

# Hallucination Assessment through Longitudinal Observation (HALO)

U01MH135901

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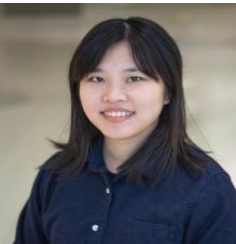
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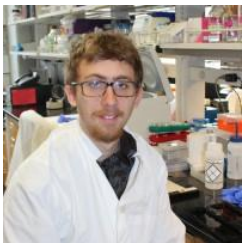
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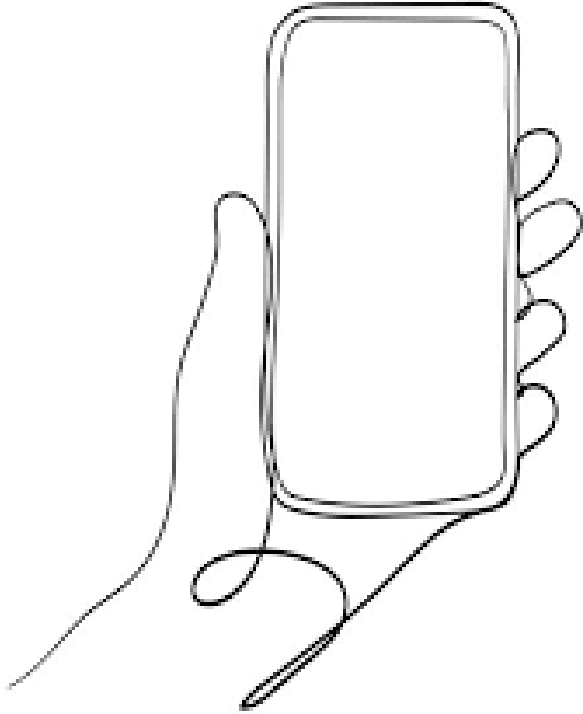


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# Hallucinations and poor outcomes do not always coincide



## Hallucinations

- Prevalent in many mental disorders
- Also occur in 10% of the general population
- Don't always portend serious negative outcomes
- Early intervention can improve outcomes

## Smartphones

- Ubiquitous
- Scalable behavioral measurement platforms

## Automated speech and language analysis

- Substrate for actionable clinical signatures

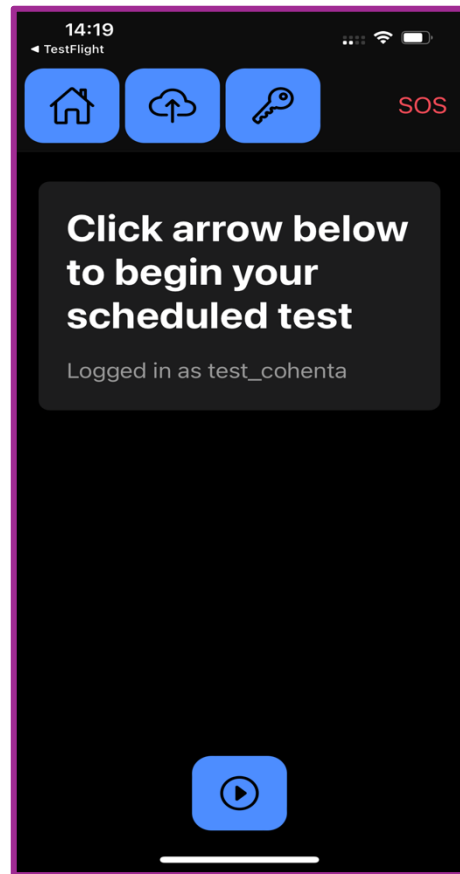


# Computable phenotypes in the wild

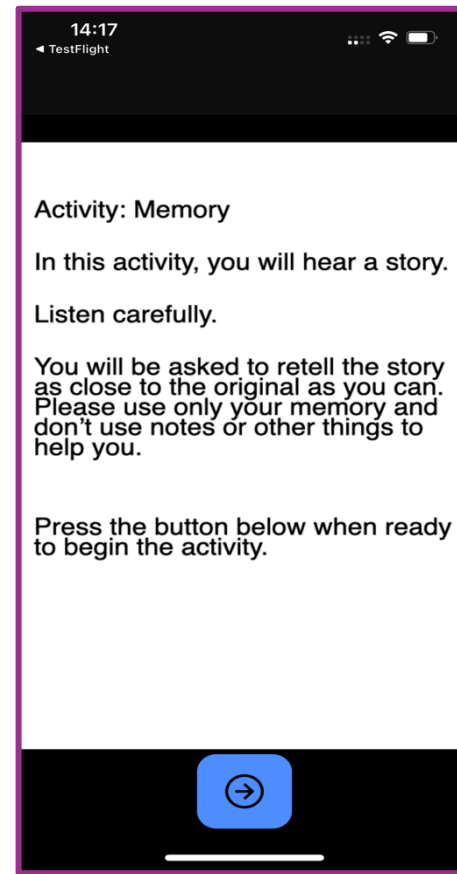
- Prospective Cohort Study
- Online recruitment of **2000 individuals** 18 years or older in the USA who experience hallucinations for one year of data collection.
- Data collected from the subjects directly via data collection system downloaded on their device.



