

Second Prime: A Training Guide for Martial Artists Over 40

Mat Manual companion guide to "The Body You Have Now: Training After 40." Print it. The article teaches the judgment: what changes, what does not, and how to think about both. This guide prints the numbers, the protocols, the per-art adjustments, the competition tables, and the trackers — the gold mine, organised so you can dig in it for years.

Name: _____ Gym/Dojo: _____ Art: _____
Date started: _____

SAFETY, BEFORE ANYTHING ELSE ☐ Stop rules in this guide outrank doses in this guide. Sharp pain, a pinch inside a joint, catching, locking, giving way, numbness, tingling, or weakness is never a training target — stop that movement. ☐ This guide reports what research found in groups of people. It does not clear you, personally, to do anything. Screening and supervision notes in Parts 4 and 9 are part of the protocols, not fine print. ☐ Heavy lifting, jumping, throwing, and hard sparring are the highest-value and highest-risk work in this guide. Earn them progressively, the way Parts 4, 9, and 15 lay out. ☐ In partner work, your partner's age and mileage count too. Agree the intensity before the round, not during it. ☐ Tell your instructor what you are working around. A modified technique agreed in advance is training. A surprise is an injury risk.

Disclaimer: Education, Not Medical Advice

Read this section before using any table in this guide.

This guide is educational material about general training for healthy adult martial artists over forty: what the research says changes with age, and the training methods with the best evidence behind them.

This guide is **not medical advice**. It does not diagnose or treat any condition, and nothing in it replaces care from a qualified professional who can examine you in person. It contains no rehabilitation program for any named injury.

Where this guide summarises research on food or supplements — protein, creatine, collagen, and others — it reports what studies found, and how strong the evidence is. That is information, not a recommendation that you take, buy, or avoid anything. Decisions about supplements, medication, hormones, and treatment belong with a qualified professional who knows your history, especially if you have kidney, joint, cardiovascular, or any other diagnosed condition.

See a qualified medical or physical therapy professional for pain that persists or worsens, for any injury, after a fall, blow, twist, or other trauma, for numbness, tingling, or weakness, for chest symptoms, for head or neck symptoms, for a joint that locks, gives way, or swells, and before beginning heavy lifting or impact work if you have a condition affecting bone, joints, heart, or blood pressure. Their instructions outrank every table in this guide. The masters competition section (Part 12) describes published rules and divisions; check the current rule book of the body you enter before relying on any band, duration, or legality printed here — rules change.

Most of the underlying research was conducted on men, in laboratories and general sport. Where evidence is women-specific — bone density and the LIFTMOR trial in particular — this guide labels it. Direct research on martial artists over forty is thin; where this guide extends wider evidence to the mat, it says so and rates the extension honestly.

Part 1: What Changes — The Numbers

Every figure below is rated: **Strong** (multiple trials or meta-analyses agreeing), **Moderate** (consistent cohorts or a meta-analysis with limits), **Weak** (small, single, mechanistic, or extrapolated). The full sources are in Part 17.

System	What the research found	Evidence
Muscle mass	Falls ~8% per decade from 40; 10–15% per decade after 70	Moderate–Strong
Strength	Falls ~3× faster than muscle mass (leg strength –2.6 to –4.1%/yr vs lean mass ~–1%/yr in one large older cohort)	Strong for direction
Power	Falls faster than strength; fast-twitch fibres are lost preferentially	Strong
Jumping	Trained athletes lose jump height ~1.1–1.6%/yr; sedentary peers ~2.7–3.2%/yr	Moderate
VO ₂ max — maintained training	–5 to –6.5% per decade when volume and intensity are kept	Moderate

System	What the research found	Evidence
VO ₂ max — sedentary	~-12% per decade	Moderate
VO ₂ max — training kept, intensity dropped	Up to -26% per decade	Moderate
Tendons (measured in the body)	Generally more compliant (less stiff) <i>and</i> weaker with age: lower failure stress, more matrix cross-linking, fewer cells, slower turnover	Moderate
Knee MRI findings, no symptoms	Osteoarthritis features in 4–14% of under-40s vs 19–43% of over-40s	Moderate–Strong
Bone — femoral neck	~-0.6%/yr (women), ~-0.3%/yr (men) past 55	Moderate
Bone — menopause window	Spine ~-2.5%/yr, femoral neck ~-1.8%/yr around the final menstrual period; ~10% / ~8% cumulative over ~6 years (SWAN cohort)	Strong
Proprioception sensors	Some receptor counts -30% or more by 80; vestibular hair cells -20–40% after 70	Weak–Moderate
Falls (context, age 65+)	~30% of people 65+ fall at least once a year	Moderate
Reaction time	Simple reaction slows ~2–6 ms per decade; choice tasks slow more	Moderate–Strong

Two readings of the same table. The pessimist's reading: everything declines. The practitioner's reading: **the trained and untrained lines separate further every decade**, and nearly every row names something training still moves. Part 2 is the half of the evidence most people never hear.

Hormones: two stories

Both sexes train on a changing hormonal supply after forty, but the shape of the change differs, and so does the training response it asks for.

Men — the slow slope. Testosterone declines gradually with age; the figure commonly cited in reviews is **roughly 1% per year after forty**. Rate it **Weak–Moderate**: the number comes from cohort summaries reviewed at second hand, not from a single definitive study, and individual variation is wide. The practical consequence is not a supplement decision (Part 16 rates the "boosters") — it is that the anabolic signal

behind muscle maintenance gets quieter, which raises the value of the two levers that still speak loudly: progressive resistance training (Part 4) and adequate protein (Part 6).

