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## Introduction

- Computational markers of speech and language** show promise for informing diagnosis, prediction, and treatment of psychotic disorders<sup>1-4</sup>
- Speech analysis among individuals with psychotic disorders has revealed alterations in usage of **personal pronouns** and **negative emotional words**<sup>5-7</sup>
- Further research is needed to understand relationships between speech characteristics and clinical markers of **risk** and **resilience** among individuals experiencing **acute and severe psychotic symptoms**
- Improving **speech-based prediction models** of suicide risk is of particular importance as individuals with psychotic disorders are at **heightened risk of dying by suicide**<sup>8</sup>

## Methods: Pilot Data from Inpatient Sample with Psychosis

### Participant Characteristics (N = 30)

<b>Age</b>	19–61 yrs old; <i>M</i> = 35.1 ( <i>SD</i> = 11.8)	<b>Duration Current Admission</b>	4–57 days; <i>M</i> = 16 ( <i>SD</i> = 9.9)
<b>Gender Identity</b>	20 Men; 6 Women; 2 Non-binary/Gender fluid; 1 Trans man; 1 Unsure	<b>Stage of Illness</b>	12 First-episode psychosis; 14 Longstanding psychosis; 4 Unclear
<b>Racial/Ethnic Identity</b>	20 White/Caucasian; 9 Black/African American; 4 American Indian/Alaskan Native; 2 Arabic/Middle Eastern; 2 Hispanic/Latino/a/x; 2 Asian/Pacific Islander; 2 Unsure/Self-describe	<b>Psychotic Disorder Dx</b>	15 Bipolar I disorder w/psychotic features; 6 Schizophrenia/schizophreniform; 5 Schizoaffective disorder; 2 Unspecified psychotic disorder; 1 Delusional disorder; 1 MDD w/psychotic features
<b>Education Level</b>	4 Less than high school; 7 High school degree or GED; 15 Some college/vocational; 4 Bachelor's degree	<b>WRAT Word Reading Standard Score</b> ( <i>estimate of premorbid intelligence</i> )	76–133; <i>M</i> = 96; <i>SD</i> = 14.5

### TAT Speech Samples

- TLI<sup>9</sup> prompts and 8 ambiguous scene stimuli from the Thematic Apperception Test (TAT)<sup>10</sup>
- Participants asked to describe each picture as fully as they can for 1 minute each, including what they see in the picture and what they think might be happening

### Linguistic Inquiry and Word Count (LIWC-22)

- Computerized software<sup>11</sup> for analyzing word use in language
- Types of words in the LIWC-22 dictionary are summarized as percentages of total number of words
- Selected variables based on prior research:
  - Positive & negative emotion words & emotional tone
  - Pronouns: first-person singular (e.g., “I”, “me”) and first-person plural (e.g., “we”, “our”)

