate a huge amount of time to the sport. You probably wouldn't have the motivation to do so as well.

Over the course of the past year when this article was published (originally published in Dec '21), I've received several email requests from people I didn't previously know — asking for guidance. The most fulfilling part about pseudo/semi-coaching is to see the people you help reach a better version of themselves, through dedication, hard work, and a sound training plan (personal bests were broken!!). If you would want to know a bit more about who I am helping now and want a sample of the **whole training plan**, you can refer to [this](#).

What I'll be covering in this piece (you can click on the links below to take you to the respective part of this article):

1. [An \(re-\)introduction to the 2.4km distance](#)
2. [A smarter way to train for the distance](#)
3. [When to run](#)

4. [When **NOT** to run](#)
5. [Training Phase 1](#)
6. [Training Phase 2](#)
7. [Training Phase 3](#)
8. [Race-day tips](#)

The Race

The 2400m distance, 6 rounds around the track, taps into 2 main energy systems in your body — aerobic and anaerobic systems. You need to know which one to train, and when to train which systems in order to maximise your performance come race day. That being said, a huge emphasis of this training plan will still be placed on **aerobic** training rather than anaerobic training, since the 2.4k distance taps into the aerobic system largely rather than the anaerobic.

How to Train for 2.4

Here's what you *shouldn't* do: run a 2.4 all out every single time you hit the track. There's a couple of problems with this strategy:

1. You are at a high risk of injuring any body part if you do not cooldown, or stretch out your muscles properly, and pushing yourself to the limit may result in muscle cramps, especially if you sprint towards the finish line every single time.
2. You will soon hit a point where diminishing returns start to set in and you see fewer and fewer improvements to your time. With that, comes a lack of motivation to continue running and soon you would *most probably* see running the 2.4 as a chore, a dreaded distance.

I don't want you to experience that. I've reached burnout as an athlete before, and it took a long time of searching and discovering why you do what you do before gaining these insights that I'm sharing with you now.

Training can generally be split up into **3 main phases**. Each phase will probably take around 1–2 months. Each phase will follow the same structure of around **3** quality workout days, meaning that at the very minimum, you would have to be running **3** times a week. That being said, doing the wrong phases without the necessary preparation might also leave you feeling demoralised. However, if I do have to compromise on one training session (i.e. you can only run 2x a week), I would skip the long runs. That being said, you should aim to finish all three quality workout sessions if you have the time.

How to assess your fitness? The simple answer: do a 2.4 time trial at the start of *each training phase* to establish your training paces. Use this calculator over [here](#) to establish your paces after you have completed the trial.

There are a few key terminologies (under "training paces") to look out for, which will be explained later on in this piece:

- Easy
- Moderate
- Tempo
- Threshold
- VO2 Max
- Speed Endurance

When to Run???

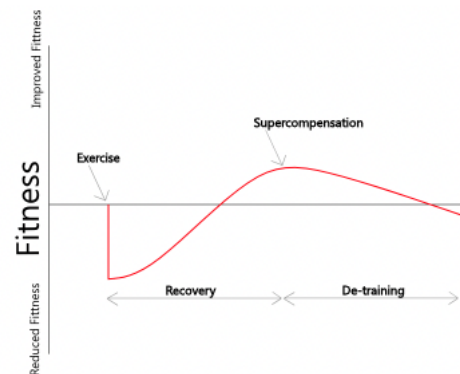
Generally, I do my hardest workouts in the morning, right after I get up, on an empty or very partially filled stomach. There are a couple of perks in doing this:

1. In Singapore weather (if you're reading this in SG) you would probably only have very low temperatures early in the morning, before the sun rises, or late in the evening, after the sun has set *for some time*. Doing your workout in the morning, instilling the discipline to wake-up early gives you the benefit of seeing higher performance in your workout under cooler conditions to prevent rapid dehydration and overheating of your body.

2. You reap the benefit of accomplishing something at the start of the day, before your peers have woken up. Getting the toughest thing done (physically) the first thing in the morning gives you a sense of accomplishment, which is hard to get from other exploits. Make sure that you get enough rest the night before, before **rest and recovery** is crucial to performance.

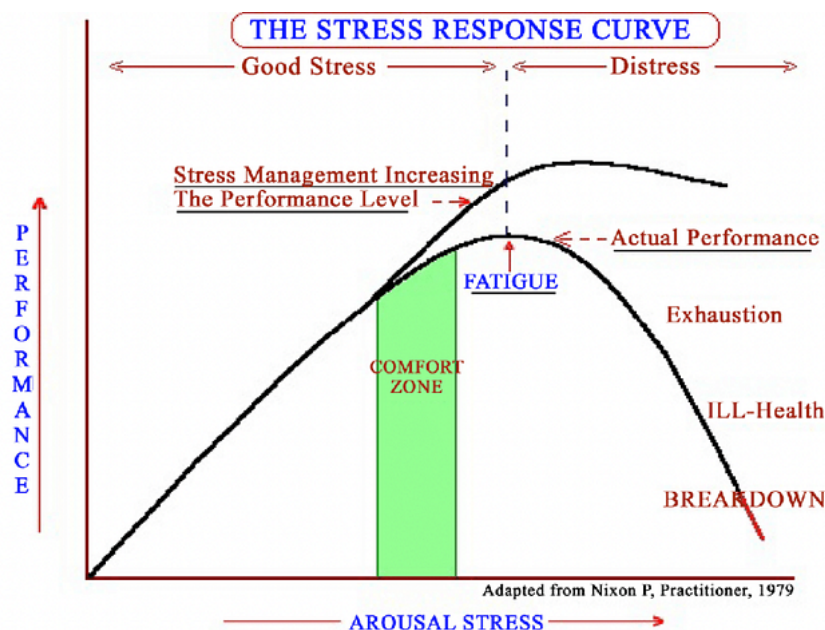
WHEN NOT TO RUN???

This is really important as well. Fitness works on the principle of loading, stressing. Refer to the graph below. You would want to reach a point where you have recovered from your previous day's workout, but *if at any point* you feel that you **might have an injury**, pulled a muscle, or are overtraining (reference the second graph), do contact me as soon as possible so I can help you get back on track.



