

Deconstructing the Heterogeneity of Emotional Experience in Those with Serious Mental Illness: Identification of Distinct Affective Subtypes Using Ecological Momentary Assessment

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Introduction

- DSM diagnoses can be separated into homogeneous subtypes based on distinct neuro-biological patterns and abnormalities.
- Previous research has identified affective clusters in the schizophrenia spectrum using trait self-report and subjective responses to affective images
- However, these studies have two notable limitations:
 - (1) they may lack ecological validity due to reliance on trait self report and laboratory stimuli
 - (2) they only investigated individuals with schizophrenia and schizoaffective disorder
- It is unclear whether distinct, ecologically valid, emotional profiles can be identified that cut across diagnostic boundaries and explain variance in clinical outcomes.
- **Hypotheses:**
 - State-level affect would cluster into two or three discrete clusters
 - Clusters would be differentiated by external symptom validators

Methods

- Ecological Momentary Assessment (EMA) collected 8 times a day for 6 days
- Assessed momentary positive and negative emotions, negative symptoms, delusions, and presence of hallucinations
- **Participants:**
 - 51 outpatients with schizophrenia (SZ); 1309 samples
 - 20 outpatients with bipolar disorder (BD); 534 samples
 - 55 healthy controls (CN); 1719 samples
 - Groups did not differ on age, sex, race, parental education, or survey adherence; SZ had lower personal education than other two groups
- **Clustering:**
 - Positive and negative affect z-scored based on CN
 - Clustered via *k*-means, PAM, and Ward's method

