

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Reflection on the future of autism research: the continuum hypothesis

Rebecchi Kevin, PhD

Author affiliations:

Development of Individuals, Processes and Disabilities in Education Research Unit University
Lumière Lyon 2, France

Education and Diversity in French-speaking Areas Research Unit
University of Limoges, France

Réflexion sur l'avenir de la recherche sur l'autisme : l'hypothèse du continuum

Rebecchi Kevin, PhD

Affiliation de l'auteur :

Unité de recherche Développement Individu Processus Handicap Éducation
Université Lumière Lyon 2, France

Unité de recherche Éducation et Diversités en Espaces Francophones
Université de Limoges, France

<https://orcid.org/0000-0001-6948-1584>

Abstract

Since about a century, researchers and clinicians have tried to find a drug treatment, diagnostic rubrics and therapy to treat autism. Yet, Sukhareva, Kanner and Asperger wondered about autism etiology and pathogenesis and continued for decades with no result. Thus, one of the very first problems of autism has been to find a consensual definition. Neither Wing's Triad nor successive international classifications and manuals have been able to answer these questions clearly and definitively.

In this paper, I discuss the "continuum hypothesis", meaning that there is a tree of neurodevelopmental disorders and that autism could be only one of the sub-branches. I will highlight all the research that argues for a phenotypic and genetic overlap between neurodevelopmental disorders. The hypothesis of a continuum is materialized through the existence of a "neurodevelopmental disorders tree" composed of three elements grouping under the same framework the autism spectrum disorder, the attention-deficit disorder with or without hyperactivity, the schizophrenia spectrum and bipolar disorders: a Global Neurodevelopmental Disorder, an Extreme Sensitivity to the Environment Syndrome and a Neurotransmission Systems Dysfunction Disorder.

Keywords: Continuum, Autism, Neurodevelopmental Disorders, Autism Spectrum Disorder (ASD)

Résumé

Depuis environ un siècle, les chercheurs et les cliniciens ont essayé de trouver un traitement médicamenteux, des rubriques de diagnostic et une thérapie pour traiter l'autisme. Déjà, Sukhareva, Kanner et Asperger se sont interrogés sur l'étiologie et la pathogenèse de l'autisme et ont continué pendant des décennies sans résultat. Ainsi, l'un des tout premiers problèmes de l'autisme a été de trouver une définition consensuelle. Ni la triade de Wing, ni les classifications et manuels internationaux successifs n'ont pu répondre à ces questions de manière claire et définitive.

Dans cet article, je discute de l'« hypothèse du continuum », c'est-à-dire qu'il existe un arbre des troubles du développement neurologique et que l'autisme pourrait n'être qu'une des sous-branches. Je mettrai en évidence toutes les recherches qui plaident en faveur d'un chevauchement phénotypique et génétique entre les troubles neurodéveloppementaux. L'hypothèse d'un continuum se matérialise par l'existence d'un « arbre des troubles neurodéveloppementaux » composé de trois éléments regroupant dans un même cadre le trouble du spectre autistique, le trouble du déficit de l'attention avec ou sans hyperactivité, le spectre de la schizophrénie et les troubles bipolaires : un trouble global du neurodéveloppement, un syndrome de sensibilité extrême à l'environnement et un trouble de dysfonctionnement des systèmes de neurotransmission.

Mots-clés : Continuum, Autisme, Troubles neurodéveloppementaux, Trouble du Spectre Autistique (TSA)

I) Introduction

A) Brief history of autism (1880“-1970“)

More than 100 years ago, Schüle (Noll, 2012), Pick (1891) and Kraepelin (1896) coined and popularized the concept of dementia praecox and discussed that of schizophrenia. Then Bleuler (1911) called “autism” a “detachment from reality” with a “predominance of the inner life” (1950, p. 63). He explained (2011) that this completion and splitting when feelings are too intense can be an inward as well as an outward defense, and that we need individuals with feelings that are too intense because they are the ones who are at the origin of exceptional acts. Then, Sukhareva described schizoid psychopathy in childhood considered today as the very first description (Wolf, 1996) of autism. Sukhareva described six boys and five girls (Rebecchi & Sukhareva, 2022). For boys (1926a, 1926b), she described four main characteristics: a particular type of thought (with a tendency to the abstract, the schematic, rationalization and ruminations), an autistic attitude characterized by staying away from the other children, adapting only with difficulty to this environment and never immersing in it completely (with a tendency to loneliness), a certain flatness and superficiality of feelings with a combination of anesthetic and hyperesthetic elements, a pronounced motor and some other special features (tendency to automatism, rhyme and neologisms, impulsive acts, grotesque behavior). Besides, she described five main characteristics for girls (1927a, 1927b): affective disorders (ambivalence of feelings, inadequacy of affective reactions, complicated and contradictory emotional combinations), negativism, hysterical symptoms, a specific type of thought (tendency to abstract, schematic thinking and ruminations) and motor impairment both less pronounced than in boys (with specific expressive movements).

Later, Kanner wrote about autistic disturbances of affective contact (1943) with a follow-up study 28 years later (1971). He described eleven children (eight boys and three girls) with good cognitive potential and explained autism as children’s inability early in life to relate to people and situations in the ordinary way, and an anxious and obsessive desire to preserve sameness. He also quoted Sukhareva (1949) to discuss the similarities between schizophrenia and autism. Asperger (1944) also reported disturbed and restricted relations with the environment but highlighted in same time that autistic children can see things and processes in the environment with a new point of view. He described children with specific physical and expressive manifestations, high cognitive functions (intelligence, creativity, reason, hyperlexia, hypernumeracy, perceptual abilities, hyperconsciousness, artistic skills), with some emotional and motor difficulties, following their impulses and interests, regardless of the environmental requirements, and a great social value (where in the best of cases accomplishments that no one but these autistic children would have been capable of). Frankl who influenced both Kanner and Asperger (Muratori, 2021), talked about an autistic continuum (1957) with two extremes we could today understand as a spectrum of conditions from Kanner’s autism to Asperger’s autism. He described autistic language in considerable details and considered autism as a “specific state of mind” not necessarily abnormal and as a “complement in the state of being ‘in communication with people’” (p. 6). Finally, Wing & Gould (1979) defined three “behavioral variables” also known as the triad of impairments, namely “absence or impairment of social interaction, especially with peers, “absence or impairment of development of verbal and nonverbal language” and “repetitive, stereotyped activities of any kind” (p. 13) with a “complete absence of symbolic, imaginative activities, including pretend play” (p. 16).

Ultimately, all this work influenced the discussions concerning the diagnosis of autism in the successive Diagnostic and Statistical Manual (DSM) of mental disorders.

B) Brief history of autism in the DSMs

The first DSM was created in 1952 and issues yet appeared (Blashfield et al., 2014). In this first edition (American Psychiatric Association, 1952) “autism” and “autistic thinking” are both quoted twice (pp. 12, 26, 28, 35) and are included in psychotic disorders and more precisely in schizophrenic reactions and schizoid personality. In the second edition (1968), autistic behavior and autistic thinking are both quoted once (pp. 35, 42) and are included in schizophrenia and schizoid personality. In the DSM-III (1980) autism is included in “infantile autism” and they’re mentioned 52 times. Infantile autism was part of pervasive developmental disorders (PDD) and was especially characterized by “pervasive lack of responsiveness to other people,” “gross deficits in language development,” “bizarre responses to various aspects of the environment,” “peculiar speech patterns” and “absence of delusions, hallucinations, loosening of associations, and incoherence” (pp. 89–90) and included childhood autism

and Kanner's syndrome. The revision of this third version (1987) changed infantile autism into “autistic disorder” which was characterized by “impairment in reciprocal social interaction,” “impairment in verbal and nonverbal communication, and in imaginative activity” and “markedly restricted repertoire of activities and interests” (pp. 38–39). The fourth version (1994) included autistic disorder and Asperger’s disorder (and atypical autism) in PDD. The diagnostic criteria for autistic disorder were “qualitative impairment in social interaction,” “qualitative impairments in communication” and “restricted repetitive and stereotyped patterns of behavior, interests, and activities” (pp. 70–71). Thus, the precision about “imaginative activity” was removed. The revision of this fourth version (2000) made some rewording in the PDD Not Otherwise Specified (Including Atypical Autism). The fifth version (2013) deleted the PDD and changed it into the current autism spectrum disorder (ASD) corresponding to the old “autistic disorder, Asperger's disorder, and pervasive developmental disorder” (p. xlii). ASD is characterized by “persistent deficits in social communication and social interaction across multiple contexts” and “restricted, repetitive patterns of behavior, interests, or activities” (p. 50). The revision of this fifth version (2022) included slightly changes from “as manifested by the following” to “as manifested by all of the following” meaning that three persistent deficits are absolutely required in social communication and social interaction across multiple contexts whereas before one or two could be enough.

C) Some current issues with autism, ASD and the DSM

We observed several changes during the last decades and that these are in discrepancy with all the observations and analyze from Sukhareva, Kanner and Asperger. This last DSM version isn’t unanimous and Wing et al. (2011) criticizes for example the absence of autistic criteria relating to social imagination but also the problems of girls and women misdiagnosis. Also, it isn’t surprising that McPartland et al. (2012) and Smith et al. (2015) noticed that the last DSM excludes a lot of people previously considered autistic or with a PDD. Furthermore, Mottron (2021) called for new standardized categorical type diagnosis and to focus research on prototypical individuals because autism in DSM is too heterogenous and vague, and the genetic landscapes are too wide (Betancur, 2011; Huguet et al., 2013). However, Chaste et al. (2015) highlighted that reducing the phenotypic heterogeneity in autism doesn’t increase the genetic homogeneity. Thus, Waterhouse & Gillberg (2014) explained that no single valid neurobiological entity linked to autism has been found and that is necessary to study individual variation in autistic people brain. Waterhouse et al. (2017) therefore called for an abandonment of the diagnosis of ASD because only the dismantling of diagnostic categories may bring new accurate neurobiological and genetic diagnostic-based (Waterhouse, 2021) but Ure et al. (2018) provided a dimensional approach to autism assessment, considering eight spectra of abilities, thought patterns, and behaviors to better understand the heterogeneity of autism (Gillberg et al., 2019) and the lack of a single etiology. Other unifying theoretical frameworks are regularly proposed such as The Pathogenetic Triad (Sarovic, 2021) composed of an autistic personality dimension, cognitive compensations and neuropathological risk factors.

However, after a century of observations, debates, classifications and analyses, we still don’t have a final answer on the etiology, nosology and diagnosis of autism. This is why in this article I’m considering one avenue that can overcome these theoretical and empirical obstacles. Indeed, if we consider there is no single autistic neurobiological, genetic and physiopathological entity, it’s therefore necessary to broaden the question and to question on the existence of a single continuum of neurodevelopmental disorders.

