

Road Safety Factsheet

January 2018

Cycling Cleats Factsheet

What are Cycling Cleats?

A cycling cleat is a small triangular metal or plastic wedge, which is attached into the sole of a cyclist's shoe. It is a sprung mechanism that allows the cyclist to clip their feet in and out of their pedals. To accompany the cleats, the standard bike pedals are replaced with smaller clip-less pedals. These pedals have a mechanism, which connects to the specially designed shoe cleat, similar to a ski boot fitting and "locks" the rider's feet firmly in place.

The clip-less mechanism was derived from ski boot bindings, originally by the French company LOOK for road use. With almost all cleats, to release the clip, the cyclist twists their heel outwards, and the cleat releases. However, some cleats allow the cyclist to unclip in any direction other than straight up. This ensures that in an accident the shoes release automatically, and the cyclist can unclip easily rather than having to bend down and release a buckle as with the older clip and strap model¹.

Different Kinds of Cycling Cleats

Various manufacturers produce different clip-less pedals and shoes but they fall into one of two types: road systems and off-road systems. Both of these styles use the metal or plastic cleat fastened to the sole of the shoe. Typically, these cycling shoes are designed to accept only one of the two types of cleat, although there are a limited number of shoes that will take either a road or off-road cleat¹. It is therefore important to consider the type of cycling when deciding upon the type of cleats to purchase as off-road cycling will normally result in more frequent unclipping than road cycling.

Road Systems

These systems use a large plastic cleat, fixed with three bolts. Road cleat shoes are not designed for walking, as the cleats protrude from the bottom of the shoe, making walking any significant distance near impossible², and care is needed on slippery surfaces.



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The pedals used alongside the cleats in road systems are usually single-sided, meaning the cyclist must find the correct side of the pedal to clip into when they start out. This might sound difficult, but most road pedals hang a certain way to make this relatively easy. This also means that you can ride on these pedals in 'normal' shoes if you wish to do so on some occasions³.

Off-Road Systems

Off-road systems are typically used for off-road cycling. This system uses a smaller metal cleat, fixed with two bolts, meaning that you will need mountain-bike or commuter style shoes that have a two-bolt fastening pattern. These systems are very popular, because the cleats are recessed into the sole of the cycling shoe. This means the cleats do not contact the ground when you walk, making this system ideal for walking and even hiking³.

These systems are also popular because they utilise a double-sided pedal. This means that the cyclist can click into the pedal on either side, which can be easier than clicking into single sided pedals. For these reasons, beginners may want to consider using mountain bike shoes and pedals. This is because the shoe is less ridged, which is easier and more practical to walk in, although less power efficient when cycling⁴.

Tension

Cycling cleats have different amounts of 'tension'. Tension is defined as how easy it is to clip in and out of the pedals. Most cleats have an adjuster screw that allows the cyclist to decide how tightly clipped-in they want to be. Beginners tend to use the lightest setting at first, but once they find it easier to clip in and out of their pedals they often increase the tension⁴. Competitive riders often set their pedals very firm because they do not want their feet clicking out of the pedals when they are cycling at high speeds. However, mountain bikers typically choose a loose setting so that they can clip their feet out of the pedals with little effort should they need to get their feet down in a hurry due to the terrain they ride on⁴.

Parker et al (2011) raised concerns about tension in their case study of a clip-less pedal user, suggesting that those who are new to using clip-less pedals have no guide to the amount of tension they need to use. Unlike skiing, where beginners have bindings adjusted according to their weight and ability; there is no guide readily available for bicycle pedals. This means that users risk only finding out that they have used too much tension when they cannot release their foot from their pedal in an emergency resulting in a fall and a potential injury⁵. In a RoSPA survey⁶ on the use of cycling cleats (September 2016) respondents advised practicing somewhere such as a park before going out on to the road to ensure that the tension is correct and that the rider can confidently clip in and out of their pedals.



Float

Pedal systems also usually allow a certain degree of 'float'. This is defined as how much lateral foot movement is allowed before releasing the foot from the pedal. Float can be spring loaded or free, and is controlled by using different cleat designs. Cleats are available with anything from 0 degrees (no movement) up to 9 degrees of float. To make this easier for cyclists purchasing cleats, cleats are typically colour coded based on the amount of float they provide ¹.

Float is highly beneficial to the rider, as it helps to ensure that they won't injure their knees by riding with their feet misaligned with their knees, which was a common problem before pedals with float were invented ³. When purchasing cleats it is advisable to discuss the options available with the retailer or to research thoroughly on the internet to ensure that you choose the correct system for your needs. This will ensure a safer and more efficient ride.

Benefits of Using Cycling Cleats

Efficiency

The benefits of using cycle cleats are widely publicised. Cyclists who responded to the RoSPA survey cited that cleats:

- Hold your feet in the right place on the pedal
- Make cycling more efficient
- Prevent your feet slipping off the pedals in wet weather

As Mills (2006) highlights in his study, the ultimate goal is to allow a pedal stroke that is a continuous, smooth and circular movement in which minimal energy is lost ⁷. For some cyclists, cleats mean that plantarflexion, or pushing down the forefoot during the downstroke, can contribute to a 'rounder' pedalling action that produces power over a larger part of the pedalling cycle ⁴.

