

# The influence of hamstring extensibility on preselected saddle height within experienced competitive cyclists

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## Abstract

**Background:** Contemporary studies have investigated the effects of bicycle saddle height for optimal performance and injury prevention. A recent review established a dynamic knee flexion angle of 25°-30° for optimal economy, anaerobic power, and knee tracking (Bini et al., 2011: Sports Medicine, 41, 463-476). Muyor et al. (2011: Journal of Human Kinetics, 29, 15-23), investigated hamstring extensibility within 96 highly trained cyclists. They concluded that shortened hamstrings had a negative influence over thoracic spinal curvature, yet no influence over saddle height. Whereas, Ferrer-Roca et al (2012: Journal of Strength and Conditioning Research, 26, 3025- 3029) examined 23 high level competitive male road cyclists and concluded that a lack of flexibility may have an influence over lower preselected saddle heights (> 40° knee flexion angle). Consequently, there remains uncertainty whether preselected saddle height may be dependent on hamstring extensibility.

**Purpose:** The purpose of the study was to investigate the influence of hamstring extensibility on preselected saddle height within experienced competitive cyclists. It was suggested that preselected saddle height may be dependent on hamstring extensibility to enable a 25°-30° knee flexion angle.

**Methods:** Participants consisted of 32 moderate to high level male and female road cyclists (35.8 ± 8.4 years; 178.22 ± 11.0 cm; 77.7 ± 13.4 kg). They used their own individually set-up road bicycle, which was placed on an indoor wind trainer. Hamstring extensibility was measured using the passive knee extension test. Dynamic 2D analysis was used to measure bicycle knee flexion and passive knee extension angles. A cycling questionnaire was also used to determine experience, training and competition levels.

**Results:** Pearson's correlation coefficients revealed bicycle knee flexion angle, years cycling ( $r = -0.35$ ,  $p < 0.05$ ), training volume, ( $r = -0.54$ ,  $p < 0.01$ ) and competition duration (years) ( $r = -0.62$ ,  $p < 0.01$ ) were significant. Whereas, no significance was identified with pre ( $r = 0.12$ ) and post ( $r = 0.12$ ) passive knee extension ( $p > 0.05$ ).

**Discussion:** Results suggest that sustained time period on the bike rather than hamstring extensibility determines preselected saddle height. In particular, being competitive for a longer duration precedes either volume or number of years cycling. However, it is apparent that in agreement with Muyor et al., (2011) a single variable such as hamstring length does not predetermine optimal saddle height. In addition, as suggested by Ferrer-Roca et al., (2012), experienced cyclists are unable to achieve a knee flexion angle of 25°, unless they have sufficient flexibility.

**Conclusion:** Results reveal that with experience, a competitive cyclist's subjective and objective interpretation of their preselected saddle height becomes more consistent. Although hamstring extensibility does not appear to influence pre-selected saddle height, an initial 35° rather than 25° knee flexion angle is recommended. Future research should consider mixed methodologies, to further establish safe and effective recommendations for optimising bicycle fit.

## References

- Bini, R., Hume, P.A., & Croft, J.L. (2011). Effects of bicycle saddle height on knee injury risk and cycling performance. Sports Medicine, 41, 463-476.
- Ferrer-Roca, V., Roig, A., Galilea, P., & Garcia Lopez, J. (2012). Influence of saddle height on lower limb kinematics in well trained cyclists: static vs dynamic evaluation in bike fitting. Journal of Strength and Conditioning Research, 26, 3025- 3029.
- Muyor, J. M., Alacid, F., & Lopez-Minarro, P.A. (2011). Influence of hamstring muscles extensibility on spinal curvatures and pelvic tilt in highly trained cyclists. Journal of Human Kinetics, 29, 15-23.

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