## Results: Language Associations with Resilience, Psychotic Symptoms, and Suicidal Ideation

### 1-Minute Speech Samples 8 Thematic Apperception Test Stimuli

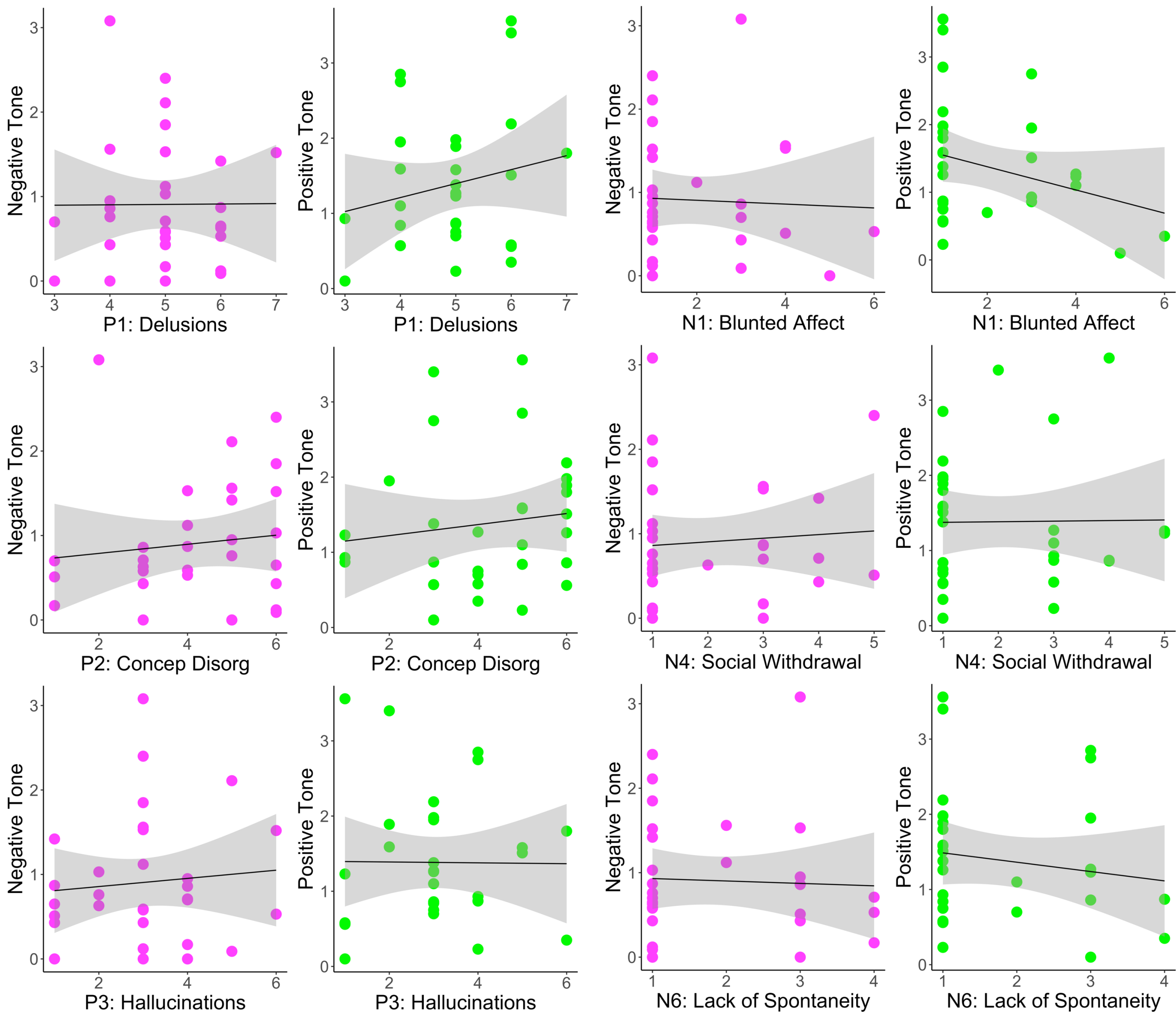
N = 30 individuals with psychotic disorders during inpatient hospitalization