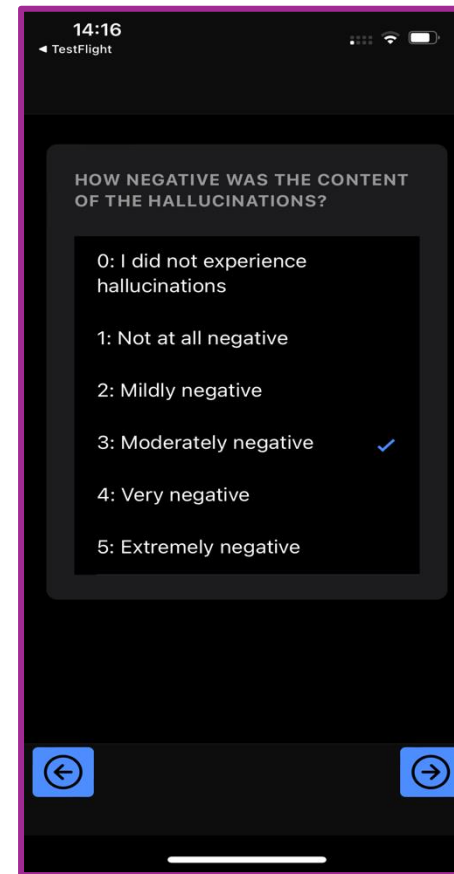
# Smartphone-based behavioral measurement



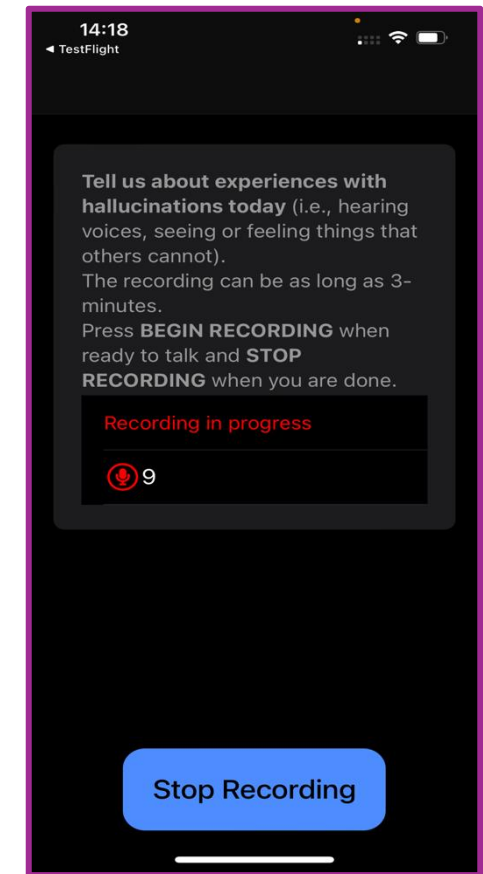
## VERBAL RECALL



## EMA



## AUDIO DIARY



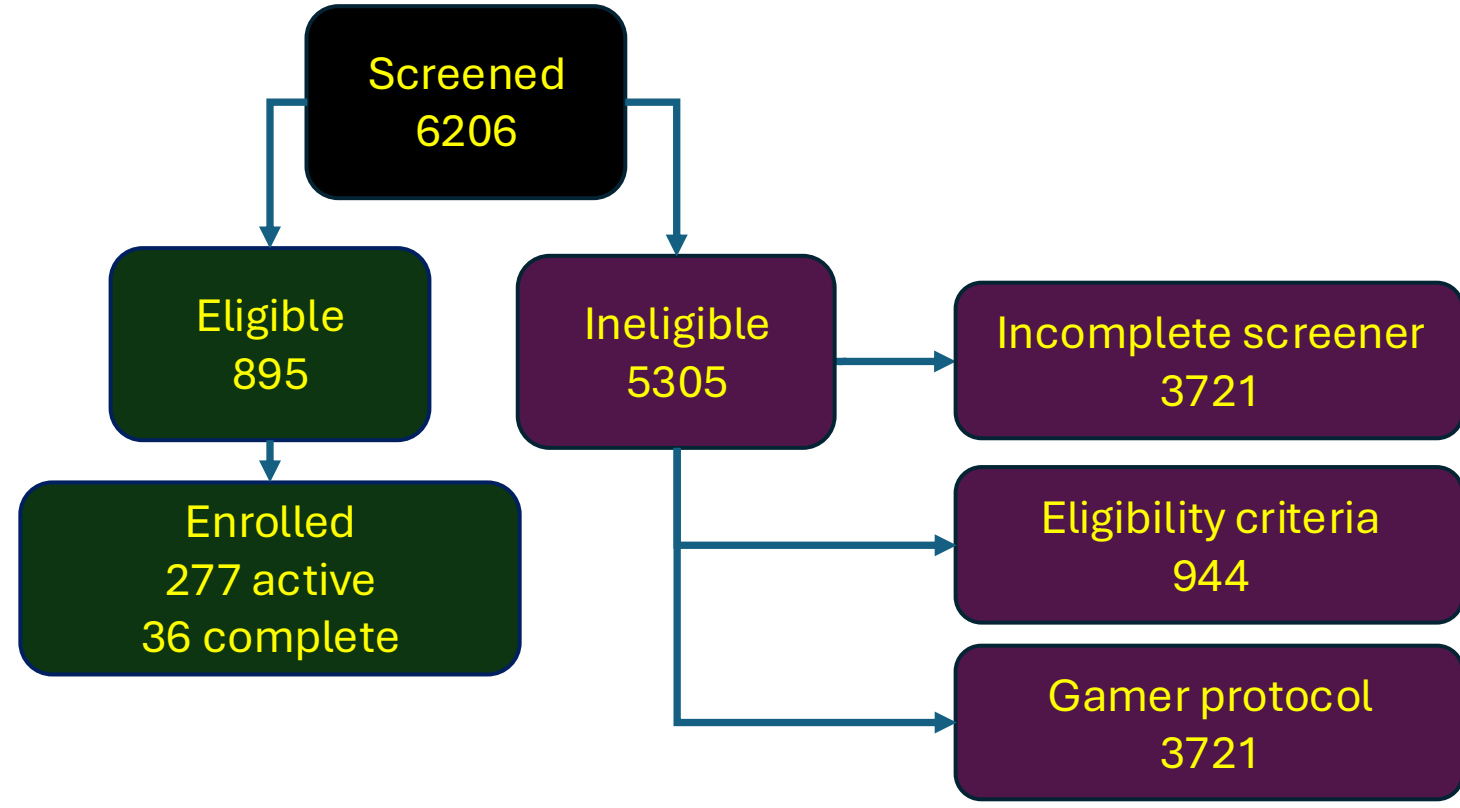
**Do you hear or see things that others don't?**