You wouldn't be able to specifically tell when you reach super-compensation, or when your fitness was below/ above your previous fitness level prior to the workout. In general, keeping two rest days a week will help to ensure that you are recovering, but not de-training.

That being said, you shouldn't **ever** stop running due to the lack of motivation. You will lose motivation at some point in your training block, but you have to keep your end goal time in mind.



DO NOT overstress the body unnecessarily.

Phase 1: Conditioning

For newer runners, and for runners who probably only do one run per week, this phase is especially crucial. The crux of conditioning is to *prevent injury* and literally condition (or make your body stronger) for the periods of more intense training periods in the future. Another fundamental point of conditioning is setting up a decent aerobic base for you to build on, this means laying the groundwork for the aerobic energy system, and expanding aerobic capacity at the lowest level. **Do the workouts in this phase for a month.**

New content: Prior to running, do sit-ups and push-ups first, when training for the IPPT.

I'm no specialist in push-up and sit-up training, but I do believe that consistency pays off. Following the principle of gentle loading, it is necessary to slowly condition your body to get used to the lactate build-up when doing push-ups and sit-ups at an all-out effort. The first step to doing this is to complete a fixed number of push-ups and sit-ups with a set rest amount, before increasing it before the next time you do a workout. So for instance, 30 continuous push-ups and 30 continuous sit-ups with a 2–3 minute rest in between, completing this for a week before your runs, and then increasing to 35 for each exercise for the next week.

TRAINING PLAN FOR PHASE 1 (EVERY WEEK):

For Newer Runners:

- Quality Session 1 (Monday/ Tuesday) — Easy Run of 20–30 Minutes, with 6x strides
- Quality Session 2 (Wednesday if ran on Monday, Thursday if ran on Tuesday) — Fartlek (Refer below)
- Quality Session 3 (Friday/ Saturday/ Sunday) — Easy Run of 20 minutes, with 10 minutes tempo

For Experienced Runners:

- Quality Session 1 (Monday/ Tuesday) — Easy Run of 40 to 60 Minutes, with 6x strides
- Quality Session 2 (Wednesday if ran on Monday, Thursday if ran on Tuesday) — Fartlek
- Quality Session 3 (Friday/ Saturday/ Sunday) — 20 to 30 minutes tempo/ steady run

Let's break these down a little further.

Quality Session (QS) 1 — Easy runs are meant to be easy, meaning that you will be able to hold a conversation at that pace for the whole duration. The easiest (and perhaps the most fun) way to test it out? Grab a friend to run the whole duration with you, making sure that you have at least a conversation going. My easy run paces are really slow, like anywhere from 6.30–7.00/km. It is actually *important* that you go slow, so as to prevent injuries, and build up the correct aerobic base without taxing too much of your other systems.

The *strides* after QS1 are meant to be something close to sprints, just that you're not going all out. It's the sweet spot between going too slow and going too fast, what my coach likes to describe it is "fast and controlled".

Quality Session 2 — Fartlek / Speed Endurance

There are two specific workouts here — one which is based on time, and the other based on distance.

Workout: 15 to 25x (15s fast, 45s jog recovery). The 15s fast are meant to get your legs turning over, with a goal cadence of around 180 steps per minute (for those of you who have a smartwatch). For week 1, start out conservative — at around 15–17 repetitions if you're feeling comfortable. Increase the number of repetitions each week by 1–2x.

Quality Session 3 (For stronger runners) — 20 to 30 minutes tempo run

Based off a 2.4 time trial of 11 minutes (arbitrarily set): here's the tempo pace that you should be following:

Easy Tempo	9:21 - 9:06	9:18 - 9:03	5:49 - 5:39	4:39 - 4:31	2:19 - 2:15	1:09 - 1:07
Tempo	8:52 - 8:39	8:49 - 8:36	5:30 - 5:22	4:24 - 4:18	2:12 - 2:09	1:06 - 1:04

According to the third column, you should be running at a pace of approximately 5.30/km.

If you have not completed an all out time trial, here's a good definition to work by. Defining the pace of a tempo run is hard to do on paper, but I'll take a crack at it. You're supposed to be going at a pace where you could theoretically hold for at least a 10km run. This means, that if you're going at 4.30/km pace, you could run a 45 minutes 10km any day. Since this tempo run is only from 20- 30 minutes, this means that the tempo run will not be an all-out effort. It is important for you to pace yourself (and practice pacing) in general, since this would benefit you for your actual 2.4km race. You shouldn't complete this workout being completely spent, it should be around 80–85% effort.

For newer runners, this 10 minutes tempo should be right around a pace where you would be able to sustain for approximately twice the time before completely dying.

Likewise for this quality session, start out at 20 minutes during the first week, and increase the duration (time) by 10% each week.

THIS PHASE (1) IS MEANT TO BE EASY.

Running isn't always supposed to be super tough. It is important for you to **gauge efforts** (or if you would like to invest a little more in running, I would suggest a heart rate monitor) and **not** kill yourself for every workout.

Phase 2: Threshold + Aerobic Power Training

The goal of this phase is to build on the aerobic base that you have created in the previous one, meaning that this will seek to expand your aerobic capacity to the maximum, before starting race pace training, in phase 3. As a ballpark figure, you should complete this phase for at least 2 months. This phase will be tough, but you'll reap significant benefits from running these workouts.

TRAINING PLAN for PHASE 2 (EVERY WEEK):

For Newer Runners:

- Quality Session 1 (Monday/ Tuesday): Long Run of 50–70 minutes
- Quality Session 2 (Wednesday if ran on Monday, Thursday if ran on Tuesday): Threshold repeats (Refer below)
- Quality Session 3 (Friday/ Saturday/ Sunday): 20–30 minutes tempo run + Speed Endurance

For Experienced Runners:

- Quality Session 1 (Monday/ Tuesday): Long Run of 60–80 minutes
- Quality Session 2 (Wednesday if ran on Monday, Thursday if ran on Tuesday): Threshold repeats (Refer below)
- Quality Session 3 (Friday/ Saturday/ Sunday): 30–40 minutes tempo + Speed Endurance

Quality Session 1

Yes, the times are getting slightly longer, but if you could complete the full duration of the long run, that would be great. The main difference here is that the pace of the long runs, after 1 month, can be dictated by you. I would recommend you to go easier on the long runs, and save the legs for Quality Sessions 2 and 3, but steady long runs at a controlled pace do build up aerobic capacity as well.

