

Exploring burden in rare diseases: examining neuropsychological symptoms, flares, and sleep quality

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Objective

To explore relationships between symptom flares, neuropsychological symptoms, and sleep quality in IgAN, C3G, and PNH using longitudinal home-reported outcomes (HROs) from the Folia Health app.

Background & Significance

- IgA nephropathy (IgAN), complement 3 glomerulopathy (C3G), and paroxysmal nocturnal hemoglobinuria (PNH) are rare diseases that present heterogeneously
- Patients with these conditions may experience neuropsychological symptoms (NS), sleep disruptions, and symptom flares
- HROs enable granular, longitudinal tracking of flares, NS, and sleep quality, creating an opportunity to explore potential relationships between them

Methods

- **Participants:** As of May 1st, 2026, 227 patients were included in this analysis (32 C3G, 85 IgAN, and 110 PNH)
- **Data Collection:** Users reported symptom severity on a 0-5 Likert scale where 0=did not experience and 5=severe, and recorded flare days and sleep quality
- **Analysis:** Two analyses examined the relationship between NS and flares, and the impact of NS on sleep quality

Table 1. Population Demographics

Characteristic	C3G N (%) or Mean (SD)	IgAN N (%) or Mean (SD)	PNH N (%) or Mean (SD)	Total N (%) or Mean (SD)
Total N	32 (100%)	85 (100%)	110 (100%)	227 (100%)
Non-responders to demographic surveys	7 (22%)	35 (41%)	24 (22%)	66 (29%)
Mean (SD) age	34.19 (17.78)	38.25 (12.35)	40.22 (11.69)	38.63 (13.04)
Gender				
Female	17 (53%)	35 (41%)	62 (56%)	114 (50%)
Male	6 (19%)	14 (16%)	24 (22%)	44 (19%)
Non-binary	0 (0%)	1 (1%)	0 (0%)	1 (<1%)
Transgender	1 (3%)	0 (0%)	0 (0%)	1 (<1%)
Prefer not to answer	1 (3%)	0 (0%)	0 (0%)	1 (<1%)
Race				
White or Caucasian	21 (66%)	34 (40%)	60 (55%)	115 (51%)
Black or African American	0 (0%)	1 (1%)	16 (15%)	17 (7%)
Reported more than one race	0 (0%)	4 (5%)	5 (5%)	9 (4%)
Asian	0 (0%)	7 (8%)	1 (1%)	8 (4%)
Some other race	3 (9%)	2 (2%)	2 (2%)	7 (3%)
Prefer not to answer	1 (3%)	2 (2%)	1 (1%)	4 (2%)
American Indian or Alaska Native	0 (0%)	0 (0%)	1 (1%)	1 (<1%)
Ethnicity				
Not Hispanic or Latino	19 (59%)	46 (54%)	77 (70%)	142 (63%)
Hispanic or Latino	5 (16%)	4 (5%)	7 (6%)	16 (7%)
Prefer not to answer	1 (3%)	0 (0%)	2 (2%)	3 (1%)

Note: Groups with 0% omitted from figure. Gender: Some other gender; Race: Native Hawaiian or Other Pacific Islander

Results

- Brain fog, fatigue, anxiety, and irritability were the most commonly reported neuropsychological symptoms across all conditions
- Average reported NS severity was consistently higher on flare days than on non-flare days across all three conditions (Figures 3, 4, and 5)
- NS severity was associated with sleep quality:
 - In PNH patients, higher average fatigue severity (3.25) was associated with "awake all night," while lower fatigue severity (1.83) was associated with "good sleep"