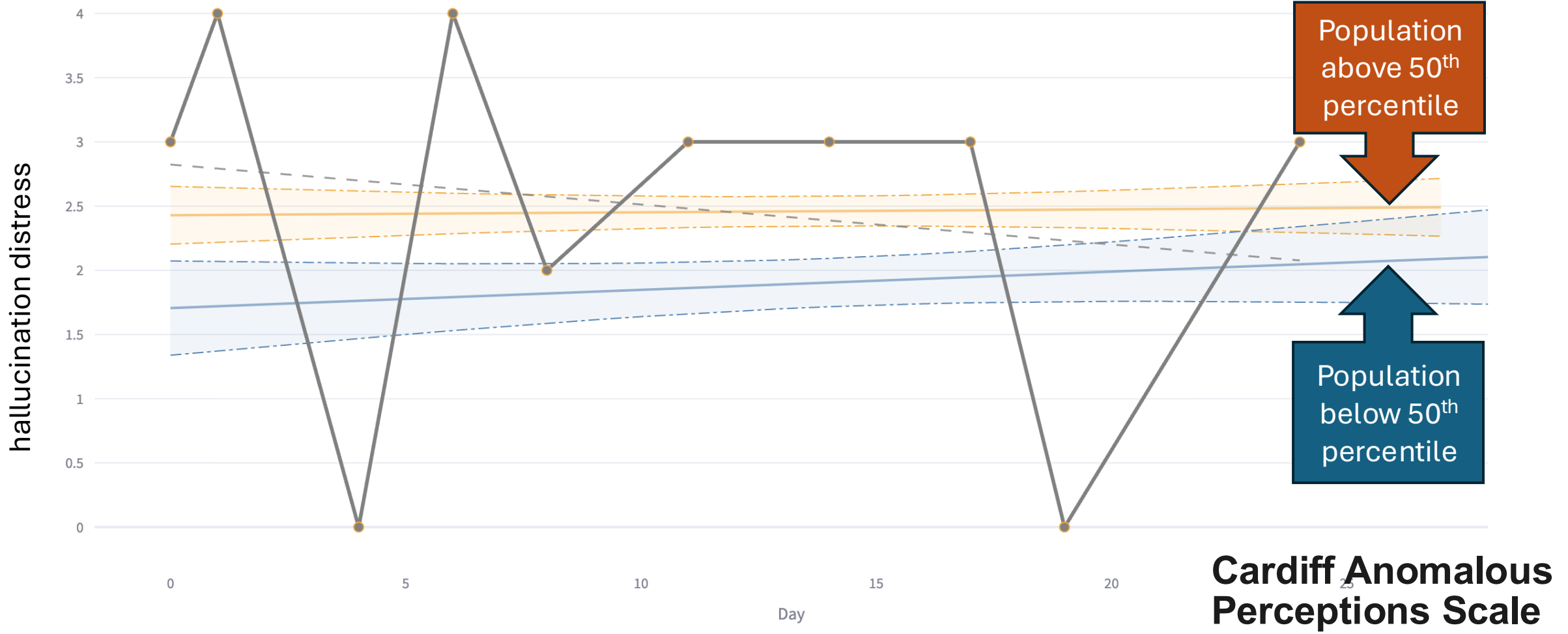
- ▶ You may be eligible to participate in a paid research study from your phone
- ▶ Contribute to research aiming to improve mental health care
- ▶ Must be 18+ with a smartphone

 UNIVERSITY of WASHINGTON  
 NIH  
 LSU  
 PSYCHIATRY & BEHAVIORAL SCIENCES

# Data to Date



Var: distress | Out: caps\_score\_adj\_sum  
Threshold: 30.0 | t: 4.215 | p: 0.0\* | n 125 (u=2.441) | n 124(u=1.807)  
Sndwch: r2:0.04 | p:0.0\* | n: 7483