Results

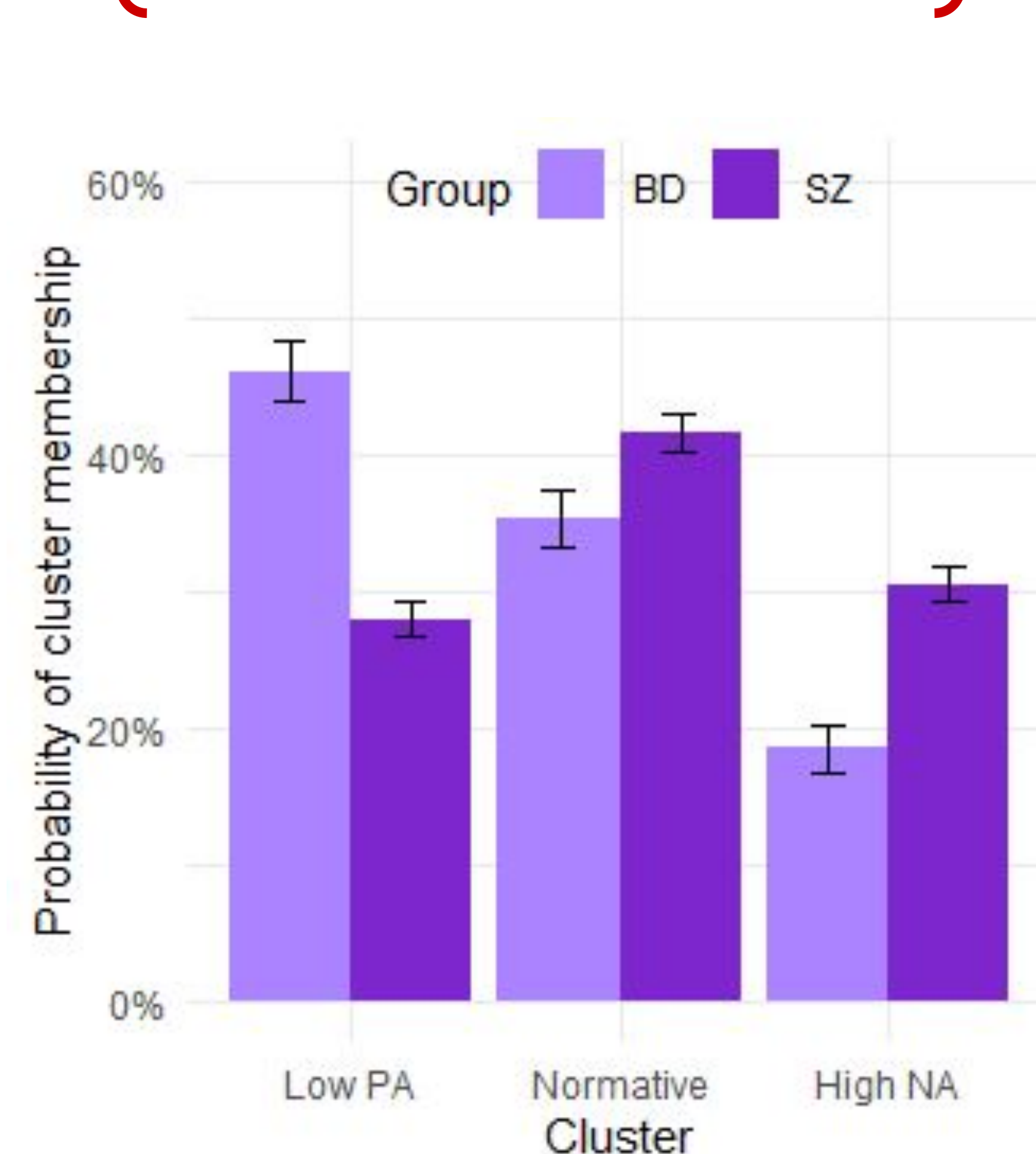