Figure 1. Fatigue symptom severity across sleep tags

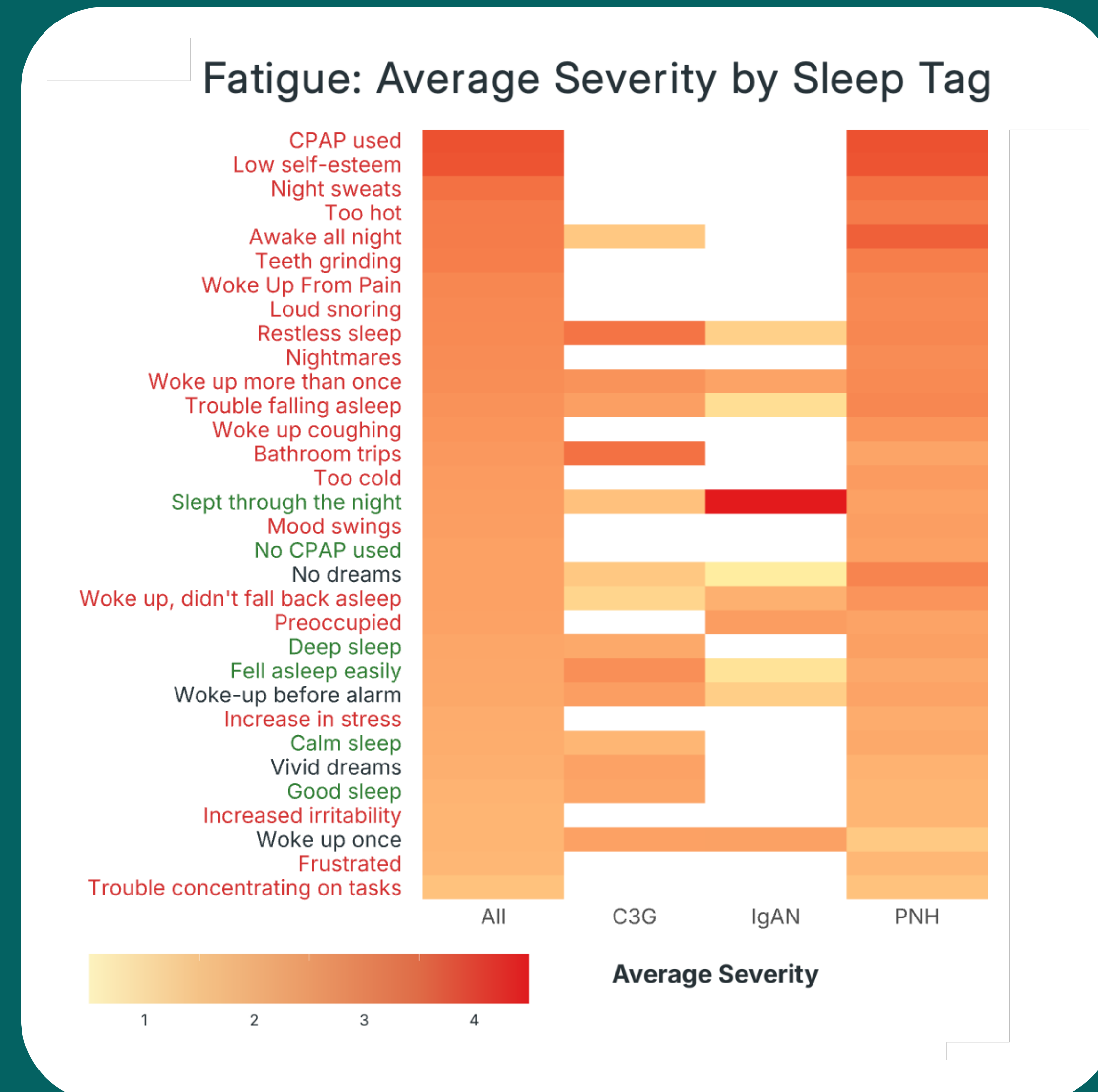


Figure 2. Brain fog severity across sleep tags

