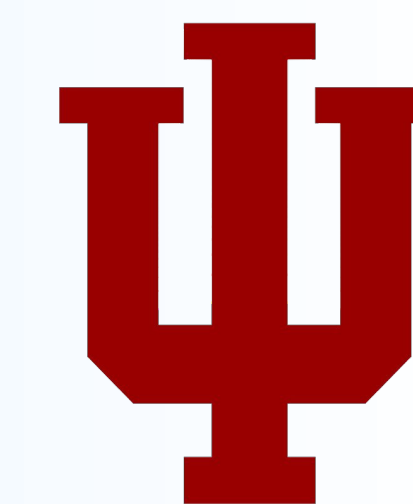


Postural sway abnormalities in schizotypal personality disorder

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BACKGROUND

- Motor abnormalities are robust findings in schizophrenia [1]
- Increasing evidence suggests these are a core feature of the disorder.
- Postural sway is a sensitive probe of brain systems: cerebellum, basal ganglia, motor cortices.
- Sway deficits are present in schizophrenia & other groups at high risk for psychosis.
- SPD individuals have attenuated psychotic symptoms, share genetic risk with schizophrenia;
- These individuals are usually free from antipsychotic medication & other illness confounds.
- This makes SPD useful for assessing biomarkers.

METHODS & MEASURES

- Measured postural sway for 1 minute with eyes closed/open, with feet together or apart (base closed/open)
- Accusway force plate; sampling rate 200 Hz
- Sway area was calculated using the 95% confidence ellipse using PCA, as in [3].
- We also measured schizotypal personality characteristics using the SPQ [4].
- Sway path was calculated using the simple trigonometric formula: $PL = \sum_{n=1}^N \sqrt{[x(n) - x(n-1)]^2 + [y(n) - y(n-1)]^2}$

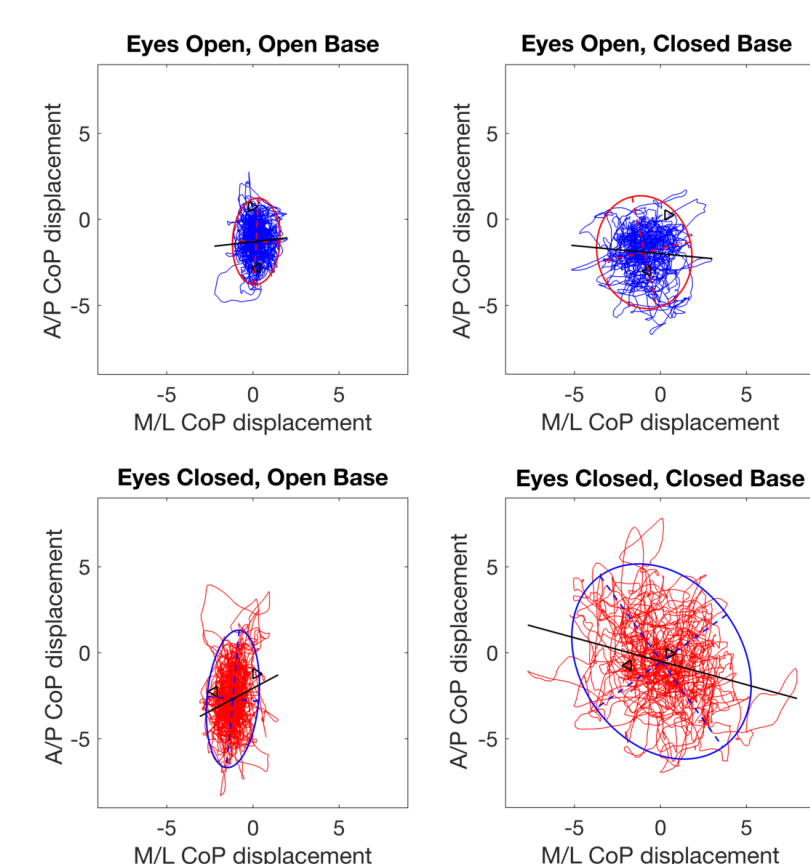


Figure 5: Example data from a single subject (from the SZ group) showing ellipse fits for each of the four conditions. Eyes open data are plotted in blue, eyes closed in red, and open-base conditions are on the right while closed are on the left.

