Psychiatry Research

Volume 170, Issue 1, 30 November 2009, Pages 43-51

Review article

# Neurological considerations: Autism and Parkinson's disease

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https://doi.org/10.1016/j.psychres.2008.07.014

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## Abstract

Within the spectrum of disorders that manifest obsessive–compulsive (OC) features lies a sub-cluster of neurological conditions. Autism and Parkinson's disease (PD) are examples of two such neurological disorders that seem quite dissimilar on the surface. Yet, both conditions can include repetitive behaviors of a compulsive–impulsive nature. Furthermore, while autism and PD differ in other associated symptom domains that shape the course of each disorder, both disorders share some phenomenology in the core domain of repetitive behaviors and involve basal ganglia and frontal lobe dysfunction, similar to OC disorder (OCD). Accordingly, examination of the similarities and differences between autism and PD may provide insight into the pathophysiology and treatment of OC spectrum disorders. The current review focuses on the phenomenology, comorbidity, course of illness, family history, brain circuitry, and treatment of autism and PD, as they relate to OCD and OC spectrum disturbances.

## Section snippets

### Autism

Autism spectrum disorders (ASD), including autism, Asperger's syndrome, and pervasive development disorder-not otherwise specified, are characterized by significant impairments in social communication and the presence of repetitive behaviors and restricted interests (American Psychiatric Association, 2000). The repetitive behavior domain comprises phenomena that overlap significantly with those observed in OCD and OC spectrum disorders and can be conceptualized as higher- and lower-order …

### OC spectrum behaviors in autism and PD—shared phenomenology

Pathological repetition is a common feature of OC spectrum behavioral disturbances in both autism and PD, although the types of behavior occur at many different levels of function, including rituals, preoccupations, or inflexible activity (Ridley, 1994). Using the nomenclature from the autism literature, the higher-order and lower-order repetitive behaviors and punding are the most salient OC spectrum behaviors shared by patients with autism and PD. While punding behaviors in PD have not been …

### Autism

Comparisons of rates of comorbid psychopathology with OC spectrum behaviors in autism relative to PD are limited in that most studies on OCS and OCD in the PD literature have not ascertained formal psychiatric diagnoses. A subgroup of patients with ASD and prominent OCD symptomatology may also have comorbid motor/vocal tics (Kerbeshian and Burd, 1996) and attention deficit hyperactivity disorder (ADHD) (Goldstein and Schwebach, 2004), as is also seen in pediatric OCD. These comorbid conditions …

## Autism

The onset of autism occurs prior to the age of three. Autism is thought to be present from birth, although a small minority of parents report near-normal development in their children prior to a loss of social and communicative skills between 15 and 24 months of age (Davidovitch et al., 2000, Goldberg et al., 2003). Autism affects more males than females at a ratio of approximately 4 to 1 (Fombonne, 2005). Although parents report some symptom improvement in adolescence as compared to middle …

## Autism

Autism is one of the most heritable of all behavioral disorders. Twin studies show a concordance rate of 60–90% in monozygotic twins, which drops to less than 5% for dizygotic twins (Bailey et al., 1995, Rutter et al., 1999). The risk of ASD in siblings of individuals with autism is estimated at 6% (Icasiano et al., 2004), while the risk for broader phenotype traits (including poor social language abilities, restricted interests/OCD type traits) in first-degree relatives is approximately 30% ( …

## Autism

In a subsample of individuals with more severe OC behaviors, linkage analysis revealed evidence for an autism susceptibility gene on chromosomes 1, 6, and 19 (Buxbaum et al., 2004). As with OCD, there is some support for an association with the serotonin transporter gene SLC6A/5-HTT. Three recent genome scans have reported linkage evidence to 17q11-12, where SLC6A is located (Cantor et al., 2005, McCauley et al., 2004, Risch et al., 1999), but evidence for association with the 5-HTTLPR …

