

HARDCORE ENDURANCE AND SERIOUS MUSCLE – SURELY THE TWO ARE MUTUALLY EXCLUSIVE? WE HAD MH WRITER AND POWERLIFTER DOMINIC CADDEN PUT HIS BODY ON THE LINE TO EXPLORE WHETHER NEW METHODS OF CONCURRENT TRAINING COULD TURN HIM – AND THUS YOU – INTO THE ULTIMATE ALL-ROUNDER

What do you get if you cross Arnold Schwarzenegger at his muscle-bound peak with a Kenyan long-distance champion?

This isn't a joke, but a theoretical question about the outer limits of physical fitness. It's a question that's confounded exercise scientists and been pondered by hardcore gym junkies across the land. Is it possible to train for serious endurance without sacrificing your hard-earned strength and muscle?

It was certainly a question I'd started asking myself. Over the past few years, as my powerlifting went to national then international level, I'd become increasingly fretful about preserving my strength and size. When mates asked if wanted to go for a run or play a social game of football, I'd knock them back, more concerned about recovering from my last lifting session or preparing for the next.

There's no doubt my focus had paid off – last year I won gold in the 66-kilogram class at the World Masters Powerlifting Championship. But I was beginning to feel a little stale from all the indoor training, and I was aware I now had more in common with the one-dimensional gym rats I'd once laughed at than the outdoorsy bloke that I used to be.

Then the opportunity landed: an offer to compete in the Mark Webber Tasmania Challenge – a five-day adventure race involving running, kayaking and cycling through 350 kilometres of Australia's most stunning landscape. What could I say? "Sorry, I can't possibly risk losing 10kg off my bench for an incredible, once-in-a-lifetime experience."

Of course, there was a catch: I would only have four weeks to train for the challenge. The second complication was that I was due to contest a powerlifting comp just five days after my efforts in Tasmania. And here lay my personal dilemma: was it conceivable to properly train for both events at the same time?

My chances didn't sound good. "There are hundreds, if not thousands of studies showing endurance training reduces strength," cautioned Robert Wilks, coaching manager at Powerlifting Australia. "For unknown physiological reasons, if someone tries both types of training, the stamina training predominates. Your aerobic gain will be just as great, but your strength gain will be greatly limited."

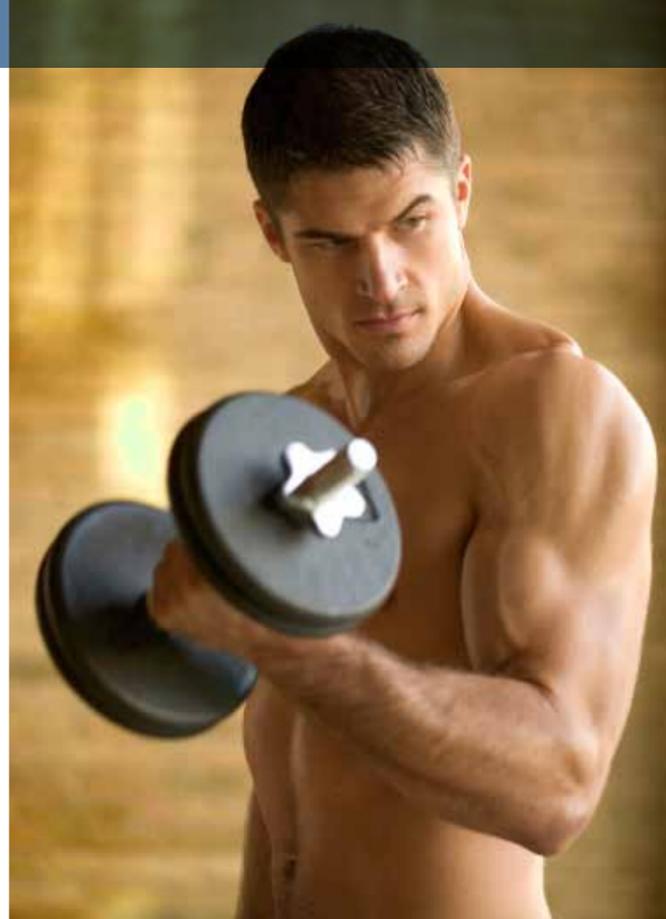
Yet, in spite of these warnings, I couldn't let it go. The promise of the Tasmanian wilderness had fastened a grip on my imagination. I wanted to swap my Spartan gym for mountains, forests and sea.