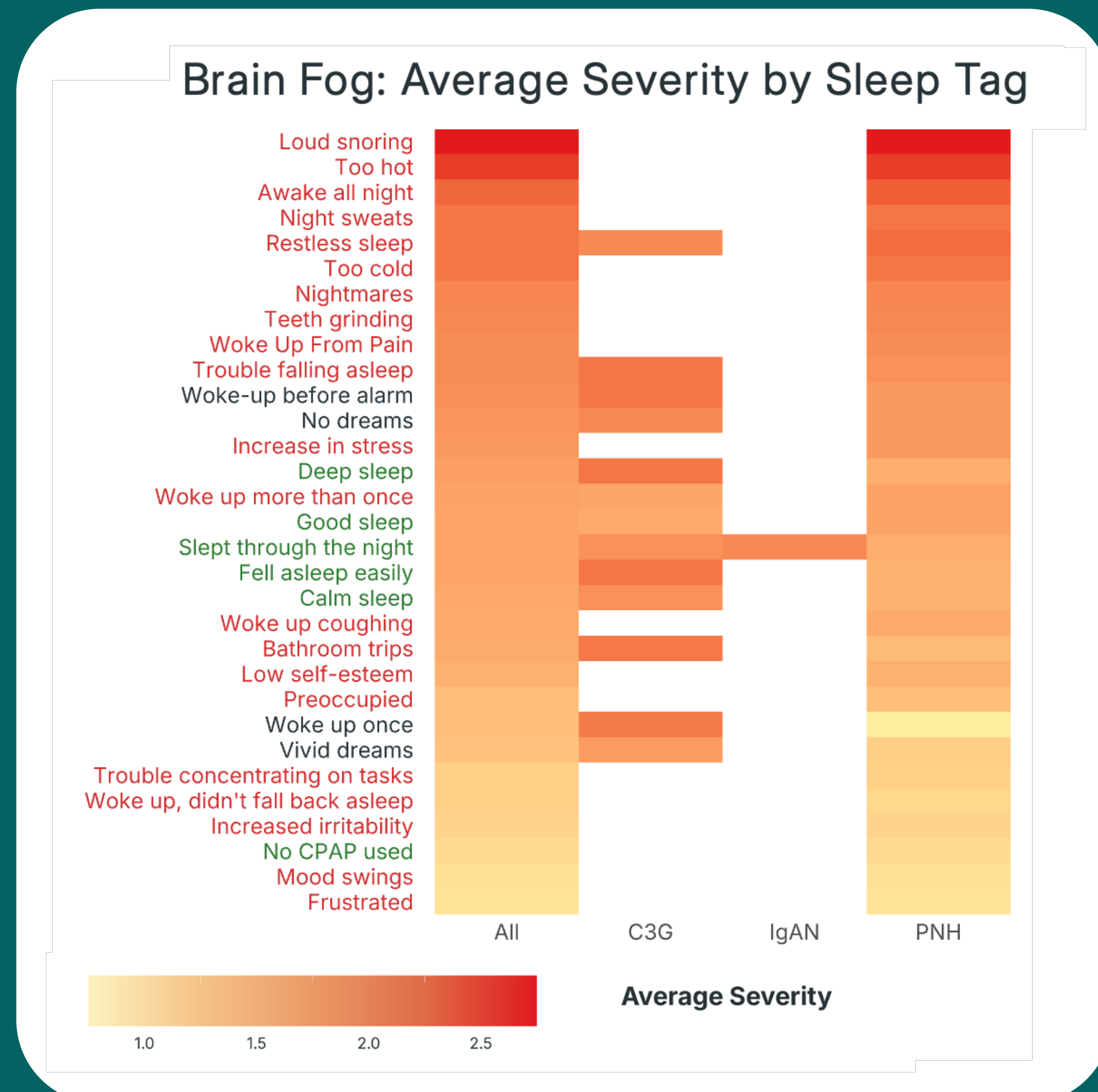


Figure 3. PNH population flare day and non-flare day symptom severity distribution

