

Speech Markers associated with Self- vs. Clinician-Reported Negative Symptoms in Schizophrenia: Comparing the SNS and PANSS

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Methodological Issue

Symptom assessment in schizophrenia uses clinician-rated tools like the Positive and Negative Syndrome Scale (PANSS) and self-report questionnaires like the Self-Evaluation of Negative Symptoms Scale (SNS). While both are valuable, they capture symptomatology through different interpretive filters: clinician ratings are based on patient reports filtered through both the patient’s and clinician’s perspectives, whereas self-reports reflect patients’ experiences more directly. These differences raise questions about how best to assess patients’ real-time symptom states and underscore the need for more scalable and patient-centered tracking methods.

Background/Aims

Accurate symptom monitoring is critical for effective treatment and research in schizophrenia, yet negative symptoms like avolition and anhedonia are challenging to assess due to their internal and unobservable nature. Instruments like the PANSS and SNS may not fully reflect a patient’s lived experience, particularly when clinician ratings are shaped by layers of interpretation. Speech, by contrast, offers a continuous, non-invasive behavioral signal that may better mirror internal states. Advances in automated speech analysis have shown potential in identifying objective markers of schizophrenia symptoms [1]. This study examines whether speech-derived features align more closely with self- or clinician-rated negative symptoms, aiming to develop more nuanced and ecologically valid digital biomarkers.

Methods

Twenty-two individuals with schizophrenia were recruited from the Karl-Jaspers Clinic of Psychiatry, University Hospital Oldenburg, Germany. After two weeks of inpatient treatment as usual, participants completed the PANSS and SNS. They also performed a positive and negative storytelling task, from which speech was recorded. Using automated analysis, a range of acoustic, prosodic, and linguistic speech features were extracted, including articulatory variability, spectral bandwidth, vocal energy, temporal patterns, and lexical content. Age- and sex-controlled Spearman correlations were computed between speech features and symptom scores, with false discovery rate (FDR) correction applied for multiple comparisons.

Table 1: Demographic and clinical information of the sample

	T1	T2	p value
N	22	22	-
Age	41.83±13.87	-	-
Education	10.5±1.82	-	-
PANSS Total	63±17.93	54.79±16.4	0.06
SNS Total	-	17.4±7.4	-
Social Withdrawal	-	2.8±1.5	-
Diminished emotional range	-	3.5±1.7	-
Alogia	-	3.9±2.4	-
Avolition	-	3.6±2.4	-
Anhedonia	-	3.6±1.9	-

Results

Of 92 analyzed features, two remained significant after FDR correction. The determiner rate (proportion of words like “the,” “a,” “this”) in negative storytelling showed a strong negative correlation with SNS social withdrawal ($p = -0.68$, $p < 0.05$), indicating higher determiner use was linked to lower withdrawal. Mean F2 bandwidth in negative storytelling correlated with SNS avolition ($p = 0.76$, $p < 0.01$), suggesting less precise vowel articulation with greater avolition. Neither feature was significantly related to clinician-rated PANSS scores: determiner rate weakly correlated with N4 ($p = -0.06$, $p = 0.98$), and F2 bandwidth with G13 ($p = -0.13$, $p = 0.91$).