Women — the transition. The menopause transition is not a slope but a step change. As estrogen falls across the years around the final menstrual period, bone loss accelerates sharply — the SWAN figures in the table above (−2.5%/yr at the spine across the window, roughly 10% of spine bone density over about six years) are the steepest bone numbers in this guide. The same transition years commonly bring stiffer, achier joints, disrupted sleep on top of the fragmentation ageing itself causes, and a harder fight to hold muscle and strength. None of that is a reason to train less. It is the specific reason the countermeasures in this guide matter at least as much for women: the accelerated bone window is exactly what the heavy-loading protocol in Part 9 was trialled against — in postmenopausal women — and the strength prescription in Part 4 is the standing answer to the muscle fight. Honest limit: menopause-specific training research in martial artists does not exist; what transfers is the bone and strength evidence, applied with the same load-management rules as everything else here.

	Men after 40	Women across the transition
Pattern	Gradual decline (~1%/yr testosterone, approximate)	Step change over the years around the final period
Sharpest tissue cost	Muscle maintenance gets harder	Bone: ~10% spine density over ~6 years (SWAN)
Common companions	Slower strength gains	Joint symptoms, disrupted sleep, harder muscle fight
First-line response	Lift (Part 4) + protein (Part 6)	Lift + impact loading (Part 9) + protein (Part 6)

The decades at a glance

The table above is system by system; this one is decade by decade — what to expect, and where to point the effort first.

Decade	What typically arrives	Point the effort at
40s	Power and jump height visibly falling; tendon complaints begin; women enter the menopause bone window	Start (or restart) lifting now; protect the bone window; learn your tendon spacing

Decade	What typically arrives	Point the effort at
50s	Sarcopenia steady at ~8%/decade; VO ₂ max slope set by whether intensity stayed; masters divisions in every art	Keep the hard minutes; protein discipline; compete in your band if you compete
60s	Strength loss outruns mass loss; balance and reaction gaps widen; judo's 60+ rules remove strangles	Power intent in every session; balance and ukemi as conditioning; compensation skills (Part 13)
70+	Muscle loss accelerates to 10–15%/decade; vestibular and proprioceptive losses compound	Strength is independence: keep lifting; falling safely is a trained skill — keep it trained

Part 2: The Correction — What Does Not Change as Feared

Your muscles are not the recovery problem

A 2025 meta-analysis (36 studies) compared adults 35+ with 18–25-year-olds after muscle-damaging exercise:

Measure (older vs younger)	Result
Loss of muscle function after exercise	No greater in the older group
Soreness at 48 hours	34% less in the older group
Soreness at 72 hours	62% less in the older group
Creatine kinase (damage marker) at 24 hours	28% lower in the older group

The authors' conclusion: advancing age is **not** associated with greater exercise-induced muscle damage. Caveats, honestly stated: "older" pooled everyone from 35 up; the exercise was laboratory work, not hard sparring; doing less absolute damage may explain part of the gap. Rate the finding **Moderate** — and strong enough to retire the blanket claim that older muscles break more and mend slower.

What this changes in practice: the reason to space your hard days is not your muscles. It is Parts 1 and 3: tendons, joints, and total systemic load. Plan for the limiter you actually have.

Flexibility can still be bought

Flexibility falls by roughly half across a lifetime (review estimate). But in stretching trials up to ten weeks, older adults gained range of motion at about the **same relative rate** as young adults, with gains often in the

range of 10 to 20 degrees at a joint. What cannot be recovered: range blocked by bone shape, advanced joint change, or cross-linked tissue — no trial returns a fifty-year-old to teenage end range. The honest target is the range your art requires, from the baseline you have. Evidence: **Moderate**.

Learning still works

Older adults learn new motor skills and show the same *savings* (faster relearning) as young adults. The differences are in the terms: acquisition is typically slower, needs more repetitions to criterion, reaches a lower ceiling on novel precision tasks, generalises less to variations, and consolidates less between sessions — which is one more reason sleep (Part 6) is a training input. Expect refinement, timing, and tactical depth to keep improving for years. Evidence: **Moderate**.

Part 3: The Real Limiters

The tendon clock

After a loading session, tendon collagen synthesis and breakdown both rise — and the balance is **net breakdown for roughly the first 24–36 hours, net building from about 36 to 72 hours** (Magnusson and colleagues, 2010, human microdialysis work; subjects were mostly young and mostly male, so rate the application **Weak–Moderate**, the mechanism itself **Moderate**). Load the same tendon hard again inside the breakdown window, repeatedly, and you are spending tissue faster than it is replaced.

The working rule: at least 48 hours between hard sessions for the same tendon. It is a mechanistic rationale, not a proven law — and it costs nothing but planning. Part 7 maps which of your sessions load which tendons.

Joints and cartilage

Part 1's MRI numbers mean most over-forty joints carry some structural change, symptomatic or not. Cartilage has no direct blood supply and adapts slowly; joint *load tolerance* — how much, how often, at what angles — is the manageable variable. The tools are the same ones used everywhere in this guide: gradual progression, strength around the joint, and the pain-monitoring rule in Part 7. One sex difference belongs here: in a longitudinal MRI cohort, **women lost knee cartilage faster than men** (medial tibia about –3.5% per year; a single cohort, so **Weak–Moderate**) — one more reason knee-strength work and load dosing are not optional extras for women after forty.

Systemic load

Hard sparring, hard throwing, and maximal lifting draw on one shared account that also pays for your job, your sleep debt, and your life. After forty the account refills more slowly — not because muscles mend

slower (Part 2), but because tendon, joint, and nervous-system costs stack. The masters skill is accounting: knowing what a session costs *you*, from your log (Part 14), rather than from a generic chart.