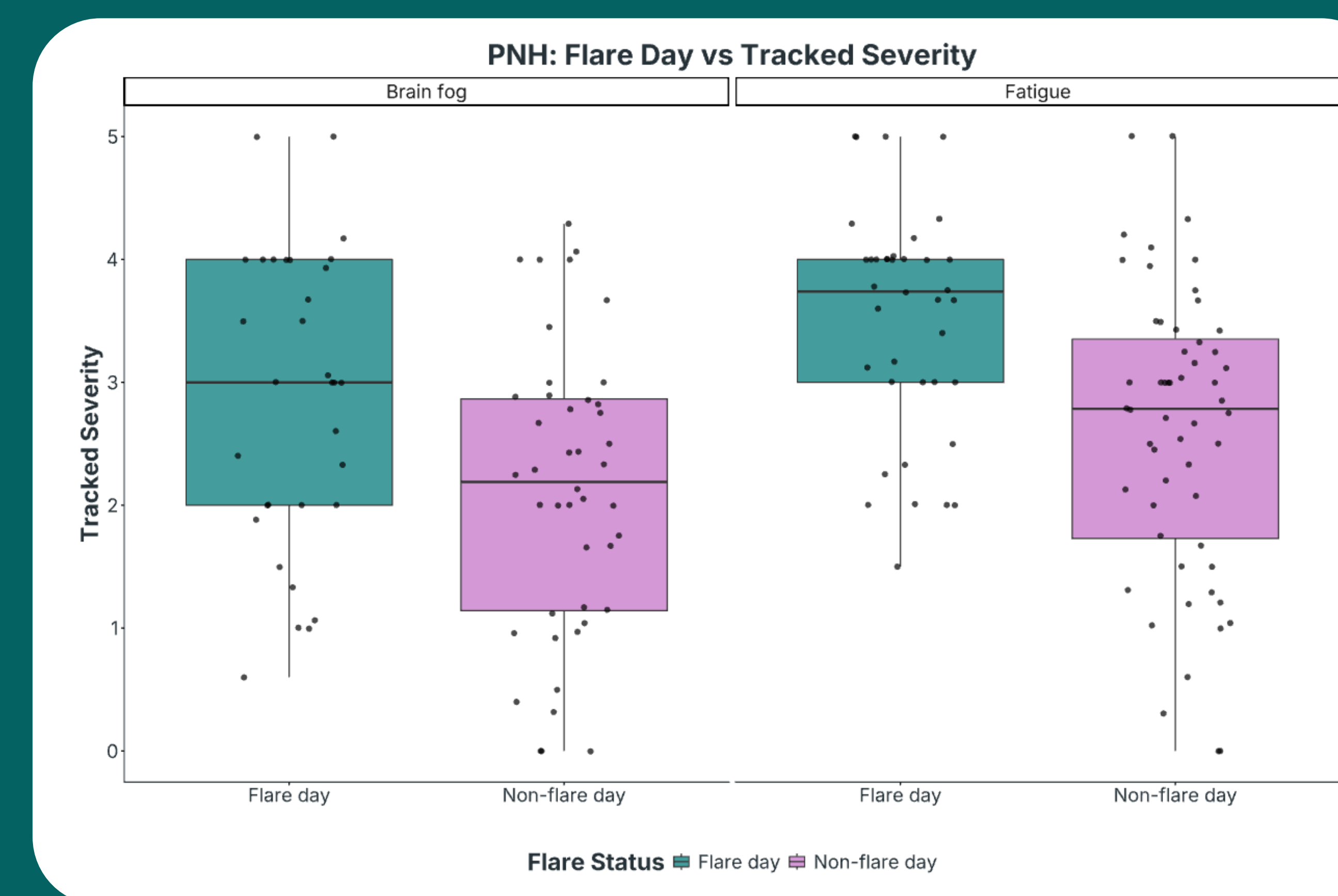


Figure 4. C3G population flare day and non-flare day symptom severity distribution