Quality Session 2: Threshold repeats

Here comes the workout that I (personally) believe has the most benefit to anyone who is willing to put in the hard work. The goal of this workout is to build up your lactate threshold endurance, which is basically the rate at which your body can effectively clear lactate from your muscles. This is a tough workout, because you may be struggling at the end of it.

The workout:

4 to 8x 1000m at Threshold Pace, with 200m float recovery.

Once again, using the example of someone running 11 minutes for 2.4km (although you should have improved from Phase 1):

Threshold	8:26 - 8:14	8:23 - 8:11	5:14 - 5:07	4:11 - 4:05	2:05 - 2:02	1:02 - 1:01
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You should be aiming for 5.14–5.07/km for these threshold repeats.

Once again, if you didn't manage to complete one before this phase: What is threshold pace? It is the pace around 10–20 seconds per km faster than your tempo pace. For example, if your current tempo pace is 4.50/km, your threshold pace may range approximately from 4.40–4.30/km.

I personally completed many workouts where I ran 4.30 (4 minutes 30 seconds) for each rep of 1000m for this workout, and I worked my way down to 4.10/km over the range of 2 months, and ran a 19.41 5000m PB at the end of two months.

Quality Session 3

The tempo run remains as a staple in this phase, but the catch is that if you were able to complete a 30 minute tempo run easily at the end of the end of phase 1, it is time to slowly increase the tempo duration (perhaps 10% each time, or around 800–900m) until 40 minutes, before cranking the pace down after you are able to complete it week after week. Remember that the tempo run should be a *hard, controlled effort which is not maxing out your effort*, but coming around 80–85% of your limits.

Bonus: Speed endurance

The workout:

6–8x 200m at 1500m / 2400m race pace, with jogging 200m recovery.

Speed Endurance	6:11 - 5:59	6:08 - 5:57	3:50 - 3:43	3:04 - 2:58	1:32 - 1:29	46.1 - 44.7
Speed	5:50 - 5:41	5:48 - 5:39	3:37 - 3:32	2:54 - 2:49	1:27 - 1:24	43.6 - 42.5

Once again using the anatomy of a 11 minute 2.4km runner, his speed / speed endurance would be at around 43 to 42 seconds.

Phase 3: Aerobic Power + VO2 Max Training

This is the part of the training that is the most important in building *speed endurance* and *VO2 Max fitness* to help you ace your race day.

This is by far the most crucial phase of the training plan that needs to be executed preferably 1–2 months before race day.

Prior to the track workout of Session 2 and 3 (refer below), I would suggest completing an **all-out, 60 seconds trial of both push-ups and sit-ups (with 2–3 minutes rest in between each trial)** to get used to the **feeling of heavy arms and legs**. This was something that I did not practise for my own pre-enlistee IPPT, and this meant much slower times in the actual 2.4km because of the novel, burning sensation of lactate-induced fatigue. Completing all-out trials of max push-ups and sit-ups will better simulate and mentally prepare you for this muscular fatigue.

TRAINING PLAN FOR PHASE 3 (EVERY WEEK) :

For Newer Runners:

- Quality Session 1: Long Run of 50–70 minutes
- Quality Session 2: VO2 Max Workout
- Quality Session 3: 20–30 minutes tempo run + Speed Endurance

For Experienced Runners:

- Quality Session 1: Long Run of 60–80 minutes
- Quality Session 2: VO2 Max Workout
- Quality Session 3: 20–30 minutes tempo run + Speed Endurance

For VO2 Max Workouts, there are a couple of useful workouts for the 2.4 distance:

VO2 Max	7:24 - 7:16	7:22 - 7:13	4:36 - 4:30	3:41 - 3:36	1:50 - 1:48	55.3 - 54.2
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VO2 Max paces for a runner with a 2.4km / 11 minutes time.

Workout 1: 4–5x 600m at goal 2.4 race pace, with 200 jog recovery

The goal is to run this at your 2.4 race pace, so if you're aiming for sub 10 minutes for example, you have to run 25 seconds per 100m, or 1 minute and 40 seconds per 400m, or 2 minutes and 30 seconds for 600m. That will be your goal time.

For recovery, ensure that you jog (NOT WALK) the 200m recovery, without allowing yourself to fully catch your breath at the start of the next interval. Try to make this time about 60–70% of your 600m time (i.e. 60% of 2 minutes and 30 seconds is approximately 1 minute and 30 seconds). Ideally, this workout should be done 1 week as a *tune-up* workout before your race (or even on the week of 2.4km, with at least 1–2 days in between for recovery)

Workout 2: 400m–600m–1000m–600m–400m at 2.4 race pace with 75 seconds recovery for the 400m, 105 seconds recovery for 600m, and 150 seconds recovery for the 1000m.

Once again, the goal is to run this at your 2.4 race pace. This is called a pyramid workout, where the middle of the workout is the toughest, and it's meant to be a *race simulation* workout, where the end of the workout will get closer to all-out effort. You will find yourself pushing for this workout, but it's to train you to close strongly in the last few laps in the 2.4km.

Do this workout 2–3 weeks before the trial.

Workout 3: 400m–800m–1200m–600m at 2.4 race pace with 90 seconds recovery for all distances.

This is a really tough one, but it works on aerobic power (especially for the 1200m) and mental tenacity for you to pull through the entire duration of the 2.4km. If you choose to do this, do it 3 weeks out before the trial.

Other useful tips for race-day / pre-race day:

1. Establish a warmup routine — jog for at least 5 minutes to get the body warmed-up, and do a couple of **static and dynamic stretches** to prepare your key muscle groups for the workout / race ahead.
2. Stay relaxed through the pain. “Pain is inevitable, suffering is optional” ~ Haruki Murakami. Fighting the pain and searing sensation of your lungs wouldn’t help you a single bit. Focus on your form, and tell your mind to stay relaxed and calm, as if you have the situation under control. The best performances are maximised not through anxiety or worry, they are done in a state of flow.
3. Find a bunch of friends to warmup with you! They will ease the tension a *ton*.
4. Have fun! Treat the 2.4km not as a single event, but rather as the culmination of a few months of hard work, and hard-earned fitness. Don’t give up during the race, you’re already 99% complete (if you look at the 2.4 as the end of hundreds of kilometres put in to work for this day, then you would know that giving up at any point in the race wouldn’t be worth it at all).
5. **Leave everything on the track.** Don’t walk away from the track knowing that you could have done better. Give it your absolute all.