Part 4: The Strength Prescription

Resistance training is the strongest countermeasure in this guide because it pushes against the fastest losses at once: strength, power, muscle mass, and bone. Presented below as **standard guidance** (the current ACSM position stand's dose, as reported in summaries of that stand — treat exact figures as standard practice, not scripture):

Element	Standard guidance
Frequency	All major muscle groups at least 2× per week
Sets	2–3 sets per exercise
Load	~60–80% of one-rep maximum, high effort
Effort	Stop 2–3 reps before failure on most sets
Power	At least 1 power-focused movement per session : fast intent on the lifting phase, control on the lowering
Starting point (novice or returning)	40–50% of one-rep maximum, progressing toward the range above

The research's loudest finding is not about sets and reps: across 137 systematic reviews, going from **no resistance training to some** mattered more than any refinement of the programme. The floor is two sessions a week. Three or four shorter sessions is a distribution choice, not a proven better dose.

Why the power movement is not optional

Power falls faster than strength (Part 1) because fast-twitch fibres go first. Slow lifting alone does not defend it. In one small trial, older men (65–88) doing bodyweight work with maximal intended speed gained **24% in peak power in eight weeks** — rate it **Weak–Moderate** (small trial), but the direction matches the physiology, and the cost of including one fast-intent movement per session is zero. Throws, strikes, and takedown entries are power movements; the lifting version is how you keep the machinery when class volume drops.

A two-day week for a martial artist (template)

Day A	Dose	Day B	Dose
Squat pattern (squat, leg press, or sit-to-stand loaded)	3 × 5–8	Hinge pattern (deadlift or hip hinge)	3 × 5–8
Press (overhead or bench)	3 × 6–10	Row or pull-up/pulldown	3 × 6–10
Power: medicine-ball throw or fast sit-to-stand	4 × 3 (full recovery)	Power: kettlebell swing or jump substitute (Part 9 gates apply)	4 × 3
Carry (farmer's or suitcase)	3 × 30–40 m	Single-leg work (split squat or step-up)	2 × 8 each side
Neck and grip finisher (your art's weak point)	2 sets	Neck and grip finisher	2 sets

Rules: progress load in the smallest step available when the top of the rep range feels controlled for two sessions; progress **slower for anything a tendon complains about** (Part 7) than for muscle effort; keep two sessions on non-consecutive days where the week allows, and never the day before your hardest class if you can help it — that last point is coaching practice, not trial data. One cross-reference worth making now: the bone protocol in Part 9 (LIFTMOR) was trialled in postmenopausal women using essentially this prescription — heavy compound lifting, twice a week. The strength work and the bone work are the same work.

Part 5: Engine Work — Keep the Intensity, Move the Impact

The VO₂max findings (Part 1) reduce to one instruction: **the hard work must not quietly leave your week**. Athletes who kept training but dropped intensity lost their engines up to four times faster than those who kept both volume and intensity. (Honesty note: the classic longitudinal cohorts behind these figures were small groups of men — Rogers' study was 15 of them. The direction is unlikely to differ for women, but the exact percentages are men's data.)

Element	Guidance	Evidence
Hard sessions	1–2 per week, genuinely hard breathing (intervals, hard rounds, hill work)	Moderate (the maintaining-intensity lesson is longitudinal)

Element	Guidance	Evidence
Interval format with trial support	4 × 4 minutes at ~90–95% of max heart rate, easy recovery between — produced ~13% VO ₂ max gains in 8 weeks in trained subjects vs ~3–4% for threshold or long-slow work	Moderate–Strong in the young/trained; Weak–Moderate as a 40+ martial-arts prescription (no direct trials)
Low-intensity volume	As much as joints tolerate, in low-impact modes: cycling, rowing, incline walking, pool work	Moderate
80/20 polarised vs pyramidal distribution	A 2025 network meta-analysis found no significant overall difference — do not let anyone sell you one true split	Moderate–Strong

The masters translation: get the hard minutes from modes your joints approve of. A rower does not care about your knees the way a fifth round of being thrown does. Class sparring can be one of the hard sessions — count it honestly, and do not stack a second maximal day on top of it.

Part 6: Fuel and Sleep

Protein: the worked numbers

Older muscle responds less to small protein doses (anabolic resistance). For older adults who resistance-train, reviews converge on **~1.6 g per kg of bodyweight per day** as the point where benefit tops out (one sarcopenia review suggests 1.6–1.8 for maximising the response; beyond ~2.2 there is no added muscle benefit in energy balance — higher intakes are a dieting tool, not a building tool). Per meal, aim for roughly **0.4 g/kg across 3–4 meals**, with about **2.5–3 g of leucine** per meal (claims that 5–6 g per meal is required rest on weaker data — flagged). Evidence: **Moderate–Strong** for the daily target.

Your bodyweight	Protein per day (~1.6 g/kg)	Per meal (4 meals)
60 kg / 132 lb	~96 g	~24 g
70 kg / 154 lb	~112 g	~28 g
80 kg / 176 lb	~128 g	~32 g
90 kg / 198 lb	~144 g	~36 g
100 kg / 220 lb	~160 g	~40 g

A day that hits the target (80 kg student, ~128 g)

Meal	Example	Protein
Breakfast	Greek yogurt (200 g) with oats and berries	~25 g
Lunch	Chicken or tofu rice bowl, palm-and-a-half of protein	~35 g
Post-training	Milk or soy shake with a scoop of protein powder	~30 g
Dinner	Fish, eggs, or beans with grains and vegetables	~38 g
Total		~128 g

The shape matters more than the brands: a real protein serving at every meal, one of them near training, and the day planned rather than hoped for.