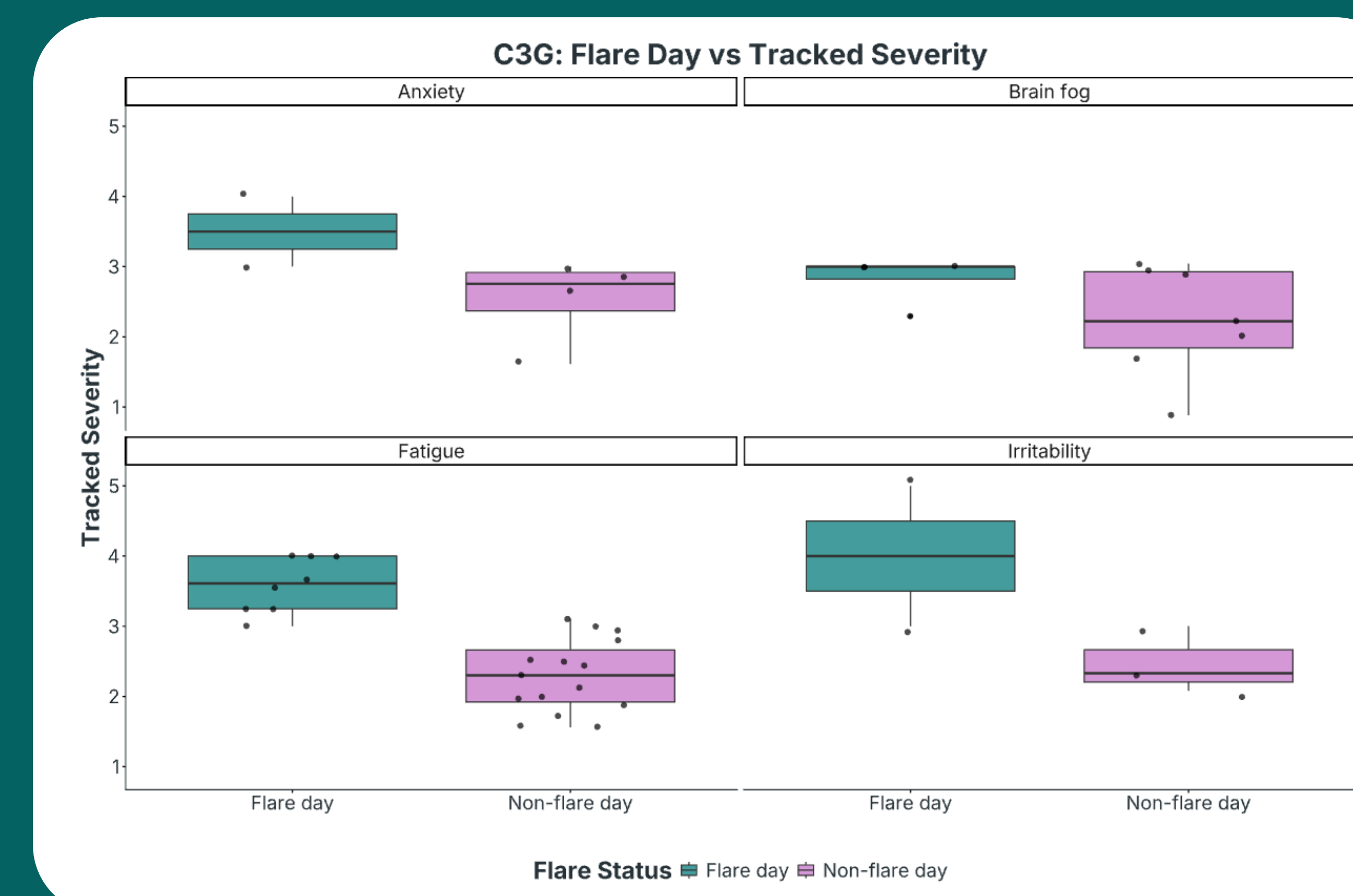
