What We Are Learning About Brain Biology and Borderline Personality Disorder

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What Is Borderline Personality Disorder?
What’s in a Name?

- Psychosis
- Neurosis
- Mood Disorders
- Identity Disorders
- Depressive Syndromes
- Impulsive Syndromes

A pervasive pattern of instability of interpersonal relationships, self-image, and affects, and marked impulsivity

Tyrer (2009)
Challenges with Diagnosing BPD

- There is not always sufficient time for clinicians to conduct a comprehensive assessment of personality disorders.

- People with BPD frequently have other co-occurring psychiatric diagnoses (e.g., major depression, substance use disorders, posttraumatic stress disorder), which may be the initial focus of clinical attention.

- When an individual’s presenting problem is another mental health concern, BPD (and other personality disorders) may be overlooked and could lead to underdiagnosis.

- Two individuals with BPD may have only one symptom in common (yet have the same diagnosis).
Core Symptom Domains of BPD

- Emotion Dysregulation
- Disturbed Relatedness
- Behavioral Dysregulation

Clarkin et al. (1993); Sanislow et al. (2000)
Factors That Cause And Maintain BPD

- Childhood trauma or maltreatment, but causal link is unclear
- Heritability .65-.75, with potential epigenetic changes linked to childhood maltreatment
Brain
Biology
Emotion Dysregulation

Disturbed Relatedness

Behavioral Dysregulation
Emotion Regulation Strategies In BPD

**Used More Frequently in BPD**
- Suppression
- Rumination
- Avoidance

**Used Less Frequently in BPD**
- Cognitive Reappraisal
- Problem-Solving
- Acceptance

↑ Rumination, ↓ Problem-Solving → Potentially Harmful Behaviours

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Age</th>
<th>Gender (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPD</td>
<td>99</td>
<td>30.2</td>
<td>91.3%</td>
</tr>
<tr>
<td>Relatives</td>
<td>103</td>
<td>39.8</td>
<td>51.4%</td>
</tr>
<tr>
<td>Controls</td>
<td>74</td>
<td>30.0</td>
<td>93.9%</td>
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</tbody>
</table>

Psychiatric Diagnoses in Families

- **Major Depression (Past)**
  - BPD: 43%
  - Relatives: 27%

- **Alcohol Dependence (Past)**
  - BPD: 35%
  - Relatives: 12%

- **Social Anxiety Disorder (Current)**
  - BPD: 18%
  - Relatives: 4%

- **PTSD (Current)**
  - BPD: 23%
  - Relatives: 5%
Familial Aggregation of Difficulties in Emotion Regulation

Theory of Emotion Dysregulation in BPD

- Hypersensitivity to emotions
- Difficulty regulating emotions
Neural Activity Associated With Negative Versus Neutral Emotional Items

Are Neutral Faces Really “Neutral” for People with BPD?

Better emotion recognition at lower levels of intensity

Worse emotion recognition at higher levels of intensity

Intensity

Lynch et al. (2006)
Brain Activation and “Neutral” Facial Expressions in BPD

Do Adolescents with BPD Traits Show the Same Neural Differences as Adults?

During implicit angry face perception, we identified a *hyposynchronous* fronto-limbic circuit, which included connections among bilateral amygdalae and bilateral anterior cingulate cortex.

Disturbed Relatedness

Affective Dysregulation

Behavioral Dysregulation
Are Neutral Faces Really “Neutral” for People with BPD?

Better emotion recognition at lower levels of intensity

Worse emotion recognition at higher levels of intensity

Intensity

Lynch et al. (2006)
People with BPD Make More Errors Recognizing Highly Arousing Negative Emotions and Neutral Expressions

Meta-Analytic Review:
266 patients with BPD
255 healthy controls
91% women, mean age = 29.0
74% medicated

Emotion Recognition in Families with BPD

BPD are less accurate at identifying neutral faces compared to relatives and controls.

Gulamani et al. (in press). Facial emotion recognition biases in probands with borderline personality disorder and first-degree biological relatives. *Journal of Personality Disorders.*
Response Speeds and “Misperceptions” of Specific Emotions

BPD and relatives are slower than controls to respond to sad facial expressions, and they are more likely to perceive sad faces as fearful.