That’s it folks! Hope you benefitted from this article. If you do have any queries / questions about what paces that you should run, or anything related to running (injuries, burnout, etc.) do feel free to contact me [here](#) (if you do not have my contact). Cheers, and all the best for your 2.4!!

We are often presented with a sorry sight: fresh-faced runners keeling over after going all-out for a set number of laps at the local track. While this sight isn’t pretty, we admire and even glorify people who repeatedly push themselves their limits.

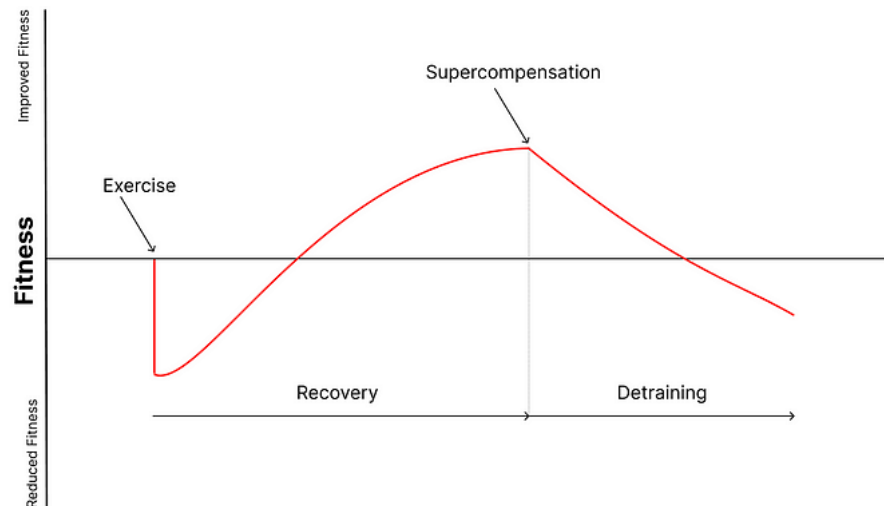
Going all-out in itself isn’t the problem (as long as your doctor thinks it’s okay for you to do so), doing that every single time is. This is especially prevalent in athletes who are just starting out. In a [previous article I wrote](#), I mentioned that doing all-out time trials repeatedly was not the right way to train. I’ll dive more in depth into the reasoning of **why** and **how** such a phenomenon occurs, using findings backed by actual research.

Here are the contents of this article:

- [Understanding basic sports science principles](#)
- [Why does overtraining occur?](#)
- [Working towards measured, sustained growth: practical steps](#)
- [Getting started](#)

Stress + Rest = Growth

This equation was first popularised in the book [Peak Performance](#) by Brad Stulberg and Steve Magness. In sports science, this equation can be represented diagrammatically by the performance curve:



Graphic created by author

This curve can be broken into three distinctive parts, the point where exercise occurs (also known as loading), the recovery phase back to original fitness, followed by supercompensation beyond original fitness levels.

While the amount of training and the type of training matters, people often overlook the *recovery* process, which is as important, if not more important, than the actual exercise load. According to Professor Michael Kellmann, effective recovery from intense training loads often faced by elite athletes can often determine sporting success or failure.

Therefore, achieving optimal rest and recovery shouldn't be overlooked. In fact, some elite athletes place such a high importance on rest and recovery that they would take extreme measures to let both their mind and body rest before their next workout. In the case of Jakob Ingebrigtsen, he engages in activities like gaming or watching shows in his downtime to avoid taxing his mental energy. Ex-elite runner Colleen Quigley also cites this to be a normal practice amongst elite training groups.

In light of these revelations, the methodology of engaging in multiple max-efforts attempts in the span of a week isn't too wise of a decision. Not only is there insufficient time for recovery, an athlete is at risk of harming himself further and decreasing his fitness below his initial baseline.

Why Does Overtraining Occur?

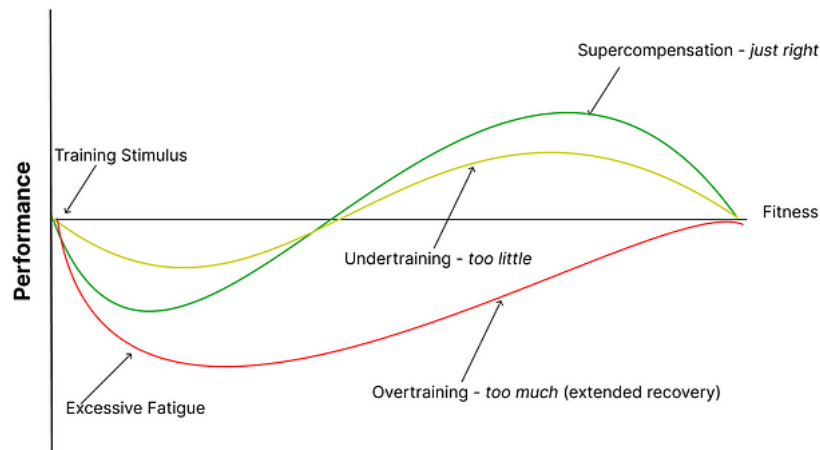
I believe that there are two broad categories of reasons to how overtraining occurs.

Internal

Budding athletes lack the experience to correctly determine perceived exertion levels, even though they might understand the importance of alternating periods of stress and rest. As a result, they misunderstand how much their body is able to handle, leading to incorrect loading at the wrong intensities. Coupled with insufficient recovery times, this is a recipe for disaster.

Research done in this area validates my personal experience in working with beginner athletes.

