

# Proper suspension improves all aspects of your ride

Dr. Edmund R. Burke, Ph.D  
Active.com

A well-tuned suspension system absorbs many small bumps, and can take the major jolt out of holes and rocks. It will also help a bicycle follow the contours of the terrain rather than skipping over them and losing traction.

But the best advantage to a suspension system may be in aiding the arms and legs by increasing control and comfort, especially when you are seated and your built-in "springs" are not in action. Suspensions allows you to relax, conserve energy and allows you to ride strongly day after day.

I have said for years that suspensions do not just spare your hands and forearms, but ease the constant pounding that tires your body and decreases energy expenditure and fatigue allowing for increased performance.

Traversing a series of rocks involves both reactive and anticipatory muscular effort; pulling on the bars, standing and bracing oneself requires energy expenditure and may result in loss of speed. But, as we know, loss of speed alone is not often a true indication of the effort involved in riding the bike.

Only by studying shock attenuation and total energy expenditure of experienced riders can we develop an idea if suspensions have any physiological benefits.

Recently, a study conducted by Dr. Frobose of the German Sports University Cologne confirmed my observations. The goal of the study, conducted by Frobose and RockShox, a Colorado Springs-based manufacturer of bicycle suspensions, was to learn more about the affect of absorption of hits and vibrations on the human body while riding various mountain bike configurations.

The same tests were conducted on bikes with front suspension only, bikes with front suspension and a suspension seat post, full suspension bikes and a totally rigid bike ridden on a specially designed testing apparatus that replicated shocks that would be replicated on a trail to the bicycles.

Monitoring devices (accelerometers) were placed on various parts of the body. The average reduction in impacts and vibrations throughout the whole body was over 20 percent in shock and vibration for the suspension bikes vs. the rigid bike. The biggest

benefit was found on the lower back with a 33 percent reduction on a full suspension bike. The suspension seat post was surprisingly efficient with a 25 percent reduction.

Now I know many of you are saying: "But that was in the laboratory at slow speeds. Would we experience similar results riding a cross country course at higher speeds?"

Well, several years ago, I was able to participate in a study that presented convincing evidence on the physiological and performance benefits of suspension bicycles ridden on a cross country course.

John Seifert, Ph.D, of Saint Cloud State University and I selected a group of 12 trained off-road cyclists and had them ride a front suspension bike, front and rear suspension bike and a bike with rigid frame on an outdoor single-track circuit course at a steady speed of 10 mph for 60 minutes.

Mean heart rates for the hour ride were lower for the front (146 bpm) and fully suspended bicycle (146 bpm) compared to when the cyclists rode the rigid frame bike (154 bpm). Perceived effort by the riders was also lower for the suspended bicycles when the course was ridden at the same speed.

In addition, Seifert states, "Riding a front suspension bicycle resulted in faster finishing times in a cross country time trial versus a rigid bike in a second part of the study.

"This information in addition to the heart rate and creatine kinase results indicate that riding a front or fully suspended bicycle resulted in less muscular trauma and better performance than a rigid bicycle. Trail shock detracts from speed and endurance."

The results of these studies confirm what I have suspected for years suspended bicycles will reduce physiological fatigue and increase comfort.

Riding a suspended bicycle will increase your satisfaction, improve bicycle control, and improve your efficiency and decrease muscle trauma and fatigue. Best of all, after your trail ride you will not feel like you have just gone 12 rounds with Lenox Lewis.

*Edmund R. Burke, Ph.D. is professor and director of the Exercise Science Program at the University of Colorado. He served as Coordinator of Sports Sciences for the U.S. Cycling Team leading up to the Olympic Games in 1996 and was a staff member for the 1980 and 1984 Olympic Cycling Teams.*

[http://www.active.com/mountainbiking/Articles/Proper suspension improves all aspects of your ride.htm](http://www.active.com/mountainbiking/Articles/Proper_suspension_improves_all_aspects_of_your_ride.htm)