Besides, I thought, didn't competitors in the CrossFit Games show that it was possible to combine fearsome strength with lung-busting stamina? Then there were examples from more conventional sports, too. Surely professional athletes like Wallabies breakaway David Pocock or Collingwood forward Travis Cloke offered proof that you could maintain a hulking physique without sacrificing match-winning endurance?

I decided to take on the challenge. Not surprisingly, given the conflicting demands of adventure racing and powerlifting, there was scant advice on how to train for this double-barrelled quest. I was going to have to wing it.

On the plus side, I did have a bit of previous. A few years ago, before my lifting got competitive, I'd completed a couple of 100km trail-running races. I also crossed my fingers that my wife's background as a personal trainer and nutritionist would mean my efforts would at least be informed. Using the six principles that follow, I was prepared to step into the physical unknown.

But if variety is the spice of life, would my training prove too hot to



handle? I wasn't sure, though I hoped to learn workout tactics that'd be relevant for any active guy looking to mix things up. Perhaps you've packed on muscle in the gym but now want to test yourself in a 10km obstacle run? Maybe you're a committed runner keen to bulk up but still smash a personal best in your next half-marathon? Think of me as your human guinea pig – a man seeking to unlock the secrets of concurrent training, while hopefully surviving to tell the tale.

PRINCIPLE No.1 BE THE MAN WITH A PLAN

First, I needed a plan of attack. The aim of my training was threefold: to build up to maximum strength, to maintain my weight and muscle mass, and to improve my endurance.

The true scale of my challenge dawned after speaking to Jason Donaldson. As Australian director of CrossFit Endurance and the owner of Perth gym The Cell – Real Fitness, Donaldson is a walking fitness encyclopaedia. He was blunt about my chances. "To compete with elite adventure racers is so far at the other end of the spectrum from elite powerlifting that you can't really be at both ends at the same time," he warned. "Having said that, you can definitely limit how much strength you lose."

Whatever your own specific training goals, these same damage-limitation principles apply. Two studies on concurrent training published in *Medicine & Science in Sports & Exercise* suggest your best bet to restrict strength loss is to alternate between strength and endurance sessions on different days.

Unfortunately, my time-pressured schedule meant I couldn't always break up my training this way. In four weeks, I had to prepare myself for three specific strength events (squat, bench press and deadlift), plus three endurance activities (running, cycling and kayaking). To achieve this, I saddled up for four sessions a week each of both strength and endurance training, leaving myself with a single rest day to recover. Twice a week, I'd have to train strength and endurance on the same day. How could I best navigate these double-ups?

"If you're training twice in the same day, it can be better to do your strength training first if that's your main focus," advises Kenji Doma, research officer at the Institute of

Sports and Exercise Science at James Cook University. Managing your recovery period is also crucial. "Six hours is not enough recovery time after a strength training session to maintain running performance and economy," says Doma. "Nine hours' recovery works much better."

That suited me fine. It meant I could do my training before and after work. But Doma warned that the detrimental effects would linger if the intensity of my second session was too high. Instead, he recommended a more gentle second session that could act as a form of cooldown, to aid recovery from the earlier workout and set me up for the next day's endurance training.

Aside from following this protocol, where possible I also alternated muscle groups, so running or cycling would follow bench press, while a kayaking session would slot in between slamming my legs in a squat and deadlift session.

Another tip if you're training twice in a day is to start with the session that demands greater brain power and coordination. "We always do our skills sessions when the players are fresh, physically and mentally," says Collingwood FC's strength and conditioning coach Michael Dugina. "If they're fatigued from another activity, then skills drop off and slow down. And like the old saying goes: 'If you train slow, you'll be slow.'"