II) Switching from “individual” neurodevelopmental disorders to a “global” neurodevelopmental disorders tree: the continuum hypothesis

A) DSM, RDoC and autism

Tsuang et al. (1993) discussed the creation of a psychiatric nosology based on genetics through strong statistical analysis and neurodiagnostic for patients, but twenty years ago, genetics-based psychiatry was still in its infancy. Beutler and Malik (2002) called for a rewriting of the DSM to better match with patients’ needs. The main DSM issue was reported by Kendell and Jablensky (2003) about the validity of psychiatric diagnoses which aren’t separated by natural boundaries. Some investigations have been especially made in quantitative genetic studies to establish the underpinnings of genetic and

environmental influences of adult psychopathology (Shih, 2004). Then the US National Institute of Mental Health (NIMH) launched and funded in 2009 the Research Domain Criteria (RDoC) which is a mental disorders research framework to answer all the current nosology validity issues. These issues especially concern heterogeneity, comorbidity, the exclusion of some people because they don't match with the pure diagnosis and the absence of dimensional conceptualizations which could prevent from arbitrary consensus. The main objective was to create a biologically based nosology rather than a clinical observation symptom like the DSM even if the RDoC doesn't aim to replace it. It's based on six domains (negative valence, positive valence, cognitive systems, systems for social processing, arousal/regulatory systems and sensorimotor systems) taking into account environmental and neurodevelopmental contexts and also neural and behavioral dimensions (NIMH, 2021). The six domains matrix (NIMH, 2022a) are organized through different dynamic elements (genes, molecules, cells, circuits, physiology, behaviors, self-reports and paradigms) (NIMH, 2022b). Moreover, even if they're different, DSM and RDoC both aim to find treatment for people.

The current diagnostic system isn't informed by recent breakthroughs in genetics; and molecular, cellular and systems neuroscience (NIMH, 2013) and doesn't allow to clarify the different psychopathological overlaps and boundaries. Hyman (2010) pointed out the modern DSM system, intended to create a shared language, also creates epistemic blinders that impede progress towards valid diagnosis. Moreover, Insel et al. (2010) highlighted that the diagnostic categories based on clinical consensus don't correspond to results from clinical neuroscience and genetics and don't allow to give adequate treatments to patients. Indeed, Dyck et al. (2011) studied developmental coordination disorder and mixed receptive expressive language disorder and noticed there were no natural boundaries between the disorders or between the disorders and normalcy. That's why Cuthbert & Insel (2013) and Casey et al. (2013) worked on new psychiatric nosology to overcome the problems of diagnostic labels not corresponding to distinct entities. Geschwind & Flint (2015) also observed the heterogeneity and polygenicity of psychiatric disorders, and Owen (2015) noted the need to neurobiological stratify patients and to promote large-scale experimentation to bring out a neurodevelopmental continuum. The RDoC could thus make it possible to overcome the limits of the DSM—validity and clinical usefulness of the diagnosis, tensions between researchers and clinicians (Whooley, 2016) but also false positives, blurred boundaries between disorders and the distinction between risk and disorder (Wakefield, 2016)—gaining clinical efficacy and social legitimacy by transforming psychiatry into clinical neuroscience (Le Quang & Gansel, 2016). This shows the importance of creating alternative and complementary classification systems, such as the International Classification of Diseases (ICD) (Doernberg & Hollander, 2016). However, Carpenter (2016) wondered if the paradigm shift claimed by the RDoC will promote information that informs new nosology and facilitate diagnoses. The RDoC raises many questions about the boundaries between normality and disorder, between psychiatric and neurological diseases, or about a possible new clinical nosology based on genetics (Smoller et al., 2019). Considerations are already being made on autism with the RDoC framework (Harrison et al., 2021; Hennessey et al., 2018; Ibrahim & Sukhodolsky, 2018) but much remains to be done. Other medical taxonomies and models exist (Gillberg, 2010; Knott et al., 2021; Kotov et al., 2017; Salicru, 2020) but don't fully include the genetic overlap between neurodevelopmental disorders.

B) Phenotypic and genetic characteristics shared intra-psychopathology: neurodevelopmental overlap and continuum

The relationships between the different pathologies are found in shared genetic variations. Gandal et al. (2018) investigated molecular brain phenotypes linked to ASD, schizophrenia, bipolar disorders (BD), alcoholism and depression and identified “patterns of shared and distinct gene-expression perturbations (...) suggesting a significant causal genetic component” and some “pathways of molecular convergence” (p. 693). Thus, they highlighted that the shared genetic factors suggest a cross disorder expression overlaps with probably some environmental effects. Other researchers found overlaps between autism, schizophrenia spectrum (SS) and BD (Ellis et al., 2016; Goes et al., 2016) but also clear differences, especially in monozygotic twins (Dempster et al., 2011). Although some clear phenotypic or genetic distinctions have been reported between autism, schizophrenia, Attention-Deficit/Hyperactivity Disorder (ADHD) and BD (Albajara Sáenz et al., 2020 ; Antshel & Russo, 2019 ; Antshel et al., 2013 ; Boedhoe et al., 2020 ; Christakou et al., 2013 ; Cristino et al., 2014 ; Di Martino et al., 2013 ; Dougherty et al., 2016; Godoy et al., 2021 ; Lim et al., 2015 ; Mahajan et al., 2016 ; Park

et al., 2018 ; Scholl & Philippe, 2012 ; Seernani et al., 2021 ; Sinzig et al., 2009 ; Stoodley, 2014 ; van der Meer et al., 2012 ; Zhang et al., 2022), it is impossible to ignore all overlaps between at least two of these disorders that have been discovered - even if some are still embryonic as for example for ASD and BD or ADHD and BD - over the past 25 years (Table 1).

These genetic associations could confirm a shared etiology between all the neurodevelopmental disorders and could lead to discussing the idea that a single "pathological spectrum" exists and that the modifications and differences could be found at the epigenetic scale, namely that change could occur with the environment of individuals (example: diet, medication, stress, diseases and frameworks and lifestyle in a more general way). Some researchers also speak of a cognitive continuum between autism and dyslexia (Williams & Casanova, 2010), between ADHD and dyslexia (Sánchez-Morán et al., 2018) and between the borderline personality disorder and ASD (Dudas et al., 2017). Zhu et al., 2014 noticed that some mutations in the same gene or genomic region can increase the risk of many complex neuropsychiatric disorders. Besides the overlaps between two disorders (Table 1), we can also notice many continua (Table 2) between three disorders or more.

Gonzalez-Mantilla et al. (2016) highlighted the shared genomic causes between intellectual disability (ID), ASD, ADHD, schizophrenia, bipolar disorder, and epilepsy. Also, Morimoto et al. (2021) noticed shared genetic risks between ASD, ADHD, bipolar disorder, depression, and schizophrenia. Cabana-Domínguez et al. (2022) ran a Genome Wide Association Study and noticed an association with the dopamine genes between ADHD, anorexia nervosa (ANO), ASD, bipolar disorder, major depression, obsessive-compulsive disorder (OCD), schizophrenia and Tourette syndrome (TS). The Cross-Disorder Group of the Psychiatric Genomics Consortium offered (2013) to move from the psychiatric descriptive syndromes to nosology informed by disease cause. Doherty & Owen (2014) also called for new classification systems for schizophrenia, bipolar disorder, major depressive disorder, ADHD and ASD. Moreover, Morris-Rosendahl & Crocq (2020) underlined that ID, ASD, ADHD, schizophrenia, and bipolar disorder lie on a neurodevelopmental continuum and Robinson et al. (2016) called for creating a continuum model to inform and better understand the neuropsychiatric disease biology. Yao et al. (2021) underlined the etiologic overlap between ASD, ADHD, schizophrenia, bipolar disorder, and major depressive disorder. These data may lead us to consider a global neurodevelopmental disorder similarity-based instead of differences-based and labels-based as in the DSM and this would be more RDoC compliant. Especially since the labels change regularly bringing people in or out and thus changing the diagnosed population (Smith et al., 2015). It therefore appears necessary to establish more precise diagnoses (cause-based) on brain particularities to keep a logical and clear continuity in time and space.

C) An inevitable conceptual and clinical reconfiguration?

In this part, we provide three propositions to create a new nosology: the first one is manifestation-based nosology, the second one is a cause-based nosology and the last one is a molecules-based nosology. These three proposals can be considered together or separately and aim to deepen the reflection on a new future nosology based on the etiologic overlap between ASD, ADHD, BD and SS and the resulting continuum. Usually, BD and SS aren't usually included in neurodevelopmental disorders (and not in DSMs) but some researchers argued they belong to (Fitzgerald, 2019; Gourion et al., 2004; Gupta & Kulhara, 2010; Kloiber et al., 2020; Owen et al., 2011; Madison et al., 2015; Mallet et al., 2021; O'Shea & McInnis, 2016; Stachowiak et al., 2013; Valli et al., 2019).

1) Proposition 1: the Global Neurodevelopmental Disorder (GND)

If the real aim of a diagnosis is to help people, it may lead us to organize a manifestation-and-difficulty-by-domain-based nosology, especially a classification with a general disorder and with/without some elements based on all the overlaps that we have been able to observe, abandoning the current nosology not because it wouldn't correspond to realities on the ground but because there is no automatic correlation between diagnosis and patient support. This proposition would somehow remix the DSMs and come back to an earlier label with the revival of PDD but whose non-specified type (Pervasive Developmental Disorder—Not Otherwise Specified, PDD-NOS) by combining the DSM characteristics of SS, BD, ADHD and ASD (Table 3) to create one with subtypes which could be the neurodevelopmental disorder norm rather than a residual disorder. Also, it would be possible to specify with/without each difficulty and it can optionally be sub-named with a label that should be discussed

(Asperger, Kanner, ADHD, etc.). So that would reverse what's been done since DSM-V and go backwards on PDDs. Thus, this new GND would serve more for the diagnosis and the help requested by the patients without social, cultural and political considerations as is the case today in the USA, in France, in Canada where help is provided according to the diagnosis. This solution would also have the merit of more or less reconciling and bringing together a lot of the current doctrines in an imperfect but clinically useful framework. This can also overcome the inconsistency of certain situations such as the incompatibility between certain diagnoses (ADHD and SS in the DSM-III, ADHD and ASD in the DSM-IV or nearly SS and ASD in the DSM-V). Moreover, this would therefore be an approach based more on the difficulties and the patients for whom the diagnosis is of no more interest than the expected help.

Because autism can be seen as a portmanteau syndrome (Waterhouse, 2009) we could provide nosology with some specifiers—not necessarily similar to those suggested by Harris (2019) and Mottron (2021)—selected from all of the shared difficulties which support the transdiagnostic idea based on a neurodevelopmental continuum (Table 4).

