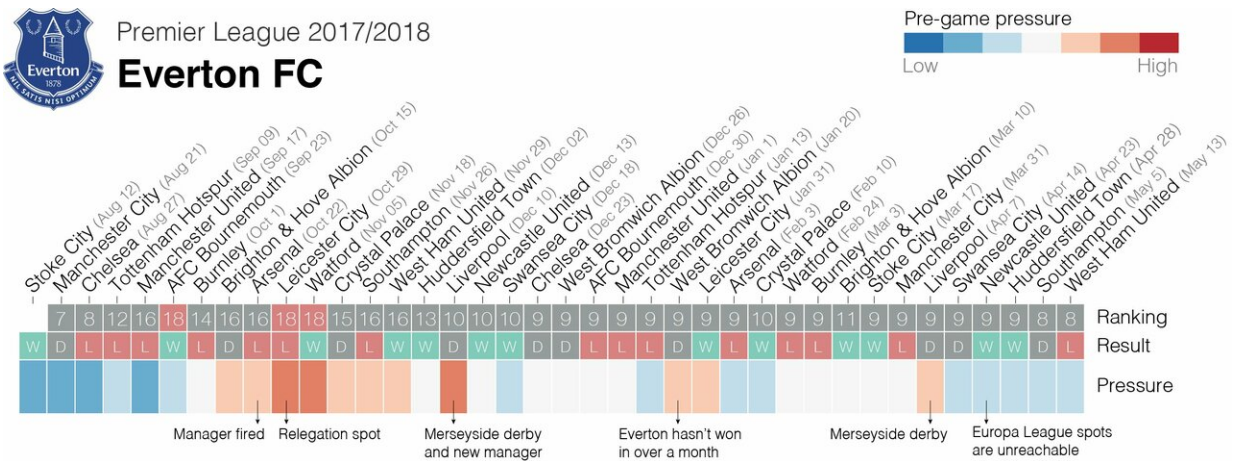


How do professional football players perform under immense pressure?

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The researchers from KU Leuven/SciSports illustrated how the mental pressure evolves during the season, in this case for the English club Everton. Credit: KU Leuven & SciSports

Professional football players need to keep a cool head during a match, but some are better at this than others. Cristiano Ronaldo seems to be immune to pressure, while Neymar's performance crumbles under it. It's one of the remarkable findings of a study conducted by KU Leuven and data intelligence company SciSports. They're presenting their results at the MIT Sloan Sports Analytics Conference in Boston in March.

It's sometimes said that football isn't just played between the lines, but

also between the ears. Professional football players are generously rewarded for their talent, but they are often expected to perform under immense mental pressure. A crucial save from the goalkeeper, scoring the decisive penalty or giving the perfect assist for the winning goal: the right action can sometimes be worth millions.

Football usually focuses on the physical, tactical and technical performances, but the mental aspect often receives insufficient attention. Researchers from Belgian university KU Leuven and SciSports are now changing this. They analysed nearly 7,000 matches in 7 competitions to see how [professional football players](#) perform under pressure.

Uncharted territory

"Mental pressure has already been extensively studied in sports such as baseball and basketball, but in football, this is uncharted territory," says Professor Jesse Davis from the Department of Computer Science at KU Leuven. "That's why we have developed a model that uses machine learning to estimate how much mental pressure is experienced by the player in possession of the ball. The model analyses how this player performs under pressure: which decision does he make, is the chosen action executed well and how much impact does the chosen action have on the outcome of the match?"

Suppose the match is tied in the 89th minute and a player decides to try and score instead of passing the ball. Our model will analyse if this was a good decision, if the shot was executed well and how it impacted the end result of the match.

Various parameters influence how much stress is experienced during a certain match. The study distinguishes between the pressure leading up to the match and the pressure during the match.

- The conditions surrounding a match: is it a home match or an away match? Are you playing a traditional rival? Will the match's outcome have a big impact on the rest of the season, for example, will it decide the league title?
- How does the match progress: the pressure rises if the scores are close together and the match is nearing its end. If, on the other hand, there's a clear difference on the scoreboard, the pressure won't be as high.

"Our model combines these different parameters and calculates the pressure minute by minute", says doctoral researcher Pieter Robberechts from the Informatics Section at KU Leuven. "This way, we get an objective indication of the mental pressure in a specific match."

<i>Worse under pressure</i> ← Decision making → <i>Better under pressure</i>			
Eden Hazard	Marcelo	Sergio Agüero	↑ <i>Better under pressure</i> Execution ↓ <i>Worse under pressure</i>
Neymar	Cristiano Ronaldo	Kevin De Bruyne	
Dele Alli	Luis Suárez	Ousmane Dembélé	

Analyses show that Portuguese star Cristiano Ronaldo is oblivious to pressure: his performances are constant. Brazilian player Neymar, on the other hand, seems to choke under stress. He makes poorer decisions when there's a lot of pressure. Credit: KU Leuven & SciSports

Clutch performer or choke artist?

Researchers can use this knowledge to see whether mental pressure has an impact on a player's performance. Some players will rise to the occasion, while others will crumble under the pressure. In order to measure the impact of mental pressure, the researchers compare a player's performance under high pressure with his performance under normal circumstances. They look at the decisions the player makes and how well his actions are executed.

Is it a good thing that players perform better when they're under pressure? It's not exactly black-and-white, says SciSports researcher Jan Van Haaren. "The most ideal scenario is for professional football players to have a stable performance, regardless of the pressure. Our analyses show, for instance, that Portuguese star Cristiano Ronaldo is oblivious to pressure: his performances are constant. Brazilian player Neymar, on the other hand, seems to choke under stress. He makes poorer decisions when there's a lot of pressure."

Sergio Agüero, a striker for the English club Manchester City, seems to excel under pressure. The Argentinian makes better decisions when he has the ball and executes them better. Another top striker, Luis Suárez from FC Barcelona, doesn't seem to handle the pressure that well. The captain of the Red Devils, Eden Hazard, also feels the stress: he executes his actions well, but makes worse decisions.

Tactics and transfers

Tactically speaking, this information can be very useful for coaches. If, for instance, there's a crucial match to be played, the coach can select players who perform best when under pressure. Or if it's clear that a player keeps making the same mistakes when stressed, this can be a point of emphasis during training sessions.

This knowledge can also have its benefits on the transfer market, notes

SciSports researcher Lotte Bransen. "If a club is willing to pay millions for a new player, it's important to know how immune to stress this player is. For instance, our analyses reveal that the English club Liverpool has an ingenious transfer policy. They go for players that perform better under high pressure. We cannot say for sure whether this is a deliberate strategy or not, but it is remarkable."

On 1 March, the researchers will travel to Boston to present their research at the MIT Sloan Sports Analytics Conference. The conference is highly regarded in the sports world, with Barack Obama as a guest speaker only last year.

Professor Jesse Davis: "All the important players in the field of sports and [data analysis](#) will be there. So, it's a major opportunity for us to talk to them about our research."

In any case, the conference doesn't signal the end of the study. "We've been able to identify various trends on the basis of a couple of seasons. Further research is needed to confirm these results and allow football clubs to actually use them. This is only the first step towards understanding how mental pressure influences the performances of professional [football players](#)."

Provided by KU Leuven

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