PRINCIPLE No.2 AVOID "JUNK" TRAINING

Limited time meant my training had to be whittled down for maximum efficiency. I wasn't a full-time athlete, after all, but a jobbing journalist trying to squeeze my training around the prosaic reality of earning a daily crust.

Many studies say muscle mass can be maintained in as little as two short sessions a week. In fact, a study of American Football players by the US Department of Health and Physical Education showed that weight training twice a week was still enough to improve strength, even in-season, as long as the weights were equal to or more than 80 per cent of the players' one-rep max and they worked big compound exercises. These included back squats, deadlifts, cleans, shoulder and bench pressing – exercises that were my bread and butter anyway.

Unfortunately, my training demands were a little more complicated than simply retaining strength and size. With my



Cadden did low reps and upped his speed work in an effort to retain power.

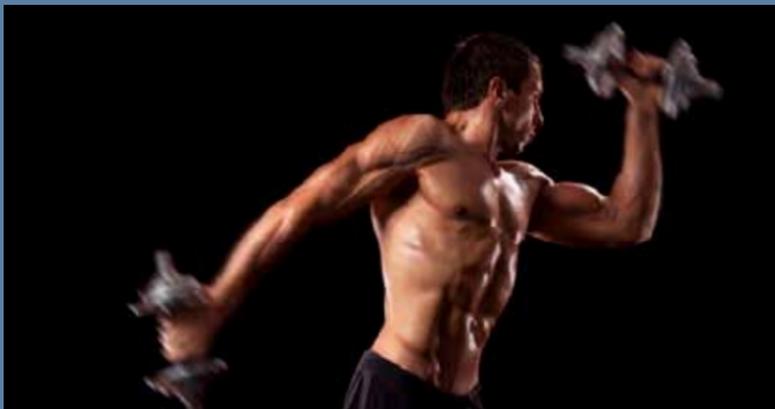
powerlifting comp on the horizon, I had to focus on ensuring I was technically proficient and capable of handling serious weights for my competition exercises (the squat, bench press and deadlift). To do this, I worked a lot at around three reps per set and increased speed work to hold my power. Moreover, I had to build up to single-rep lifts to work out exactly what I could handle on comp day.

When it came to the endurance training, longer and therefore slower distances offered the closest simulation to my race conditions. But for my purposes they just weren't practical. "If you do long, slow endurance training day after day, you're going to start eating into your muscle stores," said Donaldson.

One alternative, increasingly used by ultra-endurance athletes, is to emphasise intensity over volume. "One of the guys I train did a 100-mile (160km) trail-running race at altitude, but the longest he ever ran in training was 50km," said Donaldson. "Most of his runs were shorter and faster."

Given my demented schedule, this less-is-more approach made sense. My cycling revolved around riding lots of hills, rather than epic long-distance efforts, while my paddling incorporated full-on sprints alongside steadier stints on the water. Meanwhile, instead of clocking up endless kays of roadwork, I opted for soft-sand running. After running a fast pace for one minute, I'd walk fast for a minute then jog for a minute, repeating the process for 40 minutes.

A study at the University of Western Australia proved the efficiency of my beach-based tactics – the energy cost of running in soft sand is up to 1.6 times more than ►



interval or my ability to recover between intervals began to decline, I called it quits. I had to save myself for the next day, which, unless it was Sunday, meant another training session (or two). I reminded myself of the motto of eight-time Mr Olympia Lee Haney: "Stimulate your muscles, don't annihilate them."

PRINCIPLE No.4
MAINTAIN SPEED

Ultimately, concurrent training is a complex balancing act. Overemphasis in one area means that something is going to give elsewhere. "As the season gets closer, our players cut down their volume of endurance work because there's always the concern that, when you do too much endurance work, you lose speed," says Dugina.