PARTICIPANTS

- Indiana University study: Participants recruited from clinic (SPD and SZ) and newspaper ads (CTR)
- 28 individuals diagnosed with SPD but not medicated; no other neurological disorders or substance abuse; 28 age-matched controls; 28 patients with SZ.

INDIVIDUAL SWAY RESULTS

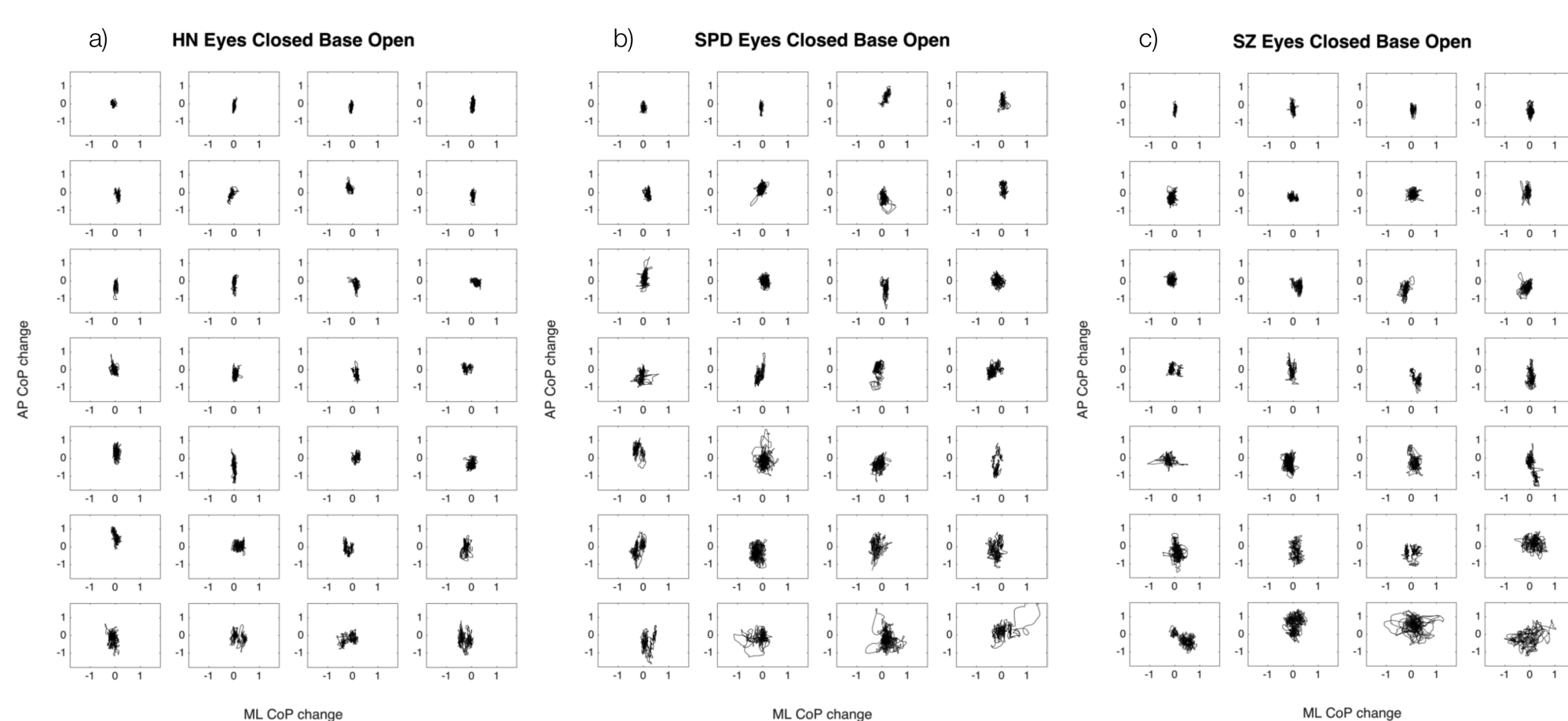


Figure 1: Individual sway data (stabilograms) for all healthy control participants (a), SPD participants (b) and SZ participants (c) in the eyes closed, base open condition. These are arranged in order of sway magnitude as calculated by the 90% confidence ellipse. **Statistical analyses:** mixed ANOVA analyses - base (open/closed) x eye (open/closed) within, group (HN/SPD/SZ) between, weight (mean-centred) as covariate (if correlated with sway).