**Cardiff Anomalous Perceptions Scale**

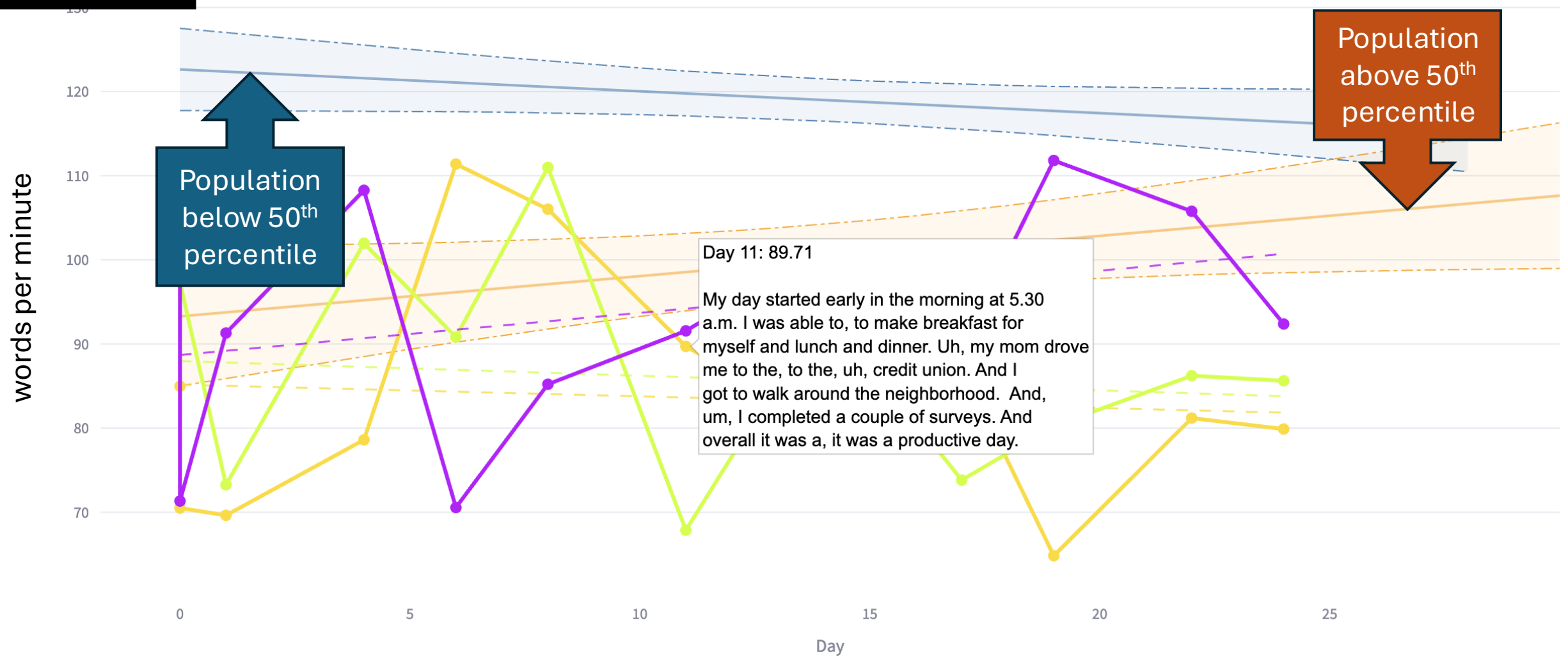


# DIARY

Var: word\_per\_min | Out: caps\_score\_adj\_sum

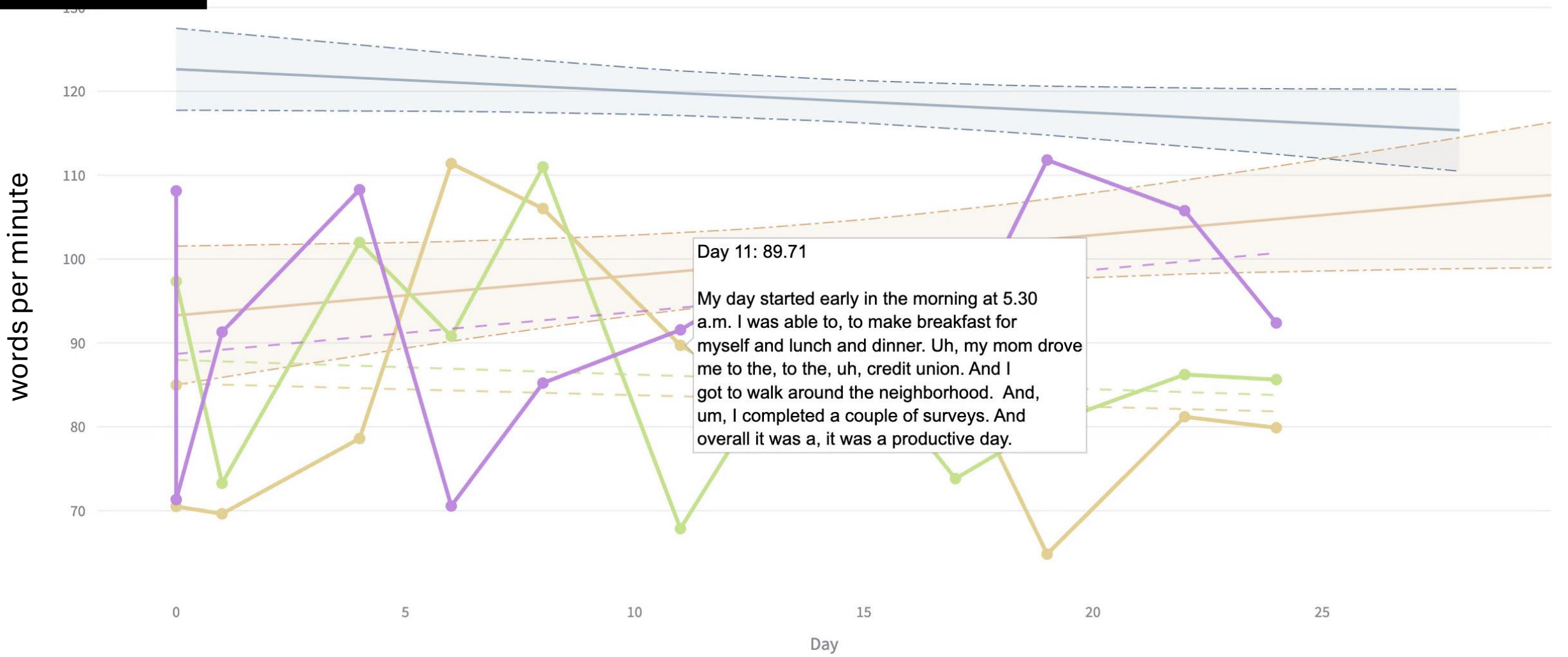
Threshold: 29.0 | t: -5.884 | p: 0.0\* | n 125 (u=95.104) | n 124(u=119.26)

