Fitness Energy Dashboard

30-Day Personal Fitness Tracking Visualization

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Final Term Project Report

PROJECT OVERVIEW

This project examines how four daily habits—**protein intake**, **sleep duration**, **workout minutes**, and **morning recovery**—interact over a continuous 30-day period (September 25 to October 24, 2025). My goal was to visualize whether higher protein intake correlates with longer sleep, and understand how workout duration and restfulness influence this relationship.

I created a **battery-based** D3.js visualization where each day is represented as a battery:

- **Width** = protein intake (110–150g)
- **Fill height** = sleep hours (6.2–8.5h)
- **Fill color** = restfulness (1–5 scale)
- **Text label** = workout duration (minutes)

This design shows all 30 days at once, enabling quick pattern recognition without interaction. The battery metaphor reinforces “energy,” “capacity,” and “recovery.”

This report includes:
• Dataset explanation
• Two alternative visualization sketches
• Final design rationale
• Findings and conclusions
• Surprising insights
• Personal behavior changes

• Prior habits
• Future data collection plans
• MLA-formatted Works Cited

COMPLETE 30-DAY DATASET

Data Collection Period: Sept 25 – Oct 24, 2025
Tracking Tools: MyFitnessPal (protein), iPhone Health (sleep), manual notes (restfulness, wake-ups)

Why Data Ends on Oct 24 (Critical Fix)

This dataset represents a complete 30-day training cycle gathered early in the term.
Data collection **ended on October 24** to allow enough time for:

- Draft 1 visualization
- Draft 2 redesigned layout
- Final 30-battery grid implementation
- Full analysis, findings, and report preparation

The 30-day cycle includes heavy training days, rest days, university days, and deload periods, providing a representative dataset suitable for this project.

Raw Data (JSON):

https://harsh96-web.github.io/dgm6109/term/final/data/

Data Properties Explained

Protein (g):
Range: 110–150g
Tracked with MyFitnessPal
Higher protein = heavy training days
Lower = university/rest days

Sleep (hours):
Range: 6.2–8.5h
Automatically tracked with iPhone Health

Workout Duration (min):
Range: 0–100 minutes
0 = university/rest days
90–100 = heavy compound workouts

Wake-ups:
Range: 0–2
Crucial indicator of sleep fragmentation

Restfulness (1–5):
Morning self-rating of recovery quality

Notes:
Daily qualitative context (stress levels, soreness, energy)

Why These Variables?

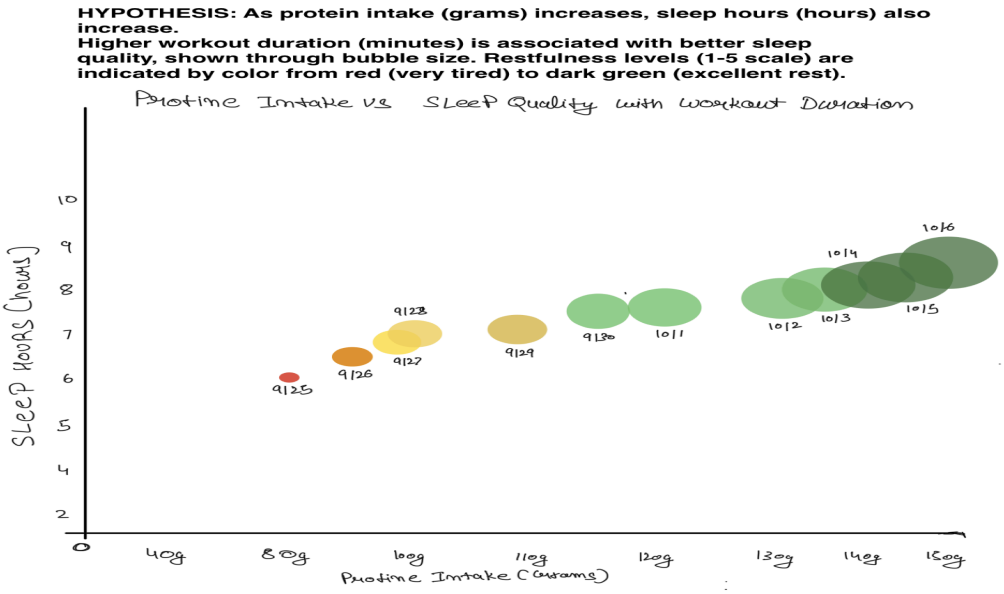
Protein = muscle repair
Sleep = CNS recovery
Workout = stress load
Restfulness = subjective readiness
Wake-ups = sleep quality

