Plyometric Training Guide

The stretch-shortening cycle, explosive power, and a safe progression protocol

The Mechanism: Stretch-Shortening Cycle

Plyometric exercises train the stretch-shortening cycle (SSC) — a rapid eccentric (lengthening) loading phase immedi
contraction. During the eccentric phase, tendons and elastic tissue store mechanical energy; a fast transition into the
more force than a concentric contraction alone could generate. This is the same mechanism behind a countermovem
dead stop.

What the Research Shows

A 2007 meta-analytical review by Markovic, published in the British Journal of Sports Medicine, pooled data across m
training produced a statistically significant average improvement in vertical jump height of roughly 4.7cm, with larger
related 2009 meta-analysis by de Villarreal and colleagues in the Journal of Strength and Conditioning Research exan
that 2 sessions per week produced comparable gains to higher frequencies once total volume was controlled for — n

Ground reaction forces during depth jumps can reach 3 to 5 times bodyweight in the landing phase, which is the basi
Multiple meta-analyses on neuromuscular training programs that include plyometrics — most notably work associate
prevention — have found well-dosed plyometric programs reduce non-contact ACL injury risk by roughly half when la
landings, controlled deceleration).

Progression Protocol

Progress through levels only after landing mechanics are controlled and quiet at the current level. Do not skip levels control.

Level 1 — Foundation

Ankle hops, pogo jumps, squat jumps (no box). Focus entirely on quiet, soft landings and full recovery between reps. 2–3 we

Level 2 — Low Amplitude

Box step-offs (12–20cm), broad jumps, lateral bounds. Introduces horizontal and lateral force absorption alongside vertical.

Level 3 — Moderate Amplitude

Box jumps (30–45cm), single-leg hops, bounding. Bobbert's landing biomechanics research found this box-height range opti ground contact time and reduce power output rather than improving it.

Level 4 — Depth Jumps

Depth drops from 30–45cm into an immediate maximal vertical or broad jump. The highest-force, highest-skill category — r training (squat strength at minimum 1.5x bodyweight is a commonly used readiness benchmark).

Volume & Recovery

NSCA guidelines commonly cite total ground contacts per session as the volume metric: roughly 80–100 contacts for 120–140 for advanced athletes. Because plyometrics rely on the phosphocreatine and neural systems rather than met full recovery — 60 to 180 seconds — not the short rest intervals used for hypertrophy training. Allow 48–72 hours be pattern.

Weekly Template & Safety

Sample Weekly Structure (Intermediate)

Day	Focus	Volume
Monday	Vertical (box jumps, squat jumps)	~100 contacts
Wednesday	Rest or light technique work	—
Friday	Horizontal / lateral (bounds, broad jumps)	~100 contacts

Safety Checklist

- Warm up with 5–10 minutes of general movement plus 2–3 sets of low-amplitude jumps before working sets.
- Land quietly — an audibly loud landing indicates poor force absorption and higher joint stress.
- Full recovery between sets; plyometrics are a power-quality activity, not a conditioning tool.
- Do not train plyometrics on consecutive days for the same movement pattern.
- Build a strength base first — squat strength around 1.5x bodyweight is a common readiness marker before depth jumps.
- Stop the session if landing mechanics degrade due to fatigue — quality drops before soreness appears.

Sources Referenced

Markovic, G. (2007). British Journal of Sports Medicine — plyometric training and vertical jump meta-analysis. de Villarreal et al. (20 Conditioning Research — optimal plyometric training frequency. Bobbert, M.F. (1990). Sports Medicine — drop jumping biomechanic training and ACL injury risk reduction.