DEMOGRAPHICS & SPQ

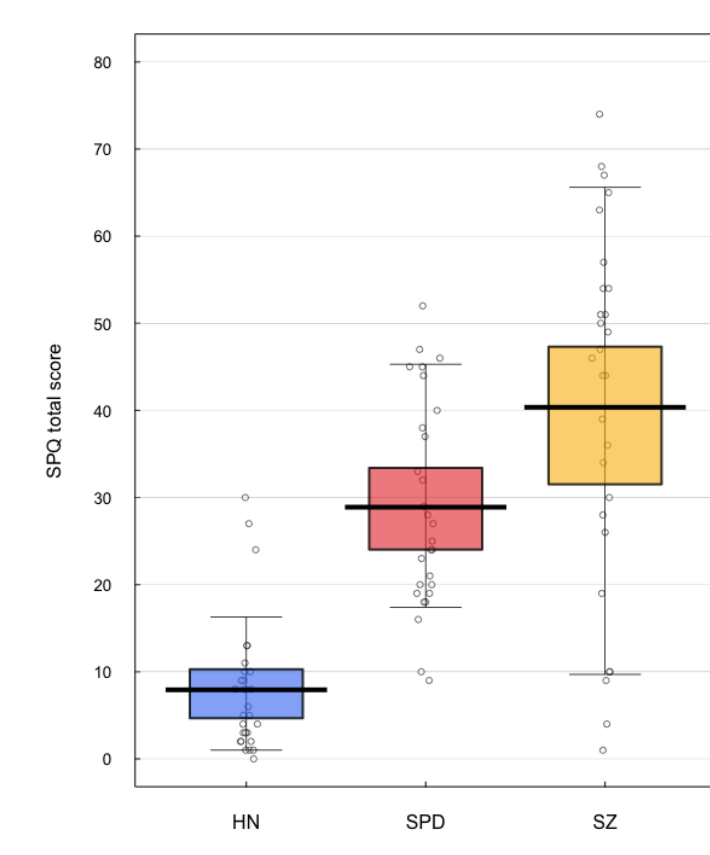


Figure 6: Boxplot showing results of the questionnaire measure, the SPQ. Individual scores are shown by black circles. There was a significant effect of group ($p < .001$), and post-hoc pairwise comparisons all survived Bonferroni correction.

	HC	SPD	Sz
Age (SD)	41.5 (10.60)	42.2 (11.30)	41.6 (9.91)
Gender (M/F)	13/14	14/13	13/14
Height (in)	66.88 (4.58)	67.1 (3.39)	66.1 (3.83)
Weight (lb)	178 (43.0)	201 (50.2)	179 (34.6)
WASI IQ (SD)	111 (15.7)	107 (15.3)	97.6 (13.2)
SPQ (SD)	8.19 (7.77)	29.07 (12.18)	41.15 (20.64)

Table 1: Demographic variables for the three groups; standard deviations are in brackets

There were no differences in age, gender, height, weight or gender between groups. Significant differences were seen in IQ - SZ patients scored lower than controls & SPD.

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- [3] Behdad Tahayor, Zachary A Riley, Armaghan Mahmoudian, David M Kocaja, and Siang Lee Hong. Rambling and trembling in response to body loading. *Motor Control*, 16(2):144-157, April 2012.
- [4] A Raine. The SPQ: a scale for the assessment of schizotypal personality based on DSM-III-R criteria. *Schizophrenia bulletin*, 17(4):555-564, 1991.