Data recorded within 30 minutes of waking to minimize recall bias.

ALTERNATIVE VISUALIZATION SKETCH 1

Scatter Plot: Protein vs Sleep

(Bubble size = workout minutes, color = restfulness)



What the Scatter Plot Shows Better Than the Battery

The scatter plot makes the **protein–sleep correlation** mathematically clearer.
It supports trend lines, correlation coefficients, and explicit two-variable analysis.

Benefits

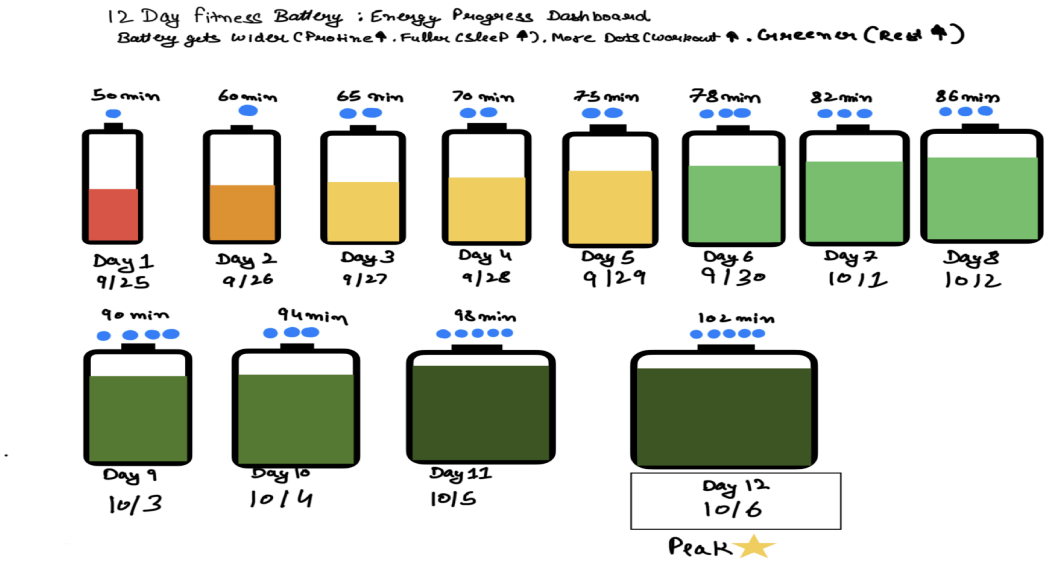
- Clear X–Y correlation
- Shows outliers
- Familiar chart type
- Bubble size & color add extra dimensions

Drawbacks

- No temporal order
- Overlapping points hide similar values
- No metaphor (feels statistical, not “energy”)
- Hard to see all four variables integrated

ALTERNATIVE VISUALIZATION SKETCH 2

Early 12-Day Battery Concept (Prototype)



Benefits

- Strong recovery metaphor
- Width + height + color combine intuitively
- Each day feels like an energy profile
- Easy visual scanning

Drawbacks

- Overcrowded spacing
- Dots for workout minutes were unclear
- No real legend
- Didn’t scale to 30 days

- Incorrect early sleep fill formula

Why I Chose the Final Battery Design

- Strong metaphor (charge level = recovery)
- Shows **all four variables** together
- Fixed 30-day grid—no scrolling
- Linear scales ensure truthful representation
- Iterative refinement solved early flaws

FINAL VISUALIZATION RATIONALE (ENCODINGS)

Design Principles

The battery metaphor works because people intuitively understand energy storage.

