What is the relationship between Neurodevelopmental and Psychiatric Disorders and Parkinson's Diseasse?

Neurodevelopmental and **Psychiatric Disorders** in **Parkinson's Disease**

Parkinson's disease is linked to **psychiatric disorders** in two directions: psychiatric symptoms are common within PD, and several mental illnesses often precede a later PD diagnosis, although whether they are true causal risk factors or early prodromal manifestations remains unsettled (Weintraub, 2020; Yoon et al., 2024; Wu et al., 2023). Neurodevelopmental disorders, especially **autism-related conditions**, also show overlap with PD through higher rates of parkinsonism and shared genetic pathways, but this evidence base is smaller and more heterogeneous than the psychiatric literature (Mai et al., 2023; Torres et al., 2020; Rast et al., 2025).

Neurodevelopmental and Psychiatric Disorders and PD

Evidence Strength	Claim
Strong	**Mental illnesses** are associated with a higher subsequent PD risk in large observational cohorts, with stronger associations for **early-onset PD** than late-onset PD (Yoon et al., 2024)
Strong	**Psychiatric disorders are common within PD** itself, often begin in prodromal or de novo stages, and cumulative prevalence for many syndromes exceeds **50%** (Weintraub, 2020)
Moderate	**Autism spectrum disorder** and related neurodevelopmental conditions show overlap with PD through increased parkinsonism, higher odds of PD/NDC co-occurrence, and shared genes such as **PARK2** (Mai et al., 2023; Rast et al., 2025; Torres et al., 2020)

FIGURE 1 Evidence strength for disorder links with Parkinson's disease

Preceding Psychiatric Illness

Large human studies consistently report that depression, anxiety, bipolar disorder, schizophrenia-spectrum illness, insomnia, and other mental illnesses are associated with later PD diagnosis (Yoon et al., 2024; Shvartsur et al., 2025). In a nationwide cohort of nearly 10 million people, mental illness was more strongly associated with **early-onset PD** than late-onset PD, suggesting that psychiatric vulnerability may be particularly relevant in younger PD presentations (Yoon et al., 2024).

The main caveat is interpretation. Some associations could reflect **prodromal PD** rather than independent causes, especially for depression, anxiety, and sleep disturbance, which can appear before motor diagnosis (Yoon et al., 2024; Ishihara & Brayne, 2006; Wu et al., 2023). Genetic causal inference remains mixed: one Mendelian randomization study found little support for most psychiatric disorders causing PD, but did find evidence that genetically predicted PD increases bipolar disorder risk (Wu et al., 2023).

Neurodevelopmental Overlap

- **ASD shows elevated parkinsonism**, with parkinsonian syndromes more frequent than in controls across reviewed studies (Mai et al., 2023).
- In **Rett syndrome**, parkinsonian features are common, with reported prevalence of **40%–80%** (Mai et al., 2023).
- PD and neurodevelopmental disorders share genes and pathways involving **PARK2, SNCA, FMR1,** and synaptic/neurogenesis biology (Mai et al., 2023; Torres et al., 2020).

Recent population data extend this beyond autism alone: Parkinson's disease cases had about **2.09-fold higher odds** of neurodevelopmental conditions than controls after adjustment for psychiatric and cardiometabolic factors (Rast et al., 2025). Newer phenotypic work also suggests elevated **autistic traits** in PD, especially in males, though this finding is early and not specific to PD versus all motor disorders (Dey et al., 2025).

Shared Biology and Limits

Shared mechanisms proposed across PD, psychiatric, and neurodevelopmental disorders include **dopamine and monoamine dysfunction**, chronic inflammation, mitochondrial dysfunction, synaptic abnormalities, protein handling, and gut-brain-axis signaling (Wu et al., 2023; Payares et al., 2024; Mitrea et al., 2022; Denman et al., 2023). Sex may modify some of these links, particularly through microbiota-brain and immune pathways, but this remains emerging rather than settled (Holingue et al., 2020; Shobeiri et al., 2022).

Not every psychiatric association means shared disease biology. Some symptoms arise from PD treatment itself, and interventions such as **subthalamic deep brain stimulation** can precipitate depression, mania/hypomania, psychosis, anxiety, or hypersexuality (Weintraub, 2020; De Almeida Lellis et al., 2024). Diagnostic confounding also matters because antipsychotic-induced parkinsonism can mimic PD (Wu et al., 2023; Shvartsur et al., 2025).

Overall, Parkinson's disease has a **substantial relationship** with both psychiatric and neurodevelopmental disorders: psychiatric disorders are common within PD and often precede it, while neurodevelopmental disorders —especially autism-related conditions—show clinical and genetic overlap with PD. The strongest evidence is for psychiatric associations in large cohorts; neurodevelopmental links are credible but less mature and need more prospective and mechanistic study (Yoon et al., 2024; Mai et al., 2023; Yoon et al., 2024).

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