welltory Energy Lab

When the drain is invisible

Sensory and cognitive load, brain injury, and what a wearable can and cannot see

A short, layered look through Welltory's own load-and-battery signals, our community data, a healthy reference, and the research.

Community question - group case

A question that comes up across the Energy Lab community: whether the shape of a crash looks different for people whose energy-limiting illness follows a head injury or a toxic environmental exposure — and whether an app that mostly counts movement can even see the drain that comes from light, motion, driving, screens and concentration rather than from steps.

Prepared 2026 · Energy Lab R&D · descriptive, per-user normalized · data through 2026-07-10

THE SHORT VERSION

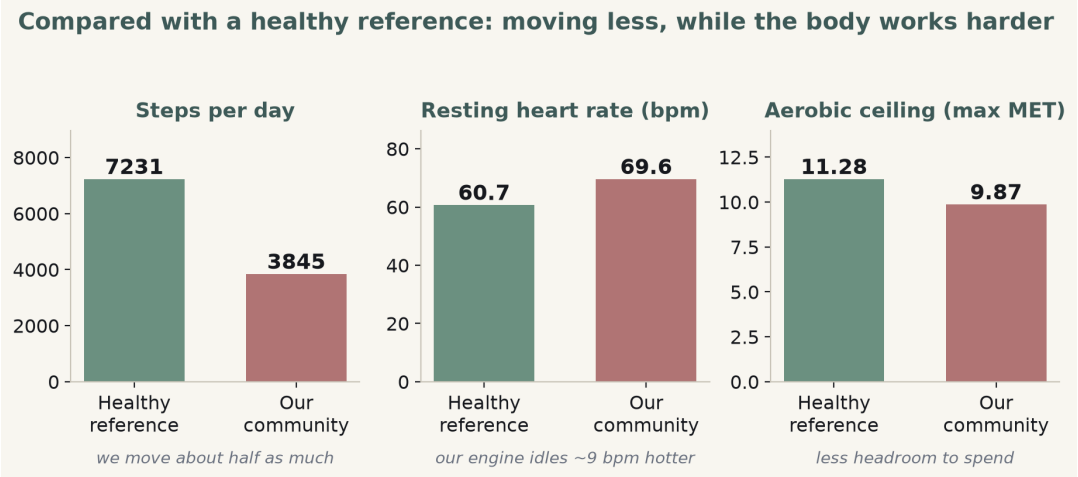
If you only have energy for one page

Three lines and one chart. Read whatever parts you have energy for; the sections after just show the working.

• **We move less, while the body works harder.** Compared with a healthy reference, our community takes about **half** the daily steps, yet the body rests at a heart rate about **9 bpm higher** with less aerobic headroom. Moving less, but running hotter.

• **Most of the effort that remains never shows up as movement.** About **87%** of our community's effortful minutes are logged while sitting still (mental and stress load), not moving. The drain from light, screens, driving and focus is real; a step count just files it elsewhere. A head injury or toxic exposure plausibly adds a further sensory and autonomic layer — the research points that way, though our own data has too few such members to prove it.

• **No single number predicts a crash from a busy day.** Across people, a busier day and the next day's readings barely move together — so impact is worth reading only against your own baseline, over the next one to three days.