This manifestation-and-difficulty-based nosology (Table 4) would have different advantages for patients and professionals. Indeed, professionals may more easily tick the boxes because it would have fewer consequences than giving a diagnosis when the differential diagnosis is complicated. This would be easier for patients for the recognition of their difficulties regardless of diagnostic labels. Also, this would include more people than today. For example, a person who has some restricted, repetitive patterns of behavior and interests, four symptoms of current hyperactivity and impulsivity, and some grossly disorganized behavior, and some negative symptoms whom today may have any of the diagnoses. Also, an optional box with the prototypical old forms may be included for research purposes. However, this proposition seems less accurate and less appropriate for prototypes for which categories were created. Also, we would fall back into the old problems of this manifestation-based nosology, namely the absence of a real and full phenotypic and genetic reality and homogeneity. Hence the second proposition to build a new framework for this neurodevelopmental continuum.

2) Proposition 2: the Extreme Sensitivity to the Environment Syndrome (ESES)

In this part, I make the hypothesis and the proposition that the symptoms (Table 4) of the Global Neurodevelopmental Disorder (GND) are in reality only the manifestations and consequences of a sensitivity (including the faculties of perceiving, feeling, experiencing feelings and emotions, and receiving intellectual, moral, and aesthetic impressions) extreme (understood as exceeding ordinary limits and far from the average) to environment (internal and external environment of the person) and that this syndrome could be a better framework to bring together ADHD, ASD, SS and BD. Thus, it's a set of specific reactions related to the sensations experienced, to the information perceived through the nervous system of the person and specific receptors in the face of changes in the internal environment of the person and the external (natural and cultural) environment.

In the 20', in reply to Kretschmer (1921), Bleuler (2011) wrote about the term "syntone" for the individuals living in unison with their environment. This means that the affectivity of the individual is linked to the surroundings and that the individual experiences homogeneous impulses and feelings. Bleuler explained that when the syntonic subject is happy or sad, the other moods are silent, and it's then completely and entirely so he/she is dominated by only one mood or indulges in only one. Bleuler suggested that the characteristics of the cyclothymia-schizothymia framework proposed by Kretschmer are present in each of us to extremely different degrees (thus ranging from the normal form to an exacerbated and socially pathological form) and they are therefore part of the normality framework and can be considered a general characteristic in individuals and that's why he offered the term "syntone." These degrees could be explained by the differential genetic sensitivity to social environments theory (Mitchell et al., 2013) highlighting that some individuals are more sensitive to environmental influences (which can be favorable or unfavorable) due to certain genetic markers mostly influencing serotonergic and dopaminergic systems and the sympathetic nervous system. This idea is also supported by Belsky's (1997; 2013) theory about variation in susceptibility to environmental influence. Belsky proposed the individuals may have an evolutionary-inspired differential susceptibility which makes them more sensitive to their good and bad environmental exposures and developmental experiences. His theory was based on serotonergic and dopaminergic systems and genes (especially the 7-repeat DRD4 allele).

Moreover, Cabana-Domínguez et al. (2022) highlighted an overlap across dopamine genes between ADHD, anorexia nervosa (ANO), ASD, BD, major depression, OCD, schizophrenia and TS.

In ADHD individuals this extreme sensitivity to the environment can be characterized through the emotion dysregulation (Shaw et al., 2014), emotional lability (Baweja et al., 2021; Gisbert et al., 2019; Rosello et al., 2020) and the emotional sensitivity (Kim et al., 2016; Silverman et al., 2022) defined as the “emotional expressions and experiences that are excessive in relation to social norms and context-inappropriate; rapid, poorly controlled shifts in emotion (‘lability’); and the anomalous allocation of attention and to emotional stimuli” (2016, p. 277). This emotion dysregulation can also be observed in Disruptive Mood Dysregulation Disorder, Oppositional Defiant Disorder, the Severe Mood Dysregulation Disorder and the Sensory Processing Disorder. In schizophrenia, this extreme sensitivity to the environment can manifest itself through the extreme emotional intensity and variability experienced (Myin-Germeys et al., 2000), the higher levels of emotional reactivity to daily life stress (Myin-Germeys et al., 2001), the emotional overinvolvement (Leff, 1976) and interpersonal hypersensitivity (Zhu et al., 2017). In BD this extreme sensitivity can be understood as enhanced sensitivity to rewarding stimuli (Alloy & Nusslock, 2019) and an emotional reactivity to the environment that influences the different phases. M'Bailara (2009) provides a rereading of BD through a pathology of emotional reactivity, with a vulnerability to emotional dysregulation that would be present from the phases of normothymia based on a continuum ranging from emotional hyper-reactivity to emotional hypo-reactivity. This environmental sensibility can also be seen in the seasonal affective disorder (Partonen & Lönqvist, 1998). Finally, in autism this extreme sensitivity to the environment can manifest itself through Kanner's (1943) observation about the obsessive desire to preserve sameness, the emotional lability of autistic people (Bennett et al., 2017) the physical reactivity and sensibility to sensory, social and emotional, and stressor stimuli (Lydon et al., 2016) but also through the intolerance of uncertainty and anxiety (Stuart et al., 2020) and the Burnout, Inertia, Meltdown, and Shutdown (BIMS) experienced by autistic people (Phung, 2021). This may also explain the greater sensitivity of autistic people to trauma in everyday life (Haruvi-Lamdan et al., 2020; Rumball, et al., 2020, 2021). Siemann et al. (2020) suggested a multisensory dysfunction in autism and Ide et al. (2019) suggested this hypersensitivity can lay in a higher temporal resolution to sensory stimuli. Furthermore, Furgo-Olszewska & Jarosz (1993) proposed that autism and syntony are two poles of the same dimension, and Wood et al. (2021) suggested that sensory over-responsiveness in ASD and ADHD individuals could be linked to gamma-aminobutyric acid (GABA) and glutamate (Glu).

Ultimately, the Extreme Sensitivity to the Environment Syndrome could be characterized by an extreme syntony to the positive and negative experiences of the internal and external environment materializing by an absence of reaction and a detachment from the environment (hypo-synthonia) or a complete reaction and spontaneous participation and very rapid adhesion to the environment (hyper-synthonia). This syntony can be seen through cognitive (level of consciousness, attention, hallucinations, memory, cognitive flexibility, perception of time, perseverance, etc.) and affective hyperesthesia - emotional reactivity and excessive mood (M'Bailara, 2009) - to stimuli from the internal and external environment. This syntony can occur at different levels (body, senses, emotions, executive functions, interoception, exteroception, proprioception, etc.) and individuals can have opposite manifestations depending on the domain, such as social hyposynthonia coupled with affective hypersynthonia. Thus, this extreme sensitivity can cause the many social, communications, mood, cognition, and behavioral problems seen in ADHD, ASD, SS, and BD. This could be a manifestations-and-causes-based syndrome and not consequences-based disorder as for the previously proposed GND. However, although this disorder may fit with the idea of a neurodevelopmental continuum, systems other than dopaminergic and serotonergic systems (Belsky, 1997, 2013; Cabana-Domínguez et al., 2022; Mitchell et al., 2013) and GABAergic and glutamate system (Wood et al., 2021) aren't referred to in all the theories presented. Also, Massary et al. (2020) investigated the genetic architecture of Environmental Sensitivity and its heritability and noticed correlation between sensitivity, neuroticism and extraversion. Finally, the basic GND can be studied through a framework of genetic overlap creating modifications in the systems of neurotransmission (NSDD) ultimately creating an extreme sensitivity with social and communication repercussions. This SESE can be well understood as a butterfly effect, where a small stimulus can have big consequences. It would therefore lead to work on the environment of the person (and society in general) in the first place to help him/her and not on his/her behavior or his/her cognition. Acevedo et al. (2017) suggested that sensory processing sensitivity is associated with

environmental sensitivity such that positive environments can provide adaptive benefits (awareness, arousal, self-control and calm). Finally, Wolf et al. (2008) suggests that the different responsiveness of individuals to environmental stimuli has an evolutionary origin and people who respond to environmental stimuli in all kinds of contexts may feel environment-specific behavioral syndromes. Thus, the whole clinical issue in this context would require seeking homeostasis in order to promote the well-being and development of individuals (Masino et al., 2016), and this would not finally mean that they are not beings with social needs, but beings that need a specific social environment less violent and more benevolent. However, this proposition isn't fully complete because it's necessary to also fully rely on the noradrenaline system and the acetylcholine system (and all the genes associated) to get a full overview.

3) Proposition 3: the Neurotransmission Systems Dysfunction Disorder (NSDD)

This other proposition is gene-based and brain-cognition-based but not completely disconnected from the previous one. It would therefore be a matter of creating nosology based on the natural (as opposed to variations acquired following life events such as accidents or illnesses) variations of the neurotransmission and associated genes in ASD, ADHD, SS and BD. Different anomalies have been detected in the lateralization of brain structures in people with schizophrenia, with TS, ADHD, autism and OCD (Klimkeit & Bradshaw, 2006a, 2006b). These differences are explained by asymmetrical distributions in the neurotransmission linked to the cholinergic, dopaminergic, serotonergic and noradrenergic systems according to the different disorders. The researchers pointed out that the genetic nature of neurodevelopmental disorders suggests a possible adaptive value, that this lateralization of psychogenic amines reflects an ancient, lateralized and evolutionary arousal system and that different neurodevelopmental disorders may reflect differential compromise in time and place. In addition, Bradshaw & Sheppard (2000), explained that indeed the main neurodevelopmental disorders (TS, OCD, ADHD, schizophrenia and autism) are, on the one hand, linked to dopamine, serotonin, norepinephrine, glutamate and aminobutyric acid and that there's a high comorbidity among the disorders. Thus, the disorders manifest differently depending on the frontostriatal system which is compromised because of hereditary genetic predispositions and environmental contingencies. They also explained that this genetic polymorphism must have adaptive significance, developing in ways that are advantageous for survival under some conditions and disadvantageous in others and this would be explained by the fact that natural selection may have shaped our mental mechanisms in terms of adaptation and survival; many emotional and behavioral responses may not only be symptoms of a disorder, but rather reflect adaptive responses to possible environmental demands. Finally, they explained that evolutionary pressures have shaped the prefrontal systems that govern our predispositions, and changes in pressure differentially benefit different predispositions. Hypotheses of pathological causation related to dopamine, serotonin, norepinephrine, glutamate and aminobutyric acid have been repeatedly made for autism, ADHD, schizophrenia and bipolar disorder. Also, these changes in neurotransmission have also been highlighted in the genetic field in these same neurotransmitters and in these same disorders. Dopamine (DA) plays a role in motivation, in reward, attention, sleep and memory (Arias-Carrión, & Pöppel, 2007) and some associated genes are DRD4, DRD2, COMT and SLC6A3 (Costa et al., 2011; Frank & Fossella, 2011). Also, serotonin (5-HT) plays a role in mood, anxiety and well-being (De Deurwaerdère & Di Giovanni, 2020) and some associated genes are HTR2A, SLC6A4 and TPH2 (Sadkowski et al., 2013). In addition, acetylcholine (ACh) plays a role in neuronal inhibition, attention and memory in adults (Collins, 2010; Dehaene, 2014) and γ -aminobutyric acid (GABA) plays a primary neurotrophic role, and a second in the control of neuronal hyperactivity associated with anxiety and it finally serves as an inhibitor with glutamate (Glu) (and associated genes such as GAD2 and GRM7) which is an excitatory neurotransmitter that works in symbiosis with the GABA to maintain a balance. Associated genes include CHRNA2, CHRNA7, GAD1, SLC6A1 and ALDH5A1 (Erlander et al., 1991; Wang et al., 2018) or CHRM2 associated with cognitive flexibility and intelligence (Gosso et al., 2007; Zink et al., 2019). The alterations in concentration levels and neurotransmission receptors in ADHD, ASD, SS and BD reported in the psychopathology scientific literature are gathered in Table 5.

