Integrating Machine Learning into Our Dementia Caregiving Simulation

In our current model, caregivers transition into a crisis state like SeekingSupport only after they reach a high level of stress. While this reflects reality to some extent, it doesn't allow the system to act early or personalize support before things get worse.

By adding a Machine Learning model, we can make the simulation more proactive and intelligent. ML lets us predict which caregivers are most at risk of burning out — even before they show extreme signs — and offer them help earlier. This creates a more realistic, responsive, and policy-relevant system.

What Does the ML Model Do?

We train a Logistic Regression model using data generated by our simulation. The model looks at each caregiver's:

- Weekly stress level (σC)
- Sleep hours
- Workload
- Quality of care they're providing
- Whether they are using formal support like therapy or daycare

The model then predicts the probability that this caregiver will enter a crisis state (like SeekingSupport) within the next 2 weeks.

If the prediction is high (e.g., above 75%), the simulation can intervene early by:

- Offering therapy
- Assigning adult day care
- Adjusting workload or financial support

How It Helps:

- Your model predicts crisis before it happens
- Simulation becomes adaptive, not reactive

- Better for policy testing — We can now simulate the impact of early interventions versus delayed ones.

- More dynamic — Agent behavior is no longer purely rule-based; it's guided by data-driven insights.