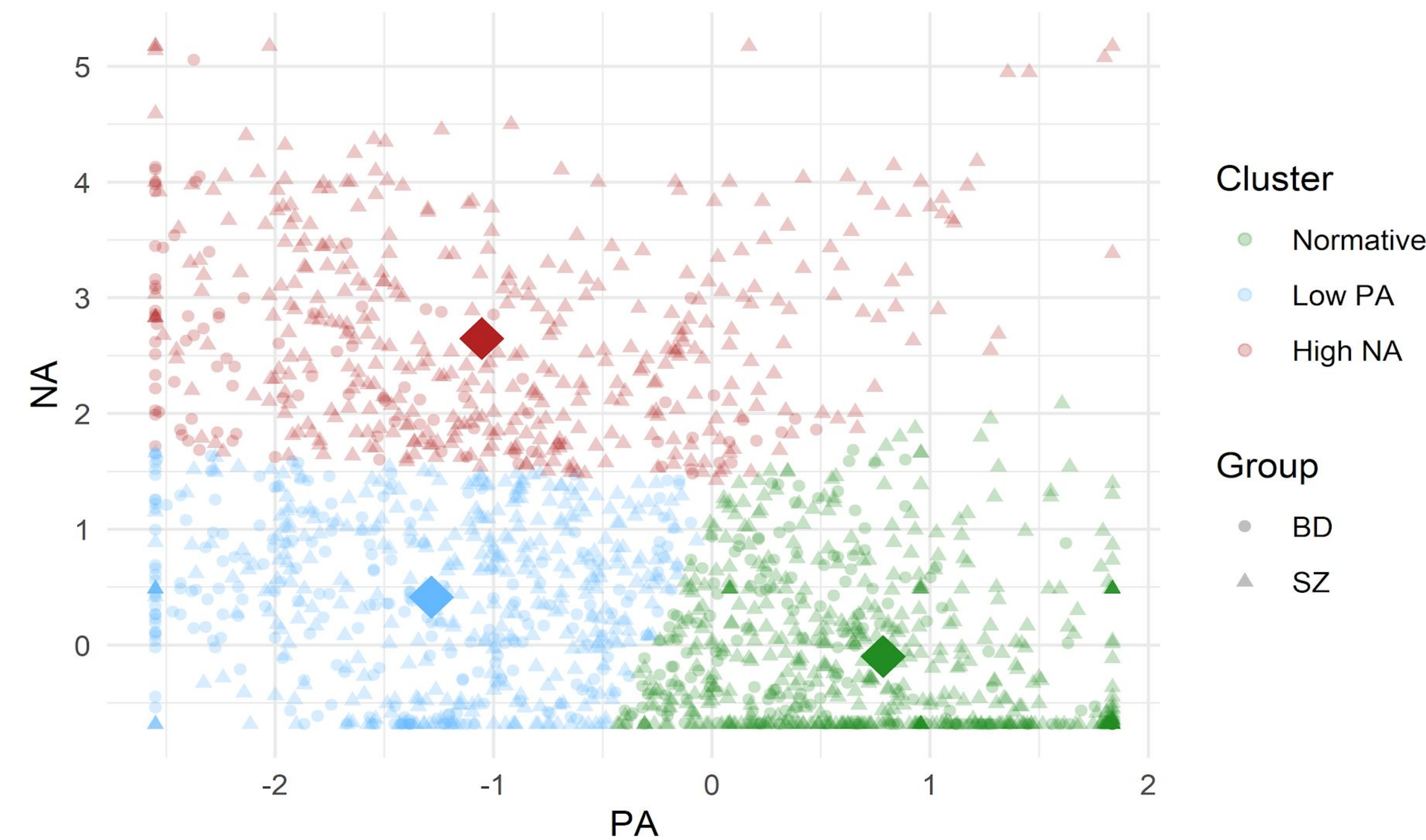