Moreover, some preliminary works have been recently run on the histaminergic system in neuropsychiatric disorders (Cheng et al., 2021; Eissa et al., 2020; Shan & Swaab, 2022; Wright et al., 2017) but more studies need to be done. Also, genetic variations of GABA, Ach, DA, Glu, 5-HT, NE-related alleles have been identified (Table 6).

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

These cerebral and common genetic characteristics could be necessary to materialize a common framework but are, however, not sufficient to characterize a neurodevelopmental disorder because they are also present in many other (neurodevelopmental) disorders (OCD, TS, learning and communication disorders...) and ability (such as creativity, see Carson, 2011) and can intervene following to accidents or illnesses. There may also be differences at the individual level which must be analyzed within this framework and it seems that there is no homogeneity in the neuro-morphology of these psychopathologies. Also, all of these cerebral changes can manifest themselves in different ways, but the visible characteristics that can be cited are related to attention and awareness (experiencing altered states of consciousness), perception (deficit of inhibition latent) or to information processing (inhibition, working memory, neuronal connectivity). Thus, these shared elements could suffice to characterize a common spectrum, and considering ADHD, SS, ASD and BD as a disorder of dysfunctions in neurotransmitter systems is nothing very new (and this could be well analyzed as part of the RDoC), but the main problem that emerges here would be that of the boundary between the normal and the pathological and the psychopathological essence of ADHD, ASD, SS and BD.

III) Discussion

A) Findings

Despite extensive empirical and theoretical research, we still don't have a definitive answer on the etiology, nosology and diagnosis of autism. This article has proposed one avenue for discussion on these elements, allowing us to reflect on perspectives for the future of autism at the clinical and research level. This track was the hypothesis of a "neurodevelopmental disorders tree". I focused on the genetic and phenotypic overlap between ADHD, ASD, BD and SS then I suggested creating a neurodevelopmental disorder tree made of the Global Neurodevelopmental Disorder, the Extreme Sensitivity to the Environment Syndrome and the Neurotransmission Systems Dysfunction Disorder. The GND consists of the presence of some of the DSM-V symptoms of these four disorders (with some of OCD, TS and learning disorders), with some specifiers and prototypical old form of these disorders. I also suggested creating an Extreme Sensitivity to the Environment Syndrome. Because the DSM-V symptoms may only be a manifestation of a sensitivity extreme to the environment and that this syndrome could be a better framework to bring ADHD, ASD, SS and BD together. I offered this syndrome may be characterized by an extreme syntony to the positive and negative experiences of the internal and external environment materializing by a total absence of reaction and a detachment from the environment (hyposynthonia) or a complete reaction and spontaneous participation and very rapid adhesion to the environment (hypersynthonia). Moreover, I suggested creating nosology based on the variations of the neurotransmission and associated genes in ASD, ADHD, SS and BD because hypotheses of pathological causation related to dopamine, serotonin, norepinephrine, glutamate and aminobutyric acid have been repeatedly made for autism, ADHD, schizophrenia and bipolar disorder. I also suggested discussing the path autism debates take, namely the questioning of the current medical framework which doesn't correspond to discoveries in genetics and neurobiology.

Ultimately, by combining the three propositions (GND, ESES and NSDD) we could characterize a "neurodevelopmental disorders tree" with a focus on different levels:

- a genetic overlap and continuum between ASD, ADH, BD and SS (the *roots*)
- this overlap modifies in particular certain neurotransmitters and the neurotransmission systems in the brain and therefore the neural circuits (the *trunk*)
- this modification causes an extreme physiological sensitivity (the *branches*)
- this sensitivity manifests itself via (behavioral, emotional and cognitive) symptoms like those of the DSM for example but not exclusively (the *leaves*)
- finally, and optionally, some manifestations may be characterized by current and/or old DSM labels and prototypical forms (the *flowers*)

This tree may fit adequately with the RDoC project even if more discussion about psychosocial factors of these neurodevelopmental disorders is needed (Demazeux & Pidoux, 2015). Thus, the genetic overlap could consist of a common basis between ASD, ADH, BD and SS, materializing by a common physiological phenotype which we propose to be an extreme sensitivity to the environment and where the visible symptoms and manifestations could be useful and serve only for helping patients, then labels

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

- old or new like a neurodevelopmental social impairment disorder (Waterhouse, et al., 2017) - could be used for researchers to continue the work of finding biological entities. Moreover, it could help patients and professionals in the field and researchers in their work even if more discussion would be needed to make it effective. Ultimately, this proposal seems to be in line with the new model proposed by Thiebaut de Schotten & Forkel (2022) highlighting brain connections as a central element of the functioning of the human brain and could be analyzed through the model of reciprocal triadic causality (Bandura, 1986) exposing the human functioning as the interaction between the environment, behaviors and the person variables (including cognition).

B) Limitations

Due to the already substantial length of this article and the impossibility of discussing all the problematic elements, many points have been evaded, such as the distinction between the sexes in autism (Robinson et al., 2013) or the different conceptions cultures of autism (Tupou et al., 2021). I have also chosen to extend the discussion of autism to other neurodevelopmental disorders, which could reveal extrapolations, hypotheses and lines of thought and issues that are insufficiently substantiated and certain inaccuracies which will need to be discussed later. Also, I didn't discuss the neurodiversity concept.

C) Future work

These elements allow us to affirm that it's difficult today to understand and conceive of autism as a biological entity, it would be at best a single social or medical entity (but without a full neurobiological and genetic basis). Moreover, all the discussions in this article lead to more questions to handle: is autism a pathological entity? Is it intrinsically autism or the characteristics around it (and specifically a low intellect or low cognitive abilities) and the many visible prototypical autistics that lead us to think that? Do autistic people inherently have communication and socialization difficulties regardless of culture and context or is it the result of a systemic stigmatization of difference or an inadequate environment? Although nosology and labels might seem important, both for research and for patients, shouldn't we focus on the well-being of individuals and help them no matter what label may be put behind it? Labels are important for providing the right therapeutic approach when needed, but they're also confining for thinking about theory and experimenting in practice.

Today the autism question seems divided into three elements more or less wide and airtight: the medical and psychiatric movement which pathologizes autism and sees it as a handicap and a disorder, the genetic movement which sees autism as a natural variation organized around the distribution traits statistics and sometimes asserts that the troubles simply don't exist and belongs to the extremes of normality, and finally the psycho-social, cultural and political movement which expresses the need to accept all differences and a reorganization of society (in terms of town planning, education, work...) for better inclusion of everyone. All these currents aren't in total contradiction on all points, but it's not impossible that they oppose and clash more in the coming years. Thus, it becomes necessary to find ways to reconcile them and to invent new medical, social, political, educational and philosophical frameworks and paradigms to address the (lively) question of autism. In any case, aren't all these debates and tensions a sign of scientific good health on the issue of autism and neurodevelopmental disorders?

I) Introduction

A) Brève histoire de l'autisme (1880"-1970")

Il y a plus de 100 ans, Schüle (Noll, 2012), Pick (1891) et Kraepelin (1896) ont inventé et popularisé le concept de *dementia praecox* et discuté celui de schizophrénie. Puis Bleuler (1911) a appelé « autisme » un « détachement de la réalité » avec une « prédominance de la vie intérieure » (1950, p. 63). Il a expliqué (2011) que cet achèvement et ce dédoublement lorsque les sentiments sont trop intenses peuvent être une défense intérieure comme extérieure, et que nous avons besoin d'individus aux sentiments trop intenses car ce sont eux qui sont à l'origine d'actes exceptionnels. Ensuite, Sukhareva a décrit la psychopathie schizoïde dans l'enfance considérée aujourd'hui comme la toute première description (Wolf, 1996) de l'autisme. Sukhareva a décrit six garçons et cinq filles (Sukhareva, 1926a, 1926b, 1927a, 1927b, traduits par Rebecchi, 2022a). Pour les garçons (1926a, 1926b), elle a décrit quatre caractéristiques principales : un type particulier de pensée (avec une tendance à l'abstraction, au schématisme, à la rationalisation et aux ruminations), une attitude autistique caractérisée par le fait de rester à l'écart des autres enfants, de ne s'adapter que difficilement à ce milieu et de ne jamais s'y immerger complètement (avec une tendance à la solitude), une certaine platitude et superficialité des sentiments avec une combinaison d'éléments anesthésiques et hyperesthésiques, une motricité prononcée et quelques autres particularités (tendance à l'automatisme, aux rimes et aux néologismes, actes impulsifs, comportement grotesque). En outre, elle a décrit cinq caractéristiques principales chez les filles (1927a, 1927b) : des troubles affectifs (ambivalence des sentiments, inadéquation des réactions affectives, combinaisons émotionnelles compliquées et contradictoires), le négativisme, des symptômes hystériques, un type de pensée spécifique (tendance à l'abstraction, à la pensée schématique et aux ruminations) et des troubles moteurs moins prononcés que chez les garçons (avec des mouvements expressifs spécifiques).

Plus tard, Kanner (1943, 1971, traduits par Rebecchi, 2022b) a écrit sur les perturbations autistiques du contact affectif (1943) avec une étude de suivi 28 ans plus tard (1971). Il a décrit onze enfants (huit garçons et trois filles) ayant un bon potentiel cognitif et a expliqué l'autisme par l'incapacité des enfants, au début de leur vie, à établir des relations avec les personnes et les situations de manière ordinaire, et par un désir anxieux et obsessionnel de préserver la similitude. Il a également cité Sukhareva (1949) pour discuter des similitudes entre la schizophrénie et l'autisme. Asperger (1944, traduit par Rebecchi, 2021) a également signalé des relations perturbées et restreintes avec l'environnement, mais a souligné en même temps que les enfants autistes peuvent voir les choses et les processus dans l'environnement avec un nouveau point de vue. Il a décrit des enfants avec des manifestations physiques et expressives spécifiques, des fonctions cognitives élevées (intelligence, créativité, raison, hyperlexie, hypernumératie, capacités perceptives, hyperconscience, compétences artistiques), avec quelques difficultés émotionnelles et motrices, suivant leurs impulsions et leurs intérêts, indépendamment des exigences de l'environnement, et une grande valeur sociale (où dans le meilleur des cas des réalisations dont personne d'autre que ces enfants autistes n'aurait été capable). Frankl, qui a influencé à la fois Kanner et Asperger (Muratori, 2021), a parlé d'un continuum autistique (1957, traduit par Rebecchi, 2022c) avec deux extrêmes que nous pourrions aujourd'hui comprendre comme un spectre de conditions allant de l'autisme de Kanner à l'autisme d'Asperger. Il a décrit le langage autistique de manière très détaillée et a considéré l'autisme comme un « état d'esprit spécifique » qui n'est pas nécessairement anormal et comme un « complément de l'état d'être en communication avec les gens » (p. 6). Enfin, Wing & Gould (1979) ont défini trois « variables comportementales » également connues sous le nom de triade de déficiences, à savoir « l'absence ou la déficience de l'interaction sociale, en particulier avec les pairs », « l'absence ou la déficience du développement du langage verbal et non verbal » et « les activités répétitives et stéréotypées de toute nature » (p. 13) avec une « absence totale d'activités symboliques et imaginatives, y compris les jeux de rôles » (p. 16).