Gulamani et al. (in press). Facial emotion recognition biases in probands with borderline personality disorder and first-degree biological relatives. *Journal of Personality Disorders.*
Cyberball—A Task for Studying Interpersonal Ostracism

Williams et al. (2000)
People with BPD are Sensitive to Interpersonal Exclusion

People with BPD Show Higher Frontal Cortex and ACC Activity during Social Exclusion

Disturbed Relatedness
Affective Dysregulation
Behavioral Dysregulation
Neurocognitive Domains

ADHD?  Learning Disorders?
When asked about neurodevelopmental features, both adults with BPD and relatives more frequently reported having had difficulty concentrating and sitting still in school, and minor detentions at and suspensions from school.
Multiple Neurocognitive Domains are Affected in BPD

Cohen's $d$

- Attention: -0.59
- Processing Speed: -0.68
- Verbal Memory: -0.45
- Visual Memory: -1.59
- Visuospatial: -0.59
- Cognitive Flexibility: -0.29
- Planning: -1.43

266 patients with BPD
255 healthy controls

Neurocognitive Deficits Are Associated with Trauma in BPD

<table>
<thead>
<tr>
<th></th>
<th>Verbal Comprehension</th>
<th>Perceptual Reasoning</th>
<th>Processing Speed</th>
<th>Response Inhibition</th>
<th>Verbal Working Memory</th>
<th>Visuospatial Working Memory</th>
<th>Sustained Attention</th>
<th>Visual Memory</th>
<th>Verbal Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controls (n=56)</td>
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<tr>
<td>BPD (n=45)</td>
<td>-0.02</td>
<td>-0.03</td>
<td>0.00</td>
<td>-0.03</td>
<td>-0.01</td>
<td>-0.03</td>
<td>-0.02</td>
<td>-0.04-0.06</td>
<td>-0.02-0.05</td>
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Childhood physical abuse was associated with more severe deficits in verbal comprehension. Additionally, patients with BPD and PTSD performed worse in verbal comprehension, visual episodic memory, and perceptual reasoning.

Prefrontal Cortex Activation during Response Inhibition in Families with BPD

Changes in Monthly Rates of Self-Harm After 7 Months of DBT

Cumulatively, rates of self-harm reduced after 7 months of treatment ($p = .001$), especially burning, hitting and "other" forms of self-harm.

Brain Stimulation Treatment
Can We Use What Is Known About The Brain In BPD To Inform Treatment?

Magnetic Seizure Therapy for Suicidal Ideation and Depression in BPD

MST induces seizures by applying magnetic stimulation to the brain, and may be an alternative to ECT. Provided under general anesthesia.
Magnetic Seizure Therapy (MST)

- An innovative, non-invasive, convulsive therapy that uses high-frequency repetitive magnetic stimulation.

- Demonstrated safety and efficacy for treatment-resistant unipolar and bipolar depression (Kayser et al., 2011; Sun et al., 2016; Tang et al., 2020; Weissman et al., 2020).

- Associated with fewer cognitive side effects compared to electroconvulsive therapy (Daskalakis et al., 2019; Tang et al., 2018; 2020).
Is MST Safe and Effective for Treating Suicidal Ideation and Depression in BPD?

- MST has shown promise for reducing suicidal ideation when stimulation is applied to the dorsolateral prefrontal cortex (DLPFC) (Sun et al., 2016; Weissman et al., 2020).

- To date, MST not been studied in people with comorbid treatment-resistant MDD and BPD.
Future Directions
Suicide and Treatments

- We are about to begin a new study funded by the American Foundation for Suicide Prevention to understand how brain-based biomarkers of decision-making place people at risk for suicide attempt, including people with BPD.

- We are systematically reviewing and synthesizing the existing research literature on brain stimulation treatments and their effects on suicide-related outcomes (e.g., suicidal ideation, self-harm).
ICD-11 proposes to replace the previous edition’s diagnostic categories with a dimensional trait model, along with an overall level of severity of personality dysfunction (self/interpersonal).
Alternative Models of Personality Disorder: Resting State Connectivity, Personality Disorder, and Personality Impairment

- More severe self-interpersonal impairment was associated with stronger intra-limbic connectivity

Thank you!


BPD Resources:

Families for BPD Research (https://familiesforbpdresearch.org)
The Sashbear Foundation (https://sashbear.org)
National Educational Alliance BPD (https://www.borderlinepersonalitydisorder.org)
TARA4BPD (https://www.tara4bpd.org)
Emotions Matter (https://emotionsmatterbpd.org)