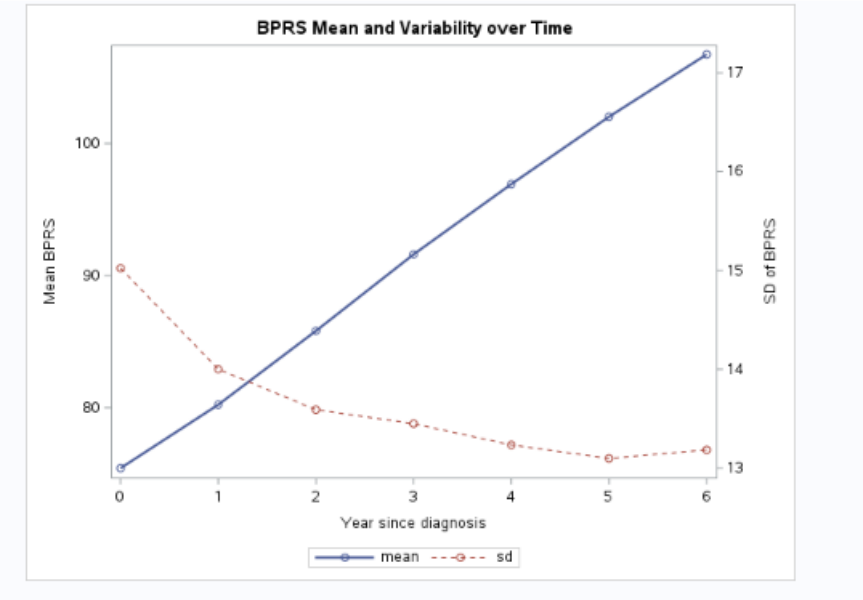
Some notes...



The figure suggests that BPRS increases roughly linearly over time while between-subject variability decreases**.**
This pattern is consistent with progressive worsening of psychiatric symptoms and a possible convergence among patients in later disease stages.
Statistically, it signals non-constant variance — a key consideration for selecting the covariance structure in your mixed model.

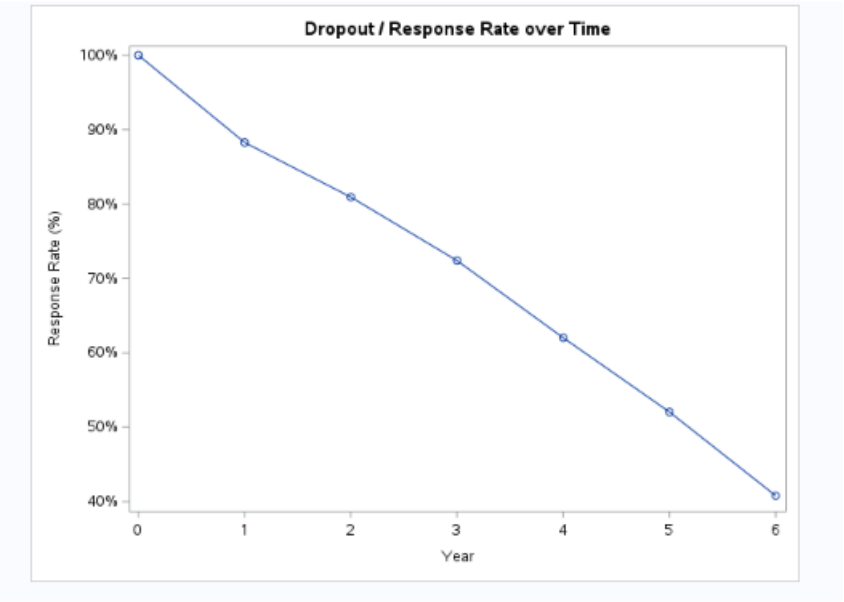
- Don't assume homogeneous variance (constant across time).

→ Instead, test covariance types like:

  - CSH (compound symmetry, heterogeneous)
  - ARH(1) (autoregressive, heterogeneous)
  - TOEPH (Toeplitz, heterogeneous)

- Consider including time as a continuous variable (linear) initially, since the trend looks very regular.