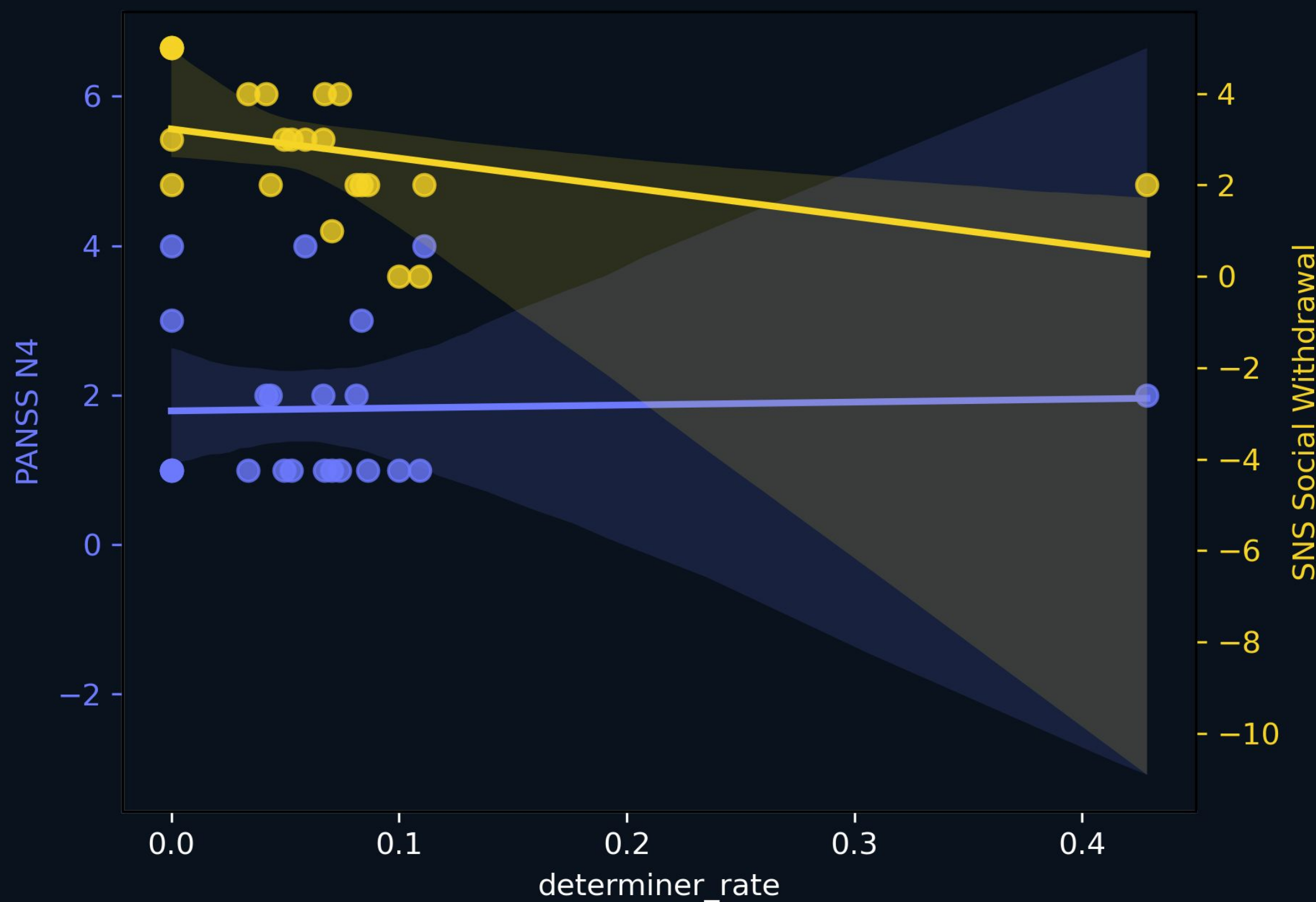


Figure 1: Spearman correlations between SNS social withdrawal subdomain (yellow)/PANSS N4 passive/apathetic withdrawal item (purple) and determiner rate speech feature.

