Neurological soft signs and their associations with extrapyramidal and psychotic symptoms in individuals living in precarious housing

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Background

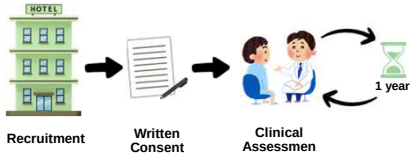
- Neurological Soft Signs (NSS) are abnormalities in motor and sensory processes not associated with lesions of specific brain areas.[1]
- NSS are associated with schizophrenia (SCZ) and somewhat with conditions like depression (MDD) and OCD.[2,3,4]
- Not enough research to establish clinical utility in informing diagnosis & treatment.
- NSS have not been researched in people living in precarious housing or homelessness.
- These individuals have worse access to care and a higher prevalence of physical & mental health conditions.[5]
- Researching NSS in this population will help improve the care they receive.

Objectives

Explore NSS in a sample of precariously housed people by analyzing...

- NSS prevalence
- Connections between NSS categories
- Links between NSS and demographic and clinical characteristics

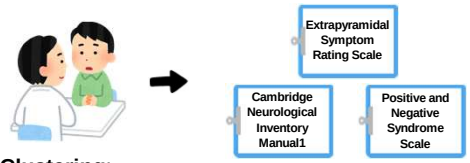
Methods



Sample: *n = 445*

- **Inclusion Criteria**: ≥ 1 complete NSS Assessment
- **Exclusion Criteria**: low attention, high disorientation

Assessments:



Clustering:

- Used participant's lowest NSS score.
  - Categories: primitive reflexes (PR), motor coordination (MC), sensory integration (SI), disinhibition (DI).
- Ward's hierarchical cluster method
- Ideal clusters = 4

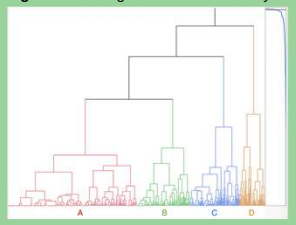
External Validity:

- Demographics, extrapyramidal and psychotic symptoms compared between clusters
- ANOVA and chi-square tests
- Comparisons: t-test and Cohen's d.

Results

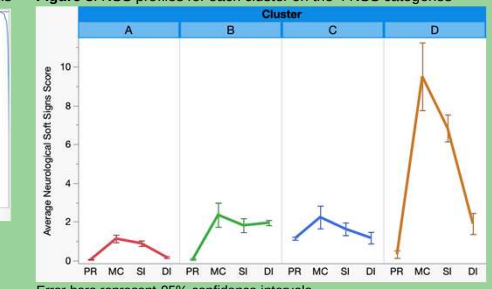
Figure 1. Scatterplot matrix of cluster distribution in NSS

Figure 2. Dendogram from cluster analysis



Cluster D is most distant from other clusters and appears more severely affected by NSS.

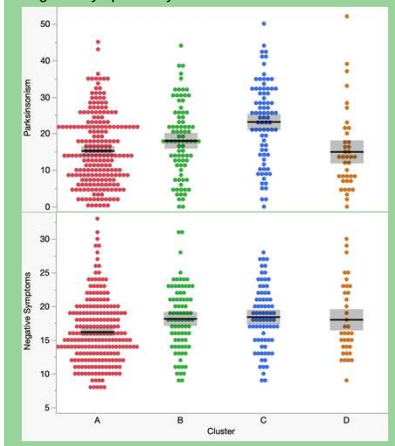
Figure 3. NSS profiles for each cluster on the 4 NSS categories



Error bars represent 95% confidence intervals.

Cluster A – least severe
Cluster B – most severe in disinhibition
Cluster C – most severe in primitive reflexes
Cluster D – most severe in motor coordination, sensory integration, disinhibition and overall

Figure 4. Distribution and average parkinsonism and negative symptoms by cluster



Cluster profile of negative symptoms is distinct from parkinsonism profile

Table 1. Differences between NSS clusters on external variables. *** $p < 0.005$.

Variable	Cluster A	Cluster B	Cluster C	Cluster D	Test statistic	Comparisons	Effect size
Age, *M (SD)*	43.9 (11.9)	45.8 (12.2)	49.6 (12.7)	49.3 (11.9)	*F = 5.89****	C > A; D > A	*d = 0.48; 0.45*
Sex (% male)	79.7	68.2	72.3	86.1	$x^2 = 7.71$		
Education years, *M (SD)*	10.7 (1.7)	10.6 (1.8)	10.2 (2.6)	10.2 (2.2)	*F = 1.76*		
Parkinsonism, *M (SD)*	15.2 (9.4)	18.0 (10.0)	23.1 (11.1)	14.9 (10.9)	*F = 13.08****	C > A; C > B; C > D	*d = 0.78; 0.50; 0.79*
Dystonia, *M (SD)*	0.1 (0.4)	0.1 (0.7)	0.2 (1.0)	0.7 (2.7)	*F = 4.86****	D > A; D > B; D > C	*d = 0.63; 0.56; 0.50*
Dyskinesia, *M (SD)*	2.6 (3.8)	3.3 (5.0)	4.8 (5.2)	3.9 (5.8)	*F = 4.91****	C > A	*d = 0.48*
PANSS negative symptoms, *M (SD)*	16.2 (4.8)	18.1 (4.8)	18.4 (4.6)	18.0 (5.2)	*F = 6.10****	B > A; C > A	*d = 0.39; 0.44*

Cluster A – youngest, and least severe in all clinical categories
Cluster B – intermediate in age, elevated negative symptoms and parkinsonism
Cluster C – higher in age and negative symptoms, parkinsonism, and dyskenisa all elevated
Cluster D – higher in age; in contrast to B and C, negative symptoms and dystonia both elevated, but not parkinsonism

Discussion

- The groups of participants resulting from the cluster analysis show heterogeneous clinical characteristics, supporting the presence of subtypes of neurological findings.
- Clusters C and D are of similar age but have distinct NSS, ESRS, and PANSS profiles. Other factors such as early life stress, substance use, mental illness, and more may distinguish these types of aging.
- While distinguishing between negative symptoms and Parkinsonism may be challenging,[6] the difference in pattern of associations of these two domains between Cluster D and Clusters B and C suggests a degree of independence can occur.
- Negative symptoms and NSS data in the sample do not align with prior NSS and SCZ research, where SCZ patients had more severe MC and SI. Here, Cluster D, the most impaired in MC and SI, did not have more severe negative symptoms than other clusters.[2]
- NSS may provide clinical value in supporting diagnostic features of neuropsychiatric conditions in people living in precarious housing.

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