When correctly set up, clip-less pedals ensure that the foot is always in the correct position over the axle, which helps to transfer power more effectively and allows the cyclist to pedal at a good cadence (the speed you pedal measured in revolutions of one pedal per minute). As well as well as pushing through the first half of the pedal stroke with the quads, clip-less pedals allow the cyclist to lift through the second half of the pedal stroke using their hamstrings, increasing efficiency ².



Efficiency is also produced by clip-in shoes, because they are stiffer, which can even improve comfort on longer rides ². Although some people might choose to cycle in trainers for comfort, they have a flexible sole unlike stiffer cycling shoes, meaning that a lot of the force is lost in the shoe flex as you pedal ⁸. Some cyclists in the RoSPA survey expressed the view that they preferred using clip-less systems rather than the more traditional clip and straps, as they are easier to use than toe clips. Clips and straps can also cut off the circulation to a rider's feet when they are fastened tightly to allow efficient pedalling and control, which means they can be less comfortable than a clip-less system and more difficult to release ³.

Disadvantages of Using Cycling Cleats

Knee Pain

Incorrectly adjusted cleats can contribute to knee pain; to minimise the likelihood of this type of injury riders are advised to seek advice from the retailer in the correct set up. ⁹

Using Cant Wedges

If a cyclist is experiencing discomfort when using cleats, cant wedges could be a solution. Research conducted on cyclists' feet showed that 96% of people have forefeet that are tilted up to the inside inward or outward toward the outside. However, almost all cycling shoes, cleats and pedals take this natural tilt and force it flat. This can generate knee pain, creating areas of the foot that feel hot, which in turn affects the ability of the cyclist to generate power. The concept behind cant wedges is to accommodate for the natural twisting of the forefoot. Cant Wedges enable the cycling shoe to connect with the pedal naturally, by acknowledging the foot's natural angle, creating a neutral foot position throughout the pedalling cycle, which results in greater comfort and power ¹⁰.

Accidents Involving the Use of Cleats

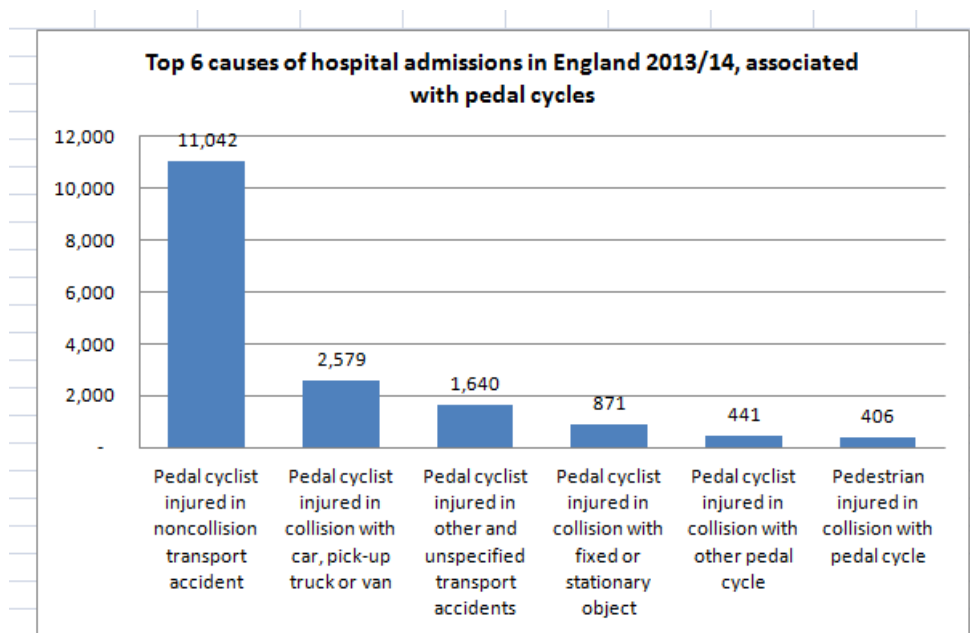
In collisions involving a bicycle and another vehicle the most common key contributory factor recorded by the police is 'failed to look properly' by either the driver or rider, especially at junctions. The second most common contributory factor is 'failed to judge other persons path or speed'. Other common contributory factors attributed to drivers are poor turn/manoeuvre and careless, reckless in a hurry.

Where a driver fails to see a cyclist resulting in a collision or carries out a manoeuvre that results in either physical contact or causes the rider to lose control, the use of clip less pedals is an irrelevant factor in preventing the incident.



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The graph below shows the six top causes of hospital admissions in 2013/14 associated with pedal cyclists ¹¹. There is a widely held belief that the use of cleats is contributing to cyclist injuries as a result of failure to unclip in time. However, Parker et al (2011) suggest that the use of clipless pedals has become widespread over the last 20 years and most injuries from clipless pedals are minor ⁵



RoSPA surveyed 130 cyclists, of which 97% used cleats. Of these cyclists, only three respondents reported that they had received an injury directly attributed to the use of their cleats and these had only been slight in nature.

Overall, in 2015 there were 100 cyclist fatalities, with a further 3,237 seriously injured and 15,508 slight injuries in reported road accidents¹². Cycling is increasing in popularity partly due to its health and environmental benefits and last year cyclists covered 3.2 billion vehicle miles.



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