

Ability to recover after 'maximum effort' is crucial to make football's top flight

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Footballers' ability to recover after high-intensity effort may not depend on their age, but on their division level, a new study has suggested.

A multinational team of scientists led by the Complutense University of Madrid (UCM) carried out maximum-effort tests with Spanish division one and division two soccer players.

They then measured the players' oxygen consumption, [heart rate](#) and ventilation during [recovery](#).

Professor Francisco Javier Calderón Montero, from UCM, is the study's lead author. He said: "Regardless of a player's technical ability, the ability to repeat sprints is essential in soccer. Players may need to [sprint](#) every 90 seconds during a game, meaning the available [recovery time](#) will be short."

"We wanted to discover if the difference in the recovery time before the next sprint were linked to the level at which a soccer player competes."

The researchers' findings, published today in *Physiological Measurement*, show that compared to first division players, second division players took longer to recover from maximum effort exertion.

Professor Montero explained: "Our results showed second division players had higher [oxygen consumption](#) and heart rate than first division players after 90 seconds of recovery time. These differences were still clear after 180 seconds of recovery time."

"The second division players, therefore, took much longer to recover to the point where they were able to repeat the effort. They are therefore unlikely to be able to repeat sprints as often and as intensely as first division players."

A huge sample of one-hundred-and-ninety-four male [soccer](#) players, from seven clubs in the Spanish Professional Football League, took part in the study. There were 114 first division and 80 second division players

comprising: 12 goalkeepers, 57 defenders, 86 midfield players, and 39 strikers.

All underwent the same maximum effort test. They first warmed up by running on a treadmill for two minutes at 4 km/h, before increasing their speed until they reached a heart rate of 120-130 bpm. They maintained this for three minutes. After this warm-up period, they could rest to stabilize the respiratory quotient (RQ) at

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