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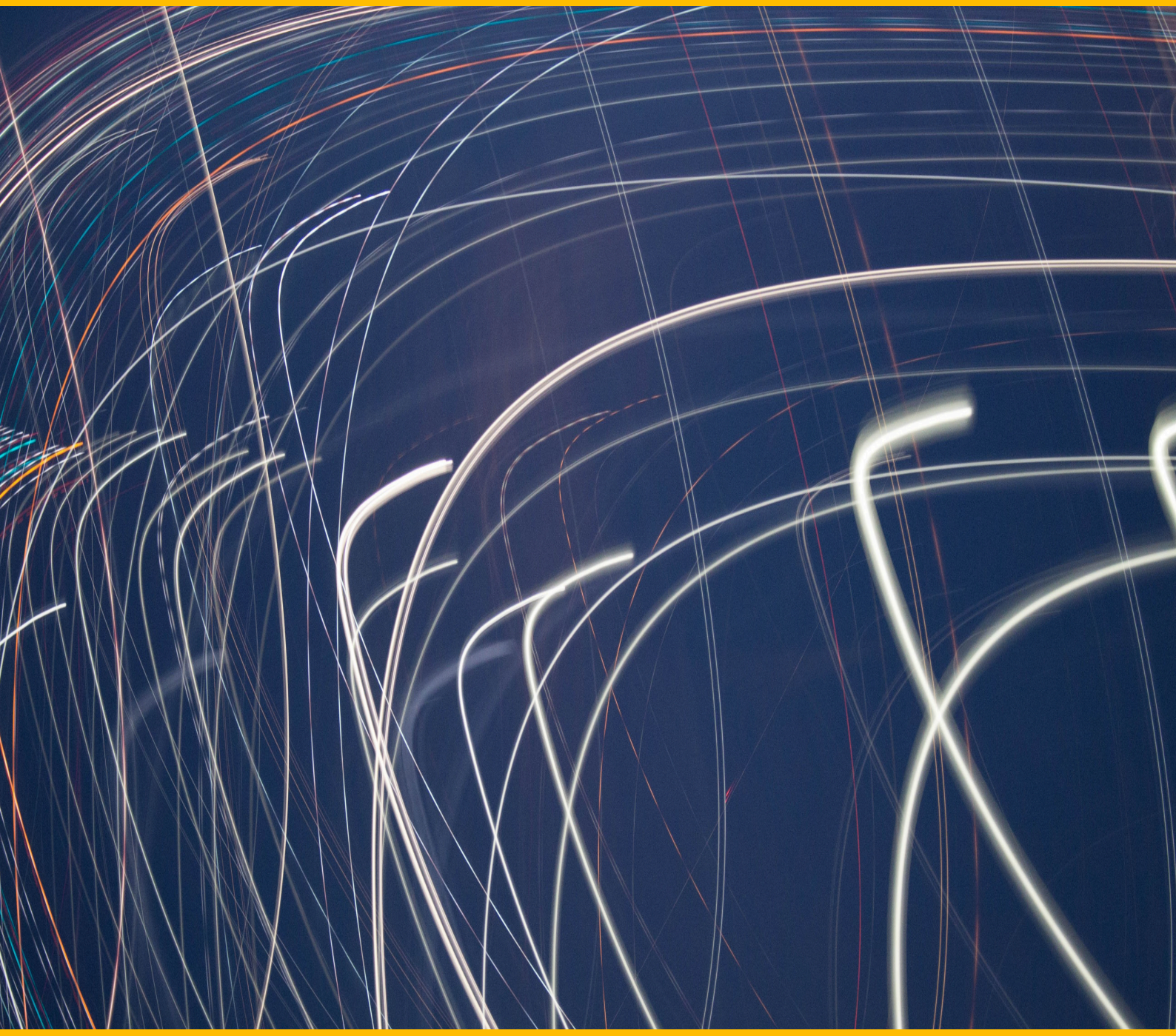

Physical Tests Every Athlete Should Do

To perform tests is something we need to do in order to track and measure progress. This is not just something for elite athletes. In school the teachers often have their students write assignments or written tests as a part of testing the students knowledge. In sport we are often tested when we are competing against others. If a test is good or not is usually determined by the reliability and validity. Does the test measure what it is intended to test and can it be replicated? If the answer is yes to both those questions then it's a good test. For instance the bench press is a good test for measuring strength in the chest, shoulders and triceps, but worthless for aerobic capacity. And if you were to do 100 repetitions of the bench press you wouldn't know your max strength (1 rep max).

Something that is common for seeing improvements is to compete and see how far you get in a tournament. The problem with that is that you can't replicate the test and every match you play will be different. Let's say you play against a rival that you are used to losing to and you all of the sudden are winning, you might think you have improved but what if you rival had a fever and hadn't trained for 3 months. Have you still improved? Your form and your opponent's form will vary from day to day. Therefore we have certain limitations in using competitions as a test. I suggest that you look at trends. Are you going further and further in competitions over a 6-12 month period? However, this document is about tests that have good reliability and validity for your physical abilities. It is also about simple tests that every athlete should do. I can go one step further and say that everyone should know their scores from these tests (at least strength and aerobic capacity).