- Later, test if the slope differs by residence (`WZC`) or sex, since group effects might change the shape or level of the trend.



Over six years, the study retains about 40% of its participants.
Dropout increases steadily over time, most likely due to disease progression and related difficulties in follow-up.
This progressive loss of participants reduces sample size and may introduce bias if the dropout depends on patient condition.
Hence, modeling approaches that assume data are Missing At Random (e.g., mixed-effects models with REML) are appropriate, and the missingness mechanism should later be examined explicitly.

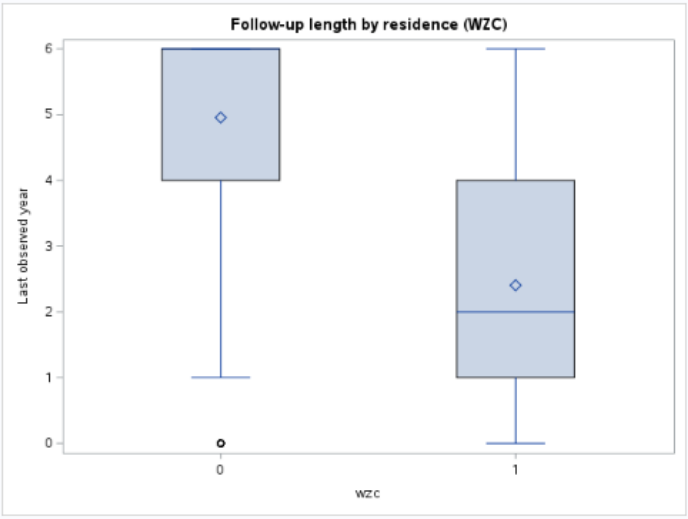
Follow-up length (last observed time) vs baseline severity

The CORR Procedure

2 With Variables:	bprs0 cdrsb0
1 Variables:	last_obs_time

Pearson Correlation Coefficients, N = 1253
Prob > |r| under H0: Rho=0

	last_obs_time
bprs0	-0.67883 <.0001
cdrsb0	-0.03056 0.2797



🧠 1️⃣ Correlation results

Variable	r (Pearson)	p-value	Interpretation
BPRS0	**–0.6789**	**< 0.0001**	Strong negative correlation: patients with *higher baseline BPRS* (worse psychiatric symptoms) tend to have *shorter follow-up*.
CDRSB0	–0.0397	0.28	No significant relationship between baseline CDR and dropout time.

🔹 So: **baseline behavioral severity (BPRS0)** is a key predictor of dropout,
while **baseline cognitive score (CDRSB0)** isn't.

Clinical sense:
Patients who already show more severe psychiatric/behavioral disturbance at diagnosis are more likely to drop out early — possibly due to faster disease progression, institutionalization, or inability to participate.

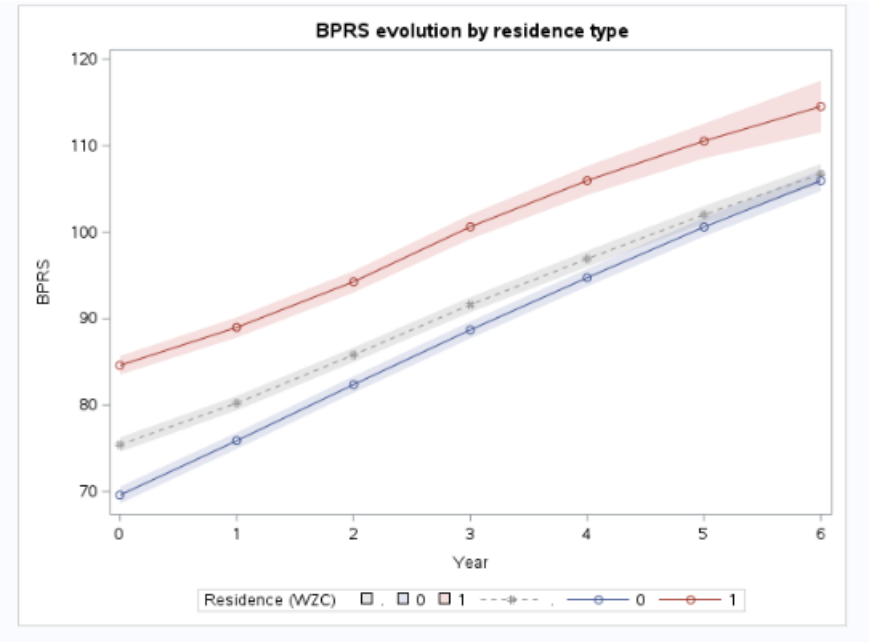
🏠 2️⃣ Residence effect (boxplot)

