

Knee Pain in Cyclists: The Importance of a Proper Bike Fit

Morven Ross, SPT

Cycling is generally regarded as a low impact sport and yet 85% of cyclists will experience an overuse injury from cycling.¹ Why is that?² Cycling is a highly repetitive activity which puts the cyclist at risk for an overuse injury. The average cyclist will perform 5,400 pedal revolutions in one hour and up to 81,000 in a week.^{1,3} Generally, with exercise and activity the joints, tendons and muscles get stronger through a process of breaking down and building up.² However, during cycling an overuse injury can occur because there is repetitive trauma breaking down these structure and not enough time to heal or build them up.² The knee is the most common site for a lower extremity overuse injury in cyclists.¹ Approximately 50% of cyclists will experience overuse knee pain and injury at some point in time.¹

Multiple factors can contribute to the development of knee overuse injuries in cycling such as training errors- doing too much too fast, body alignment, poor cycling technique and bike fit.⁴ Bike fit is considered to be one of the most critical aspects for preventing overuse knee injuries.¹ An individual that has poor positioning on the bike that causes even small deviations in their body's natural alignment or cycling technique is at risk for a knee overuse injury. In recent years there has been an increase in the amount of research searching for the proper bike fit.

Everyone is different in regards to their height, body alignment, flexibility and goals, recreational cycling versus racing. Therefore, a standard bike set-up may not be appropriate for everyone. An individualized and proper bike fit is essential for injury prevention, comfort and performance.³ The goal of a proper bike fit is to optimize these three components.

There are three contact areas between the rider and the bike; (1) the shoe and the pedal, (2) the saddle and the pelvis and (3) the hands and the handlebars. These are the primary contact areas where adjustments are made to establish a proper bike fit to prevent and manage knee pain and injury in cycling.



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The following bike fit adjustments are specifically for knee injury prevention while optimizing performance

Shoe-cleat-pedal interface

- Your shoe or cleat, if you are using clipless pedals, should be positioned so that the bottom of your big toe lies directly over the center of the pedal.³

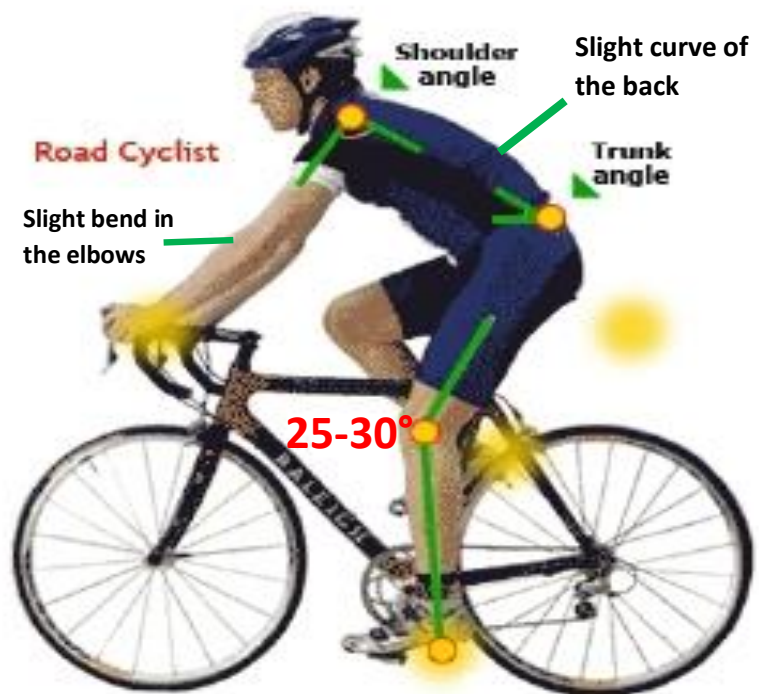
- Your shoes and/or cleats should be aligned so that your toes are pointing straight ahead. Some individuals with excessive toeing in or toeing out postures in standing may find that positioning their cleats to match these postures is more comfortable.
- If you are using clipless pedals the cleats should be adjusted to allow between 5-10° of float or movement of your shoe on the pedal. ⁴

Pelvis-saddle interface

- The saddle height should be adjusted so that when you are seated on the bike with your foot positioned appropriately on the pedal (see above) and the pedal is at the bottom dead center of the pedal cycle there is a slight bend in your knee, 25-30 degrees. This angle can vary depending on a cyclist's flexibility, experience and history of injury. ¹
- Your saddle should be adjusted forwards or backwards so that when you are appropriately seated on the saddle and the pedal is positioned at the 3 o'clock position in the pedal cycle a line dropped from your knee cap should hang directly over the center of the pedal. ¹

Hands-handlebar interface

- The distance between the saddle and the handlebars should be adjusted so that when your hands are on the handlebars there is a minor bend in your elbows and a slight C-curve in your back. When the distance is too long and you are over reaching you may get a dip in your low back or if the distance is too short you may be bunched up on the bike. These postures increase your risk for back, neck, shoulder and even knee pain while cycling. ⁵
- When you are appropriately seated on the bike and your hands are on the handlebars your elbows should be slightly bent and the angle between your trunk and the horizontal should be 40 to 80 degrees for the recreational rider and 30-45 degrees for the road cyclist. ^{3,5} In this same position a recreational cyclist should have an 80-90 degree angle between their shoulders and their trunk while a road cyclist should have a 90-100 degree angle. ⁵



Moen E, 2006

For a more comprehensive bike fit to prevent and manage knee pain or other overuse injuries from cycling see the bike specialists at your local TrySports.

References

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