Creatine: the honest effect size

Creatine monohydrate, **3–5 g per day** (loading optional), in older adults who resistance-train: a 2025 meta-analysis (8 trials, 482 people) found a **small** benefit — lower-limb strength effect size 0.29 (a result that only just reaches statistical significance), lean tissue mass 0.27, and **no significant overall upper-limb strength effect**. A second three-level meta-analysis agrees on a small strength benefit at moderate certainty. Verdict: real, small, cheap, and safe in the screened healthy adults studied — **Moderate**. It is not a transformation, and anyone with kidney disease belongs in the professional conversation this guide's disclaimer points to. One more honesty note: the trial populations behind these effect sizes were predominantly male, so women should expect the direction rather than the exact size.

Sleep: the achievable version

Guidance ranges: **7–9 hours for adults, 7–8 hours for adults 65+** (National Sleep Foundation). Ageing fragments sleep and shifts it earlier on its own, so for many over-fifties the winnable target is **regularity and opportunity**: a defended sleep window at steady times, not a heroic hour count. Sleep supports muscle protein synthesis and the between-session consolidation of new skills (weaker in older adults to begin with — Part 2). One warning about warnings: the widely quoted statistic linking short sleep to a large rise in injury risk comes from **adolescent** athletes. It does not describe you, and this guide does not use it. Evidence for sleep's role: **Strong** as public-health guidance, **Moderate** for the performance mechanisms.

Part 7: Tendon Care

The pain-monitoring rule (replaces "no pain, no gain")

From tendinopathy practice: loading is acceptable while pain stays at or below roughly **5 out of 10 during the work and has settled back to baseline by the next morning**. Pain above that, or still raised the next day, means the dose was too big — reduce it next session. Pain is information with a deadline, not a test of character.

Heavy Slow Resistance (HSR) — the best-supported tendon protocol

For Achilles and patellar tendinopathy, HSR and eccentric loading carry the best evidence (rate **Moderate–Strong** for those tendons; **Weak** for finger, shoulder, and elbow tendons, where it is untested):

Element	Protocol
Frequency	3× per week (respects the 48-hour tendon rule, Part 3)
Dose	3–4 sets of 6–15 reps
Load	Heavy: ~70–85% of one-rep maximum
Tempo	Slow — about 3 seconds up, 3 seconds down
Duration	At least 12 weeks
Pain rule	The monitoring rule above governs every session

Isometrics: contested — presented honestly

One small 2015 crossover study in patellar tendinopathy reported 5 × 45-second holds at 70% of maximum cut pain dramatically for at least 45 minutes. A later Achilles study found heavy 45-second isometrics offered **no meaningful immediate benefit** and could not recommend them for that tendon. Evidence: **Weak and conflicting**. If isometrics help *your* tendon, your log (Part 14) is the judge; do not build a programme on them.

Which of your sessions load which tendons

Session type	Tendons loaded hardest	Spacing note
Hard gripping / gi grappling	Finger flexors, wrist, elbow	Alternate gi and no-gi days where possible
Throwing practice (high volume)	Shoulder, elbow, knee	Not the day before heavy pressing
Receiving throws / breakfall volume	Wrist, shoulder, spine tissues	Build volume gradually; quality ukemi is load management
Kicking volume	Achilles, patellar, hip flexors	Not back-to-back with jump or sprint work
Lifting: pressing / pulling	Shoulder, elbow	HSR days count as tendon days
Lifting: squat / hinge	Patellar, Achilles, spinal tissues	Keep 48 h before repeating the same pattern hard

Part 8: Mobility After 40

What can be regained: meaningful range from *your* baseline — trials show gains of 10–20 degrees at a joint are common, and older adults improve at about the same relative rate as the young (Part 2). **What cannot:** range blocked by bone shape or advanced joint change, and teenage end range. Programme for the range your art actually uses:

Method	When	Use
Dynamic mobility (leg swings, hip circles, arm swings, easy range rehearsal)	In the warm-up, before training	Reaches training positions at rising speed — this is preparation, not stretching
Static or PNF stretching, moderate holds	After class, or in separate sessions	The ROM-building work; this is where range is earned
Loaded end-range work (resistance training through full range, controlled)	In lifting sessions	Likely transfers best to positions under load — grappling and deep stances (inference, Weak)

The stretching myth, precisely: static stretching does **not** prevent injuries and does **not** reduce next-day soreness in the trial literature (evidence: **Negative/Weak** for those claims). Long static holds (60 seconds or more per muscle) right before strength work temporarily cut strength in a 2024 meta-analysis, though jump and sprint tasks in complex training were not harmed — so "never stretch first" is also an overstatement. The accurate version: warm up dynamically, stretch for range in its own slot.

Part 9: Bone — Loading Is the Signal

Note first where this guide's strongest evidence comes from: the landmark trial below was run in women. Bone responds to load it is not used to: heavy resistance and impact, in brief doses. The strongest single trial (LIFTMOR) enrolled 101 postmenopausal women with low bone mass, supervised and screened, for eight months of **two 30-minute sessions per week**: heavy lifting at over 85% of one-rep maximum (deadlift, squat, press, 5 × 5) plus jumping and drop landings, against a low-intensity home programme.

Outcome (8 months)	Heavy + impact group	Control
Lumbar spine bone density	+2.9%	−1.2%
Femoral neck bone density	+0.3%	−1.9%
Serious adverse events	None (one minor back spasm)	—

Evidence: **Strong for this protocol in this population** — one well-run RCT, supervised, with screened participants. Walking alone does **not** preserve spine bone density; swimming and cycling are non-osteogenic (Moderate–Strong). Martial arts provide plausible bone loading — throws received with good ukemi, jumping, heavy lifting — but no martial-arts trial has measured it; do not claim your art "builds bone" as a proven outcome. And the LIFTMOR gates travel with the protocol: **screening first, supervision for the heavy work, progression earned**. Unsupervised maximal lifting is not the trial.