<b>Total Word Count</b>	427–1908 words; <i>M</i> = 986.8 ( <i>SD</i> = 323.7)
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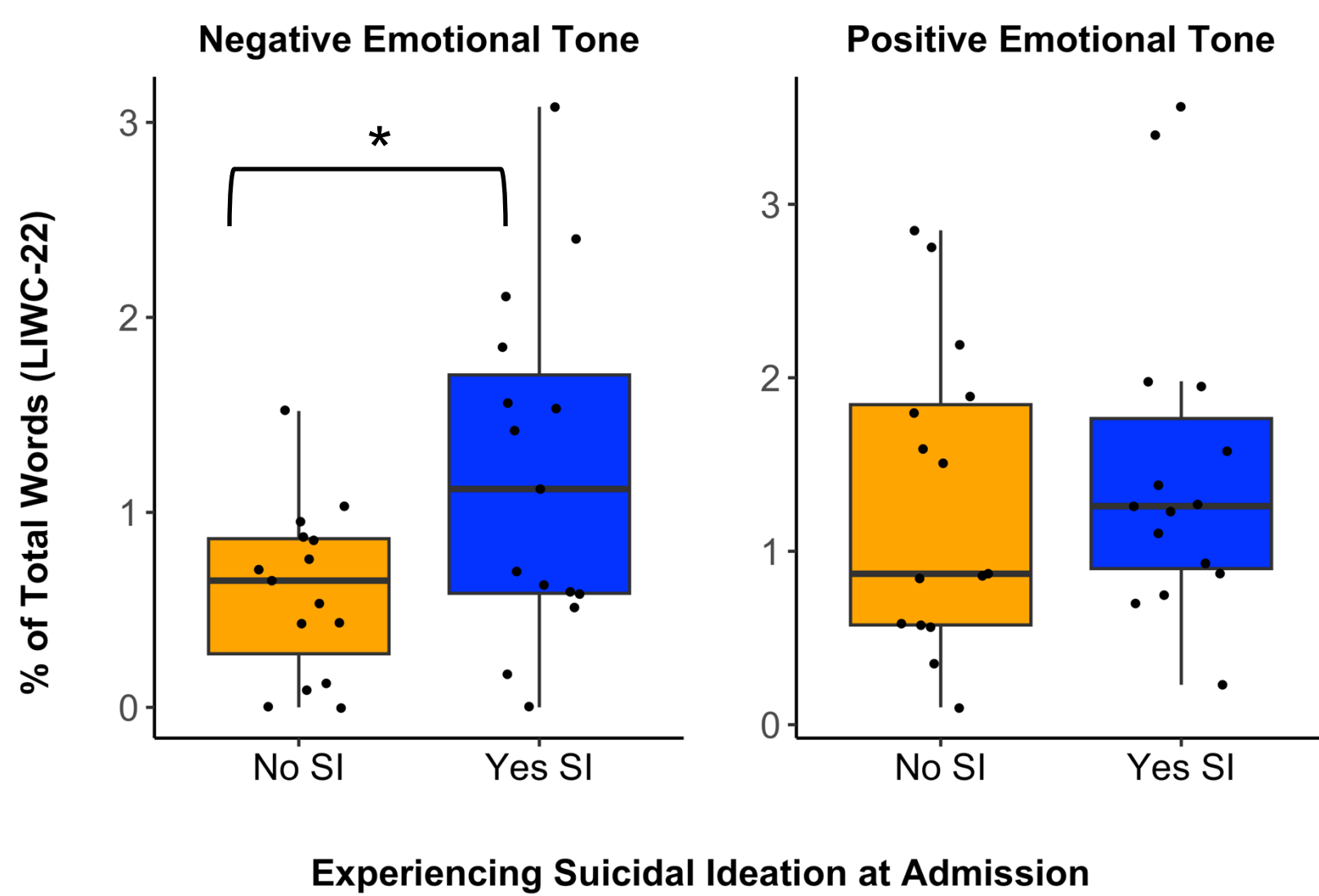
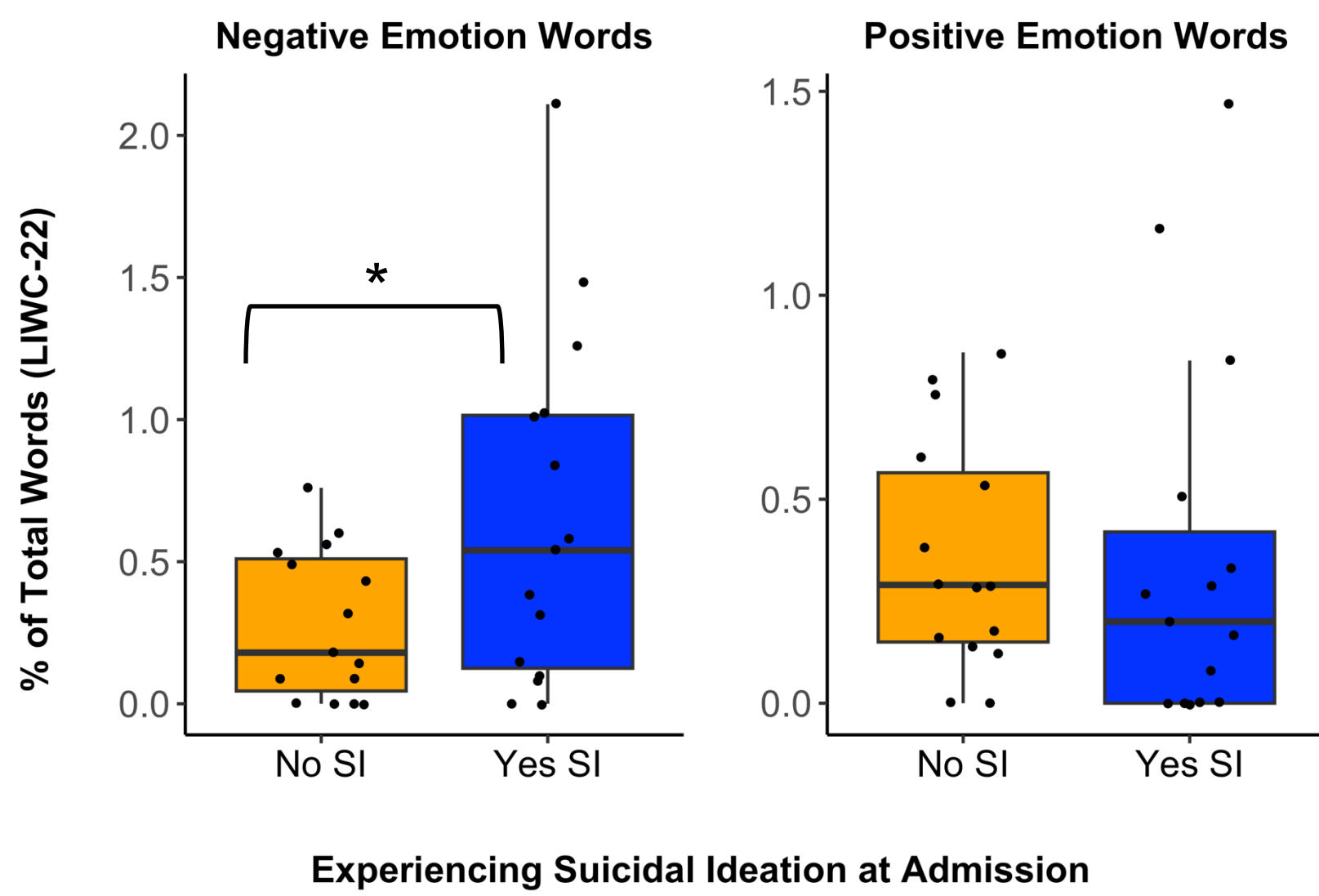
Resilience measure total scores (MHRM-10<sup>12</sup> and CD-RISC-10<sup>13</sup>) and PANSS-8<sup>14</sup> positive & negative item symptom severity did not significantly correlate with emotional words or first-person singular or plural pronoun usage ( $p > .1$ )