Sndwch: r2:0.065 | p:0.0\* | n: 7672



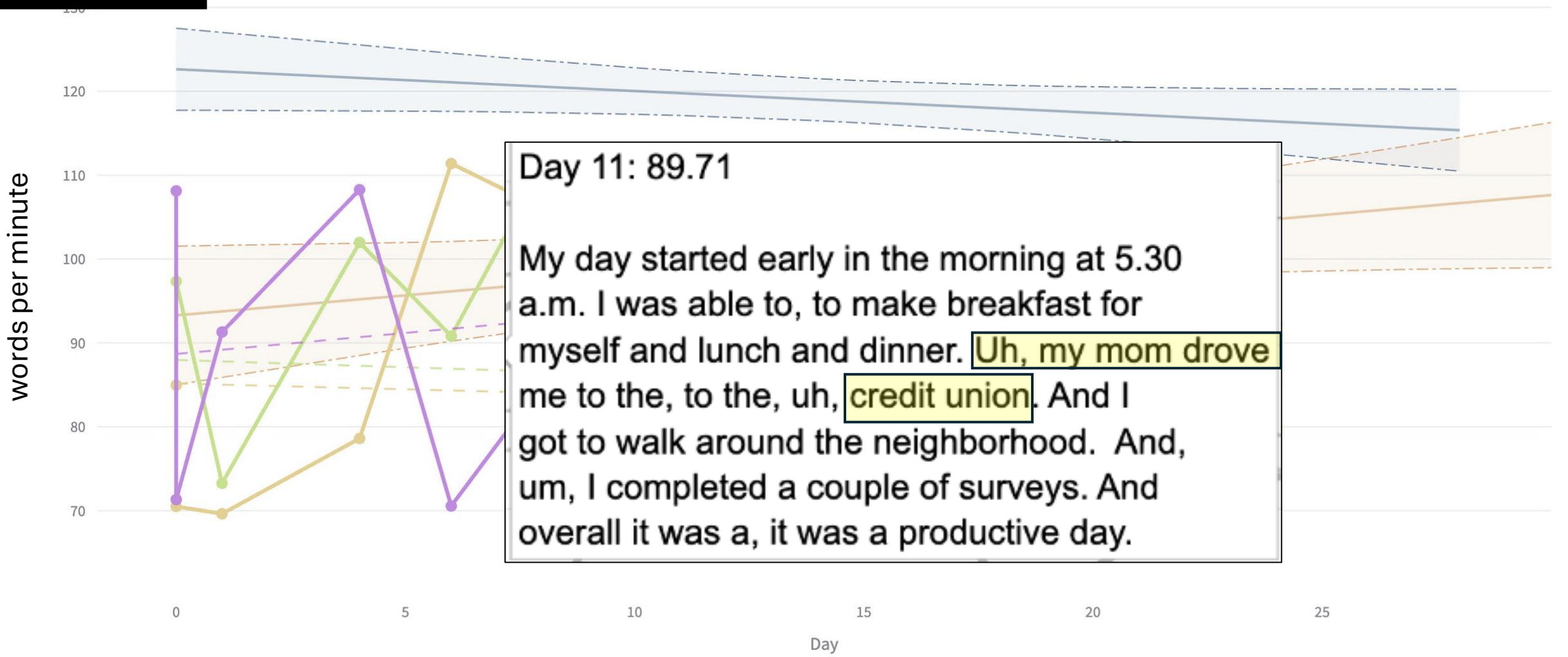
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# INTERACTIONS

Var: word\_per\_min | Out: caps\_score\_adj\_sum

Threshold: 29.0 | t: -5.884 | p: 0.0\* | n 125 (u=95.104) | n 124(u=119.26)

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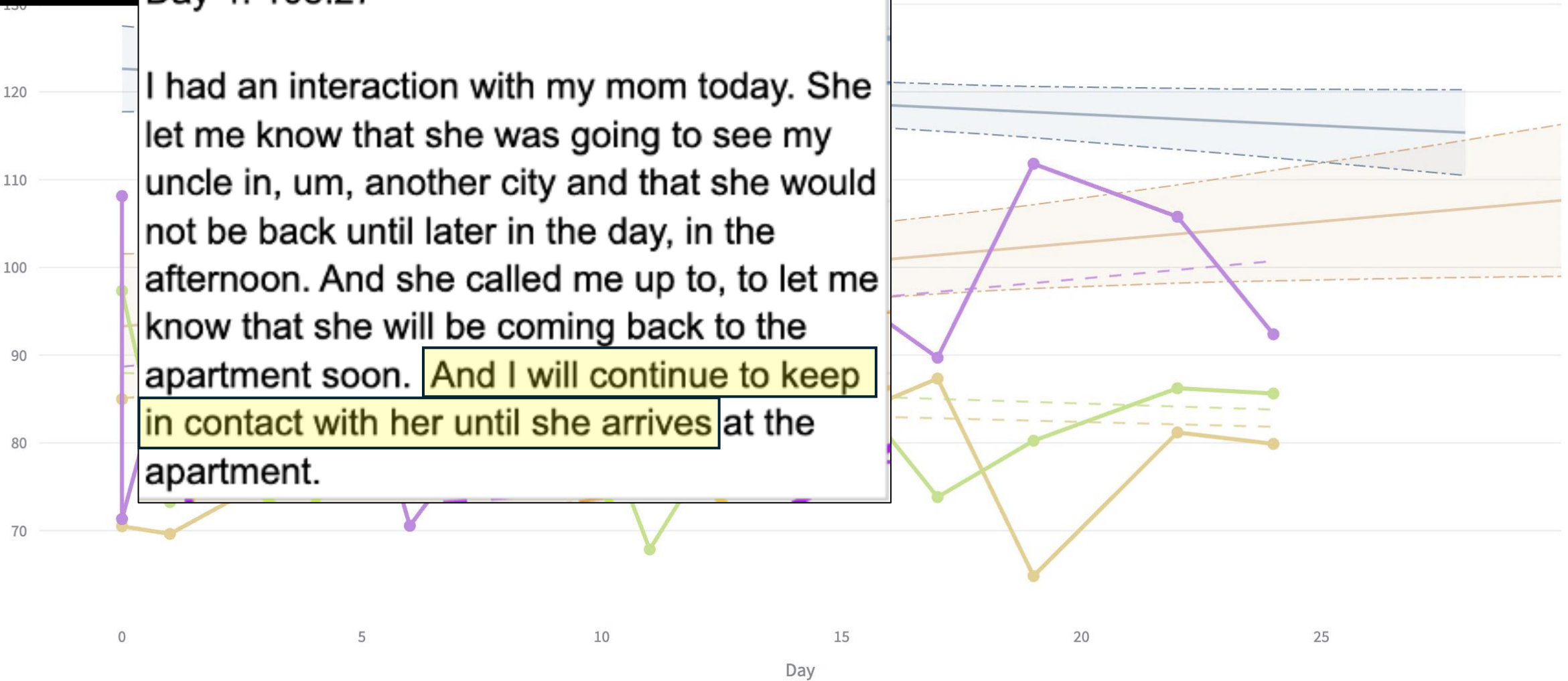
Threshold: 29.0 | t: -5.884 | p: 0.0\* | n 125 (u=95.104) | n 124(u=119.26)