Impact and the pelvic floor

Impact work — jump landings, drop landings, being thrown — and heavy braced lifting load the pelvic floor as well as the skeleton. This matters most for women, many of whom have carried pregnancies, and it is almost never mentioned in martial arts material. Plain, practical guidance, inside this guide's not-medical-advice framing:

- **Know the signals.** Leaking urine during jumps, landings, or heavy lifts, or a feeling of pelvic heaviness or pressure during or after training, are signals to modify and get assessed — not a character test to push through, and not a reason to quit impact work permanently.

- **Progress impact like load.** The pelvic floor adapts to gradual exposure the way tendon does (Part 7): low drop landings and small jumps first, volume before height, and the next-morning rule applies — symptoms still present the next day mean the dose was too big.
- **Brace smart while you build.** Exhaling through the effort phase of a heavy lift, rather than a maximal breath-hold strain, reduces the downward pressure while technique and capacity are being built; full bracing is a skill to layer back in as the floor strengthens.
- **Train the floor itself.** Pelvic floor exercises are standard practice, they take minutes, and they belong in the same category as the neck and grip finishers in Part 4 — small, regular, unglamorous, effective maintenance.
- **Receiving throws counts.** Ukemi quality and a gradual build in receiving volume (Parts 10–11) protect the pelvic floor as surely as they protect the shoulder.
- **Get the right professional.** Persistent leaking, pressure, or pain is a referral to a pelvic-health physiotherapist — a routine, specialised assessment, and for many women a short, fixable problem rather than a life sentence of modified training.

Part 10: The Six Arts After 40

Read your own row closely and the others for the partner across from you. Injury figures are labelled with their populations — most are all-age cohorts in which older age appears as a risk factor; there is no prospective injury study of martial artists over forty, and this guide will not pretend the all-age numbers are masters numbers.

Shotokan Karate

What changes most: jump height and the deep-stance budget. Power goes first (Part 1), and long sessions in low stances spend knees whose MRI would likely show findings (Part 1) whether or not they hurt. *Keep:* kihon precision — accuracy is not a young person's game; it is the older student's home ground — kata, a complete training method that scales forever, and kumite with chosen intensity. *Modify:* stance depth as a dial, not a doctrine — higher in volume work, deep in short quality sets. Jump kicks become occasional, landed well, on good surfaces. Competition data (mostly young elite) is head-dominant: head/neck a median ~58% of competition injuries, contusions ~68% — masters training should keep the control culture that data argues for, with head contact dosed deliberately.

Brazilian Jiu-Jitsu

The data: the largest survey (1,140 athletes, all ages) found injuries causing at least two weeks lost at 308 per 1,000 athletes per year; **knee the most common site (27.1%)**, lower body 45.7%, upper body 30.2%.

Setting and mechanism matter most: **77.6% of injuries in sparring, submissions 29.7%, takedowns 26.4%**; older age was itself a significant risk factor. The survey population skewed male — treat the percentages as the best available map, not a women's injury census. A Brazilian age-group study found masters (over 30, in BJJ's definition) carried more injuries and significantly more muscle and tendon injuries than adolescents, with joint injuries most common in every group. *Keep*: everything — BJJ's scalable intensity is why masters divisions thrive (Part 12). *Modify*: tap early as a trained reflex, not a decision; choose guard and passing styles that spare your knees and fingers; manage grip volume (alternate gi and no-gi); agree takedown intensity before rounds; count hard rounds like a budget, because they are one.

Kodokan Judo

The data: French federation surveillance across 421,670 fights found 1.1% injury per fight exposure — sprains 54.3%, fractures 15.6%, dislocations 12.5%, shoulder/elbow/knee dominant (all ages, competition). In German elite data, throwing actions produced 78.1% of injuries — **being thrown 40%, your own throw 38%** — and training produced nearly two-thirds of them. *Keep*: ukemi — the highest-value skill in this entire guide for a 40+ body, practised as conditioning, not ceremony. *Modify*: throw counts are load: track nage-komi volume like sets. Receiving volume builds gradually. Randori intensity is a dial you set with your partner before the round. The veterans rules (Part 12) — shorter matches, and no strangles at 60+ — exist because the federation did this arithmetic too.

Muay Thai

The data: a fight survey (195 fighters) found 55.4% reported an injury in their most recent fight; lower extremities were 51% of injuries, and about 20% were fracture or concussion. Direct masters data does not exist. *Keep*: the clinch, the teep, the roundhouse — Muay Thai technique is leverage and timing, which age far less than athleticism. *Modify*: shin conditioning stays progressive, never heroic; roadwork impact can move to the bike without losing the engine work (Part 5); sparring head contact is a career-length decision — make it deliberately, at every age, and doubly after forty.

Taekwondo

The data: pooled reviews put lower-extremity injuries first (35.7 per 1,000 athlete exposures), head/neck second (12.65), with foot and toes a signature site. *Keep*: poomsae — and note that poomsae competition has the deepest masters structure of any art in this guide (Part 12), a competitive home for life. *Modify*: head-height kicking is a flexibility programme before it is a technique: earn the range with Part 8's methods rather than borrowing it from your lower back. In sparring, the older athlete's game is distance, timing, and the counter — the compensations Part 13 describes, applied on purpose.

Catch Wrestling

The data: honestly, a gap — no usable masters injury epidemiology exists for catch; the general wrestling literature is scholastic and collegiate. Do not borrow BJJ's numbers and call them catch's. *Keep:* the ride, positional control, and the submission craft — a pressure game ages well. *Modify:* neck load is the watch item (bridging volume progressed like any other load, Part 7 rules apply); leg-lock work follows the library's standing safety progression — control and knowledge first, tap early, always; masters freestyle formats shorten the periods (Part 12), which tells you how the sport itself doses age.