So which tests should an athlete do? As I've said previously it depends on the sport, but for these general tests everyone benefits from knowing their results. For me as Strength and Conditioning Coach [S&C] I want to know some basic things. How strong are the athlete, what is his or her aerobic capacity and lastly the athlete's power. Power is closely linked to explosiveness. When I get the results I can then begin to create a plan for the future development of the athlete. For instance when I was a player I would have scored good on strength, bad on aerobic capacity and okay/good on power. Based on that it is clear that we need to prioritize aerobic capacity and other conditioning work, gradually increase power training and just maintain strength for myself. But what if I´m equally bad/good at everything? Well, then we need to prioritize what is most important for YOU. Are you losing matches because you are too tired towards the end? Then we need endurance and aerobic capacity. The point is: find what you need to work most on and work on it. There will soon be two complete guides for a strength and conditioning program that you can take part in on sugiyamabadminton.com

Now, what you have been waiting for. The tests are: The cooper test, 1RM squat, pistol squats, vertical jump and standing long jump. Below there are some basic instructions for you to follow and some good information about each test.

The cooper test

Measures: Aerobic capacity

A cooper test is an aerobic capacity test which will give you a good indication of your VO2max. There are 2 different ways of doing the test: run 3 km as fast as you can OR 12 minutes as far as you can. So pick one and stick to that. It is important that you run on the same track or surface. For instance you don't want to run the first test on a treadmill and then the second on a muddy surface with lots of hills. Make sure it is the same circumstances, or as close to the same conditions as possible or else the results will be hard to compare against each other.

There are many different ways of finding out your VO2max by the cooper test, but go by charts and calculators online. This one is fine i think: https://exrx.net/Calculators/MinuteRun. You could even use this one: https://www.brianmac.co.uk/gentest.htm

What you should aim for is different for everyone since playing style and category plays a huge role in it, but around 3000 meters for elite players is good. Around 3100 for men is great and 2800 for women. But don´t put too much emphasis on the cooper test since there are many different aspects that affect your endurance and recovery in badminton. If you are good at running straight ahead but terribly slow at changing direction, improving your V02max won’t help that much.

1RM Squat

Measures: Strength in the lower limbs (basically legs)

For finding out your lower body strength the 1RM (one rep maximum) squat is one of the, if not the, best test. However if you are new to squatting then don't do it! You need great technique and a lot of experience for the test to be safe and accurate. It is possible for someone to “gain” a lot of strength in a short period of time if they just improve their technique. For this test to be good, we need to have a stable starting point. So practice the

technique first and then do the test. Just make sure that the settings and environment are about the same. That means being well rested before the test.

A safer alternative for beginners could potentially be the leg press. However, be careful there as well. I cannot stress enough how important it is to learn proper technique first.

A good test result is different for every age, gender and sport. For males around 1,6-2 times your bodyweight is around elite level strength and for females 1,3-1,6 times your bodyweight. So a 80 kg male should squat around 128-160 kg and a 60 kg female should squat somewhere between 78-96 kg. However, just try and get stronger from year to year. Don't worry too much about it. You are a badminton player, not a powerlifter. A poor result on this test only means that we should have some more mesocycles of strength training during the year.

Pistol Squat

Measures: Unilateral lower limb strength

This is a test where we measure the difference in strength, balance and stability in your lower limbs from side to side. The pistol squat is an unilateral exercise which means it is performed one leg at a time. Look it up on youtube if you don't know how to perform one. We want both sides to be quite equal even though there will be differences. It is fine with some differences, but if you can do 20 on one leg and 5 on the other (unless you are injured), you need to address that problem.

For male elite players around 15 per legs and for female elite players 10 is good.

Vertical jump (Counter Movement Jump a [CMJa])

Measures: Lower body power

Any vertical test is best to perform on a contact mat that can actually measure the height correctly. However this free version is fine even though there might be some slight errors. But you can comfort yourself with the fact that as long as you’re feeling better while you are playing badminton, the vertical jump test doesn’t matter.

Make sure you have something to mark on the wall where you touched it. Stand on the ground and reach as high as you can and make a mark. It could be with some magnesium, tape or a post-it note. When that is done you stand on the ground again, sit down and explode up in one movement as high as you can, best of 3, and measure the difference between the 2 points. Let's say you can reach 2 meters when you are standing and then you jump and mark at 2,35, your vertical jump is 35 cm. Once again I want to point out that since there can be some slight errors, you need to take it with a grain of salt. It is around 35 cm and therefore the next time you might end up having the “same” results.

What should we aim for? 40-70 cm (yes, that is a huge difference I know). From tests taken from the Swedish national team where CMJ(a) with arm swing were measured, the median was 43,2 for women and 46,8 for men. Since that is the median we don't know if someone jumped 100 cm and someone 20 cm, but aim for 40-45 cm and you should be fine. Elite male sprinters can jump about 64 cm and female sprinters 55 cm without arm swings. You should therefore add about 15-25 % to that when you are allowed arm swings in order to compare against them.

Standing long jump (standing broad jump)

Measures: Lower body power

This test is easy to both perform and measure. What you need is something to measure length with and some tape or marker. You are allowed arm swings. If you land and need to put your hand down for balance, that is a failed test. So make sure you can land and stay in balance. Make sure that the surface is good so that you don't slip and hurt yourself. Preferably you should land on a soft surface. Best of 3.

For M (men) and F (females) at age of 16 we want somewhere around 230 and 180 cm respectively. For male athletes at the top level you need a jump of about 3,10 meters to be considered very good. For female athletes at the top level 2,79 meters is considered very good. But as usual, always compare yourself against yourself.

How often should I perform the tests? I suggest about 2-4 times in a year depending on your level and opportunities. You can measure the squat and pistol squat more frequently, but the cooper test will be harder since it takes so much from you mentally and physically. But usually tests can be performed after the season has ended and then before it starts again. Some players might be able to do some testing during Christmas as well.

If you want some more information listen to the podcast “Badminton Science Podcast” where I talk about these tests in episode “13. Physical Tests All Athletes Should Do”.

Now, measure your progress using the table below:

Test	Date	Cooper	Squat	Pistol squat	CMJ(a)	Standing long jump
1						
2						
3						