In your boxplot:

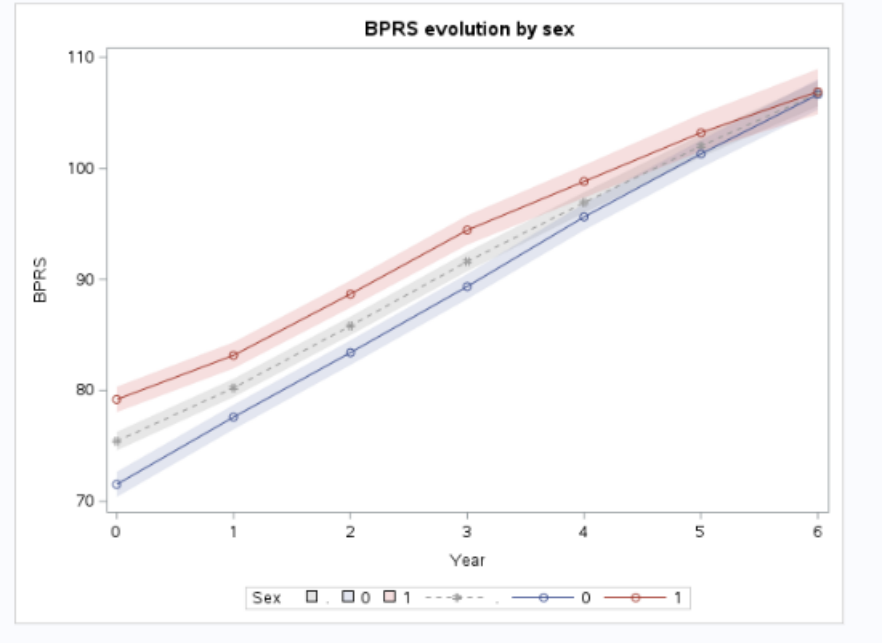
- **WZC = 0 (living at home):** higher median follow-up (~5–6 years)
- **WZC = 1 (nursing home):** much lower median follow-up (~2 years) and greater variability

Interpretation:

- Residents in nursing homes tend to **drop out earlier**.
- This is consistent with the idea that those already institutionalized at baseline are generally in **more advanced disease stages**, or that data collection is logistically harder in care settings.



Patients residing in nursing homes start out with more severe psychiatric symptoms and maintain that higher severity across the 6-year follow-up.
Both groups show a steady, roughly linear increase in BPRS, consistent with progressive behavioral decline.
The overall pattern supports including WZC as a covariate in the mean structure of the mixed model and possibly exploring a Time × WZC interaction to confirm that the slopes truly remain parallel.