Part 11: Injury Patterns — The Prevention Synthesis

Labelled honestly: this is a **synthesis** from the mechanisms above (evidence **Weak** as a tested programme — no prevention trial in masters martial artists exists), not a proven protocol.

1. **Control the setting you get hurt in.** Grapplers get hurt in sparring; strikers get hurt in competition and hard sparring. Dose those settings first.
2. **Submissions and throws are the mechanisms.** Tap early; agree throw and takedown intensity; build receiving volume gradually.
3. **Load spikes injure.** Age plus training volume predicted lower-limb injury in multi-art data. One variable at a time — the rule from *Built to Last*, this guide's companion — applies with interest after forty.
4. **Strengthen the sites the data name:** knees (Part 4 templates), neck, shoulders, grip — neuromuscular strength work cuts knee injuries in other sports; the extension to the mat is inference.
5. **Treat overuse early.** Fingers, neck, ribs, and shoulders in grapplers; shins and feet in strikers. Early and cheap beats late and long.
6. **Rules and equipment work.** When karate's world body tightened its rules, injuries fell by roughly 42% in follow-up data with no rise in severe injuries — the strongest prevention evidence in this field is that environments, not just bodies, decide injury counts. Choose your training environment like it matters, because it does.

Part 12: Masters Competition — The Tables

Bands and durations below are as published in the bodies' current materials and corroborating summaries at the time of writing. **Check the current rule book before you enter** — bodies revise these, and Mat Manual's corrections policy exists for when they do.

Brazilian Jiu-Jitsu — IBJJF (Rule Book v6.1, as summarised)

Division	Ages	Notes
Master 1	30–35	Age = event year – birth year
Master 2	36–40	You may enter a younger division, never an older one
Master 3	41–45	Black-belt match length: Master 1 $\approx$ 6 min, Master 2+ $\approx$ 5 min (adult: 10 min)
Master 4	46–50	White/blue masters matches $\approx$ 5 min
Master 5	51–55	Technique legality is set by belt , not by masters age — claims of relaxed masters technique rules were not found in the rule book summaries
Master 6	56–60	
Master 7	61+	

Women's masters divisions run the same Master 1–7 age bands, under the same belt-based technique rules and match durations.

Kodokan Judo — IJF Veterans

Division	Ages	Match rules
F/M1–F/M2	30–34, 35–39	3 minutes
F/M3–F/M4	40–44, 45–49	3 minutes
F/M5–F/M6	50–54, 55–59	3 minutes
F/M7–F/M8	60–64, 65–69	2.5 minutes; no shime-waza (strangles); capped golden score
F/M9	70+	As F/M7–8 (2024 championship outlines)

The F divisions are the women's: **F1–F9 mirror the men's M1–M9 bands, durations, and 60+ rule changes exactly** — one of the most complete women's masters structures in this guide.

Karate — the honest entry

The WKF has no masters division. Its 2024 rules cover senior (kumite 18+, kata 16+) and youth categories only. Masters karate absolutely exists — under the **WUKF (veterans from 36+, a different federation)**, national bodies, and Masters Games — but anyone who sells you a "WKF masters title" is selling something that does not exist.

Taekwondo — WT poomsae and US sparring

Route	Bands
WT poomsae masters	1st Masters 41–50 · 2nd Masters 51–60 · 3rd Masters 61–65 · 4th Masters 66+ (Senior 31–40 precedes them); each band has its own compulsory poomsae, drawn from progressively later forms; women's masters divisions use the same bands and the same forms
USAT sparring	"Ultra" divisions from 33+ ; many charts shorten rounds and lighten head contact vs the senior division — varies by year and event, check the current packet
AAU sparring	Executive 33–42 · Ultra 43+

Wrestling — USA Wrestling Masters / UWW Veterans

Route	Bands
USA Wrestling Masters	A 25–34 · B 35–42 · C 43–50 · D 51–58 · E 59–66 (F 67+ appears in some years' tables)
UWW Veterans	35–60, in five-year increments
Format	Freestyle/Greco periods shorten to 2 × 2 minutes (senior: 2 × 3)

Muay Thai — the gap, stated

Masters structures exist at national and masters-games level, but no single authoritative age-band table could be verified to the standard of the tables above. This guide prints nothing rather than something shaky: check the current IFMA or your national body's rule book for the event you enter.

Entering your first masters event: the short checklist

- **Eight-plus weeks out:** confirm your division from the *current* rule book (bands and legality change), and confirm whether the event runs men's and women's divisions in your band or merges small

brackets.

- **Six weeks out:** build the competition block in Part 14 — intensity up in class, lifting to maintenance, the injury settings (sparring, throwing volume) dosed deliberately rather than avoided.
- **Two weeks out:** taper — volume down, intensity kept; no new techniques, no new equipment, no heroic sessions.
- **The week itself:** sleep protected like a class; weigh the travel and warm-up logistics more than any opponent; plan your warm-up to be *long* — the older joint needs the full ramp (Part 11).
- **On the day:** you are competing against your band and your own baseline. The students still competing at sixty are the ones who treated every event as information, not verdict.

Part 13: The Mind After 40 — Reaction, Compensation, Learning

Reaction. Simple reaction time slows by roughly **2–6 milliseconds per decade**; tasks requiring a choice slow more. Forced-response research locates the delay in stimulus processing and movement preparation — interestingly, the gap between preparation and initiation itself (~90 ms) stayed constant from age 21 to 80. You do not hesitate more. You *know* slightly later.