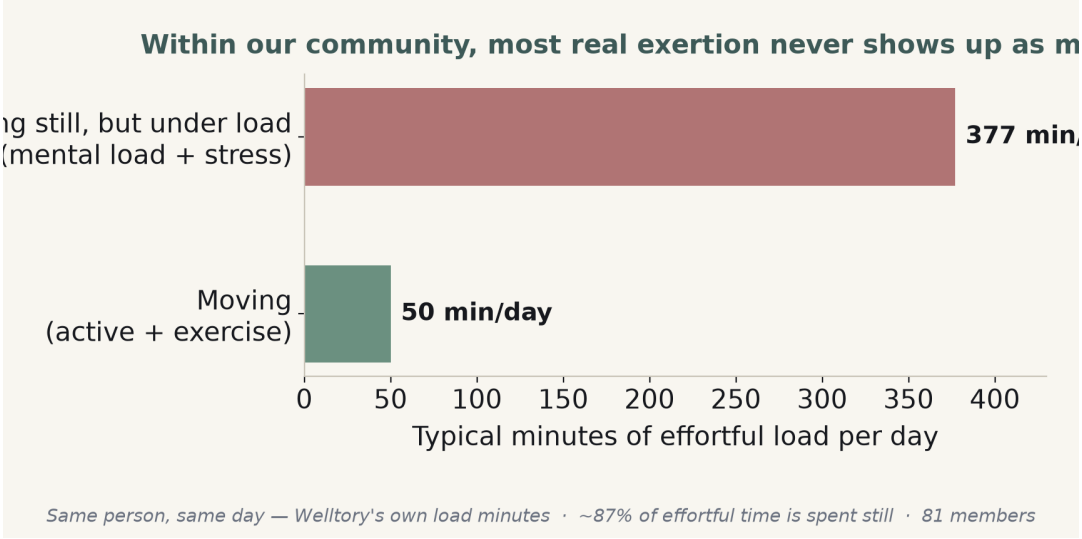
Like-for-like against a healthy reference: about half the steps, a higher resting heart rate, less aerobic headroom. A disease-plus-population contrast, not a clean split.

≈87%	+9 bpm	≈½	24–72h
of a day's effort is spent sitting still, under load	resting HR vs a healthy reference	the daily steps of a healthy reference	typical lag before a crash lands

STEP 1

Your energy buckets are real — and mostly invisible to a step count

Thinking in buckets — going out, driving, screens, focus, and whatever is left for home — closely matches how the body spends energy. Welltory already works this way: it tracks a daily **battery** and separates moving minutes from sitting-still minutes that still cost effort. Read that way, our community's moving bucket is tiny and the sitting-still-but-costly bucket is huge: about **377 minutes a day of loaded stillness against ~50 of movement**, and nearly everyone spends most of their effortful time not moving.



The same person on the same day: hours logged as load while sitting still, a sliver as movement. Welltory's own load minutes, within our community (81 members).

This is why three PT sessions a week can leave less for home than two outings: the biggest draws are things a pedometer never sees. Mental, sensory and physical effort pull from one shared pool, and the cost often lands a day to three later — which is what makes a crash feel like it came “for no reason” [8].

> How to read it: the step and movement numbers describe the small bucket. The battery, the stress-pressure signal and the sitting-still “mental load” minutes are what track the big one — the bucket that light, driving, screens and concentration fill.

STEP 2

A smaller, hotter battery — and what an injury adds

The first-page comparison already shows the shared picture: our community moves about half as much as a healthy reference, yet the body idles hotter with less headroom. On top of that, a structural injury plausibly adds its own layer.