En fin de compte, tous ces travaux ont influencé les discussions concernant le diagnostic de l'autisme dans les manuels successifs de diagnostic et de statistique (DSM) des troubles mentaux.

B) Bref historique de l'autisme dans les DSMs

Le premier DSM a été créé en 1952 et des numéros sont encore parus (Blashfield et al., 2014). Dans cette première édition (American Psychiatric Association, 1952), « l'autisme » et « la pensée autistique » sont tous deux cités à deux reprises (pp. 12, 26, 28, 35) et sont inclus dans les troubles

psychotiques et plus précisément dans les réactions schizophréniques et la personnalité schizoïde. Dans la deuxième édition (1968), le comportement autistique et la pensée autistique sont tous deux cités une fois (pp. 35, 42) et sont inclus dans la schizophrénie et la personnalité schizoïde. Dans le DSM-III (1980), l'autisme est inclus dans « l'autisme infantile » et ils sont mentionnés 52 fois. L'autisme infantile faisait partie des troubles envahissants du développement (TED) et se caractérisait notamment par « un manque envahissant de réactivité aux autres personnes », « des déficits flagrants dans le développement du langage », « des réponses bizarres à divers aspects de l'environnement », « des modes d'élocution particuliers » et « l'absence de délires, d'hallucinations, de relâchement des associations et d'incohérence » (pp. 89-90) et incluait l'autisme infantile et le syndrome de Kanner. La révision de cette troisième version (1987) a transformé l'autisme infantile en « trouble autistique », caractérisé par « une déficience de l'interaction sociale réciproque », « une déficience de la communication verbale et non verbale et de l'activité imaginative » et « un répertoire d'activités et d'intérêts nettement restreint » (pp. 38-39). La quatrième version (1994) a inclus le trouble autistique et le syndrome d'Asperger (et l'autisme atypique) dans les TED. Les critères diagnostiques du trouble autistique sont « une déficience qualitative de l'interaction sociale », « une déficience qualitative de la communication » et « des modèles restreints de comportement, d'intérêts et d'activités répétitifs et stéréotypés » (pp. 70-71). Ainsi, la précision sur « l'activité imaginative » a été supprimée. La révision de cette quatrième version (2000) a apporté quelques reformulations dans le TED non autrement spécifié (y compris l'autisme atypique). La cinquième version (2013) a supprimé le TED et l'a transformé en l'actuel trouble du spectre autistique (TSA) correspondant aux anciens « trouble autistique, trouble d'Asperger et trouble envahissant du développement » (p. xlii). Le TSA se caractérisent par « des déficits persistants en matière de communication et d'interaction sociales dans de multiples contextes » et « des modèles restreints et répétitifs de comportement, d'intérêts ou d'activités » (p. 50). La révision de cette cinquième version (2022) a inclus de légers changements, passant de « tel que manifesté par les éléments suivants » à « tel que manifesté par tous les éléments suivants », ce qui signifie que trois déficits persistants sont absolument nécessaires en matière de communication sociale et d'interaction sociale dans de multiples contextes, alors qu'auparavant un ou deux pouvaient suffire.

C) Quelques questions actuelles sur l'autisme, les TSA et le DSM

Nous avons observé plusieurs changements au cours des dernières décennies et que ceux-ci sont en désaccord avec toutes les observations et analyses de Sukhareva, Kanner et Asperger. Cette dernière version du DSM ne fait pas l'unanimité et Wing et al. (2011) critiquent par exemple l'absence de critères autistiques relatifs à l'imagination sociale mais aussi les problèmes de mauvais diagnostics chez les filles et les femmes. Aussi, il n'est pas surprenant que McPartland et al. (2012) et Smith et al. (2015) aient remarqué que le dernier DSM exclut un grand nombre de personnes précédemment considérées comme autistes ou avec un TED. De plus, Mottron (2021) a appelé à un nouveau diagnostic de type catégoriel standardisé et à concentrer la recherche sur des individus prototypiques car l'autisme dans le DSM est trop hétérogène et vague, et les paysages génétiques sont trop larges (Betancur, 2011 ; Huguet et al., 2013). Cependant, Chaste et al. (2015) ont souligné que la réduction de l'hétérogénéité phénotypique dans l'autisme n'augmente pas l'homogénéité génétique. Ainsi, Waterhouse & Gillberg (2014) ont expliqué qu'aucune entité neurobiologique unique et valide liée à l'autisme n'a été trouvée et qu'il est nécessaire d'étudier les variations individuelles dans le cerveau des personnes autistes. Waterhouse et al. (2017) ont donc appelé à un abandon du diagnostic de TSA car seul le démantèlement des catégories diagnostiques peut apporter de nouveaux diagnostics neurobiologiques et génétiques précis (Waterhouse, 2021) mais Ure et al. (2018) ont fourni une approche dimensionnelle de l'évaluation de l'autisme, en considérant huit spectres d'aptitudes, de schémas de pensée et de comportements pour mieux comprendre l'hétérogénéité de l'autisme (Gillberg et al., 2019) et l'absence d'étiologie unique. D'autres cadres théoriques unificateurs sont régulièrement proposés comme *The Pathogenetic Triad* (Sarovic, 2021) composé d'une dimension de personnalité autistique, de compensations cognitives et de facteurs de risque neuropathologiques.

Cependant, après un siècle d'observations, de débats, de classifications et d'analyses, nous n'avons toujours pas de réponse définitive sur l'étiologie, la nosologie et le diagnostic de l'autisme. C'est pourquoi, dans cet article, j'envisage une piste qui pourrait permettre de surmonter ces obstacles théoriques et empiriques. En effet, si l'on considère qu'il n'existe pas une seule entité neurobiologique,

génétique et physiopathologique autistique, il est donc nécessaire d'élargir la question et de s'interroger sur l'existence d'un seul continuum de troubles neurodéveloppementaux.

II) Passer des troubles neurodéveloppementaux « individuels » à un arbre des troubles neurodéveloppementaux « globaux » : l'hypothèse du continuum

A) DSM, RDoC et autisme

Tsuang et al. (1993) ont discuté de la création d'une nosologie psychiatrique basée sur la génétique par le biais d'une analyse statistique solide et d'un neurodiagnostic pour les patients, mais il y a vingt ans, la psychiatrie basée sur la génétique en était encore à ses débuts. Beutler et Malik (2002) ont appelé à une réécriture du DSM pour mieux répondre aux besoins des patients. Le principal problème du DSM a été signalé par Kendell et Jablensky (2003) concernant la validité des diagnostics psychiatriques qui ne sont pas séparés par des frontières naturelles. Certaines recherches ont été menées en particulier dans le cadre d'études génétiques quantitatives afin d'établir les fondements des influences génétiques et environnementales de la psychopathologie adulte (Shih, 2004). Ensuite, le National Institute of Mental Health (NIMH) des États-Unis a lancé et financé en 2009 les Research Domain Criteria (RDoC), un cadre de recherche sur les troubles mentaux visant à répondre à tous les problèmes actuels de validité de la nosologie. Ces problèmes concernent notamment l'hétérogénéité, la comorbidité, l'exclusion de certaines personnes parce qu'elles ne correspondent pas au diagnostic pur et l'absence de conceptualisations dimensionnelles qui pourraient empêcher un consensus arbitraire. L'objectif principal était de créer une nosologie basée sur la biologie plutôt qu'un symptôme d'observation clinique comme le DSM, même si le RDoC ne vise pas à le remplacer. Il est basé sur six domaines (valence négative, valence positive, systèmes cognitifs, systèmes de traitement social, systèmes d'éveil/régulation et systèmes sensorimoteurs) en tenant compte des contextes environnementaux et neurodéveloppementaux ainsi que des dimensions neurales et comportementales (NIMH, 2021). La matrice des six domaines (NIMH, 2022a) est organisée à travers différents éléments dynamiques (gènes, molécules, cellules, circuits, physiologie, comportements, auto-rapports et paradigmes) (NIMH, 2022b). De plus, même s'ils sont différents, le DSM et le RDoC visent tous deux à trouver un traitement pour les personnes.

Le système de diagnostic actuel n'est pas informé des récentes percées en génétique et en neurosciences moléculaires, cellulaires et systémiques (NIMH, 2013) et ne permet pas de clarifier les différents chevauchements et limites psychopathologiques. Hyman (2010) a souligné que le système moderne du DSM, destiné à créer un langage commun, crée également des œillères épistémiques qui empêchent de progresser vers un diagnostic valide. De plus, Insel et al. (2010) ont souligné que les catégories diagnostiques basées sur un consensus clinique ne correspondent pas aux résultats des neurosciences cliniques et de la génétique et ne permettent pas de donner des traitements adéquats aux patients. En effet, Dyck et al. (2011) ont étudié le trouble de la coordination du développement et le trouble mixte du langage réceptif et expressif et ont remarqué qu'il n'y avait pas de frontières naturelles entre les troubles ou entre les troubles et la normalité. C'est pourquoi Cuthbert & Insel (2013) et Casey et al. (2013) ont travaillé sur une nouvelle nosologie psychiatrique pour surmonter les problèmes des étiquettes diagnostiques ne correspondant pas à des entités distinctes. Geschwind & Flint (2015) ont également observé l'hétérogénéité et la polygénéicité des troubles psychiatriques, et Owen (2015) a noté la nécessité de stratifier neurobiologiquement les patients et de promouvoir l'expérimentation à grande échelle pour faire émerger un continuum neurodéveloppemental. Le RDoC pourrait ainsi permettre de dépasser les limites du DSM - validité et utilité clinique du diagnostic, tensions entre chercheurs et cliniciens (Whooley, 2016) mais aussi faux positifs, frontières floues entre les troubles et distinction entre risque et trouble (Wakefield, 2016) - en gagnant en efficacité clinique et en légitimité sociale en transformant la psychiatrie en neurosciences cliniques (Le Quang & Gansel, 2016). Cela montre l'importance de créer des systèmes de classification alternatifs et complémentaires, tels que la Classification internationale des maladies (CIM) (Doernberg & Hollander, 2016). Cependant, Carpenter (2016) se demande si le changement de paradigme revendiqué par le RDoC va favoriser l'information qui informe la nouvelle nosologie et facilite les diagnostics. Le RDoC soulève de nombreuses questions sur les frontières entre normalité et trouble, entre maladies psychiatriques et neurologiques, ou sur une éventuelle nouvelle nosologie clinique basée sur la génétique (Smoller et al., 2019). Des réflexions sont déjà menées sur l'autisme avec le cadre du RDoC (Harrison et al., 2021 ; Hennessey et al., 2018 ; Ibrahim

& Sukhodolsky, 2018) mais beaucoup reste à faire. D'autres taxonomies et modèles médicaux existent (Gillberg, 2010 ; Knott et al., 2021 ; Kotov et al., 2017 ; Salicru, 2020) mais n'incluent pas complètement le chevauchement génétique entre les troubles du neurodéveloppement.

