



### **Modern Movement: A health crisis waiting to happen?**

In the last 60 years the movement patterns of Human Beings in the Western World have changed beyond all recognition. The development and introduction of a variety of technologies have changed how we operate and more specifically how we move (and how often) on a daily basis. The convenience supplied by many of these technologies might also be responsible in part for other problems, which as a Physiotherapist writing this article will focus on the potential impact these changes could have on pain and injury in the body, however these impacts could be much further reaching.

#### **Background**

In 1952 the car or taxi was used for about 27% of all distance travelled; with 42% being by bus or coach and 18% by rail. A further 11% was by bicycle and 3% by motorcycle. The distance travelled by air was negligible. The factors influencing this could be multi-faceted and may include factors such as the distance people commuted to work, shopping patterns, and because car ownership did not really take off until the mid-1950s. (Wikipedia)

By 2003 85% of distance travelled was by car or taxi; with 6% being by bus and 6% by rail. Air, pedal cycle and motorcycle accounted for roughly 1% each. 70% of workers outside London commute to work in their cars with the average distance being 8.5 miles. (17% further than a decade before) Only 3% used a cycle to get to work and just 10% ever walked to work. The significance of this?

1. People do less physical exercise/activity.

2. They are less physically conditioned by everyday activities such as walking or running to catch a bus.

We spend long periods sat in cars, sat at computers, and sat watching television sets. Modern life has taken out the need for physical work at home with clothes and crockery washing being automated in many houses and we don't even stand and move to turn our Televisions on and off! Food gets delivered to our houses, films are available to download from our sofas and physical activity is often confined to the gym when we take time away out from our busy (but sedentary) lives to get there! Our general physical condition therefore deteriorates and possibly makes it more likely that we suffer from musculoskeletal pain, particularly if we suddenly demand a physically stressing activity from our body that is more used to sedentary activity than moving!

Research suggest that women in the 1950s easily burnt 1000+ calories per day, whereas modern day females burn an average 556 (Daily Mail Health article) The same article describes the average woman in 1953 completing 3 hours of house work, 1 hour walking to and from shops and an hour walking in the shops per day. Whilst social roles are not the matter for discussion here, it highlights how physical conditioning of these individuals would have been obtained from their normal everyday lives.

Physiotherapists (and other Primary Care health providers) see the impact that the lack of movement and exercise are having upon the body on a daily basis. They are frequently being challenged with how best to manage problems that are not always limited to physical problems such as obesity and general aches and pains.

Musculoskeletal pain (pain from muscles, joints, ligaments etc) is responsible for many people seeking help from healthcare professionals. In 2000 a survey conducted by Palmer et al and published in the British Medical Journal

suggested 49% of the UK adult population had reported an episode of continual lower back pain that lasted in excess of 24 hours. The National Health Service in the UK spends over £1 billion pounds per year treating these cases including £141m on GP consultations alone. (Maniadakis & Balague 2000).

Lifestyle changes have altered our movement patterns and the frequency with which we move. The positions we adopt for long periods can add undue stress on parts of the body that were not designed for this. Despite the incredible adaptability of the Human Body it was designed to move, not to be sedentary.



The positions we sit at in front of computers, whilst driving or watching TV can all contribute to pains in the body.

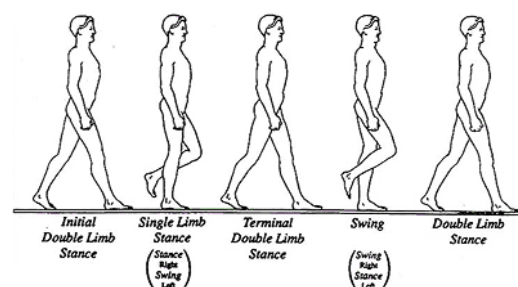
Consider yourself holding a small weight in your arm with a 90 degree bend at the elbow. If you maintain this position without moving for any length of time then eventually your arm will start to hurt as waste products build up in the area and the blood flow to the area becomes restricted. When seated at a computer there are often muscles contracting/working in a similar fashion, meaning that similar sensations can occur due to a lack of blood flow and build of waste products. (Often in the neck and shoulders) If you continue holding these positions or repeat this on a regular basis then the pains can become worse if not properly addressed.

If you sit at a computer incorrectly positioned for any length of time you can develop tension and

pain in the shoulders and up into the sides of your neck. This is because you are effectively lifting the weight of your arm using muscles in your neck. The average human arm weighs 5-6% of your total body weight. So if you weigh 70Kg you could be lifting 3.5 Kg each side for 8+ hours per day. If this is prolonged for a significant period, it could result in pain. The solution? Besides correcting your posture using professional advice and equipment where needed, you may also need to undertake regular exercise to compensate for the long periods spent in one position. However be careful how you exercise as this can also cause people problems.

Many people in modern day life have another habit that surprisingly may be harming their health... the gym. Now before you all go out and cancel your memberships **STOP!** I am obviously not anti-exercise as I hope you can appreciate from the start of this article. What I am anti is training ABNORMAL human movement which I believe many pieces of gym equipment do. We spend so long in bad positions in modern life that the last thing you want to do when going to the gym is train it badly and add to your problems. Let me explain what I mean by this.

