

Jumping Technique and Injury

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Today's article is another in a current theme of reviewing what exercises clients at my local gym typically do incorrectly resulting in discomfort, injury and ultimately time away from exercise to recover.

With the increased popularity of group circuit type training, we see lots of clients attending multiple sessions per week and if it is a typical high intensity class, there is then a lot of jumping type activities incorporated into these routines (Jumping is a great way of increasing intensity within any routine).

There are two areas of concern with these sorts of exercise routines:

1. There is no progressive overload of this intensity for each client – you turn up and all do the same session (which could be your first or your 100th!).
2. Very few clients ever learn how to jump properly (or more importantly, learn how to land correctly!).

I have a client who is currently in lock down (like the rest of us) and she wanted to continue doing circuit classes and so downloaded a movie star's circuit training app and within two weeks gave herself patella tendonitis and now can't walk up or down a flight of stairs let alone jump about!!

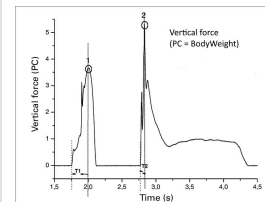
A future article will review the downside of what I will call "Remote Training", but for now I wanted to focus on the problems I typically see with clients getting injured performing these types of activities?

Anyone with a background in Athletics will attest that jump or plyometric training whilst being valuable in the improvement in running and jumping power, did take a toll. I would expect few athletes didn't experience "Shin Splints" at least once in their career (Shin Splints being the tendonitis of one or more of your low leg muscles).



Anytime you minimise your ground contact time during jumping, you dramatically increase your "Ground Reaction Force" – (a core principle in biomechanics is "for each action, there is an equal and opposite reaction"). If you hit the ground hard with your foot or feet during a jump – then the ground reacts back against you with the same level of force.

The graph on the right shows the GRF (x body weight) of a couple of landings during jumping. Both jumps created forces >4.5 times body weight at impact!



The body's anatomical structure is such that it can take a certain level of high impact loads but it is very demanding. The body should be given plenty of time to recover from any such bouts of exercise and with time and the correct programming, you can develop a high level of power through this type of training. BUT, you are very close to the edge of injury with this sort of training and it doesn't take much to step over the line and develop an injury of some sort.

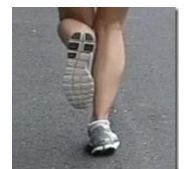
Typically there is little to no exercise load management in circuit classes, resulting in clients having to self regulate how much and how hard they should do this activity. The problem with this approach is that jump training doesn't cause the same physiological responses to the body like other forms of exercise; there is no rapid increase in heart rate, you aren't gasping for breath, or feeling exhausted at the end of it. This makes it very difficult to know when you have done enough!!



If you do include jump training into a circuit, then you are now adding fatigue to the jumps and this then raises the second issue that of jumping and more importantly landing technique.

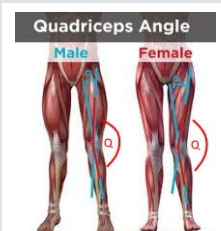
Very few non-athletes learn how to jump and land correctly. This lack of technique is often exacerbated through poor shoes (buying for looks rather than stability) and less than ideal anatomical shape.

Image on the right shows a runner with excessive pronation – the shoe selection certainly hasn't helped alleviate this biomechanical fault.



If we look at landing technique, this is where we start to see major issues with the majority of clients whom end up injured after too many training sessions with a lot of jumping.

There is an angle at the knee joint (Q-Angle) created by the anatomy of our hips to shin. Typically in females, due to wider hips, the Q-angle is more acute than that in the typical male.



This is problematic for a couple of reasons:

1. Whenever there is a force through the knee joint, this causes the patella (knee cap) to want to move in the direction to decrease this angle (angles aren't great for force production).

There is a constant pressure for the patella to move laterally (outwards) and if the quadricep muscles are not appropriately developed to limit this lateral movement, then the patella will start to track out of knee alignment which will cause pain and movement limitations.



2. Often I see poor knee tracking combined with lack of hip stability.

This typically results in very poor landing technique shown by knee position in the images on the right.

Key aspects of this poor technique include:

- a. At landing the toes are often pointed outwards.
- b. The knees rotate inwards because of lack of hip stability.
- c. Lack of flexibility to get into a good squat type position often exacerbates these technical faults.



WHAT TO DO?

A rehabilitation exercise that has become very popular in the gym these days is the squat with theraband around the thighs.

This is a good exercise for improving your hip rotator muscle groups which in turn should improve your knee position during any squatting activity.

Sadly, many of the gym goers whom I see perform this exercise are doing so purely to try to increase their butt size ([see recent article on this issue](#)).



What is important to add to this exercise is the dynamic nature of the jumping activity. Performing these movements slowly won't be enough to improve your jumping/landing technique. If you perform repeated squat jumps with a band, then you are creating a great training environment to improve your jumping/landing technique at the same time as strengthening all the appropriate muscles through the correct movement speeds.

LANDING TECHNIQUE

If you are going to be undertaking exercise that includes short ground contact repeated jumps then the following should be adhered to which will minimise any potential overuse injuries:

1. If the jump height is no more than a few cm (like you would experience with skipping), then the most important aspects of landing technique is to minimise knee bend and ensure you are abdominally bracing during each impact (there is a lot of force driven through the skeletal system with low height, high impact jumps)– the core will take the brunt of these impacts, and if not strong, will result in much of the force being transmitted to the pelvis & lower spine.

Ankle position whilst less important still should have a focus of engaging your ankles to better absorb the repeated impacts.



If you are jumping higher heights (either over a hurdle or up and down of f a box), you need to try to land with most of the shock absorption taking place through your knees & hips.



Often I see clients repeatedly jumping with pointed toes. This is poor technique (but looks aesthetically pleasing in photos!!). The ankle should be strongly braced at ground contact, and the only way of achieving this is to place the ankle in a dorsiflexion position at impact.

The reason why this is important is because ankle integrity is highest when the ankle is dorsiflexed (engaging all key muscles and ligaments) and this reduces the likelihood of injury with repeated landings. Also the Achilles tendon is engaged when the foot is dorsiflexed thereby assisting with some shock absorption as well as improved energy storage for repeated jumps.



What I am not saying here is that you should land heels first, that is often another technical error I see particularly with distance runners. What you should aim for is a dorsiflexion position with all supporting musculature switched on (you can improve this by pulling up your toes – which in turn engages your plantar fascia), ready for impact (trying to eliminate a “soft foot” landing).

If you see this image on the right – my ankle is largely dorsiflexed, my toes are extended (pulled up) and my ankle is braced ready for impact with the ground.

If you look at this second image, you see the ankle is plantarflexed, toes down, and the ankle is not braced for impact – this puts excess strain on the ankle joint and also leads to poor force transmission to the more suitable joints for large impacts, that of the knee and hip joints.



SUMMARY:

1. Group circuit classes don't take into account training load and as such, it is easy to injure yourself when engaged in high impact movements like repeated jumps.
2. Poor jumping & landing technique is also to blame for the spate of injuries seen with clients undertaking high impact training classes.
3. Poor biomechanics through the hip and knee joints can also exacerbate the chance of injury (particularly female athletes) with large Q angles and poor hip stability.
4. Good landing technique starts with strong ankles at the point of impact – stop toe pointing!!!