.065 | p:0.0\* | n: 7672

Day 4: 108.27

I had an interaction with my mom today. She let me know that she was going to see my uncle in, um, another city and that she would not be back until later in the day, in the afternoon. And she called me up to, to let me know that she will be coming back to the apartment soon. **And I will continue to keep in contact with her until she arrives at the apartment.**

words per minute

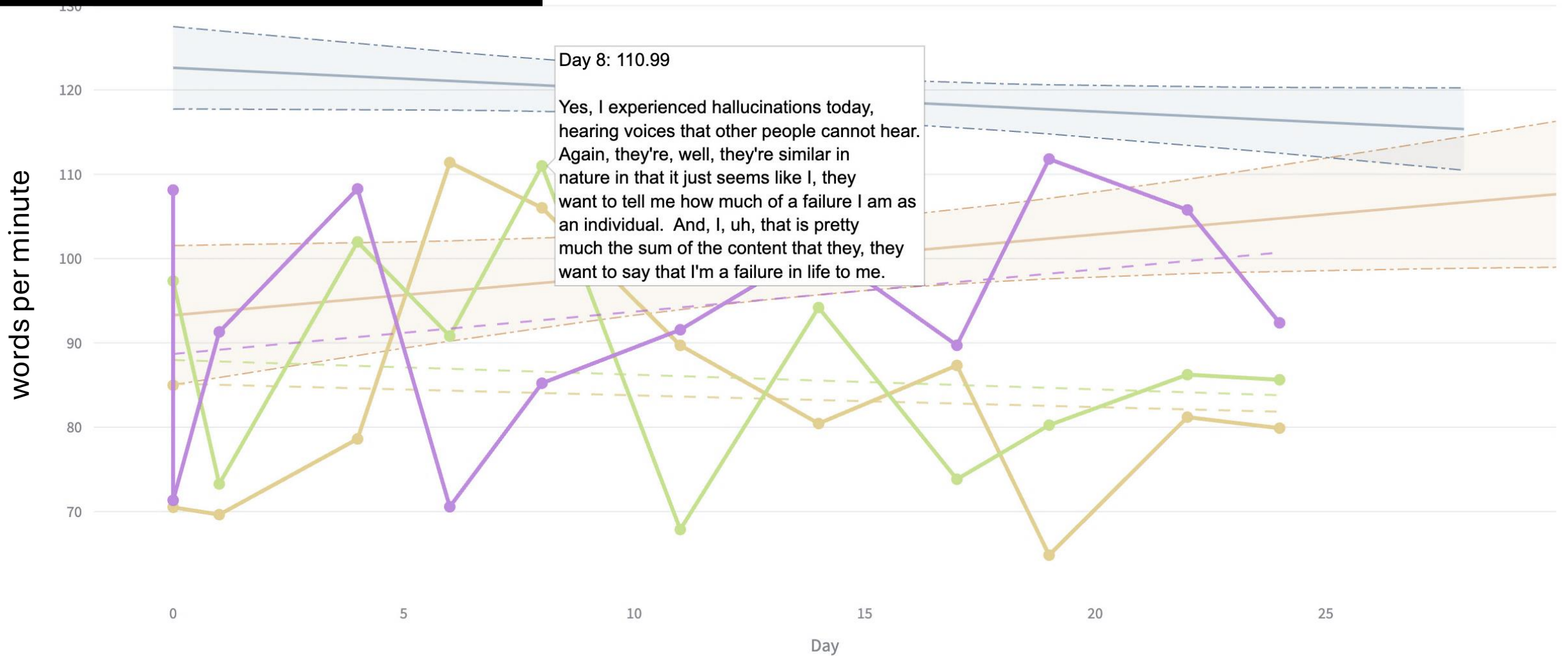


# HALLUCINATIONS

Var: word\_per\_min | Out: caps\_score\_adj\_sum

Threshold: 29.0 | t: -5.884 | p: 0.0\* | n 125 (u=95.104) | n 124(u=119.26)