One common way for runners (and endurance athletes in general) to gauge how hard they are pushing would be through using the *rate of perceived exertion* (RPE) scale. The idea is simple: after a given workout, give a rating from 1 to 10, with 1 being "very easy" and 10 being "all-out effort" to grade how hard or easy you felt that workout was. This is known as the OMNI scale, with the original Borg scale running from 6–20.



Aim for supercompensation — where training is *just right*. Image created by author.

Coaches and social running apps like Strava mainly use the OMNI scale to get feedback from athletes. While such a tool has been generally useful across experience levels (for runners), there have been instances in which the RPE scales is not advised to be used as metric to track exertion levels in other sports such as indoor cycling, especially for novice adults.

Knowing when to keep pushing or when to dial back on training intensities is crucial. Without an accurate metric to track exertion levels, overtraining can occur.

External

The presence of social exercise platforms like Strava also gives athletes an added incentive to *mask* how hard a workout truly felt. The comparison of distances and paces ran has been fuelled by the presence of fastest known times (FKTs) on Strava Segments — subconsciously adding to a greater level of competition and pushing athletes to run harder than they are supposed to. While these features allow for friendly competition, they may have the *unintended consequence* of adding to the threat of overtraining. Therefore, it takes **discipline** in order to run at the correct intensities.

Overall

MY CURRENT PLACE		MY BEST TIME		All-Time ▾		All ▾
1 / 1526		1:25				
Rank	Name	Date	Pace	HR	Time	
	Samuel Lim	8 Dec 2016	3:27 /km	187 bpm	1:25	
	Andrew Wu	14 Feb 2018	3:27 /km	142 bpm	1:25	
	Daniel Ching	16 Dec 2019	3:27 /km	-	1:25	
	Jeremy Chong	24 Nov 2020	3:27 /km	-	1:25	
5	Samuel Toh	11 Dec 2021	3:34 /km	130 bpm	1:28	
6	Cedric Chua	15 Jun 2016	3:37 /km	160 bpm	1:29	
6	Chai Jiacheng	9 Dec 2019	3:37 /km	141 bpm	1:29	
8	Jakub Tomášek	20 Oct 2018	3:39 /km	-	1:30	

An example of Strava leaderboards. Image created by author

In addition, the prevalence of grindset and hustle cultures do not help. If you have been looking for ways to self-train, I'm sure you've come across many TikTok videos and YouTube shorts prescribing generic workouts at various distances and intensities. These workouts might not be suitable for you, the individual.

Said videos often include high-intensity, high-effort interval repetitions, without specifying the context with which these intervals are completed in. For instance, it wouldn't be wise to do multiple sessions of VO2-Max repetitions per week in a base training

phase. Therefore, having a dose of skepticism against videos / articles promising quick hacks to increasing your running fitness would go a long way in preventing overtraining.

Knowing that there have to be times in which you would have to push yourself, this leads us to the question: *when should I push and how much?*

Working Towards Trackable, Sustained Growth

Training volume

For many of us, a good principle is the 80/20 rule: have 80% of your mileage **easy**, with 20% at higher intensities.

Most elite runners stick to this principle, allowing them to have high volumes of training without getting injured. This can range anywhere from 100 to 160km per week. Of course, this has to be built up over time, but the key takeaway here is that there has to be discipline *to run easy* when the time calls for it. From the world's best middle distance runners like [Jakob Ingebrigtsen](#) to the 5k/10k world record holder [Joshua Cheptegei](#) and marathon legend [Eliud Kipchoge](#), it can be seen that a majority of such training is at easy paces.

That being said, it is also important to bear in mind what training at *relative intensities* look like (explained more in the next section): running at 4min / km for elites might be easy running for them, while it would most probably look like 6–6:30min/km for amateur / beginner athletes (as a rough gauge). So just because elites are running 5km at 3 min/km for a threshold training run and are succeeding at what they do, this doesn't mean that you have to do the same.

Understanding training intensities

Another common question that I get from trainees would be this: how do I know that I'm running at <some> pace? Is there a way to tell how hard I'm running?

While definitions vary from coach to coach, these are the general classifications of what these intensities mean:

A general ballpark of how hard these intensities should feel can be quantified in terms of the ease of conversation, which is roughly defined below:

As such, a good way to track how easy you are going on your runs would be to bring friends along with you as you run, and engage in a heartfelt chat with them. This is a simple, fun, and cost-efficient way to track intensity without caring too much about pace or heart rate.

Easy running should be the **bulk of your training** as you start out laying the groundwork of your aerobic foundations.

Sometimes, easy workout days don't even have to be days where running is involved: Steve Magness recently pointed out that if you're not having fun in your runs, you're probably going too fast 🐢.

If you wish to go beyond easy running to add some rigour to your training in light of an upcoming race/ competition, I recommend checking out [Jack Tupper Daniels' Running Formula](#). Feel free to reach out to me if you have any queries as well.

Understanding recovery

Having understood what the different training intensities mean, it's time to dive into how a beginner athlete can better track recovery. Currently, for beginner runners who possess a running watch (like Garmin / Coros / Polar), a recovery time would be suggested after any running workout. A no-brainer approach would be to simply wait that x number of hours before attempting the next workout.

However, as [Marco Altini points out](#), as recovery is a *calculated estimate* based on heart rate data (and arbitrarily set heart rate zones based on your age, which might not be accurate for individuals), I would suggest approaching such a metric with caution, rather than taking it at face value. The same can be said for some other [watch-based metrics](#).

A great thread on how watch metrics should be approached with caution.

Beginner athletes who are more privileged might turn to Whoop as a training / recovery partner. A mid-tier option could be the Oura Ring. However, I believe that the most cost-effective tool to track recovery would be [HRV4Training](#)— built by Marco. It utilises nothing more than the camera of your smartphone to accurately measure heart rate variability. You can find out more [here](#).

Knowing what to optimise for

Best practices in the sport of running are varied. There are several frequently asked questions among new trainees:

1. How do I correct my running form? Is there a single, efficient way of running? How can I achieve it?

2. Should I forefoot / mid foot strike? If so, how should I go about doing it?
3. Should I take long or short strides?
4. How should I breathe when I run?

