

FINGER AND HAND EXTENSION & ABDUCTION

Reference Values

A quick-reference for interpreting Splayometer measurements.

PRELIMINARY

Published norms for finger extension and abduction are limited. Ranges below come from biomechanics literature, not clinical norming. Prefer **within-patient serial tracking** over direct comparison.

Individual Finger Extension

Approximate adult ranges, mixed sex; standardized hand position, force-transducer measurement.

Index (D2) Approximate mean, healthy adults	~4.0–6.3 lb ~1.8–2.9 kg
Middle (D3) Approximate mean, healthy adults	~3.6–5.8 lb ~1.6–2.7 kg
Ring (D4) Approximate mean, healthy adults	~2.2–4.0 lb ~1.0–1.8 kg
Little (D5) Approximate mean, healthy adults	~1.8–3.1 lb ~0.8–1.4 kg

Synthesized from Li et al. (1998) and related biomechanics literature; original units Newtons.

Finger Abduction (Dorsal Interosseous)

Isolated finger abduction force; from biomechanics and rheumatology contexts.

D2 abduction (index from middle) Healthy adults	~5.6–10.1 lb ~2.5–4.6 kg
D3 abduction (middle from ring) Healthy adults	~4.5–8.5 lb ~2.0–3.9 kg
D4 abduction (ring from little) Healthy adults	~3.4–6.3 lb ~1.5–2.9 kg
Reduction in RA Estimated, vs. healthy adults	~30–50% lower

Brorsson et al. (2009); Nordenskiöld & Grimby (1993). Source data in Newtons.

Whole-Hand Spread (Multifinger Abduction)

Cumulative four-finger abduction and adduction force – applicable to hand-loop measurement.

Total abduction (4-finger spread) Mean, healthy adults	~7.3 lb ~3.3 kg
Total adduction (4-finger squeeze) Mean, healthy adults	~9.5 lb ~4.3 kg
Sex effect Males significantly stronger; sex-stratified means not reported	M > F

Pataky, Latash & Zatsiorsky (2008), n = 21 (12 F / 9 M). Apparatus used four independent transducers; hand-loop biomechanics differ – treat as orientation, not threshold. Multifinger performance is not predictable from single-finger strengths.

Evidence-based context

- **Extension is a fraction of grip:** individual finger extension is ~10–30% of total grip force, by digit and configuration (Li 1998; Zatsiorsky 2000).
- **Index and middle are strongest:** D2 and D3 produce greater extension force than D4 and D5 in healthy adults (Li 1998).
- **Inter-finger dependence ("enslaving"):** activating one finger produces force in adjacent fingers — relevant to inter-digit abduction (Zatsiorsky 2000).
- **Sensitive to intrinsic muscle pathology:** abduction declines with ulnar nerve palsy and early RA (Brorsson 2009; Nordenskiöld & Grimby 1993).
- **Whole-hand spread is its own metric:** multifinger ab/adduction force is not predictable from single-finger strengths — measure it directly (Pataky 2008).
- **Sex and age effects:** pattern parallels grip — peak in late 20s–30s, progressive decline thereafter; magnitude can differ by digit (Li 1998).

Recommended clinical application

Establish a baseline at session 1, replicate test conditions at each follow-up, and document change over time as the primary outcome. A Splayometer-specific minimal detectable change (MDC) has not been published — interpret session-to-session variation against your own setup repeatability rather than a fixed threshold. For context, grip dynamometry MDC is ~3–5 kg (Mathiowetz 1984); no equivalent value exists yet for finger extension or abduction.

SOURCES

- Li, Latash & Zatsiorsky (1998). *Exp Brain Res* 119(3): 276–286.
Zatsiorsky, Li & Latash (2000). *Exp Brain Res* 131(2): 187–195.
Brorsson et al. (2009). *Disabil Rehabil* 31(22): 1879–1885.
Nordenskiöld & Grimby (1993). *Scand J Rheumatol* 22(1): 14–19.
Pataky, Latash & Zatsiorsky (2008). *J Hand Ther* 21(4): 377–385.
Mathiowetz et al. (1985). *Arch Phys Med Rehabil* 66(2): 69–74.
Mathiowetz et al. (1984). *J Hand Surg* 9(2): 222–226.