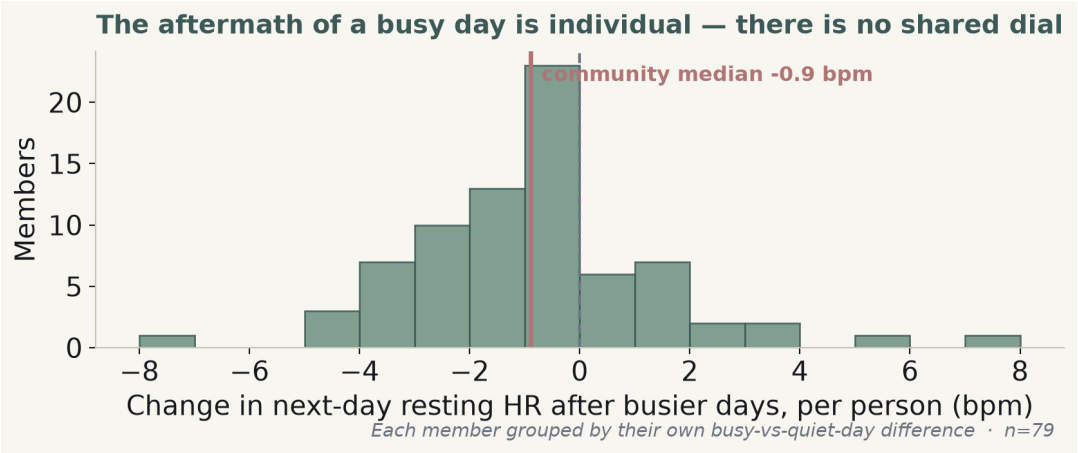
The resting-brain slowing many people are told about (excess slow-wave, delta and theta, activity) is a recognised correlate of post-concussion and neuroinflammatory states [1][3] — but it is **consistent with** several things at once and is not unique to any one, which is why a report lists possibilities rather than naming one [2]. That hotter idle has a known basis too: after brain injury, autonomic balance stays disturbed — a review of 89 studies finds heart-rate variability drops and can stay low even after symptoms resolve [4][5], leaving less spare capacity for an ordinary day. And air pollution and wildfire smoke are independently tied to brain inflammation, so an injury plus a smoke exposure can act as two hits on one system [6][7].

> What our data cannot do: only two members tag concussion symptoms and one tags air quality — far too few to test whether crashes differ for brain-injury survivors as a group. That part rests on the research, kept separate from our numbers.

STEP 3

Potential vs realized: read it against yourself

Looking at a high-drain day before and after is a good instinct — with one honest limit. Across our community, the size of a busy day and the next day's readings barely move together: for some a busy day nudges the next morning's resting heart rate up, for others it settles. There is no shared dial to turn into a crash score.



Members grouped by their own busy-minus-quiet-day difference in next-morning resting HR — the responses spread across zero. The aftermath is individual (n=79).

What works is a ledger read against yourself. **Potential impact** = what days like this have usually cost *you* (your own past battery drain and recovery time). **Realized impact** = what landed: the battery drawn down that day, plus the 24–72 hour tail in your resting heart rate and how you felt. Pairing a quick self-rating of capacity with the objective read turns a busy week into something you can plan against.

STEP 4

What could change if the app knew about the injury

A known injury doesn't need a group to be useful — it changes how one person's own numbers should be read. Four shifts follow, none of them adding pressure or scoring.

One — count loaded stillness as real effort, so a demanding but motionless day isn't read as rest. **Two —** let a sensory or cognitive event (an outing, a drive, a screen-heavy stretch, a PT block) be logged like movement already is. **Three —** expect and show a longer tail, reading load against the next one to three days. **Four —** let people mark an injury and their high-drain events — something this community has already asked for — so a baseline can shift with a person's history instead of anyone else's.

The answer

The pattern you describe is real and mostly invisible to a step count: the largest draws — light, motion, driving, screens, focus — happen while sitting still, and the wearable records them as load and battery drain, not as movement.

A head injury or toxic exposure plausibly adds a sensory and autonomic layer, and the research supports it — but our data has too few brain-injury members to prove a group difference, so we hold that as physiology.

And impact reads best as a personal before-and-after over 24–72 hours, against your own baseline — not as a single crash-prediction number.

References

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EVIDENCE & LIMITS

How to weigh this

A descriptive, community-level look meant to make sense of a pattern — not a diagnosis.

Welltory day-level and journal data from the Energy Lab community, per-user normalized, through 10 July 2026 (81 members with movement/battery signals; coverage generated 2026-07-12). Heart-rate variability is only read within a person over time, never between people. The **healthy reference** is a set of relatively healthy, active people compared only on identically-defined fields (steps, resting HR, aerobic ceiling); the groups differ in age, devices and era as well as illness, so it is a disease-plus-population contrast, not a clean split. The movement-vs-loaded-stillness split is within our own community (same person, same day). Load and symptoms are read with a 24–72 hour lag.

Welltory Energy Lab · general information from community data, not a substitute for medical advice.