The truth is that every individual is unique. There are surely great answers to some of these questions but I believe that this is a matter of **over-complication**. Consistency, coupled with a sound training method, would get you much further than focusing on these relatively smaller details. As you grow aerobically fitter, and get your body used to the rigours of long distance running, these variables can be looked at in greater detail. The key is to start running first.

For those who are looking for answers though, read on:

While we can allow ourselves to be blown away by Eliud Kipchoge's efficient running form or Paul Chelimo's swift, flowy strides (in comparison to Luis Orta here), it's good to note that these are elites who have devoted their entire lives to competitive racing at the highest level.



GIF created by author. Here Paul Chelimo is running at 4:30/ mile pace.

Therefore, simply emulating how they run would not work, especially without the targeted training of muscle groups which are activated during running.

Further, even if it is true that numerous elites forefoot or midfoot strike, there has been research that shows that changing to a mid or forefoot strike does not necessary improve running economy. Changing foot striking patterns can be time consuming, and requires a continuous, conscious effort before the change can be fully made. From personal experience, my transition from heel-striking to mid-foot striking has taken about 2–3 years.

For the last two questions, the answer is a little more straightforward. It turns out that there is a correct answer to both questions. In Jack Daniels' Running Formula, he states that most elites run at a minimal cadence of 180 steps per minute (or 3 steps a second) when they are racing. The goal is for runners to increase their cadence towards this target.

He further recommends runners to work towards a *2–2 breathing rhythm*, which means to take two steps while breathing in, and two steps while breathing out. Such a ventilation rate should be practised so that it becomes natural.

However, the bottom line is for you to *get started in a consistent, sustainable fashion*, and tweak these other variables you go along.

How Should I Get Started?

If I could summarise what I've learnt to anyone who wants to gain fitness in running in a phrase, it would be this: **run easy, run far**.



Photo by [Fil Mazzarino](#) on [Unsplash](#)

Easy running serves to build the aerobic foundation, so it is absolutely critical for a solid base to be built before even considering interval workouts. It is analogous to constructing a house: attempting to build / stack more levels on top of one another without a stable foundation is pointless.

That being said, it is natural to want to have some feeling of *speed* during base phase training. So do check out [strides](#), and [fartlek](#) workouts (Swedish for speed play) for an added dose of excitement. And once you're ready to make the progression from a beginner to an amateur, sign up for your first race!



PLEASE REORGANISE!

Things to read @February 12, 2023 :

1. <https://pubmed.ncbi.nlm.nih.gov/36680410/>
2. <https://pubmed.ncbi.nlm.nih.gov/36501148/>
3. <https://pubmed.ncbi.nlm.nih.gov/35509120/>

Some interesting key takeaways from twitter threads (honestly, I don't know whether I will have both the time and energy to do this in the future, but I'm just going to kick start the process)

1. Carb-loading: Only carb load one day before?
 - a. ketoneIQ (ketone and carb dual fuelling - https://www.youtube.com/watch?v=2PUQpodV-cU&ab_channel=AriKlau)
2. Training Zones / HR Zones → It seems that people are still overexerting / working themselves
 - a. walking vs running during easy runs
3. HRV

The Race

How to Train for 2.4

How to assess your fitness? The simple answer: do a 2.4 time trial at the start of *each training phase* to establish your training paces. Use this calculator over [here](#) to establish your paces after you have completed the trial.

When to Run???

WHEN NOT TO RUN???

Phase 1: Conditioning

TRAINING PLAN FOR PHASE 1 (EVERY WEEK):

Phase 2: Threshold + Aerobic Power Training

TRAINING PLAN for PHASE 2 (EVERY WEEK):

Phase 3: Aerobic Power + VO2 Max Training

TRAINING PLAN FOR PHASE 3 (EVERY WEEK) :

Stress + Rest = Growth

Why Does Overtraining Occur?

Internal

External

Working Towards Trackable, Sustained Growth

Training volume

Understanding training intensities

Understanding recovery

Knowing what to optimise for

How Should I Get Started?

Key takeaways (that I found interesting from 1 to 15 Jan)

Key Takeaways from own side project sentiment analysis tracker to prevent distortion of RPE:

Rate of Perceived Exertion

Threshold Training

Heart Rate Variability

How to use?

What affects HRV?

Strava

Papers to read:

Effects of Sodium Bicarbonate Supplementation on Muscular Strength and Endurance: A Systematic Review and Meta-analysis - PubMed

The .gov means it's official. Federal government websites often end in .gov or .mil. Before sharing sensitive information, make sure you're on a federal government site. The site is secure. The https:// ensures that you are connecting to the official website and that any information you provide is encrypted and transmitted securely.

 <https://t.co/kqvIM3rUp>

P

On the wisdom of not-knowing: reflections of an Olympic Canoe Slalom coach

ABSTRACT Never has the domain of sports coaching been so inundated with secondary information. In high-performance contexts, for example, coaches are routinely presented with detailed reports specifying features about an athlete's or team's performance. Here, we question whether such detailed secondary information

 <https://t.co/CTcEI5nDfD>

Carbohydrate loading in human muscle: an improved 1 day protocol - PubMed

It is generally acknowledged that even without a glycogen-depleting period of exercise, trained athletes can store maximal amounts of muscle glycogen if fed a carbohydrate-rich diet for 3 days. What has never been examined is whether under these conditions this many days are necessary for the conten ...

 <https://t.co/fn0LI2spHr>



<https://twitter.com/APSPublications/status/1613973474195669035/photo/1>

Key takeaways (that I found interesting from 1 to 15 Jan)

1. Build from longer intervals to shorter intervals, rather than the other way round, paper, where HIDIT stands for High-intensity decremental interval training

PRACTICAL TAKEAWAY

If the goal is to accumulate time close to VO2 Max, interval sessions that start with a longer interval and are followed by shorter intervals appear optimal. Examples include:

- [HIDIT intervals](#)
- 3' fast / 2' easy; 12 x (30" fast / 15" easy)

After I shared [this study on Twitter](#) there was some good discussion on different ways to manipulate intervals and a few good sessions mentioned by coaches in the thread. I'd encourage you to go there to read more.