The body operates around what are known as primal movements. These are Squat, Push, Pull, Bend, Twist and finally GAIT. (Walking Pattern)



Humans will use all of these movements in different combinations during their everyday lives, but the key thing is that they are all normal human movements. Whether you want to throw a ball in a game, run, walk or pick up an

object, you need to have the ability to functionally move into these positions smoothly and without restriction. This is particularly important if you want to do this again and again in repetitive actions without pain or injury. Restrictions to range of movement at a joint, or a lack of strength in certain parts of the range ranges, could result in injury or pain. Therefore if you want to train your body to reduce your injury risk, improve general fitness, co-ordination, sports performance or strength to name a few examples it would seem logical to train these primal movement patterns. When you train, you are also educating your brain in how to recruit and use muscles. Confusing the existing movement patterns that exist in your brain with others might arguably lead to problems.

When we go to the gym there are many machines used to train people that do not train “normal movement” but in fact train abnormal movement patterns. It could be argued that these machines should have no place in the majority of gym goers programmes and in fact could lead to more problems/injury through the development of imbalance between muscle groups.



The leg extension machine seen in many gyms is a perfect example. The machine resists the leg as you straighten the knee and is designed to

strengthen the muscles at the front of your thigh called the Quadriceps. However, other than on this machine, when do you perform this movement in everyday life? This machine requires extension/straightening of the knee with the hip position being fixed, however in normal movements they always move together. Therefore why train your leg in this manner? You're strengthening muscles in an unnatural movement and position which arguably has very limited benefit to improving function. It can also

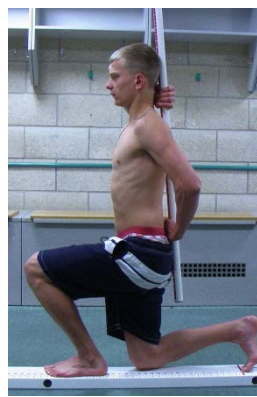
lead to unnatural stresses placed on the body and may result in injury.

This is not the only problem. When you use your quadriceps to walk, run or jump they are used in conjunction with your hamstrings (back of your leg) and Gluteals (bottom muscles) to name two muscle groups.

These muscles work with the quadriceps to stabilise/control movements of the leg in a 3D space. If you are strengthening your quads then ideally these stabilising groups should be developed at the same time to ensure your legs stay “balanced”. When using the leg extension machine, stabilisation of the body and the direction of movement is dictated by the machine and not your body. Whilst we aren't suggesting these muscles aren't working to a degree, the machine “splints” your body in the working position so the requirements of the body to stabilise this movement are minimal. Therefore you may end up with very strong powerful muscles in one part but the intricate adaptation of the muscles to stabilise this power are not achieved using this exercise.

These machines are also thought to switch off naturally occurring “proprioception” in the body too. Proprioception is the “ability of a person to know where they are in space.” Fixing the body in an abnormal position on a machine might reduce the naturally occurring messages from joints, tendons and ligaments (to name 3 examples) that are required by your body to control movement. Therefore your injury risk is again higher.

The movement patterns of a human are free and individualised. This means that everyone moves slightly differently and in 3D space. Gym machines make little or no effort to recognise this. Muscles work in a multitude of movement planes and therefore need to be trained in all



of these planes. If we take a lunge movement (which is a functional quadriceps strengthening exercise) you can lunge at a multitude of angles, varying the loads through the legs, and training the leg how it might work functionally in many sporting activities. You are not able to integrate the variety of positions on a leg press or leg curl machine.

So next time you are at a gym think about what it is that you're trying to train. Many gym instructors/ personal trainers have moved away from machine weights now and perform exercises where the body is free in space and/or use free weights instead of machine weights.

When strengthening the quadriceps for example a full single leg dip against body weight (pictured below) with an ability to return to standing shows great strength, power and control.



This shows a good interaction of power and supportive muscles and should be a more impressive demonstration

of physical strength and ability than lifting as much as possible on a leg extension machine.

Always ask advice from trained professionals if you are unsure, but next time you are in the gym think about whether you are training your body to work more or less efficiently. Think about the range the joint can move through. Am I exercising all the way through the range of that joint, or am I just exercising the parts of the range that I feel strong or comfortable in?

Modern movement patterns are therefore causing significant interest and this article only touches the surface. A crisis it probably isn't, but our level of every day physical conditioning is being slowly reduced and should be an area of concern to every human living in the modern world.

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#### References

1. [http://news.bbc.co.uk/2/hi/uk\\_news/3085647.stm](http://news.bbc.co.uk/2/hi/uk_news/3085647.stm)
2. [http://en.wikipedia.org/wiki/Transport\\_in\\_the\\_United\\_Kingdom](http://en.wikipedia.org/wiki/Transport_in_the_United_Kingdom)
3. Palmer KT, Walsh K et al (2000) Back Pain in Britain: comparison of two prevalence surveys at an interval of 10 years. *BMJ* 320:1577-1578
4. Maniadakis A, Gray, A. (2000) The economic burden of back pain in the UK. *Pain*. 84 95-103