I selected encodings using perceptual accuracy research (Cleveland & McGill, 1984).

1. Width = Protein Intake

Linear: 50px → 85px for 110g → 150g
Highly accurate for comparison.

2. Fill Height = Sleep Duration

Linear: 60% → 85% of battery
Mimics real battery charge indicators.

3. Fill Color = Restfulness (1–5)

Threshold bins:
Red → Orange → Yellow → Green
Pre-attentive visual cue for recovery quality.

4. Workout Minutes = Text Label

Above each battery for accuracy.
Text is more precise than size encoding.

5. Battery Outlines (Red/Green/Gray)

Red = low restfulness
Green = excellent recovery
Gray = normal days
Aids accessibility.

6. Star Icon (Peak Recovery Days)

Highlights restfulness = 5.

LAYOUT, LITERATURE, AND ITERATION

Layout & Spacing

- 30 batteries
- 9 per row
- Dynamic centering algorithm
- Comfortable vertical spacing
- Clean margins
  All days fit in a single fixed canvas.

Supporting Research

- **Munzner (2014):** Match marks/channels to analytical tasks
- **Cairo (2016):** Truthfulness in visual encoding
- **Few (2013):** Use text for precision
- **Healey et al. (1996):** Color processed pre-attentively

Iteration Improvements

Draft 1 → Draft 2:

- Removed clutter
- Added refined legend
- Fixed sleep-fill calculation
- Improved spacing
- Replaced dots with numbers
- Added outlines + star logic

FINDINGS (KEY RESULTS)

Research Questions

1. Does protein increase sleep duration?
2. Does workout intensity affect restfulness?
3. What combination produces peak recovery?

I focused on Question 1 for clarity.

⭐ Finding 1: Protein ↑ = Sleep ↑ (Supported)

- ≥140g protein → **7.98h average sleep**
- 120–139g → **7.45h**
- ≤120g → **6.92h**

Wider batteries tend to be fuller.

⭐ Finding 2: Recovery is Multi-Factor

High protein alone didn't guarantee good recovery.
Days with **2 wake-ups** had poor restfulness despite normal protein/sleep.

⭐ Finding 3: Peak Recovery Requires Alignment

All restfulness-5 days had:

- 140g+ protein
- 8h+ sleep
- 0 wake-ups
- 90–100 min workout

Recovery is multivariate, not isolated.

SURPRISING INSIGHTS & IMPACT

Surprising Insights

1. Rest Days ≠ Guaranteed Recovery

University stress days produced worse recovery than heavy workout days.

2. Workout Duration Not Linear

Longer workouts didn't reduce recovery—sleep quality mattered more.

3. Wake-ups Are the Most Important Metric

0 → excellent
1 → good
2 → poor recovery

Sleep fragmentation was the strongest predictor.

Impact on My Behavior

This project helped me understand recovery as a system, not a single number.

- I now prioritize sleep habits that reduce night-time wake-ups.
- I track protein + sleep daily
- I adjust training intensity when restfulness drops
- I see each day as **charging my battery**, not just working out

PRIOR HABITS & FUTURE PLANS

Prior Data Collection Habits

Before this project:

- Tracking was inconsistent
- Sleep was never measured
- Nutrition tracked only during cuts
- Data stayed in spreadsheets with no visualization

This project taught me that multi-variable tracking reveals hidden patterns.

Future Data Collection Plans

I will add:

- REM sleep
- Deep sleep
- HRV
- Stress levels
- Caffeine timing

- Workout performance (weight × reps)
- Hydration
- Meal timing

Goal: **90-day extended dataset** and an evolving D3 dashboard.

Final Reflection

This project helped me understand recovery as a **system**, not a single number.
The visualization made invisible patterns crystal clear:

- High protein + 8h sleep + 0 wake-ups = peak performance
- Rest days don't always help
- University stress is more damaging than training stress

This project improved both my habits and thinking.

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