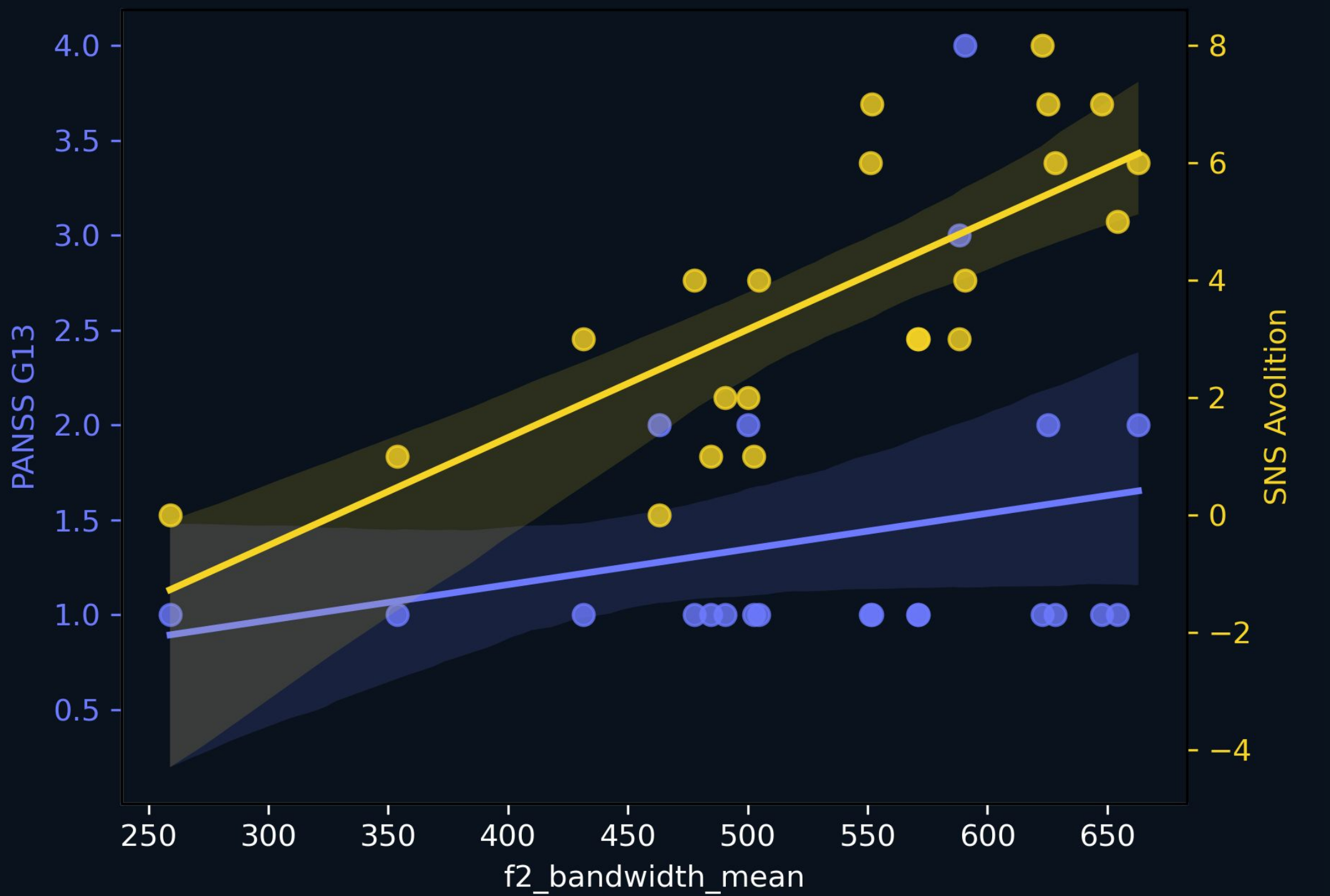


Figure 2: Spearman correlations between SNS avolition subdomain (yellow)/PANSS G13 disturbance of volition item (purple) and F2 bandwidth speech feature.

Conclusion

Our results show that certain speech features, reduced vowel precision (increased F2 bandwidth) and vaguer speech (lower determiner use), relate more closely to self-perceived negative symptoms than to clinician-rated PANSS scores. Greater F2 bandwidth was linked to avolition, suggesting less precise articulation, while reduced determiner use was tied to social withdrawal, consistent with less specific, more ambiguous expression. Both effects appeared in SNS self-reports but not PANSS ratings, indicating that speech may offer a more immediate window into subjective experience. These findings highlight speech analysis as a complement to traditional tools, enabling a more nuanced, patient-centered assessment of negative symptoms in schizophrenia.

Disclosure

FM, FD, JT, and AK are employed by the speech biomarker company ki:elements. JT and NL hold shares in ki:elements. The remaining authors have nothing to disclose.

Reference

[1] Worthington, M., Efsthadiadis, G., Yadav, V., Galatzer-Levy, I., Kott, A., Pintilii, E., Patel, T., Sauder, C., Kaul, I., Brannan, S., & Abbas, A. (2025). Measurement of schizophrenia symptoms through speech analysis from PANSS interview recordings. *Frontiers in Psychiatry*, 16. <https://doi.org/10.3389/fpsyt.2025.1571647>