B) Caractéristiques phénotypiques et génétiques partagées en intra-psychopathologie : chevauchement et continuum neurodéveloppemental

Les relations entre les différentes pathologies se retrouvent dans des variations génétiques partagées. Gandal et al. (2018) ont étudié les phénotypes cérébraux moléculaires liés aux TSA, à la schizophrénie, aux troubles bipolaires (TB), à l'alcoolisme et à la dépression et ont identifié « des modèles de perturbations d'expression génique partagées et distinctes (...) suggérant une composante génétique causale significative » et certaines « voies de convergence moléculaire » (p. 693). Ainsi, ils ont souligné que les facteurs génétiques partagés suggèrent un chevauchement de l'expression des troubles croisés avec probablement certains effets environnementaux. D'autres chercheurs ont trouvé des chevauchements entre l'autisme, le spectre de la schizophrénie (SS) et le TB (Ellis et al., 2016 ; Goes et al., 2016) mais aussi des différences claires, en particulier chez les jumeaux monozygotes (Dempster et al., 2011). Bien que certaines distinctions phénotypiques ou génétiques claires aient été rapportées entre l'autisme, la schizophrénie, le trouble du déficit de l'attention/hyperactivité (TDAH) et le TB (Albajara Sáenz et al., 2020 ; Antshel & Russo, 2019 ; Antshel et al., 2013 ; Boedhoe et al., 2020 ; Christakou et al., 2013 ; Cristino et al., 2014 ; Di Martino et al., 2013 ; Dougherty et al., 2016 ; Godoy et al., 2021 ; Lim et al., 2015 ; Mahajan et al., 2016 ; Park et al., 2018 ; Scholl & Philippe, 2012 ; Seernani et al., 2021 ; Sinzig et al., 2009 ; Stoodley, 2014 ; van der Meer et al., 2012 ; Zhang et al., 2022), il est impossible d'ignorer tous les chevauchements entre au moins deux de ces troubles qui ont été découverts - même si certains sont encore embryonnaires comme par exemple pour les TSA et les TB ou le TDAH et les TB - au cours des 25 dernières années (tableau 1).

Ces associations génétiques pourraient confirmer une étiologie commune entre tous les troubles du développement neurologique et pourraient conduire à discuter l'idée qu'il existe un seul « spectre pathologique » et que les modifications et les différences pourraient être trouvées à l'échelle épigénétique, à savoir que le changement pourrait se produire avec l'environnement des individus (exemple : alimentation, médicaments, stress, maladies et cadres et mode de vie d'une manière plus générale). Certains chercheurs parlent également d'un continuum cognitif entre l'autisme et la dyslexie (Williams & Casanova, 2010), entre le TDAH et la dyslexie (Sánchez-Morán et al., 2018) et entre le trouble de la personnalité limite et le TSA (Dudas et al., 2017). Zhu et al., 2014 ont remarqué que certaines mutations dans le même gène ou la même région génomique peuvent augmenter le risque de nombreux troubles neuropsychiatriques complexes. Outre les chevauchements entre deux troubles (tableau 1), nous pouvons également remarquer de nombreux continuums (tableau 2) entre trois troubles ou plus.

Gonzalez-Mantilla et al. (2016) ont mis en évidence les causes génomiques partagées entre la déficience intellectuelle (DI), le TSA, le TDAH, la schizophrénie, le TB et l'épilepsie. De même, Morimoto et al. (2021) ont remarqué des risques génétiques partagés entre le TSA, le TDAH, le trouble bipolaire, la dépression et la schizophrénie. Cabana-Domínguez et al. (2022) ont mené une étude d'association à l'échelle du génome et ont remarqué une association avec les gènes de la dopamine entre le TDAH, l'anorexie mentale, le TSA, le trouble bipolaire, la dépression majeure, le trouble obsessionnel-compulsif (TOC), la schizophrénie et le syndrome de la Tourette (ST). Le Cross-Disorder Group du Psychiatric Genomics Consortium a proposé (2013) de passer des syndromes descriptifs psychiatriques à une nosologie informée par la cause de la maladie. Doherty & Owen (2014) ont également demandé de nouveaux systèmes de classification pour la schizophrénie, le trouble bipolaire, le trouble dépressif majeur, le TDAH et le TSA. En outre, Morris-Rosendahl & Crocq (2020) ont souligné que la DI, les TSA, le TDAH, la schizophrénie et le trouble bipolaire se situent sur un continuum neurodéveloppemental et Robinson et al. (2016) ont appelé à la création d'un modèle de continuum pour informer et mieux comprendre la biologie des maladies neuropsychiatriques. Yao et al. (2021) ont souligné le chevauchement étiologique entre les TSA, le TDAH, la schizophrénie, le trouble bipolaire et le trouble dépressif majeur. Ces données peuvent nous amener à considérer un trouble neurodéveloppemental global basé sur la similarité plutôt que sur les différences et les étiquettes comme dans le DSM, ce qui serait plus conforme au RDoC. D'autant plus que les étiquettes changent régulièrement faisant entrer ou sortir des personnes et modifiant ainsi la population diagnostiquée (Smith

et al., 2015). Il semble donc nécessaire d'établir des diagnostics plus précis (basés sur les causes) sur les particularités cérébrales pour garder une continuité logique et claire dans le temps et l'espace.

C) Une reconfiguration conceptuelle et clinique inévitable ?

Dans cette partie, nous fournissons trois propositions pour créer une nouvelle nosologie : la première est une nosologie basée sur les manifestations, la seconde est une nosologie basée sur les causes et la dernière est une nosologie basée sur les molécules. Ces trois propositions peuvent être considérées ensemble ou séparément et visent à approfondir la réflexion sur une nouvelle nosologie future basée sur le chevauchement étiologique entre TSA, TDAH, TB et SS et le continuum qui en résulte. Habituellement, le TB et le SS ne sont pas inclus dans les troubles neurodéveloppementaux (ni dans le DSM) mais certains chercheurs ont soutenu qu'ils en font partie (Fitzgerald, 2019 ; Gourion et al., 2004 ; Gupta & Kulhara, 2010 ; Kloiber et al., 2020 ; Owen et al., 2011 ; Madison et al., 2015 ; Mallet et al., 2021 ; O'Shea & McInnis, 2016 ; Stachowiak et al., 2013 ; Valli et al., 2019).

1) Proposition 1 : le trouble global du neurodéveloppement (TGN)

Si le but réel d'un diagnostic est d'aider les personnes, cela peut nous amener à organiser une nosologie basée sur la manifestation et la difficulté par domaine, notamment une classification avec un trouble général et avec/sans certains éléments en fonction de tous les recoupements que nous avons pu observer, en abandonnant la nosologie actuelle non pas parce qu'elle ne correspondrait pas aux réalités du terrain mais parce qu'il n'y a pas de corrélation automatique entre le diagnostic et l'accompagnement du patient. Cette proposition permettrait en quelque sorte de remixer les DSM et de revenir à un label antérieur avec la renaissance des TED mais dont le type n'est pas spécifié (Trouble envahissant du développement - non spécifié, TED-NS)) en combinant les caractéristiques des DSM des SS, TB, TDAH et TSA (Tableau 3) pour en créer un avec des sous-types qui pourrait être la norme des troubles neurodéveloppementaux plutôt qu'un trouble résiduel. De plus, il serait possible de spécifier avec/sans chaque difficulté et on pourrait éventuellement lui donner un sous-titre avec une étiquette qui devrait être discutée (Asperger, Kanner, TDAH, etc.). Cela reviendrait donc à inverser ce qui a été fait depuis le DSM-V et à revenir en arrière sur les TED. Ainsi, ce nouveau TGD servirait plus au diagnostic et à l'aide demandée par les patients sans considérations sociales, culturelles et politiques comme c'est le cas aujourd'hui aux USA, en France, au Canada où l'aide est apportée en fonction du diagnostic. Cette solution aurait aussi le mérite de plus ou moins réconcilier et rassembler une grande partie des doctrines actuelles dans un cadre imparfait mais cliniquement utile. Cela peut également permettre de surmonter l'incohérence de certaines situations comme l'incompatibilité entre certains diagnostics (TDAH et SS dans le DSM-III, TDAH et TSA dans le DSM-IV ou presque SS et TSA dans le DSM-V). De plus, il s'agirait donc d'une approche basée davantage sur les difficultés et les patients pour lesquels le diagnostic n'a pas plus d'intérêt que l'aide attendue.

Parce que l'autisme peut être vu comme un syndrome porte-manteau (Waterhouse, 2009), nous pourrions fournir une nosologie avec quelques spécificateurs - pas nécessairement similaires à ceux suggérés par Harris (2019) et Mottron (2021) - sélectionnés parmi toutes les difficultés de partage qui soutiennent l'idée transdiagnostique basée sur un continuum neurodéveloppemental (Tableau 4).

Cette nosologie basée sur les manifestations et les difficultés (tableau 4) présenterait différents avantages pour les patients et les professionnels. En effet, les professionnels pourraient plus facilement cocher les cases car cela aurait moins de conséquences que de donner un diagnostic lorsque le diagnostic différentiel est compliqué. Cela serait plus facile pour les patients pour la reconnaissance de leurs difficultés indépendamment des étiquettes diagnostiques. En outre, cela inclurait plus de personnes qu'aujourd'hui. Par exemple, une personne qui présente des schémas de comportement et d'intérêts restreints et répétitifs, quatre symptômes d'hyperactivité et d'impulsivité actuels, un comportement manifestement désorganisé et des symptômes négatifs, pourrait aujourd'hui présenter n'importe lequel de ces diagnostics. En outre, une case facultative contenant les anciens formulaires prototypiques peut être incluse à des fins de recherche. Cependant, cette proposition semble moins précise et moins appropriée pour les prototypes pour lesquels des catégories ont été créées. En outre, nous retomberions dans les vieux problèmes de cette nosologie basée sur les manifestations, à savoir l'absence d'une réalité et d'une homogénéité phénotypiques et génétiques réelles et complètes. D'où la deuxième proposition de construire un nouveau cadre pour ce continuum neurodéveloppemental.