Figure 1. Visualizations of final cluster solution
 $\chi^2 = 60.47, p < .001$

Distinct affective profiles cut across diagnostic boundaries and are associated with unique clinical outcomes.

A. Final cluster solution



B. Affect means by cluster

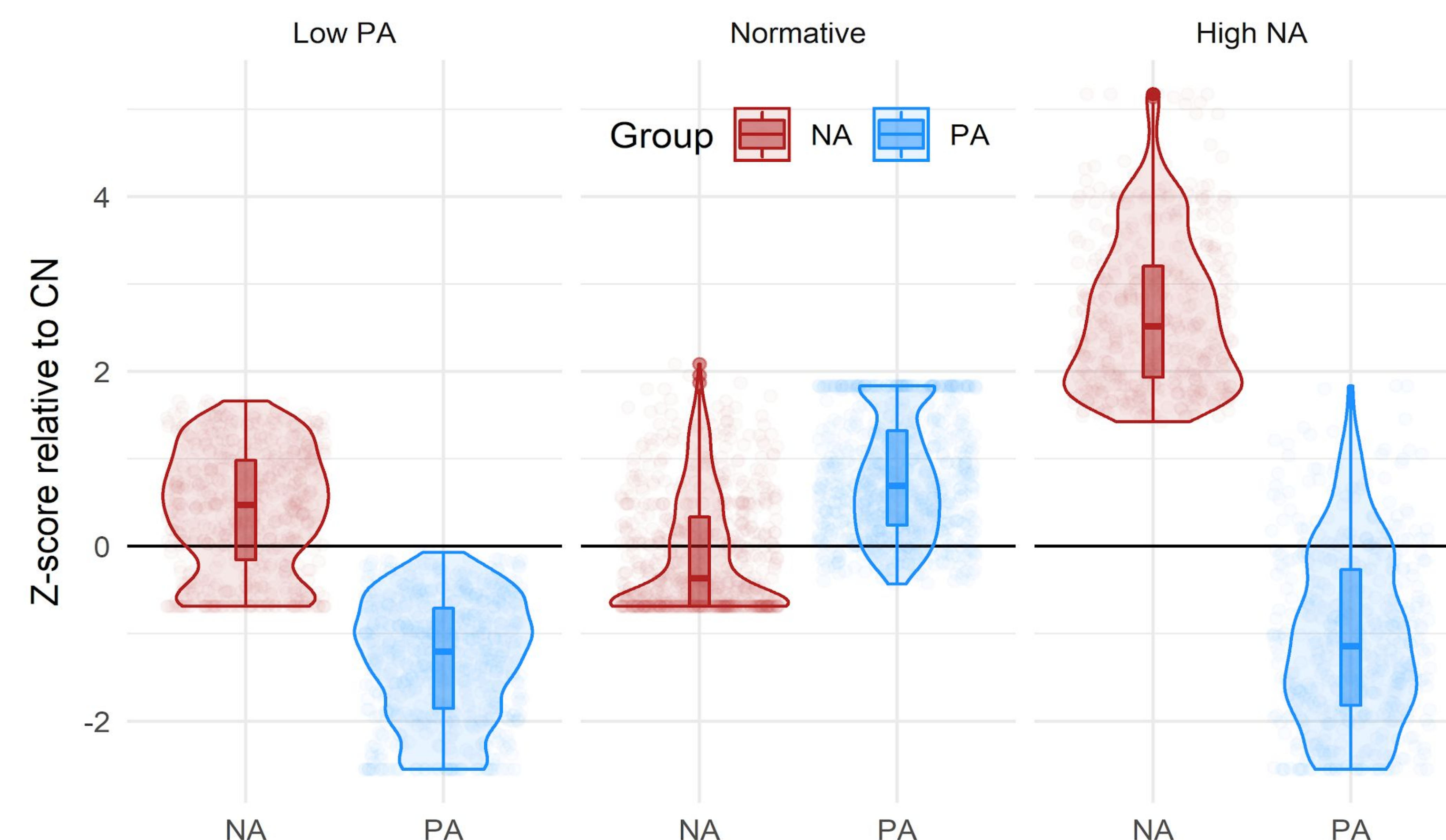


Figure 2. Visualizations of final cluster solution

Note. Panel A: Final cluster solution using *k*-means clustering. Diamonds represent identified medoids for a given cluster. Panel B: Violin and boxplots of positive and negative affect by cluster. Horizontal line reflects mean affect in CN group. NA = Negative affect, PA = Positive affect.

Table 1. External validators by affective cluster

Variable	Anhedonia	Avolition	Asociality	Delusions	Hallucinations ¹
Cluster descriptives; M (SD)					
Normative	39.97 (40.63)	34.91 (37.71)	35.44 (37.25)	9.17 (14.81)	4.32% (20.37%)
Low PA	91.55 (56.98)	73.88 (50.46)	72.02 (48.42)	7.54 (9.85)	5.32% (22.47%)
High NA	95.64 (52.08)	75.06 (51.5)	71.7 (51.37)	24.41 (22.57)	14.9% (35.64%)
Omnibus ANOVA <i>F</i> values					
	104.69***	63.49***	66.36***	69.07***	3.71*
Contrasts; <i>t</i> (<i>d</i>)					
Normative - Low PA	11.17*** (0.55)	9.48*** (0.47)	8.33*** (0.53)	1.61 (0.08)	1.5 (0.36)
Normative - High NA	13.39*** (0.66)	9.83*** (0.49)	10.49*** (0.7)	10.98*** (0.52)	2.8* (0.19)
Low PA - High NA	3.09** (0.15)	1.07 (0.05)	2.42* (0.16)	9.69*** (0.46)	1.1 (0.53)

Note. 1 = Hallucinations were collected as a dichotomous variable, values presented for M and SD reflect percentages where hallucinations were endorsed, post-hoc contrasts are *z* statistics with Odds Ratio.

Results

Three clusters identified:

- (1) **normative**, moderate to high positive affect and low to moderate negative affect (38.4%)
 - (2) **low positive affect and average negative affect** (36.5%)
 - (3) **high negative affect and low positive affect** (24%)
- See **Figure 1** for cluster membership by diagnostic group
- Overall, stability of cluster membership across time is moderate ($\kappa = .53, z = 29, p < .001$)
 - SZ group more stable ($\kappa = .56, z = 25.7, p < .001$)
 - BD group less stable ($\kappa = .43, z = 12.2, p < .001$)

Conclusion

- Distinct groups of momentary emotional experience emerged that showed moderate stability and associations with clinical validators
- Similarities in symptoms between clusters supports equifinality, where multiple mechanistic pathways can lead to similar clinical manifestations
- Specifically, findings highlight two affective pathways to negative symptoms which may reflect primary (i.e., idiopathic) and secondary negative symptoms. These pathways could be used to study differential momentary mechanisms and interventions
- Results support use of alternative, data-driven, classification techniques based on ecological data which may allow for greater specificity in assessment, diagnosis, and intervention of severe mental illness

