

Boosting ACL Rehab: Utilizing Motorized Flywheel Technology



Case Study: Stony Brook University →

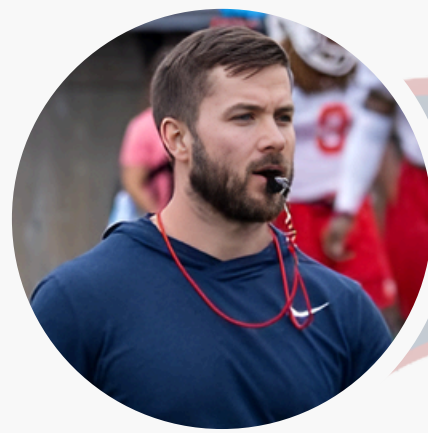
Introduction

Anterior cruciate ligament (ACL) injuries are common in football (1) and is followed by a lengthy rehabilitation time. For this reason, there is interest in methods that can aid with return to sport (RTS).

Flywheel resistance training (FRT) is an emerging and promising modality due to the high forces it can create in both the concentric and eccentric phases. Two studies recently highlighted the effectiveness of FRT in an RTS program among athletes with ACL injuries and found large increases in several assessments (i.e. strength, CMJ, single-leg jump, rate of force development) (2,3).



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Coach Vinnie Cagliostro and the Stony Brook team tested the Exerfly Ultimate on two football players with ACL injuries. The staff not only utilized a flywheel similar to the two previous studies, but also utilized Exerfly's motorized technology.

Non-motorized FRT creates roughly a 1:1 ratio (concentric:eccentric) of resistive load. With Exerfly's motorized technology, it gives you the ability to boost the preceding eccentric repetition up to 80% greater than the concentric repetition, driving the ratio past 1:1 and creating an accentuated eccentric load.



Program

	Load (kgm ²)	Sets	Reps / Duration	Boost %
Wk 1	.1	3	10 reps	0%
Wk 2	.1	3	10 reps	3%
Wk 3	.1125	3	6 reps	6%
Wk 4	.1125	3	6 reps	9%
Wk 5	.05	3	10 sec	0%
Wk 6	.05	3	10 sec	3%
Wk 7	.05	3	10 sec	6%
Wk 8	.05	3	10 sec	9%

Let's break this down



Program Overview

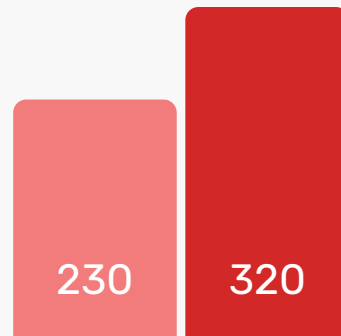
The RTS program, conducted in the early off-season, included three weekly FRT exercises (Squat, Split Squat, RDL). The FRT exercises were performed immediately after their prescribed TRT program and in addition to their speed/conditioning session.

Weeks 1–4 focused on strength using heavier loads, while weeks 5–8 targeted power using moderate loads and work capacity by performing maximum reps within 10-second duration sets. The eccentric intensity increased by 3% each week per 4-week block.

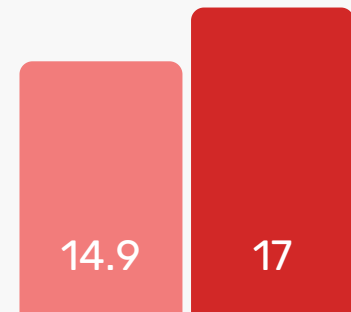


Results

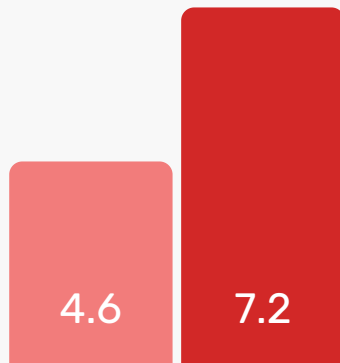
Before
After



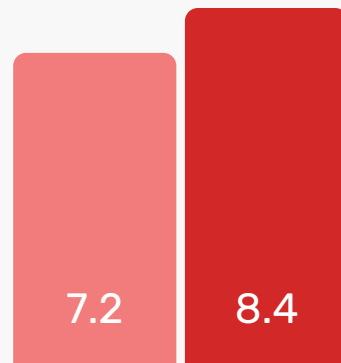
Squat



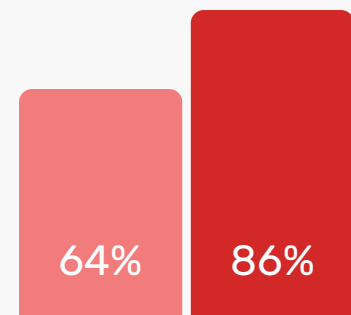
CMJ



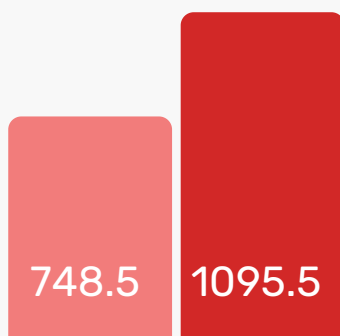
Single leg jump injured



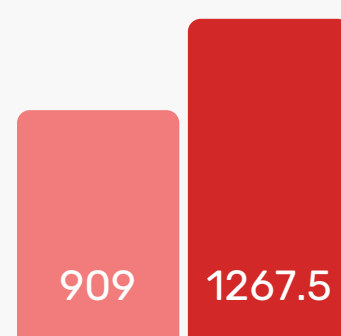
Single leg jump uninjured



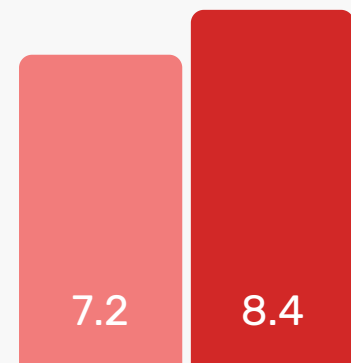
Single leg jump limb symmetry



CMJ braking force injured



CMJ braking force uninjured



CMJ braking force limb symmetry



Key Results

Bilateral assessment	Unilateral assessment	Subjective measures
CMJ jump height increase by 14%	Single leg jump height with injured leg increased by 58%.	Increase in coordination and stability on flywheel and non-flywheel movements
Squat 1RM increased by 39%	CMJ braking force with injured leg increase by 46%	Improvements in athletes' confidences level for on-field task such as cutting
	Limb symmetry index of single leg jumps increased by 35%	



Takeaways

The incorporation of motorized FRT in a RTS program following an ACL injury showed enhancement in a host of performance assessments such as strength, jump height, and limb symmetry. There were also improvements in subjective measures (coordination, stability and confidence).

Altogether, the implementation of flywheel resistance training with Exerfly motorized technology following an ACL injury seems to address key objective markers, as well as having additional benefits from a subjective point of view.