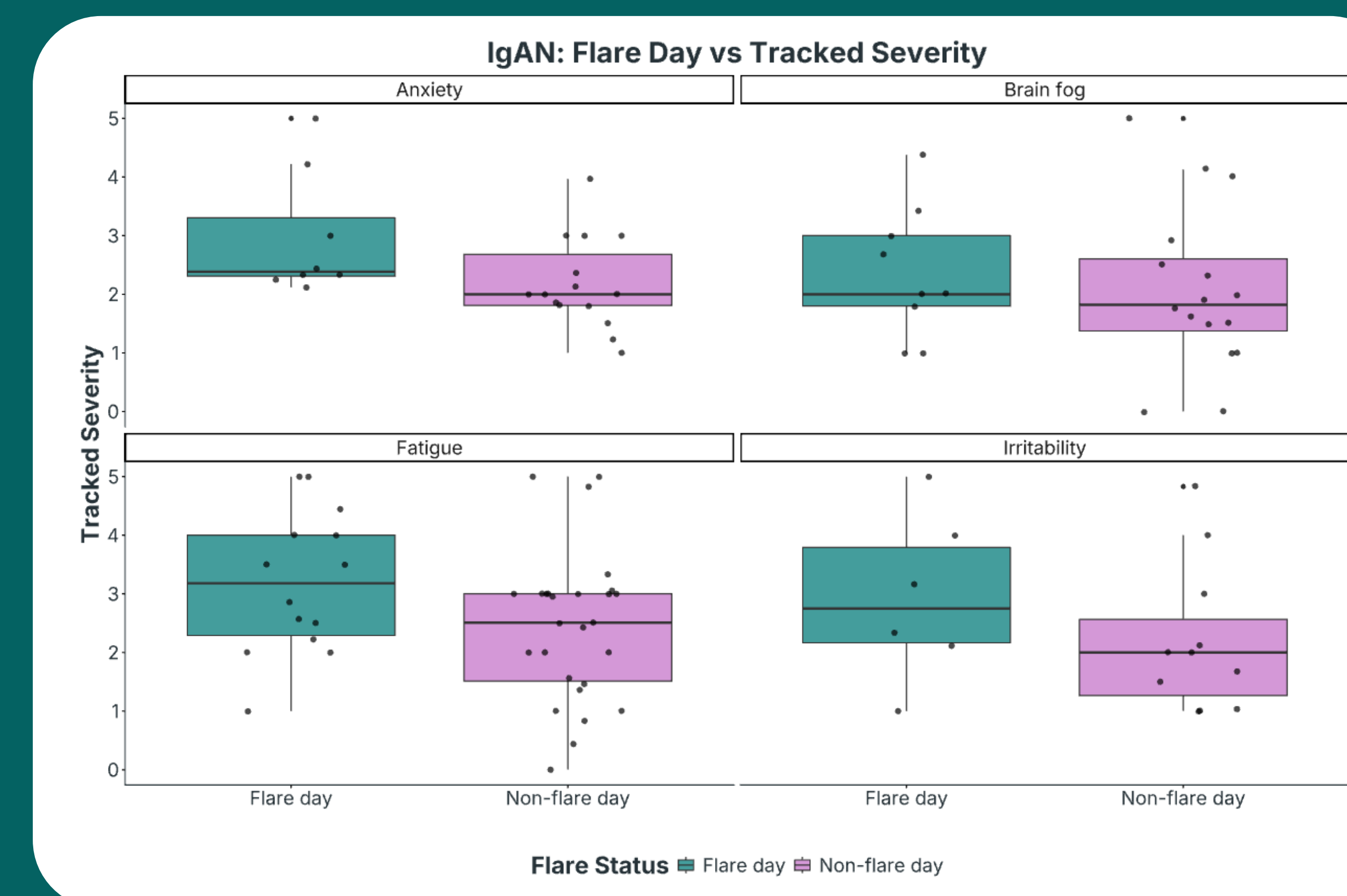