SWAY PATH AND AREA OVERALL RESULTS

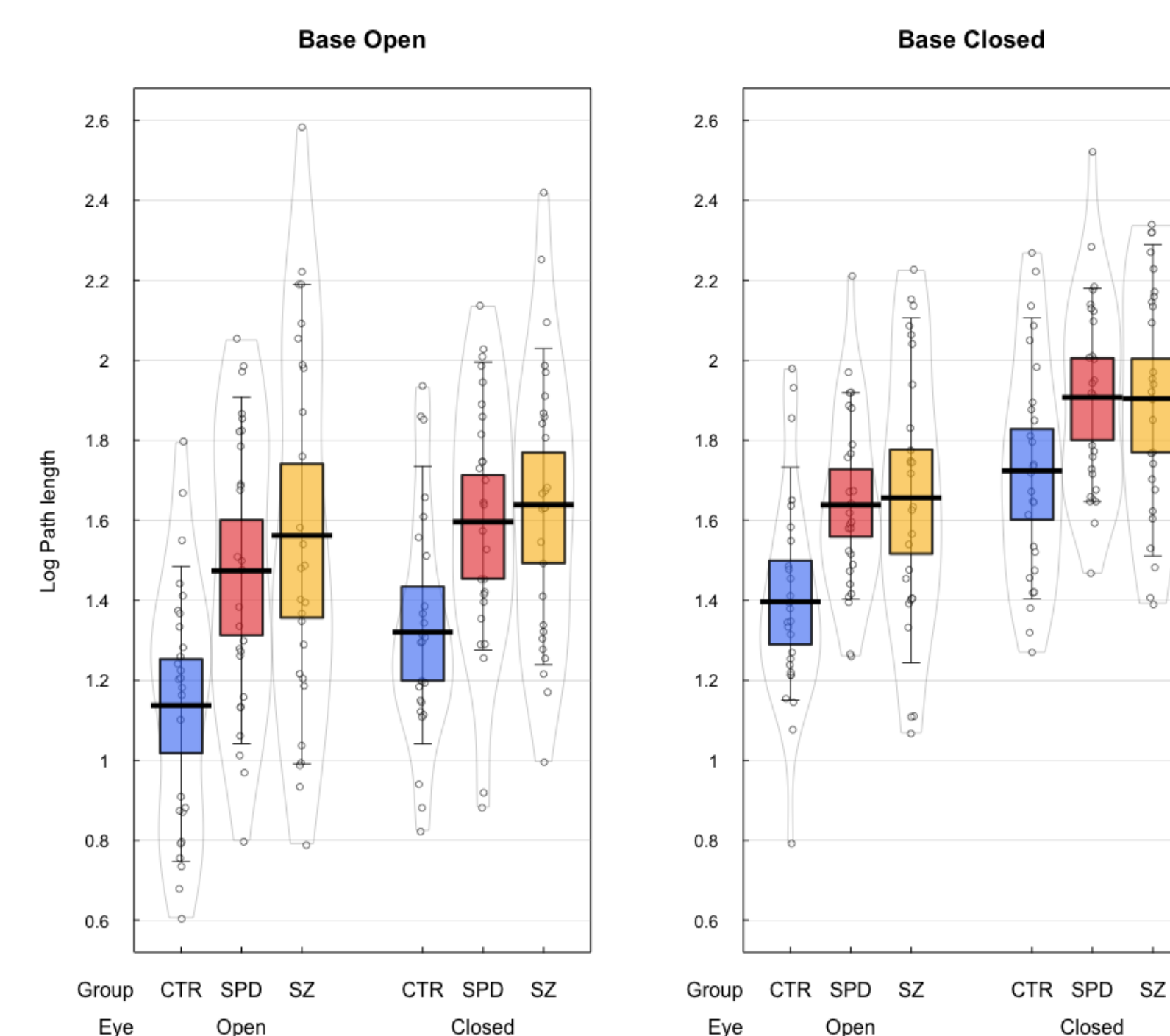


Figure 2: Results for sway area (log transformed to correct skew) for all participants. Black circles show individual data points, coloured areas show ± 1 standard error, and vertical lines show ± 1 standard deviation.