However, greater severity on PANSS N6 Lack of Spontaneity of Speech was associated with lower word count in scene descriptions ( $\rho = -0.41$ ,  $p = .024$ )

### PANSS-8 Positive & Negative Item Symptom Severity and Emotional Tone in Speech No significant associations in this pilot sample



### Higher Usage of Negative Emotional Words while Describing Scenes in People Experiencing Suicidal Ideation at Hospital Admission



\* $p < .05$

Higher usage of negative emotion words ( $t(18.8) = -2.17$ ,  $p = .043$ ,  $d = -0.79$ ) and words with negative emotional tone ( $t(20.4) = -2.45$ ,  $p = .023$ ,  $d = -0.9$ ) in people experiencing SI at hospital admission.

No significant difference between SI groups in positive emotion words, words with positive emotional tone, or first-person singular or plural pronouns ( $t < 1$ ;  $p > .1$ ).

### Example Participant TAT Scene Descriptions: Emotion Words & Suicidal Ideation

	Experiencing Suicidal Ideation	Not Experiencing Suicidal Ideation
<b>TAT Boy in Doorway Scene</b>	"See a child that's, uh, <b>bored</b> ... It's like he wants to go <b>play</b> , but it's all about working. Just <b>lonely</b> and <b>hurt</b> ."  "The child looks in <b>despair</b> ... very <b>poor</b> and he's <b>worried</b> ."  "He might be <b>mad</b> at his father. His father might have not bought him as much <b>candy</b> as he wanted... he might have been <b>offered</b> a job working at a coal mine."	"He's just <b>chillin'</b> by himself... He's <b>happy</b> , he's just <b>loving</b> the sun... He don't even got a door to his house, and he don't even <b>care</b> ... He knows that Pa is probably up there hunting and he'll be back."
<b>TAT Boat Scene</b>	"...but the son realized he really wasn't moving ahead in life... so he decided to <b>reject</b> the boats, and he <b>relapsed</b> on crystal meth again... His parents are <b>pissed off</b> <b>peaceful</b> , <b>calm</b> day, not too too because no one is using the boat."	"Just a <b>cool</b> , <b>relaxing</b> beautiful day. A little boat is tied off, where they went and had a <b>nice</b> little <b>picnic</b> off the water... really <b>peaceful</b> , <b>calm</b> day, not too bright, not too dark, which is <b>perfect</b> ."
<b>Color coding key:</b>	<b>POSITIVE: Tone; Emotion; NEGATIVE: Tone; Emotion</b>	

## Conclusions & Future Directions

- Results contribute to research of improving prediction of suicide risk among individuals with psychotic disorders using easy-to-collect speech samples

Future goals:

- Continue data collection to build larger sample with greater statistical power
- Analyze relationships between emotionally valenced language and organization of speech
- Analyze emotionally valenced language and first-person pronoun usage in IP11<sup>15</sup> life story narratives within this same study to assess variation in lexical characteristics by speech context
- Conduct comprehensive quantitative and qualitative analyses of speech data using variety of linguistic tools to characterize different stages of illness and symptom and cognitive profiles
  - Improve future assessments and treatments for challenges organizing thought and speech among individuals with psychotic disorders

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