Sndwch: r2:0.065 | p:0.0\* | n: 7672

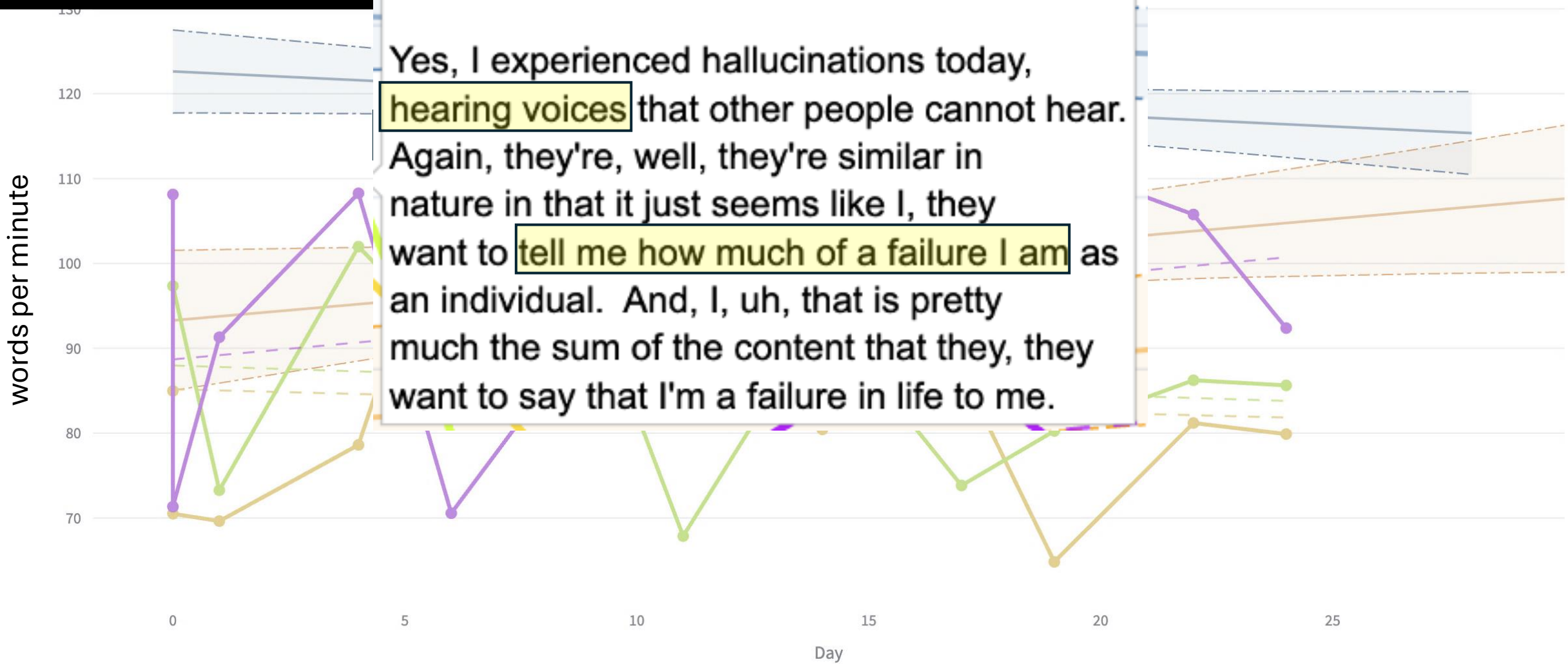


# HALLUCINATIONS

Var: word\_per\_min | Out: caps\_score adj\_sum

Day 8: 110.99

l25 (u=95.104) | n 124(u=119.26)



# RECALL

## Story

zoe is 21 years old and lives in sacramento. at 11:15 am, she was at a supermarket shopping for groceries. she forgot her shopping list and couldn't remember what to buy. ben is 23 years old and is her brother. ben saw her confusion and helped her remember the items. zoe said "our friends will love this dinner" and she got everything she needed.

## Recall

um, the stories about zoe went to the supermarket. i think she's from sacramento. she went to the supermarket and she forgot her shopping list. and her brother ben helped her to remember what was on the list. and she said that her friends and family is going to enjoy the meal that she's going to prepare.