2. Insufficient evidence to suggest that one type of running shoe will prevent lower-limb running injuries (e.g. motion control shoes might not reduce injuries when compared with stability shoes, soft midsole vs hard midsole no difference, basically **get whichever shoes feel most comfortable** for each runner), [paper](#)
3. Carbohydrate loading - rather old paper (2002) - only **1 day of high carbohydrate intake** is required for glycogen stores to reach maximal levels, [paper](#)

Key Takeaways from own side project sentiment analysis tracker to prevent distortion of RPE:

1. Especially in amateur athletes who have low regulation / 'taste' / experience for exertion levels, i.e. those who are not trained enough, they tend to exert a *higher level* of effort than what they *thought* they were doing (at least for cycling)

Exercise Intensity and Validity of the Ratings of Perceived Exertion (Borg and OMNI Scales) in an Indoor Cycling Session

The purpose of the study was: 1) to determine the intensity of an indoor cycling session; 2) to know the correlation between the rating of perceived exertion (RPE) scales (Borg and OMNI) and % heart rate reserve (%HRR) with categories; and 3) to evaluate ...

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3916918/>



In line with the aforementioned, another purpose of the current study was to evaluate the validity of RPE scales (Borg and OMNI) with respect to HR and %HRR. In this sense, the results reported that both the Borg and the OMNI scales are not valid to quantify the intensity performed in indoor cycling sessions. Although a high correlation value between the Borg and the OMNI scales ($r = 0.82$, $p < 0.001$) was found, the correlation between average HR and %HRR with Borg and OMNI scales was lower than $r = 0.4$ but significant ($p < 0.05$). These results are in agreement with previous studies performed in indoor cycling. [López-Miñarro and Muyor \(2010\)](#) found a reduced validity between the Borg RPE scale and %HRR ($r = 0.41$, $p < 0.05$) in fifty-nine subjects with limited experience in indoor cycling (between 4 and 12 weeks and 2–3 classes per week). Consequently, [Muyor and López-Miñarro \(2012\)](#) evaluated eighty subjects who had experience between 24 and 28 weeks (2–3 classes per week) in indoor cycling. However, these authors found a low correlation between the Borg RPE scale and %HRR ($r = 0.18$, $p > 0.05$). These authors explained their results by the fact that the participants may have had little experience in indoor cycling and because they would not have understood the methodology of the Borg scale. However, in the current study we used two scales, the Borg and the OMNI scales in more experienced subjects than in prior studies but we did not find acceptable validity values in none of these scales.

When the distribution of subjects with regards to intensity categories obtained from the overall RPE in the Borg and the OMNI scales, and %HRR was analyzed, we found that fewer than 50% of the subjects perceived (in the Borg and the OMNI scales) the same intensity than they were performing (calculated with %HRR). However, more than 50% of subjects performed higher intensity levels than they perceived. This discrepancy between the intensity perceived and performed could explain the low validity found in the RPE Borg and OMNI scales.



While this is only true in amateur cyclists, further research is being done currently (I'm looking up) to see whether this is true. Also further research has to be done on whether true RPE can be determined from private comments (but even if it doesn't, comment-based RPE can be a proxy)

Coquart [et al](#) in 2007 shows that RPE can be used effectively for experienced athletes (mean training time at least 6.8 hrs per week, with 6 years of running experience mean) - but estimated time limit (basically another scale to gauge how hard someone is exerting) isn't a good estimate, paper is here:

<https://s3-us-west-2.amazonaws.com/secure.notion-static.com/8e60ed5a-a691-4fff-8d83-debafef92af2/coquart2007.pdf>

Garcin 2003 confirms that RPE is reliable (generally) for trained males (evidently, with MAV / VO2 max speed being 17 kmh they are rather solid), paper can be found here:

<https://s3-us-west-2.amazonaws.com/secure.notion-static.com/fa55ef1e-c3fa-4ece-a878-6e82960893b3/reliability-of-rating-scales-of-perceived-exertion-and-heart-rate-2003.pdf>

Oh this is pretty interesting:

Garcin 2002 concludes that even after 8 weeks of training (actually more so because of that training), RPE values increased for the same speed, rather than decreased or stay the same

- this could mean that they are more sensitive to that level of exertion, or perhaps a simpler conclusion could be that they are more fatigued - as a result the conclusion was that coaches can use RPE to gauge whether athletes are overtraining, but it

must be self-reported, accurately - basically it comes with experience

- one reference that was particularly interesting was womack, CJ:

<https://s3-us-west-2.amazonaws.com/secure.notion-static.com/7e1160c8-3a38-4600-b186-77bfa451af85/womack1998.pdf>

Development vs performance

Rate of Perceived Exertion

Papers to read:

<https://s3-us-west-2.amazonaws.com/secure.notion-static.com/4a4e5368-3a47-40fb-bb11-bf079198af8e/demorree2014.pdf>

<https://s3-us-west-2.amazonaws.com/secure.notion-static.com/d38a1d09-e1bb-408b-a130-0e17b6453731/ijerph-19-14439.pdf>

https://s3-us-west-2.amazonaws.com/secure.notion-static.com/c2ffec7c-67db-46ee-a24c-dafbfbd525bf/2001_Blondel_IJSM.pdf

Threshold Training

from the man himself ari klau:

I wrote most of the articles found on this site, like Kenyan Training, a Practical Guide back in 2000 - 2004 when I was still running actively. Since then, I've finished medical school, and since 2010 I've been busy working as a physician in Southern Norway. I still enjoy running, three times a week.