Surprisingly, speed was a genuine concern for me, too. I didn't care about improving my time in the 100-metre dash, but powerlifters rely on speed and acceleration to keep the weight moving through the weakest part of a lift.

If you're pumping iron simply to build and maintain muscle bulk, this loss of speed isn't such a big deal, as muscle growth can also be triggered through lifting a lighter weight for more reps at a deliberately slower pace. But bodybuilding is unusual in that respect – functional strength for the majority of sports requires strength to be combined with speed.

Consequently, I made a concerted effort to combat any slowing of the muscles by performing specific exercises before going heavy on my three main lifts (see "The Fast Track", below). Powerlifting demanded a need for speed and I was determined not to take my foot off the gas.

running on grass. It fitted in with my training philosophy of getting the maximum bang for my buck.

PRINCIPLE No.3
HOLD BACK A LITTLE

You don't have to be a masochist to appreciate that hollowed-out feeling of satisfaction you get from pushing yourself to the physical limit. The truth is that training to absolute failure makes you look and feel like a hero. But leaving yourself prostrate in a pool of your own sweat can easily lead to burnout and injury if you're attempting to train strength and endurance at the same time.

Instead, I pulled my strength workouts back to the point where I'd aim to stop a set just short of exhaustion, or at the point where my reps or weight per set began to decline. I also reduced my rests between sets (except when I worked up to single-rep lifts). A study in *Medicine & Science in Sports & Exercise* found that 90 seconds of rest facilitated adaptations in both strength and endurance. Resting less didn't further bolster endurance, while resting longer could help strength, but would actively detract from endurance.

I reined myself in on the endurance sessions, too. Once my time per

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THE FAST TRACK Do these exercises before going heavy on the squat, bench and deadlift

SQUAT

ALTERNATING BLOCK START JUMPS 3 x 40
From a sprinter's block, skip one foot up under the shoulders, then the other, swapping the position of the feet.



20m SPRINTS 3 x 6



DEPTH JUMPS 3 x 6
Stand on a box higher than knee level. Jump down onto the floor then up onto another box about 1.5m in front of the first one – spend as little time in contact with the floor as you can.



BENCH PRESS



MEDICINE-BALL THROWS 3 x 20
Throw the ball from your chest while kneeling, then catch the rebound off a wall.

VERTICAL MEDICINE-BALL THROWS 3 x 10
Stand holding the ball on your chest. Extend your arms up vertically to toss the ball up, then catch it.



JUMP PUSH-UPS 3 x 6



DEADLIFTS

BOUNDS (STANDING LONG JUMP) 3 x 6



HIGH PULLS 3 x 6
Lift a barbell from the floor to in front of your face.



GLUTE/HAMSTRING RAISES 3 x 10
Lie facedown on a high bench with your legs hanging off the end and down to the floor. Hold your legs straight as you swing them up so they are above the bench.



PRINCIPLE No.5
RECOVER, RESTORE, REPLENISH

One advantage of my relentless schedule was that it offered good preparation for five straight days of adventure racing. It allowed me to learn how to pace myself, maximise my recovery and remain injury-free, so I could back up day after day.

My recovery relied on several factors. Within 20 minutes of training, I soaked my body in cold salt water or took a cold shower to alleviate any post-workout inflammation. After that I'd slip into 2XU recovery compression gear: long tights after a leg-dominant session, a long-sleeve top after an upper-body-dominant session. I'd wear these for at least two hours and would even occasionally sleep in them if I trained in the evening. An Australian Institute of Sport study found that athletes who wore this gear for an hour after exercising improved clearance of blood lactate, the waste product that causes delayed muscle soreness. For me, I noticed it relieved the tension in muscles around my joints and spine that often led to stiffness or muscle spasms.

Combined with careful nutrition, stretching and a little self-massage with a foam roller, my muscles recovered with little soreness or tightness. What was harder to control was the general fatigue. No amount of ice, massage or ibuprofen helped – extra sleep was the only answer. I tried to get eight hours a night and took daytime naps where I could. Previously, occasionally missing a couple of hours sleep had been no big deal. Now it left me absolutely wasted.