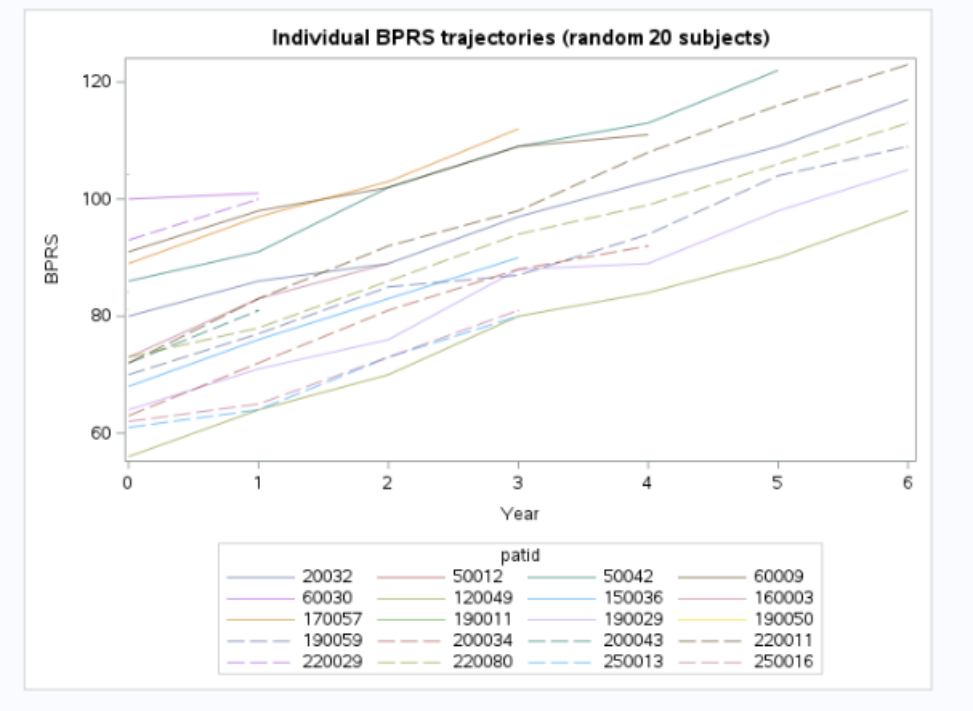
Both male and female Alzheimer's patients experience a similar linear increase in behavioral symptom severity (BPRS) over the six-year follow-up.
Female patients tend to start and remain at a slightly higher level of symptoms, but the rate of progression is comparable between sexes.
Statistically, this supports including Sex as a covariate in the model to account for overall level differences, while a Time × Sex interaction is probably unnecessary unless later tests show otherwise.

7 Variables:	bprs0 bprs1 bprs2 bprs3 bprs4 bprs5 bprs6

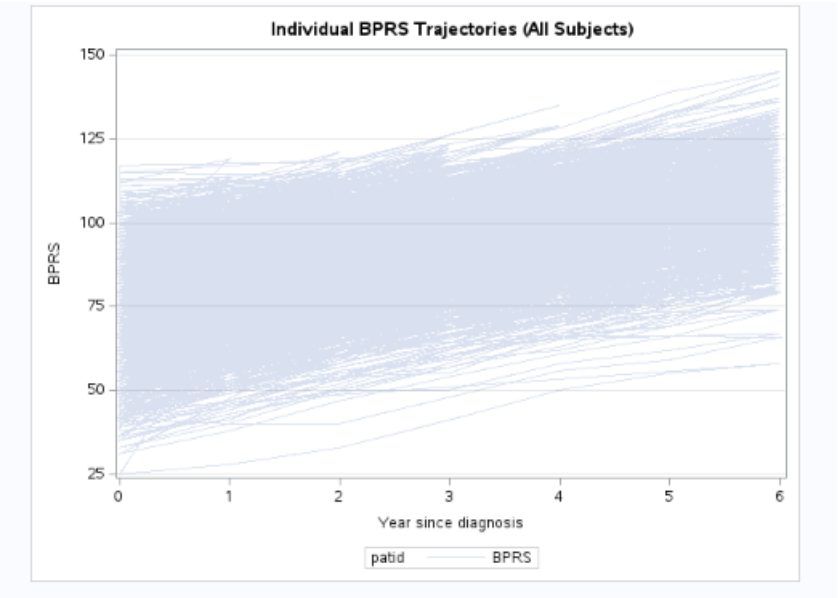
Pearson Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