## Brain circuitry

The common occurrence of OC spectrum behaviors in autism and PD, as well as other neurological disorders involving the basal ganglia, such as Huntington's disease, provides support for the role of basal ganglia dysfunction in idiopathic OCD (Rauch et al., 1998) and suggests shared neural mechanisms, at least in part, across seemingly disparate conditions (Graybiel, 2004). For example, both autism and PD involve multiple brain regions, and proposed models of dysfunctional neurocircuitry in both …

## Autism

Some commonalities exist between OCD and autism in terms of neurotransmitter function and pharmacological response. Hollander et al. (2000) observed that the severity of repetitive behaviors in adults with autism or Asperger's syndrome was linked to serotonin function as measured by 5HT1d receptor sensitivity. In addition, PET revealed an increase in 5HT-2A receptors in patients with autism relative to controls (E. Hollander & M. Laruelle, unpublished data). Clearly, dopaminergic dysfunction …

## Autism

Vagus nerve stimulation (VNS), repetitive transcranial magnetic stimulation (rTMS) and deep brain stimulation (DBS) have all been examined as treatment options for OCD. A couple of preliminary studies with small numbers of subjects suggest that participants with "autistic behaviors" may show behavioral improvements following VNS (Park, 2003), but the subjects in these studies were poorly characterized. With regard to rTMS, because of a couple of reports of the effectiveness of rTMS for treating …

## Autism

Cross-cultural issues have not yet been well studied, but autism appears to occur across all ethnicities and nationalities. Although it has been theorized that autism is more prevalent among immigrant families (e.g., Gillberg et al., 1987), these reports have relied on a very small sample size. A large epidemiological survey in the UK found no differences for ethnicity in the prevalence of pervasive developmental disorders, including autism (Fombonne, 2005). …

## Parkinson's disease

Published reports from multiple …

## Summary

OC spectrum behaviors occur in PD and in autism and the autism spectrum disorders, including Asperger's syndrome and pervasive developmental disorder-not otherwise

specified. The phenomenological similarities in repetitive behaviors occurring across conditions, especially punding in PD and stereotypies in the autistic disorders, suggest shared pathology with idiopathic OCD and the OC spectrum. For autism, other important similarities with OCD are seen in the areas of comorbidity, course of …

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## References (117)


Barnea-GoralyN. *et al.*
White matter structure in autism: preliminary evidence from diffusion tensor imaging
Biological Psychiatry (2004)

CantorR.M. *et al.*
Replication of autism linkage: fine-mapping peak at 17q21
American Journal of Human Genetics (2005)

CoolsR. *et al.*
L-Dopa medication remediates cognitive inflexibility, but increases impulsivity in patients with Parkinson's disease
Neuropsychologia (2003)

CzerneckiV. *et al.*
Motivation, reward, and Parkinson's disease: influence of dopatherapy
Neuropsychologia (2002)

FriedmanJ.H.
Punding on levodopa
Biological Psychiatry (1994)

GraybielA.M.
Network-level neuroplasticity in cortico–basal ganglia pathways
Parkinsonism Related Disorder (2004)

GraybielA.M. *et al.*
Toward a neurobiology of obsessive–compulsive disorder
Neuron (2000)

HarbishettarV. *et al.*
Is there a relationship between Parkinson's disease and obsessive–compulsive disorder?
Parkinsonism Related Disorder (2005)

HollanderE. *et al.*
The relationship between repetitive behaviors and growth hormone response to sumatriptan challenge in adult autistic disorder
Neuropsychopharmacology (2000)

HollanderE. *et al.*
Obsessive–compulsive behaviors in parents of multiplex autism families
Psychiatry Research (2003)


View more references

## Cited by (26)

The role of alpha-synuclein and other parkinson’s genes in neurodevelopmental and neurodegenerative disorders ↗
2020, International Journal of Molecular Sciences

Synaptic dysfunction in neurodegenerative and neurodevelopmental diseases: An overview of induced pluripotent stem-cell-based disease models ↗
2018, Open Biology

High rates of parkinsonism in adults with autism ↗
2015, Journal of Neurodevelopmental Disorders