Compensation — the veteran's actual game. The well-supported general principle from sport-cognition research: experts read cues, formations, and tendencies earlier, start positioning sooner, and waste fewer movements — buying back with anticipation what reaction loses. Rate it **Moderate** as a general principle, **Weak** as a measured martial-arts quantity (nobody has timed it in older grapplers). It has a ceiling: under enough simultaneous load, the older brain's compensatory recruitment saturates and performance falls faster (the CRUNCH model in the cognitive-ageing literature). Practical translation: simplify under pressure. Fewer simultaneous problems, earlier decisions, positions chosen before they are urgent.

Learning. From Part 2, the working rules: more repetitions to criterion than a younger student needs; practice spaced and closer to when you will use the skill; explicit instruction over discovery; protect sleep, because between-session consolidation is the weak link. And the long view: within older groups, chronological age alone was a weak predictor of improvement — the 70-year-old in the study improved about as fast as the 65-year-old. The on-ramp is slower. It is not closed.

Part 14: The Week, Rebuilt — And How to Watch It

Three template weeks

Two classes a week (the floor that works):

Day	Content
Mon	Class (technical emphasis) + lifting Day A after or next morning
Tue	Low-intensity volume (bike/row/walk) 30–45 min
Wed	Rest or mobility session (Part 8)
Thu	Class (harder day: sparring/rounds dosed) + lifting Day B
Fri	Rest
Sat	Interval session (Part 5) or open mat, technical only
Sun	Rest; weekly log review (below)

Three classes a week: add a third class on Saturday as the technical session; keep only **two genuinely hard days total** (classes, intervals, and maximal lifting all draw on the same account — Part 3). Tendon rule applied: no tendon group is loaded hard on consecutive days.

Competition block (6–8 weeks out): class intensity rises, lifting drops to maintenance (one session, moderate), intervals sharpen; the final 7–10 days **taper** — volume down, intensity kept. A taper is not a deload: it is a peak strategy with decent evidence behind the principle in strength/endurance sport.

Deloads: the honest paragraph

Direct deload research is **very thin and not in masters athletes**: one small trial in untrained young men found planned deload weeks did not hinder gains — which shows deloading is cheap, not that it is necessary. Coach practice converges on roughly **five to six hard weeks, then a lighter week at 30–50% less volume**, and that is how this guide labels it: **practice, Weak evidence**. Your log arbitrates: two consecutive weeks of falling performance, rising joint complaints, and poor sleep is a deload signal whatever the calendar says.

Monitoring without superstition

Wearable "readiness scores" are proprietary composites whose validity, as published, is **unknown** — and in elite swimmers, the headline HRV metric alone did not even distinguish overload from recovery phases. What holds up better (evidence **Weak–Moderate**): a **trend dashboard** of simple measures, read as seven-day rolling patterns, never as a single morning's verdict.

Daily (30 seconds)	Weekly (5 minutes)
Sleep hours + quality (1–5)	Sessions trained vs planned (availability — the master metric)
Resting heart rate (if you track it)	Hard days count vs plan
Soreness (1–5) and joint complaints (name them)	Performance note: one line — better / same / worse, and at what
Mood/readiness (1–5)	Tendon responses: any next-morning carryover (Part 7 rule)
	Decision: hold / progress / deload next week — written down

Rule: a trend moves the plan; a single bad morning moves nothing but the warm-up's length.

A filled example (one week, 52-year-old, two classes + two lifts): sessions trained 4 of 4 planned; hard days 2, as planned; sleep 6.8 h average, quality 3 — third week running under 7; right Achilles grumbled Monday, quiet by Wednesday (no next-morning carryover by week's end); performance note: "same, but Wednesday rounds felt shorter." Decision written down: **hold loads, add 30 minutes to the sleep window, re-check next week** — the trend (sleep) moves before the training does.

Part 15: The First Twelve Weeks (Starting, or Returning, After 40)

For the beginner at 45 and the black belt returning at 52 alike: capacity is rebuilt in phases, and the phases are not negotiable by enthusiasm. Move to the next phase when the current one has felt *repeatable* for two full weeks — soreness familiar and fading, joints quiet by next morning, sleep steady.

Phase	Weeks	Class	Lifting	Engine	Notes
1 — Arrive	1–4	2×/wk, technical roles; no maximal rounds; ukemi and movement quality first	2×/wk at 40–50%, technique over load	Low-intensity volume only	Learn the room, the people, your responses. Log everything (Part 14)
2 — Build	5–8	2–3×/wk; one hard day/wk, dosed	2×/wk progressing toward 60–80%; add the power movement	Add 1 interval session/wk	First tendon check: any next-morning carryover? Adjust before progressing

Phase	Weeks	Class	Lifting	Engine	Notes
3 — Train	9–12	3×/wk; two hard days max	2×/wk at working loads	1–2 hard sessions total across the week	You now own a sustainable week (Part 14 templates). Progress one variable at a time from here

Returning after injury is a professional conversation first (see the disclaimer); this table is for the healthy returner and the new starter.

Part 16: Myths, Rated

Rated by the same key as Part 1. Neither hyped nor trashed — priced.