Stanford Sleep Disorders Clinic research reflects this. Their studies show that more sleep – even up to

10 hours a night – leads to better sports performance for all types of athletes. Much of this is linked to growth hormone, which is released during deep sleep, but extra Zs are also considered important when learning a new skill.

Certainly, I found that on days when I was tired, my strength training suffered – I had trouble firing up and focusing on getting everything technically correct, and I felt slow. It fitted with the Stanford findings that "sleep debt" had negative effects on cognitive function and reaction time.

How do you know if you're sufficiently recovered? Doma recommends doing a quick vertical jump test or a series of timed 20m sprints before a session to see if you're firing on all cylinders. "Just make sure that the tests themselves aren't tiring you out," he says.

PRINCIPLE No.6
USE THE RIGHT FUEL

While I was already vigilant about nutrition, I often struggled to eat enough and chow down at the optimal times. This meant I tended to lose weight easily, something I needed to avoid. I didn't have much excess fat to burn, so lost weight would probably mean lost muscle and, therefore, less strength.

To combat this, I had to maintain a protein intake of about 1.6-1.7 grams per kilo of body weight (around 110g) a day. This quantity was sufficient for a strength athlete and a little more than an endurance athlete would need.

Admittedly, I became a little OCD about calculating my protein count in every meal, to make sure I was getting the 20-30g my body

Stopping just short of exhaustion can prevent burnout and injury

could make optimal use of. Turkey, chicken or kangaroo often turned up in my breakfast – they're lean but very high in protein, so I didn't have to stomach too much first thing in the day. Afternoon snacks included hummus for the high protein content in chickpeas, or a mix of roasted chickpeas and nuts, as I found both easy to digest before training.

Second, I tried to eat more of my daily carbs in the "carb window" – a period of 2-3 hours after exercise. This is the optimal time to "refuel", because it's when the muscle cells are most receptive to glucose, so that even simple carbs like sugars are put to good use.

I also put away more carbs in general – even at night – to help fuel the extra workouts, which often took place in the early evening. I also let myself succumb to a sugary snack from a bakery after training, when my body was crying out for a quick carb fix.

Finally, I had to simply up my overall kilojoule count. This even meant increasing the amount of fat, since fat is a key energy source for long endurance sessions, plus per gram it has more than twice the kilojoules of protein or carbs. Not wanting to clog up my arteries, I targeted good fats: monounsaturated in peanuts and almonds, and omega 3 in oily fish such as mackerel. I also had small amounts of very dark chocolate (above 70 per cent cocoa) for its big kick of antioxidants that punch back against the high oxidative stress caused by aerobic exercise. ▶

THE RESULTS

So did my training strategy pay off? The answer was yes . . . and no.

First, the positives. After a month of intense training, my body weight was down by less than a kilo – a good result given the cardio battering I'd put myself through.

Admittedly, my strength dipped slightly, but more at the very top end. When the training period finished, my single-rep lifts for squat, bench press and deadlift were down on my best for the year by about five per cent each. At three reps, however, my weights were much closer to par, so I'd expect that if I had tested weights at my eight- or 10-rep max – a typical range for building muscle – the difference would have proved minimal. Several studies suggest that endurance training has less of a negative effect on low-velocity strength (eg, bodybuilding training) than on high-velocity strength.

My beep test score (which estimates VO_2 max) increased from 11 before my concurrent training blitz to 12.75 10 days after the adventure race. But I felt my endurance had an even bigger improvement at a lower pace.

This was borne out by the challenge itself. Over five days, not only did I complete 44 hours of adventure racing over tough terrain on six hours' sleep a night, my teammate and I actually improved our placings each day, to finish 22nd out of 32 pairs. This might not sound especially impressive, but bear in mind that 14 of these teams were pro athletes in the elite race category. I finished the race tired but uninjured, at a weight of 65.9kg – part one successfully achieved.