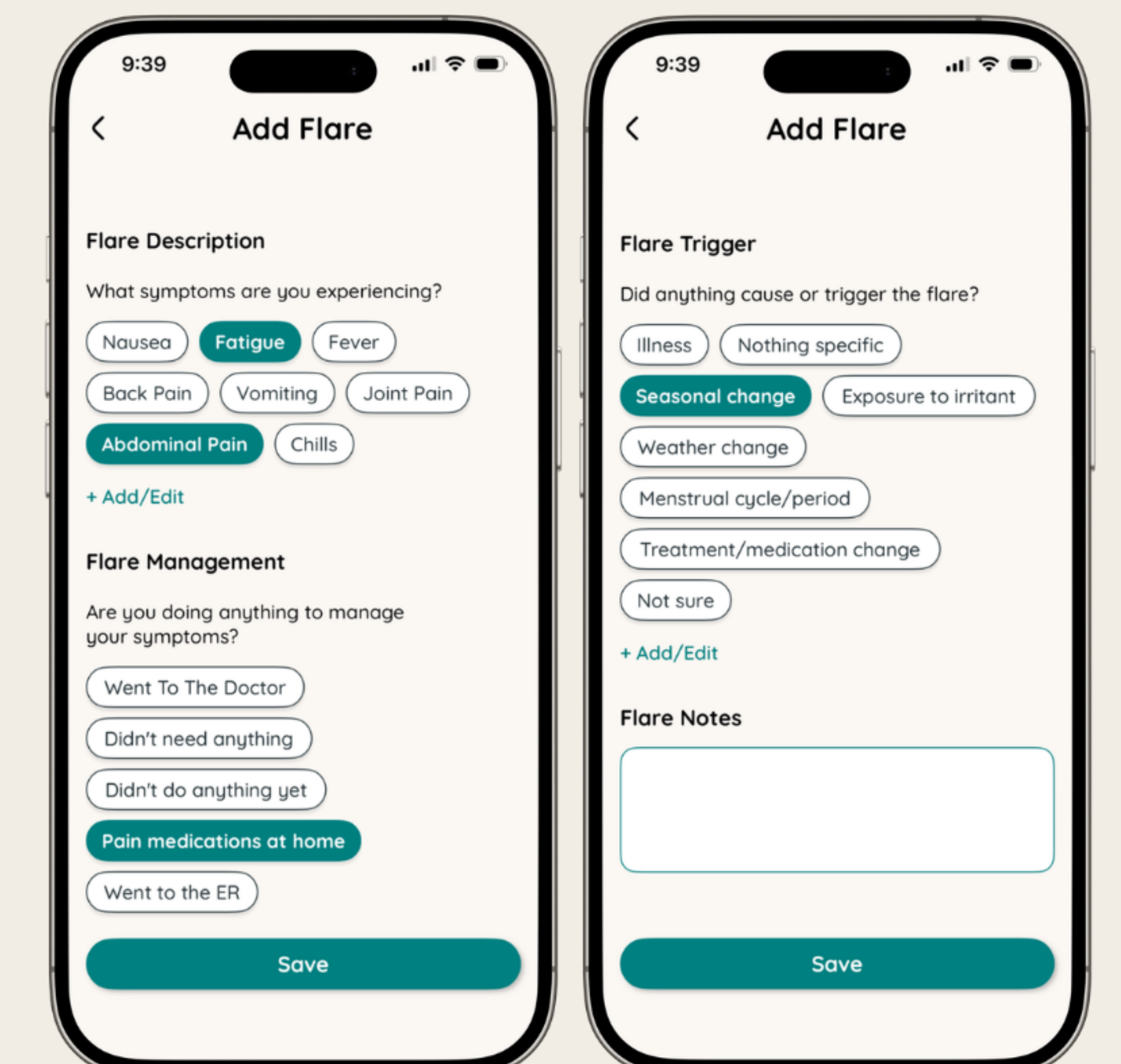
Figure 5. IgAN population flare day and non-flare day symptom severity distribution



Key Findings & Conclusions

- Findings are consistent with a relationship between neuropsychological symptom severity and flare incidence, as well as a relationship between NS severity and sleep quality
- Understanding the relationship between symptom flares, NS, and sleep quality provides insight into the holistic burden of these diseases, including heterogeneity within each population in terms of symptoms and other health-related quality of life outcomes
- These findings may inform how treatment utilization affects important quality-of-life domains beyond traditional clinical outcomes

Figure 6. Example Tagging & Flare Tracking Functionality



Acknowledgments
 The authors want to thank all participants of this study. We are also grateful to Ally Hotz and Ariel Simon for their support in poster design.