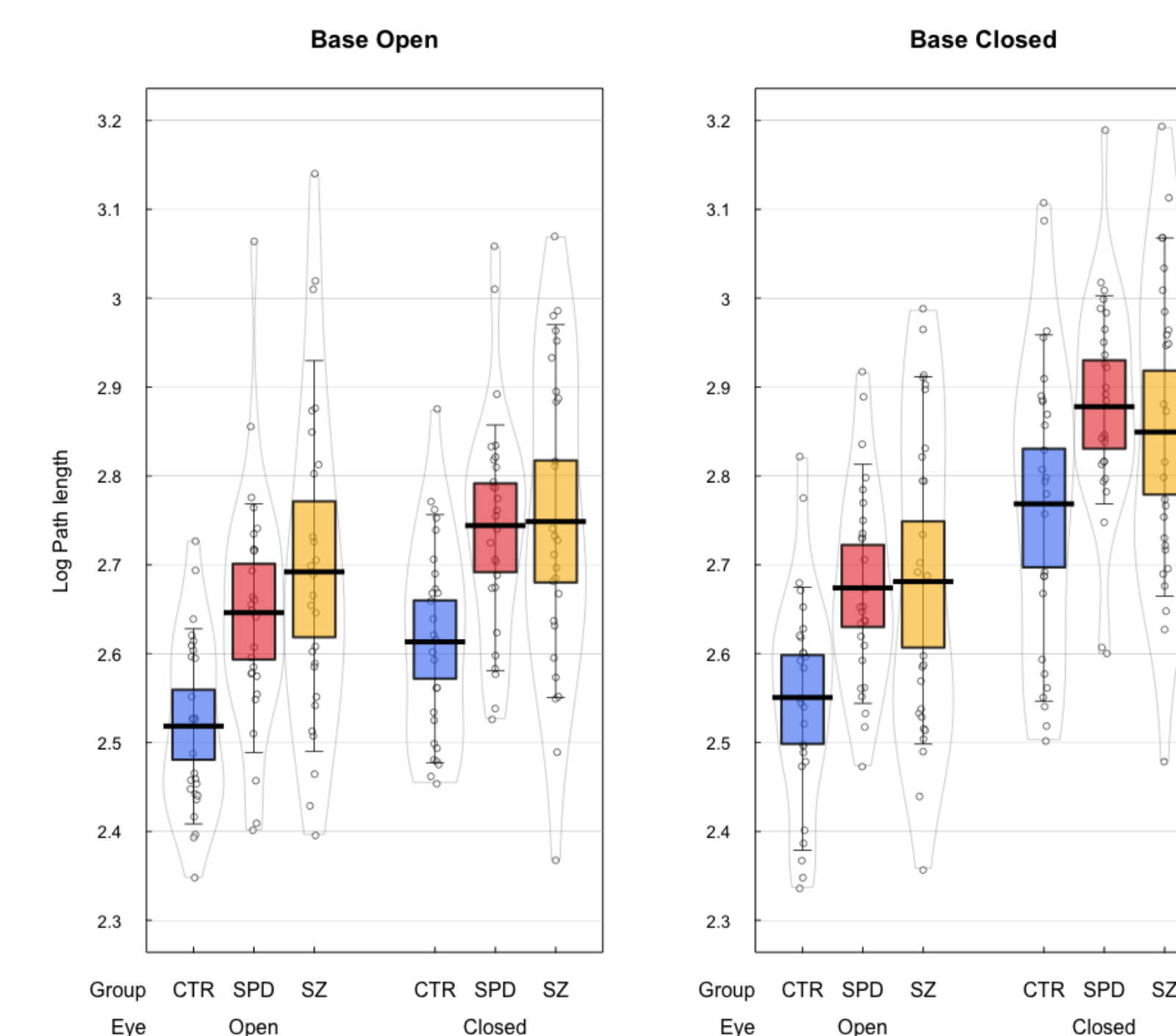


Figure 3: Results for sway path (log transformed to correct skew) for all participants. Black circles show individual data points, coloured areas show ± 1 standard error, and vertical lines show ± 1 standard deviation.