2) Proposition 2 : le syndrome d'extrême sensibilité à l'environnement (SESE)

Dans cette partie, j'é mets l'hypothèse et la proposition que les symptômes (tableau 4) du trouble global du neurodéveloppement (TGN) ne sont en réalité que les manifestations et les conséquences d'une sensibilité (comprenant les facultés de percevoir, de sentir, d'éprouver des sentiments et des émotions, et de recevoir des impressions intellectuelles, morales et esthétiques) extrême (comprise comme dépassant les limites ordinaires et éloignée de la moyenne) à l'environnement (environnement interne et externe de la personne) et que ce syndrome pourrait être un meilleur cadre pour réunir le TDAH, le TSA, le SS et le TB. Ainsi, c'est un ensemble de réactions spécifiques liées aux sensations éprouvées, aux informations perçues par le système nerveux de la personne et aux récepteurs spécifiques face aux changements de l'environnement interne de la personne et de l'environnement externe (naturel et culturel).

Dans les années 20', en réponse à Kretschmer (1921), Bleuler (2011) a parlé du terme « syntone » pour les individus vivant à l'unisson avec leur environnement. Cela signifie que l'affectivité de l'individu est liée à l'environnement et que l'individu éprouve des impulsions et des sentiments homogènes. Bleuler explique que lorsque le sujet syntone est heureux ou triste, les autres humeurs se taisent, et c'est alors complètement et entièrement qu'il est dominé par une seule humeur ou qu'il se livre à une seule. Bleuler a suggéré que les caractéristiques du cadre cyclothymie-schizothymie proposé par Kretschmer sont présentes chez chacun de nous à des degrés extrêmement différents (allant donc de la forme normale à une forme exacerbée et socialement pathologique) et qu'elles font donc partie du cadre de normalité et peuvent être considérées comme une caractéristique générale chez les individus et c'est pourquoi il a proposé le terme « syntone ». Ces degrés pourraient être expliqués par la théorie de la sensibilité génétique différentielle aux environnements sociaux (Mitchell et al., 2013) mettant en évidence que certains individus sont plus sensibles aux influences environnementales (qui peuvent être favorables ou défavorables) en raison de certains marqueurs génétiques influençant principalement les systèmes sérotoninergiques et dopaminergiques et le système nerveux sympathique. Cette idée est également soutenue par la théorie de Belsky (1997 ; 2013) sur la variation de la sensibilité aux influences environnementales. Belsky a proposé que les individus puissent avoir une susceptibilité différentielle inspirée de l'évolution qui les rend plus sensibles à leurs bonnes et mauvaises expositions environnementales et expériences de développement. Sa théorie était fondée sur les systèmes et les gènes sérotoninergiques et dopaminergiques (en particulier l'allèle DRD4 à 7 répétitions). De plus, Cabana-Domínguez et al. (2022) ont mis en évidence un chevauchement des gènes de la dopamine entre le TDAH, l'anorexie mentale, le TSA, la TB, la dépression majeure, les TOC, la schizophrénie et le ST.

Chez les personnes TDAH, cette sensibilité extrême à l'environnement peut être caractérisée par la dysrégulation des émotions (Shaw et al., 2014), la labilité émotionnelle (Baweja et al., 2021 ; Gisbert et al., 2019 ; Rosello et al., 2020) et la sensibilité émotionnelle (Kim et al., 2016 ; Silverman et al., 2022) définie comme les « expressions et expériences émotionnelles excessives par rapport aux normes sociales et inadaptées au contexte ; les changements rapides et mal contrôlés de l'émotion ("labilité") ; et l'allocation anormale de l'attention et aux stimuli émotionnels » (2016, p. 277). Cette dysrégulation des émotions peut également être observée dans le trouble de la régulation de l'humeur, le trouble oppositionnel avec provocation, le trouble sévère de l'humeur et le trouble du traitement sensoriel. Dans la schizophrénie, cette sensibilité extrême à l'environnement peut se manifester par une intensité et une variabilité émotionnelles extrêmes (Myin-Germeys et al., 2000), des niveaux plus élevés de réactivité émotionnelle au stress de la vie quotidienne (Myin-Germeys et al., 2001), une implication émotionnelle excessive (Leff, 1976) et une hypersensibilité interpersonnelle (Zhu et al., 2017). Dans le TB, cette sensibilité extrême peut être comprise comme une sensibilité accrue aux stimuli gratifiants (Alloy & Nusslock, 2019) et une réactivité émotionnelle à l'environnement qui influence les différentes phases. M'Bailara (2009) propose une relecture des TB à travers une pathologie de la réactivité émotionnelle, avec une vulnérabilité à la dysrégulation émotionnelle qui serait présente dès les phases de normothymie sur la base d'un continuum allant de l'hyper-réactivité émotionnelle à l'hypo-réactivité émotionnelle. Cette sensibilité à l'environnement peut également être observée dans le trouble affectif saisonnier (Partonen & Lönnqvist, 1998). Enfin, dans l'autisme, cette sensibilité extrême à l'environnement peut se manifester à travers l'observation de Kanner (1943) sur le désir obsessionnel de préserver la similitude, la labilité émotionnelle des personnes autistes (Bennett et al., 2017), la réactivité et la sensibilité physique aux stimuli sensoriels, sociaux et émotionnels, et aux facteurs de stress (Lydon et al., 2016) mais aussi à travers l'intolérance à l'incertitude et à l'anxiété (Stuart et al., 2020) et le *Burnout*, *Inertia*,

Meltdown, and Shutdown (BIMS) vécu par les personnes autistes (Phung, 2021). Cela pourrait également expliquer la plus grande sensibilité des personnes autistes aux traumatismes de la vie quotidienne (Haruvi-Lamdan et al., 2020 ; Rumball, et al., 2020, 2021). Siemann et al. (2020) ont suggéré un dysfonctionnement multisensoriel dans l'autisme et Ide et al. (2019) ont suggéré que cette hypersensibilité peut se situer dans une résolution temporelle plus élevée aux stimuli sensoriels. En outre, Furgo-Olszewska & Jarosz (1993) ont proposé que l'autisme et la syntonie soient deux pôles de la même dimension, et Wood et al. (2021) ont suggéré que la sur-réactivité sensorielle chez les personnes TSA et TDAH pourrait être liée à l'acide gamma-aminobutyrique (GABA) et au glutamate (Glu).

En définitive, le syndrome d'extrême sensibilité à l'environnement pourrait être caractérisé par une syntonie extrême aux expériences positives et négatives de l'environnement interne et externe se matérialisant par une absence de réaction et un détachement de l'environnement (hypo-syntonie) ou une réaction complète et une participation spontanée et une adhésion très rapide à l'environnement (hyper-syntonie). Cette syntonie se manifeste par une hyperesthésie cognitive (niveau de conscience, attention, hallucinations, mémoire, flexibilité cognitive, perception du temps, persévérance, etc.) et affective - réactivité émotionnelle et humeur excessive (M'Bailara, 2009) - aux stimuli de l'environnement interne et externe. Cette syntonie peut se produire à différents niveaux (corps, sens, émotions, fonctions exécutives, interoception, extéroception, proprioception, etc.) et les individus peuvent avoir des manifestations opposées selon le domaine, comme par exemple une hyposyntonie sociale couplée à une hypersyntonie affective. Ainsi, cette sensibilité extrême peut causer les nombreux problèmes sociaux, de communication, d'humeur, de cognition et de comportement observés dans le TDAH, le TSA, le SS et TB. Il pourrait s'agir d'un syndrome basé sur les manifestations et les causes et non d'un trouble basé sur les conséquences comme dans le cas du TGN proposé précédemment. Cependant, bien que ce trouble puisse correspondre à l'idée d'un continuum neurodéveloppemental, les systèmes autres que les systèmes dopaminergique et sérotoninergique (Belsky, 1997, 2013 ; Cabana-Domínguez et al., 2022 ; Mitchell et al., 2013) et les systèmes GABAergique et glutamate (Wood et al., 2021) ne sont pas mentionnés dans toutes les théories présentées. De même, Massary et al. (2020) ont étudié l'architecture génétique de la sensibilité environnementale et son héritabilité et ont remarqué une corrélation entre la sensibilité, le neuroticisme et l'extraversion. Enfin, le TGN de base peut être étudié à travers un cadre de chevauchement génétique créant des modifications dans les systèmes de neurotransmission créant finalement une sensibilité extrême avec des répercussions sociales et de communication. Ce SESE peut être bien compris comme un effet papillon, où un petit stimulus peut avoir de grandes conséquences. Cela conduirait donc à travailler sur l'environnement de la personne (et de la société en général) en premier lieu pour l'aider et non sur son comportement ou sa cognition. Acevedo et al. (2017) ont suggéré que la sensibilité au traitement sensoriel est associée à la sensibilité à l'environnement de sorte que les environnements positifs peuvent apporter des bénéfices adaptatifs (conscience, éveil, maîtrise de soi et calme). Enfin, Wolf et al. (2008) suggèrent que la réactivité différente des individus aux stimuli environnementaux a une origine évolutive et que les personnes qui répondent aux stimuli environnementaux dans toutes sortes de contextes peuvent ressentir des syndromes comportementaux spécifiques à l'environnement. Ainsi, tout l'enjeu clinique dans ce cadre nécessiterait de rechercher l'homéostasie afin de favoriser le bien-être et le développement des individus (Masino et al., 2016) et cela ne signifierait finalement pas qu'ils ne sont pas des êtres avec des besoins sociaux, mais des êtres qui ont besoin d'un environnement social spécifique moins violent et plus bienveillant. Cependant, cette proposition n'est pas totalement complète car il est nécessaire de s'appuyer également sur le système de la noradrénaline et le système de l'acétylcholine (et tous les gènes associés) pour avoir une vue d'ensemble complète.

