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# Through four years' training, college football players gain strength and size

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From freshman through senior year, college football players achieve significant increases in strength and size, reports a study in the September issue of *The Journal of Strength and Conditioning Research*, official research journal of the National Strength and Conditioning Association (NSCA).

But even with modern training regimens, these athletes show limited changes in speed and power, according to the study by Bert H. Jacobson, EdD, FACSM, and colleagues of Oklahoma State University, Stillwater. They believe their results have implications for tracking the progress and development of football players by position, as well as for evaluating potential recruits.

## How Much Do College Football Players Improve Over Time?

The researchers analyzed the findings of preseason evaluations of players from Oklahoma State's NCAA Division I football program over a seven-year period. Measures of size, strength, speed, and power were tracked across all four years of eligibility.

Evaluations were performed before the start of each football season, after summer training camp. The study included data on a total of 92 offensive and defensive linemen and 64 players in skill positions—wide receivers and defensive backs.

"All strength measures improved significantly over the years of training," Dr Jacobson and coauthors write. For example, among linemen, maximum bench press strength increased by 18 percent from freshman to senior year: from approximately 350 to 410 lb. For skill players, bench press strength increased by 34 percent: from about 230 to 310 lb, with most of the increase in the first two years.

For linemen, body mass increased each year, while body fat progressively decreased. Skill players had a significant increase in body mass through the first two years; body fat remained low through all four years.

## Strength Increases, but Little Change in Power and Speed

In contrast, there were no significant changes in measures of speed, such as 40-yard sprint time; or power, such as vertical jump height. Skill players showed a small increase in power between the first and second years. For linemen, there was no significant change in power. Neither group increased significantly in speed.

Partly because of sophisticated training programs, today's athletes are stronger, faster, and more powerful than in the past. The new study is one of the first to analyze detailed information on measures of physical performance in collegiate football players throughout their four years of eligibility.

"These data provide a theoretically predictable 4-year rate of change in anthropometric, strength, and power variables for Division I football players," Dr Jacobson and coauthors write. They believe their results will help strength and conditioning professionals ensure that these elite athletes stay on track in terms of developing increased size and strength.

However, the study finds little or no change in the key attributes of power and speed. The initial increase in power among skill players appears "negligible," compared to the large gains in strength; neither group shows improvement in speed over the course of their careers

Based on their findings, the researchers suggest that recruiting efforts should focus on identifying athletes who have previously demonstrated superior power and speed. "These variables are particularly difficult to positively alter in four years of training at the college level."

So why can't athletes develop greater speed and power? "Theoretically, speed and power are variables that are greatly dependent on muscle fiber type," Dr Jacobson explains. "With respect to fast- and slow-twitch fibers, people are born with a certain proportion of each and those individuals who possess a greater ratio of fast-twitch fibers are naturally faster."

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