<https://www.mariusbakken.com/the-norwegian-model.html>

WED.	7 "	(11,25 km)	@	5 "	45 "	" "	(3 "	35 "	" "
THUR.	AS	TUES.							
FRI.	REST.								
SAT.	AS	WED.							
SUN. a.m.	3 miles (5 km)	@	5 min:00sec/mile pace (3 min:07 sec/km)						
p.m.	3 "	@	5 "						
TOTAL MILES	43								

on lactate training + triathlon training from alexander bu:

triathlon is a demand driven sport

- is the athlete able to hit correct intensities for the duration in KEY sessions? if yes, good. if no, bring down volume on non key sessions
- maximal sustainable energy expenditure
- a lot more work for elites than amateurs
 - work ≠ volume, need to consider intensity. work is a better metric
 - less volume / work, more margin of error
- question: no polarised training, so can alex walk through what a key week looks like
 - research from calories to energy

- is what you are doing in training simulating race effort? IE 5 min / 20 min FTP might not be very useful if ur racing iron man, so same for vo2 max - is it useful?
- a big week (5-6 weeks away): work on overspeed- metabolic steady state
- hard bike and hard swim day 1 + easy run
- day 2 easy but close to duration (long)
- plan for calorie budget + biochemical efficiency
- if race distance is broken up into small intervals, will the muscle fatigue? (at or slightly above race pace) - swim
- transition to bike
- gustav and cristian goal is to win ironman and olympic (going back)
- specific to running: marathon time (kipchoge vs blummenfelt) is arguably a much bigger pace difference than sprint, olympic or half
 - specificity
 - on gustav and cristian's tactics of uploading 40k at 3.50/k on strava the week before ironman: not playing games, alexander really just doesn't have time - controlled taper without loading too much
- what does a big run/ bike workout look like?
 - race pace power for extended duration- eg push 300/310W for 4h for bike (duration more than distance because of terrain)
 - race 3.30/3.35 for ironman - 40k run should feel and easy when isolated
- time spent training in a regular week? 30h can go up to 35-40 for big weeks (check their article): no massage no stretching unless it is need based no weights unless need based
- olav holds few secrets!
 - why he used lactate:
 - look at lactate to see adaptation - get the answer as you go
 - lactate as intensity control: you will most likely fail if you do this - too many factors (physics and physiology)- everything from nutrition to hydration can affect
 - stick with pace in swimming, power in running and biking
 - lactate affected by many other different things including the area in which you measure the lactate they can also call the affected by sweat and it can also be affected by the measurement tool
 - not accurate because small volumes of blood are used with high variance and unless u know how to measure
- altitude as peripheral recovery ? 80:30
- heat training as an advantage
- don't look at single metrics- it's not accurate / useful

Part 2:

- how to do individualisation?
 - always have consistent tests to see whether an athlete is better in one area or another, find out his end goal then adapt the training plan towards there
 - don't do too many changes - controlled changing one parameter at a time
 - does what i'm trying to do / specialise in compromise anything else?
 - workout response for one athlete might be good while it might not be good for another
 - individualisation: learning adaptation + changing

Heart Rate Variability



Main incentive is because I've been using HRV4Training App to track recovery time periods (cost-effective, cheap way to do so)

- mainly acts as a tool to measure the *body's response to stress* more than anything else
- cannot look at the absolute number, rather, must look at the trend of values over time to gain a more accurate view of heart rate variability as applied to the individual



One thing I'm doing isn't just taking everything that marco altini says as true, i'm doing my own research as well: <https://sci-hub.ru/https://onlinelibrary.wiley.com/doi/10.1111/j.1469-8986.2005.00277.x> → so it seems that it is indeed true to use HRV as a basis of comparison within myself as compared to like, comparing numbers with different people

How to use?

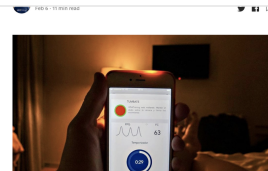
- in comparison to baseline HRV, high periods of fluctuation usually means that body is not adapting well to stress levels.
 - for instance periods of lower-than-normal HRV means that body cannot adapt to changes properly

Main set of articles that I found really useful to learn more:

The Ultimate Guide to Heart Rate Variability (HRV)

In this series of posts, I'll provide an overview of best practices for your Heart Rate Variability (HRV) measurements (part 1), and tips on how to analyze and interpret your data over the short and long term (response to acute stressors, longer-term trends, etc. - in part 2).

<https://www.marcoaltini.com/blog/the-ultimate-guide-to-heart-rate-variability-hrv-part-one>



Definitely several highlights that I want to take note of:

One last important point to discuss here. **The view that training should cause a dip in HRV is very simplistic**, HRV is a measure of physiological stress — or even better: a measure of how we are adapting and responding to stress. While higher stress is typically highlighted by a reduction in HRV, **positive adaptation to stress** (think for example about an intense training block) **should result in a stable or increased HRV**. Only in case of issues such as too much of a stimulus (e.g. intensity or volume) or non-training related stressors, you should see a reduction. ~ Part 2

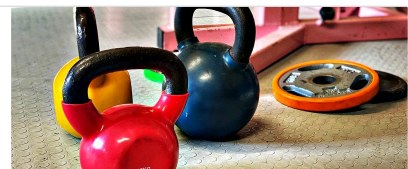
These visualizations are helpful when we look at the big picture, beyond simple acute responses. In this case, you should not expect your HRV to reduce if you are responding well to stress in the medium / long term, even during a high-volume or high-intensity training block. On the contrary, **a positive adaptation is shown as a stable HRV or even increasing HRV** for a few weeks. ~ part 2

generally part 4 is useful as well:

The Ultimate Guide to Heart Rate Variability (HRV): Part 4

This is the fourth (and last) part of my series of educational posts on heart rate variability (HRV). You can find the other posts at these links: HRV is nothing new, and fairly simple to use effectively, but poor standardization and methodological inconsistencies make it difficult sometimes for people to make good use

https://medium.com/@altini_marco/the-ultimate-guide-to-heart-rate-variability-hrv-part-4-909b52f71131



What affects HRV?

- Question arose from me taking a measurement @February 15, 2023 and then realising that I'll be getting back my As really quickly / soon and then my HRV was abnormally high. Didn't know what to attribute the sudden spike in HRV to, but might have been because of the adrenaline surge (or otherwise, idk)

- But then:

https://twitter.com/altini_marco/status/1625399321939124224?s=20&t=YlgIRhIkSTOG7p9_LeSStQ

and this: <https://pubmed.ncbi.nlm.nih.gov/7429902/>

- Will keep collecting resources here for now: basically last google search was *factors affecting RMSSD*
 - <https://www.psychiatryinvestigation.org/upload/pdf/pi-2017-08-17.pdf>
 - <https://www.intechopen.com/chapters/71001>
 - is there an exhaustive list?? and perhaps it's time to start understanding HRV and the deeper literature behind them (parasympathetic, sympathetic nervous system, etc.) → good to know
-

Strava

- test out the strava api