# RECALL

## Story

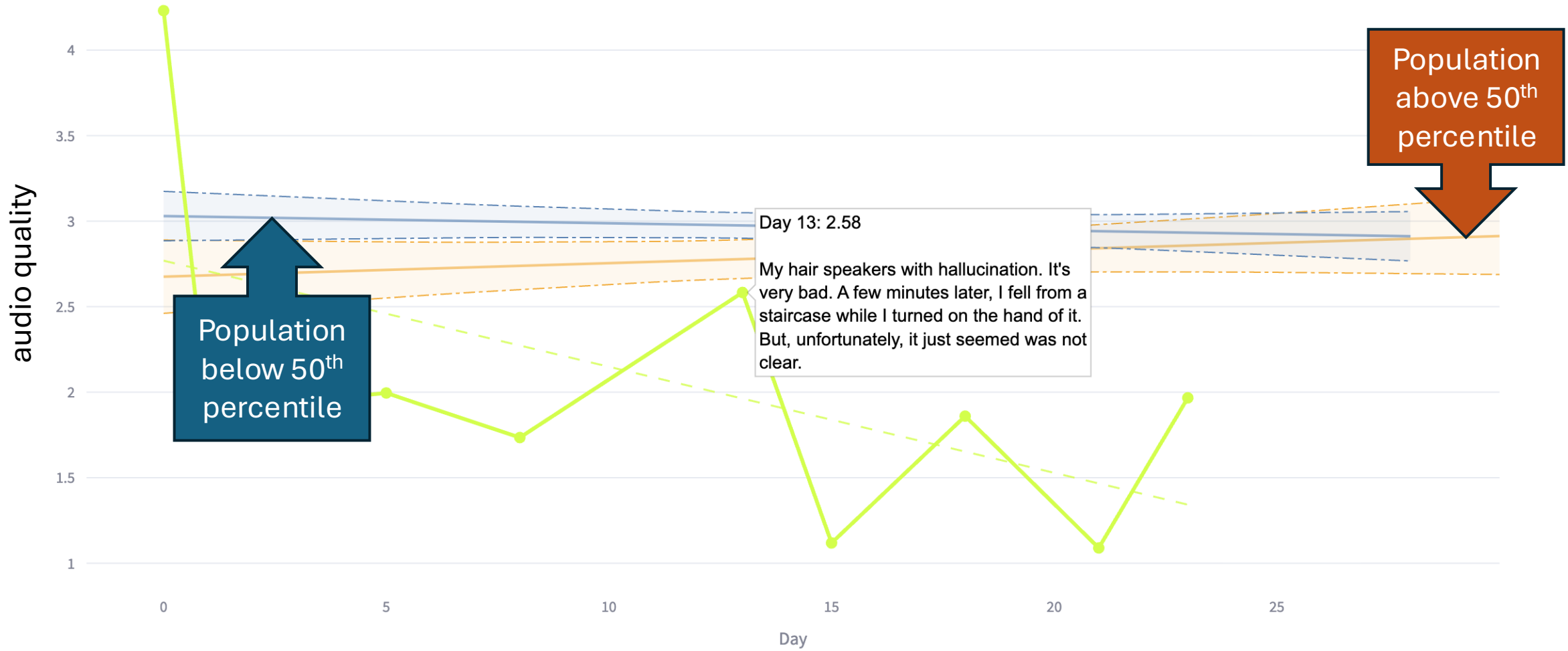
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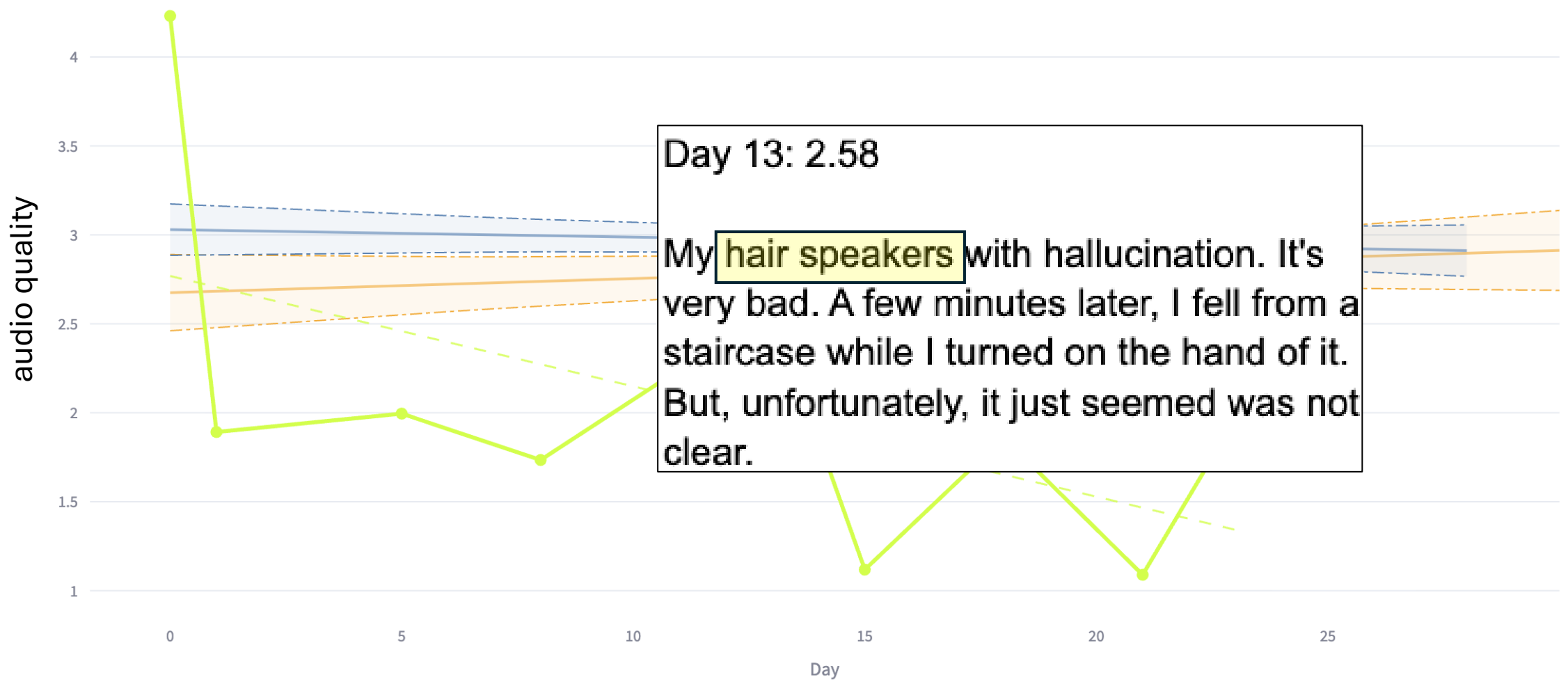
# DISCONTENTS

Var: ablated\_amos | Out: caps\_score\_adj\_sum  
Threshold: 29.0 | t: -3.012 | p: 0.003\* | n 125 (u=2.692) | n 124(u=2.975)  
Sndwch: r2:0.014 | p:0.029\* | n: 2544



# DISCONTENTS

Var: ablated\_amos | Out: caps\_score\_adj\_sum  
Threshold: 29.0 | t: -3.012 | p: 0.003\* | n 125 (u=2.692) | n 124(u=2.975)  
Sndwch: r2:0.014 | p:0.029\* | n: 2544



# Thank you!

- Now:
  - NIMH, NLM, IMPACT-MH, Garvey Institute for Brain Health Solutions
- Then:
  - NIMH, NLM, NIA, NIH Common Fund
  - Garvey Institute for Brain Health Solutions