Claim	Rating	The evidence in brief
Collagen powder repairs joints / regrows cartilage	Weak	Meta-analysis of 5 small trials (519 people) found modest pain/function improvement — every included study industry-funded, doses and forms all different. No human evidence of cartilage regrowth
Gelatin + vitamin C before activity builds tendon collagen	Weak (mechanistic)	15 g gelatin an hour before 6 minutes of rope-skipping doubled a collagen-synthesis marker — in 8 young men, measuring blood markers and engineered tissue, not injuries or performance. Interesting; unproven where it matters
Glucosamine + chondroitin rebuild joints	Weak to Negative	The large independent GAIT trial (1,583 people) found no overall benefit over placebo; smaller trials show at most a small short-term pain effect of unclear importance. Safe for most; not a substitute for load management and strength
Static stretching prevents injury and soreness	Negative / Weak	Trial literature: no consistent injury prevention, no meaningful soreness reduction. Stretching is for range (Part 8), where it works
"No pain, no gain"	Unsupported — and contradicted	No trial supports training through joint pain at any age. Tendinopathy practice uses the opposite: a pain-monitoring model (Part 7). Muscle <i>effort</i> is productive; joint <i>pain</i> is a cost

Claim	Rating	The evidence in brief
Testosterone "boosters" raise T and build muscle	Weak to Negative	A systematic review of 52 studies covering 27 booster products found most fail to raise total testosterone at all. Tribulus does not replicate; D-aspartic acid <i>lowered</i> testosterone ~12.5% in one trial of trained men. Zinc and vitamin D help only when you are deficient. Regulators have found boosters spiked with steroids and SARMs. Sleep, energy balance, training, and medical care for true deficiency are the supported routes
Ice baths after lifting speed up gains	Moderate evidence — against	A 2024 meta-analysis found a 95.7% probability that lifting alone grows more muscle than lifting plus routine cold immersion (effect 0.36 vs 0.14). Cold <i>does</i> reduce soreness and helps short turnarounds — so use it in competition weeks and two-a-days, kept hours away from lifting you want to adapt to
Creatine is dangerous, or only for young bodybuilders	False as stated	See Part 6: small real strength benefit in older adults who lift, good short-term safety in screened healthy adults — Moderate

Part 17: Trackers and Sources

Weekly log (photocopy or copy into your training journal)

Week of	Sessions planned / done	Hard days	Lifting days	Interval day	Tendon carryover? (Y/N, which)	Sleep average	One-line verdict
	/						
	/						
	/						
	/						

Tendon response log

Date	Session / load	Tendon	Pain during (0–10)	Next morning (settled / raised)	Action taken

The year on one line

Availability is the master metric (article, "Adjust the Expectations"). At each quarter's end, write four numbers: **sessions trained · weeks fully missed · injuries that cost a week or more · one thing that measurably improved**. Four honest lines a year will tell you more about your trajectory than any single test day.

Sources and further reading

The studies and rule sources behind this guide's numbers. Mat Manual's corrections policy applies to this guide: if a figure here is wrong, it will be corrected in the open.

- Muscle, strength, and ageing: GeroScience review of sarcopenia rates (PMC11226578); Health ABC cohort (Goodpaster 2006) on strength vs mass; masters physiology reviews (PMC13389671, PMC9517884).
- Jumping across the lifespan: Frontiers in Aging countermovement-jump cohort (PMC11672781).
- VO₂max in masters athletes: Rogers et al. 1990, *Journal of Applied Physiology* (PubMed 2361923); Tanaka & Seals synthesis.
- Tendons: ageing reviews (PMC7385684, PMC6316563); Magnusson et al. 2010, *Nature Reviews Rheumatology*, on the collagen synthesis/breakdown window; heavy-slow-resistance and isometric literature as summarised in Part 7 (Rio 2015 and the later Achilles isometric cohort, PMC6706360).
- Muscle-damage recovery: 2025 meta-analysis of 36 studies, *Journal of Aging and Physical Activity*, via Lancaster University's summary.
- Protein: Morton breakpoint analysis and older-adult protein reviews (PMC9268432, PMC8746908); ESPEN/PROT-AGE general guidance.
- Creatine in older adults: 2025 meta-analysis of 8 RCTs (PMC12752335 / PubMed 41388441); three-level meta-analysis, *Frontiers in Nutrition*.
- Bone: SWAN cohort (PMC8208668); LIFTMOR trial, Watson et al. 2018 (PubMed 28975661); masters bone review (PMC8166030).
- Joints on MRI: systematic review of asymptomatic knee findings (PMC6837253).

- Flexibility: ageing and stretching review (PMC12225444); stretching and performance meta-analysis (PMC11336295); Cochrane review of stretching and soreness (Herbert 2011).
- Injuries: Hinz et al., BJJ survey, *Orthopaedic Journal of Sports Medicine* (PMC8721390); das Graças et al. age-group BJJ study (PMC5651575); Frey et al., French judo federation surveillance (PMC6545656); German elite judo cohort (2026); karate competition meta-analysis (Lystad); taekwondo epidemiology (Lystad; Canadian nationals, PMC506779); Muay Thai fight survey (PMC5149460).
- Competition rules: IBJJF Rule Book v6.1 (bands and durations as corroborated across published summaries); IJF Veterans championship outlines (2024); WKF Rules 2024 (no masters division); WUKF veterans category; WT/USAT/AAU taekwondo age divisions; USA Wrestling Masters and UWW Veterans definitions.
- Load and monitoring: HRV in elite swimmers (PubMed 40360152); combined-monitoring trial in cyclists (PubMed 41028151); deload trial (PubMed 41730991).
- Mind: motor learning in older adults (PMC1995805, PMC4425712); compensation/CRUNCH model (PMC4870863).
- Myths: collagen meta-analysis (García-Coronado 2019); gelatin study (Shaw 2017, PMC5183725); glucosamine GAIT trial and syntheses; testosterone-booster systematic review (Morgado et al.); cold-water immersion meta-analysis (2024).

Second Prime is a free Mat Manual guide. Its companion article, "The Body You Have Now: Training After 40," is free in full at matmanual.com, where the other free guides — Train Anywhere, Built to Last, and Strong for the Mat — also live.