In a perfect world, I'd end this story right there. But it was after the challenge that things began to go pear-shaped. Shattered from

my exertions in Tasmania, what I really needed to do now was rest. Unfortunately, my schedule demanded that I return to the gym after just three days for a monster 2.5-hour session to work up to my opening weights on all lifts for the competition.

When I fronted up to the comp two days later, I was slow, light-headed and my focus was terrible – mentally, I still felt fried from the race. My weight was now down by 1.9kg in the five days since the race. The drop-off in my strength was striking: my squat was down eight per cent, my bench press 12 per cent and my deadlift 6.7 per cent. What had gone wrong?

"After 44 hours of racing, you would be just about completely depleted of muscle glycogen," Doma told me after the competition. "Ironman athletes take weeks to recover from an event. You'd take up to a month to recover from your race, especially given that this was your first multi-day adventure-racing event."

My weight loss didn't surprise Doma, either.

"The body uses a lot of energy while going through recovery, which accounts for your post-race weight loss. It's very hard to exert maximum force while so much energy is taken up by the recovery process."

That covered the body, but I was also curious as to why I couldn't mentally fire myself up at the comp. "Exhaustion has a massive impact on cognitive processes," explains Doma. He reckoned my levels of dopamine and serotonin would have plummeted in the aftermath of the race. These neurotransmitters are significant because they influence your mood, motivation and energy levels. Throw in the physical damage and recovery

Shattered from my exertions in Tasmania, what I needed was rest

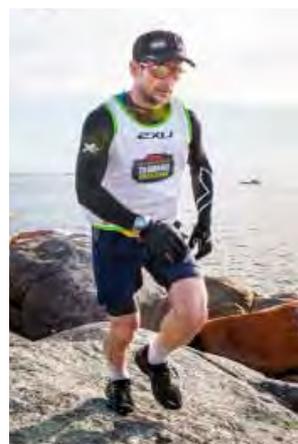
process going on in my muscles and you have a combo that, as Doma pointed out, would "dramatically affect motor performance and impair coordination – qualities essential for powerlifting".

So is there anything I could have done better?

In retrospect, I should have been more disciplined about my post-training recovery; I didn't always manage to sleep enough or eat as regularly as I planned. Doma also thought I'd set myself back with the intensity of my workouts before the weightlifting comp. "Lifting to 60 per cent of your maximum would have been enough to get the stimuli your muscles needed."

Ideally, to compete in both events without suffering any ill-effects, Doma suggested I should have allowed for four weeks of reduced training leading up to the powerlifting comp, gradually raising the intensity as I progressed. In week one, the total volume of weight training would be limited to a single hour and no more than 60 per cent of my max, he explained. "You'd then increase the weights in 10-15 per cent increments each week, so that the week before the competition you are getting close to your maximum."

Yes, I was still standing, but the lesson in fatigue will stay with me. Going straight into the powerlifting comp without sufficient recovery had caused my body to wave the white flag. Everyone has their limits – ignoring them is a recipe for meltdown. ●



CHOW TIME A typical day's eating when training twice a day

MEAL 1

- Two poached eggs or 220g of baked beans with two slices of wholegrain toast, mushrooms and tomato sauce
- Coffee with milk
- Cranberry juice or green vegetable juice

TRAIN

MEAL 2

- (post-training)
- Homemade banana oatbran pancakes (mix includes eggs, milk and protein powder) with fresh fruit and peanut butter sauce (peanut butter, soy milk and maple syrup)

MEAL 3

- Pasta and tomato-based vegetable sauce with mackerel; or stir-fried rice with veg, cashews and chicken or turkey sausages
- Apple strudel or dark chocolate
- Fruit

MEAL 4

- (pre-training)
- Dried cranberries or pineapple; wholewheat crackers and cheese
 - Coffee with milk

TRAIN

MEAL 5

- (post training)
- Mix of roast chickpeas, almonds and corn
 - Açaí berry drink

MEAL 6

- Lean red meat, vegetables, corn, baked jacket potatoes
- Pumpkin and pinenut scone with light ice-cream