CORRELATIONS & CONCLUSIONS

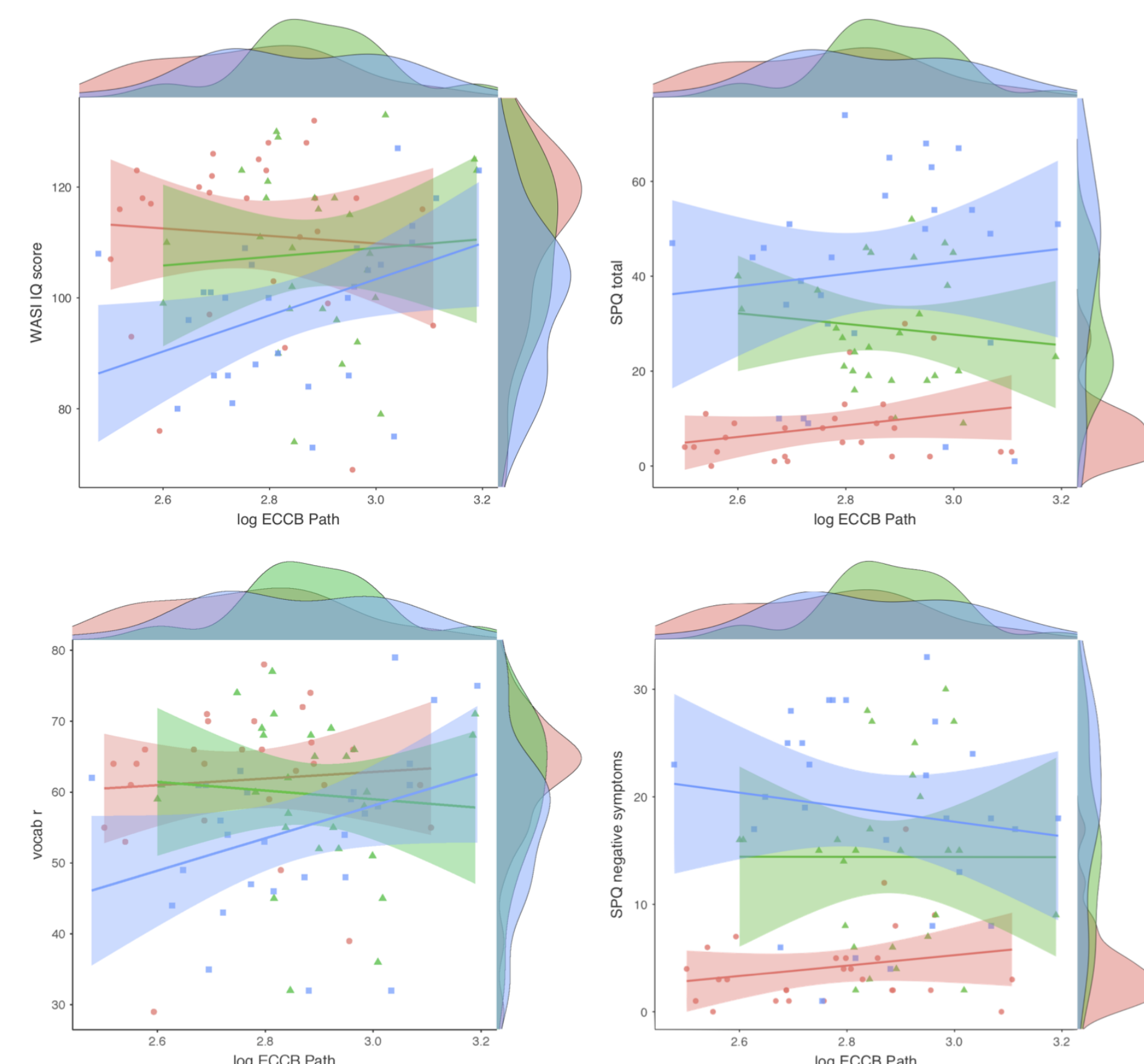


Figure 4: Correlations between eyes closed, base closed sway, SPQ score, WASI IQ, SPQ negative symptoms subscale, and WASI vocabulary subscale for the three groups.

- In all conditions, SPD participants swayed more than controls but not less than SZ participants.
- There were no interactions between group and any of the other conditions (eye or base).
- This is consistent with previous reports of motor abnormalities in schizophrenia and SPD.
- We are the first to show increased sway in SPD in unmedicated individuals not at high risk.
- Interestingly, none of the sway measures correlated with SPQ (either full score or negative symptom scale - [2] - all $ps > .4$, uncorrected; also did not correlate with IQ or subscales (weak correlation in SZ - $p = .03$, uncorrected).
- This suggests sway may be a genetic marker rather than a clinical marker of severity.

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