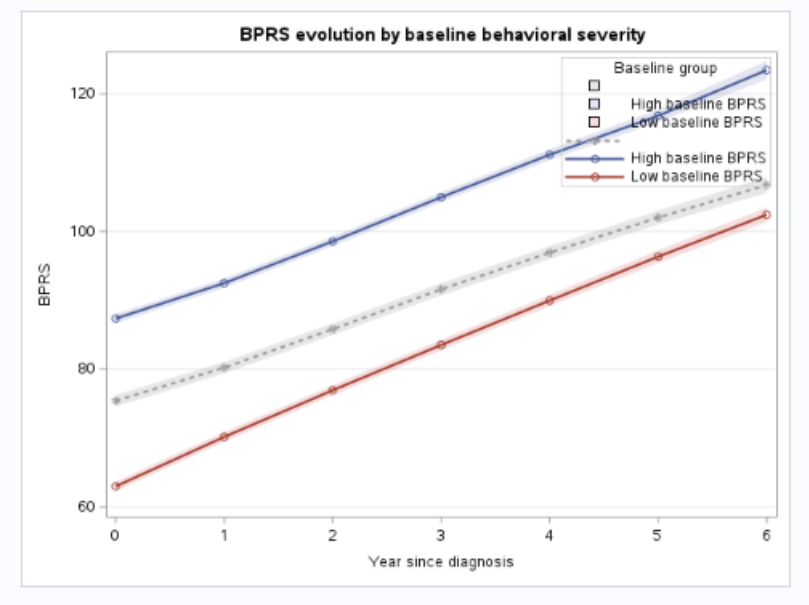
	bprs0	bprs1	bprs2	bprs3	bprs4	bprs5	bprs6
bprs0	1.00000 1253	0.98481 <.0001 1106	0.97851 <.0001 1014	0.96775 <.0001 907	0.95183 <.0001 777	0.93056 <.0001 652	0.90851 <.0001 511
bprs1	0.98481 <.0001 1106	1.00000 1106	0.98256 <.0001 1014	0.97697 <.0001 907	0.96555 <.0001 777	0.94963 <.0001 652	0.93098 <.0001 511
bprs2	0.97851 <.0001 1014	0.98256 <.0001 1014	1.00000 1014	0.98284 <.0001 907	0.97548 <.0001 777	0.96280 <.0001 652	0.94943 <.0001 511
bprs3	0.96775 <.0001 907	0.97697 <.0001 907	0.98284 <.0001 907	1.00000 907	0.98144 <.0001 777	0.97596 <.0001 652	0.96736 <.0001 511
bprs4	0.95183 <.0001 777	0.96555 <.0001 777	0.97548 <.0001 777	0.98144 <.0001 777	1.00000 777	0.98203 <.0001 652	0.97760 <.0001 511
bprs5	0.93056 <.0001 652	0.94963 <.0001 652	0.96280 <.0001 652	0.97596 <.0001 652	0.98203 <.0001 652	1.00000 652	0.98291 <.0001 511
bprs6	0.90851 <.0001 511	0.93098 <.0001 511	0.94943 <.0001 511	0.96736 <.0001 511	0.97760 <.0001 511	0.98291 <.0001 511	1.00000 511

The repeated BPRS measurements are strongly correlated over time, especially between adjacent years.
The correlation weakens gradually as the time gap increases, reflecting the natural persistence of behavioral symptoms with slow temporal change.
This pattern supports modeling the covariance using an autoregressive structure (AR(1)), allowing correlation to decline with increasing time separation.



Each line represents a single patient's behavioral trajectory.
Most patients show a steady, monotonic increase in BPRS over time, confirming progressive worsening.
However, the rate and severity vary widely across individuals, reflecting strong heterogeneity in disease course.
This variation underscores the need for a random-effects model that captures both individual starting points and progression rates.





⚖️ 5️⃣ Statistical implications

Observation	Modeling implication
Parallel slopes	Include **BaselineGroup** as a fixed effect (intercept difference)
No divergence	**Time** × **BaselineGroup** interaction likely nonsignificant
Linearity	Linear time term is sufficient for mean structure
Low within-group variability	Random intercepts and slopes can capture individual deviations efficiently

Patients with high baseline behavioral severity remain consistently worse over time, following a trajectory parallel to those with initially milder symptoms.
Both groups show a clear linear increase in BPRS, reflecting steady worsening.
This pattern implies that baseline behavioral severity affects the level of symptoms but not the speed of progression, supporting a model with a group-level intercept difference and a shared slope for time.