3) Proposition 3 : le trouble de dysfonctionnement des systèmes de neurotransmission (TDSN)

Cette autre proposition est basée sur les gènes et la cognition cérébrale mais n'est pas complètement déconnectée de la précédente. Il s'agirait donc de créer une nosologie basée sur les variations naturelles (par opposition aux variations acquises suite à des événements de la vie tels que des accidents ou des maladies) de la neurotransmission et des gènes associés dans les TSA, TDAH, SS et TB. Des anomalies différentes ont été détectées dans la latéralisation des structures cérébrales chez les personnes avec schizophrénie, ST, TDAH, TSA et TOC (Klimkeit & Bradshaw, 2006a, 2006b). Ces différences s'expliquent par des distributions asymétriques des neurotransmissions liée aux systèmes

cholinergiques, dopaminergiques, sérotonergiques et noradrénergiques selon les différents troubles. Les chercheurs ont souligné que la nature génétique des troubles neurodéveloppementaux suggère une possible valeur adaptative, que cette latéralisation des amines psychogènes reflète un système d'éveil ancien, latéralisé et évolutif et que les différents troubles neurodéveloppementaux peuvent refléter un compromis différentiel dans le temps et l'espace. De plus, Bradshaw & Sheppard (2000), expliquent qu'en effet les principaux troubles neurodéveloppementaux (ST, TOC, TDAH, SS et TSA) sont, d'une part, liés à la dopamine, la sérotonine, la noradrénaline, le glutamate (Glu) et l'acide aminobutyrique et qu'il existe une forte comorbidité entre les troubles. Ainsi, les troubles se manifestent différemment selon le système frontostriatal qui est compromis en raison de prédispositions génétiques héréditaires et de contingences environnementales. Ils ont également expliqué que ce polymorphisme génétique doit avoir une signification adaptative, se développant de manière avantageuse pour la survie dans certaines conditions et désavantageuse dans d'autres, ce qui s'expliquerait par le fait que la sélection naturelle a pu façonner nos mécanismes mentaux en termes d'adaptation et de survie ; de nombreuses réponses émotionnelles et comportementales peuvent ne pas être uniquement des symptômes d'un trouble, mais plutôt refléter des réponses adaptatives à d'éventuelles exigences environnementales. Enfin, ils ont expliqué que les pressions de l'évolution ont façonné les systèmes préfrontaux qui régissent nos prédispositions, et que les changements de pression profitent différemment à différentes prédispositions. Des hypothèses de causalité pathologique liées à la dopamine, la sérotonine, la norépinéphrine, le glutamate et l'acide aminobutyrique ont été formulées à plusieurs reprises pour l'autisme, le TDAH, la schizophrénie et le trouble bipolaire. De plus, ces modifications de la neurotransmission ont également été mises en évidence dans le domaine génétique pour ces mêmes neurotransmetteurs et dans ces mêmes troubles. La dopamine (DA) joue un rôle dans la motivation, la récompense, l'attention, le sommeil et la mémoire (Arias-Carrión, & Pöppel, 2007) et certains gènes associés sont DRD4, DRD2, COMT et SLC6A3 (Costa et al., 2011 ; Frank & Fossella, 2011). La sérotonine (5-HT) joue également un rôle dans l'humeur, l'anxiété et le bien-être (De Deurwaerdère & Di Giovanni, 2020) et certains gènes associés sont HTR2A, SLC6A4 et TPH2 (Sadkowski et al., 2013). Par ailleurs, l'acétylcholine (ACh) joue un rôle dans l'inhibition neuronale, l'attention et la mémoire chez l'adulte (Collins, 2010 ; Dehaene, 2014) et l'acide γ -aminobutyrique (GABA) joue un premier rôle neurotrophique, et un second dans le contrôle de l'hyperactivité neuronale associée à l'anxiété et il sert enfin d'inhibiteur avec le glutamate (Glu) (et les gènes associés tels que GAD2 et GRM7) qui est un neurotransmetteur excitateur qui travaille en symbiose avec le GABA pour maintenir un équilibre. Les gènes associés comprennent CHRNA2, CHRNA7, GAD1, SLC6A1 et ALDH5A1 (Erlander et al., 1991 ; Wang et al., 2018) ou CHRM2 associé à la flexibilité cognitive et à l'intelligence (Gosso et al., 2007 ; Zink et al., 2019). Les altérations des niveaux de concentration et des récepteurs de neurotransmission dans le TDAH, le TSA, le SS et les TB rapportées dans la littérature scientifique en psychopathologie sont rassemblées dans le tableau 5.

De plus, quelques travaux préliminaires ont été récemment menés sur le système histaminergique dans les troubles neuropsychiatriques (Cheng et al., 2021 ; Eissa et al., 2020 ; Shan & Swaab, 2022 ; Wright et al., 2017) mais d'autres études doivent être menées. De plus, des variations génétiques des allèles liés au GABA, ACh, DA, Glu, 5-HT, Norépinéphrine (NE) ont été identifiées (tableau 6).

Ces caractéristiques cérébrales et génétiques communes pourraient être nécessaires pour matérialiser un cadre commun mais ne sont cependant pas suffisantes pour caractériser un trouble neurodéveloppemental car elles sont également présentes dans de nombreux autres troubles (neurodéveloppementaux) (TOC, ST, troubles de l'apprentissage et de la communication...) et capacités (comme la créativité, voir Carson, 2011) et peuvent intervenir suite à des accidents ou des maladies. Il peut également exister des différences au niveau individuel qui doivent être analysées dans ce cadre et il semble qu'il n'y ait pas d'homogénéité dans la neuro-morphologie de ces psychopathologies. De plus, toutes ces modifications cérébrales peuvent se manifester de différentes manières, mais les caractéristiques visibles que l'on peut citer sont liées à l'attention et à la conscience (expérience d'états modifiés de conscience), à la perception (déficit d'inhibition latent) ou au traitement de l'information (inhibition, mémoire de travail, connectivité neuronale). Ainsi, ces éléments partagés pourraient suffire à caractériser un spectre commun, et considérer le TDAH, le SS, le TSA et le TB comme un trouble de dysfonctionnement des systèmes de neurotransmetteurs n'est pas très nouveau (et cela pourrait être bien analysé dans le cadre du RDoC), mais le principal problème qui émerge ici serait celui de la frontière

entre le normal et le pathologique et de l'essence psychopathologique du TDAH, du TSA, du SS et du TB.

III) Discussion

A) Conclusion

Malgré de nombreuses recherches empiriques et théoriques, nous n'avons toujours pas de réponse définitive sur l'étiologie, la nosologie et le diagnostic de l'autisme. Cet article a proposé une piste de discussion sur ces éléments, nous permettant de réfléchir à des perspectives d'avenir pour l'autisme au niveau clinique et de la recherche. Cette piste était l'hypothèse d'un « arbre des troubles neurodéveloppementaux ». Je me suis concentré sur le chevauchement génétique et phénotypique entre le TDAH, le TSA, le TB et le SS, puis j'ai suggéré de créer un arbre des troubles neurodéveloppementaux composé du Trouble global du neurodéveloppement, du Syndrome d'extrême sensibilité à l'environnement et du Trouble de dysfonctionnement des systèmes de neurotransmission. Le TGN consiste en la présence de certains des symptômes du DSM-V de ces quatre troubles (avec certains des TOC, ST et troubles de l'apprentissage), avec certains spécificateurs et la forme ancienne prototypique de ces troubles. J'ai également suggéré de créer un syndrome d'extrême sensibilité à l'environnement. Parce que les symptômes du DSM-V peuvent n'être qu'une manifestation d'une sensibilité extrême à l'environnement et que ce syndrome pourrait être un meilleur cadre pour réunir le TDAH, le TSA, le SS et le TB. J'ai proposé que ce syndrome puisse être caractérisé par une syntonie extrême aux expériences positives et négatives de l'environnement interne et externe se matérialisant par une absence totale de réaction et un détachement de l'environnement (hyposyntonie) ou une réaction complète et une participation spontanée et une adhésion très rapide à l'environnement (hypersyntonie). De plus, j'ai suggéré de créer une nosologie basée sur les variations de la neurotransmission et des gènes associés dans les TSA, TDAH, SS et TB car des hypothèses de causalité pathologique liées à la dopamine, la sérotonine, la norépinéphrine, le glutamate et l'acide aminobutyrique ont été émises à plusieurs reprises pour l'autisme, le TDAH, la schizophrénie et le trouble bipolaire. J'ai également proposé de discuter de la voie que prennent les débats sur l'autisme, à savoir la remise en cause du cadre médical actuel qui ne correspond pas aux découvertes en génétique et en neurobiologie.

En fin de compte, en combinant les trois propositions (TGN, SESE et TDSN), nous pourrions caractériser un « arbre des troubles neurodéveloppementaux » en nous concentrant sur différents niveaux :

- un chevauchement et un continuum génétiques entre les TSA, TDAH, TB et SS (les *racines*).
- ce chevauchement modifie en particulier certains neurotransmetteurs et les systèmes de neurotransmission dans le cerveau et donc les circuits neuronaux (le *tronc*)
- cette modification entraîne une sensibilité physiologique extrême (les *branches*)
- cette sensibilité se manifeste par des symptômes (comportementaux, émotionnels et cognitifs) comme ceux du DSM par exemple mais pas exclusivement (les *feuilles*)
- enfin, et de manière facultative, certaines manifestations peuvent être caractérisées par les étiquettes et formes prototypiques actuelles et/ou anciennes du DSM (les *fleurs*).

Cet arbre peut s'adapter de manière adéquate au projet RDoC même si une discussion plus approfondie sur les facteurs psychosociaux de ces troubles neurodéveloppementaux est nécessaire (Demazeux & Pidoux, 2015). Ainsi, le chevauchement génétique pourrait consister en une base commune entre TSA, TDAH, TB et SS, se matérialisant par un phénotype physiologique commun que nous proposons d'être une sensibilité extrême à l'environnement et où les symptômes et manifestations visibles pourraient être utiles et servir uniquement à aider les patients, alors les étiquettes - anciennes ou nouvelles comme un trouble neurodéveloppemental d'altération sociale (Waterhouse, et al., 2017) - pourraient être utilisées par les chercheurs pour continuer le travail de recherche d'entités biologiques. Par ailleurs, il pourrait aider les patients et les professionnels du domaine ainsi que les chercheurs dans leur travail, même si des discussions supplémentaires seraient nécessaires pour la rendre efficace. En définitive, cette proposition semble en adéquation avec le nouveau modèle proposé par Thiebaut de Schotten & Forkel (2022) mettant en exergue les connexions cérébrales comme élément central du fonctionnement du cerveau humain et pourrait s'analyser à travers le modèle de causalité triadique

réci-proque (Bandura, 1986) exposant le fonctionnement humain comme l'interaction entre l'environnement, les comportements et les variables de la personne (y compris la cognition).

B) Limites

En raison de la longueur déjà importante de cet article et de l'impossibilité de discuter de tous les éléments problématiques, de nombreux points ont été éludés, comme la distinction des sexes dans l'autisme (Robinson et al., 2013) ou les différentes cultures de conception de l'autisme (Tupou et al., 2021). J'ai également choisi d'étendre la discussion de l'autisme à d'autres troubles neurodéveloppementaux, ce qui pourrait révéler des extrapolations, des hypothèses et des pistes de réflexion et des problématiques insuffisamment étayées ainsi que certaines imprécisions qui devront être discutées ultérieurement. De même, je n'ai pas abordé le concept de neurodiversité.

C) Travaux futurs

Ces éléments nous permettent d'affirmer qu'il est difficile aujourd'hui de comprendre et de concevoir l'autisme comme une entité biologique, il s'agirait au mieux d'une seule entité sociale ou médicale (mais sans base neurobiologique et génétique complète). De plus, toutes les discussions de cet article mènent à d'autres questions à traiter : l'autisme est-il une entité pathologique ? Est-ce que c'est intrinsèquement l'autisme ou les caractéristiques qui l'entourent (et plus particulièrement un faible intellect ou de faibles capacités cognitives) et les nombreux autistes prototypiques visibles qui nous amènent à penser cela ? Les autistes ont-ils intrinsèquement des difficultés de communication et de socialisation, indépendamment de la culture et du contexte, ou est-ce le résultat d'une stigmatisation systémique de la différence ou d'un environnement inadéquat ? Bien que la nosologie et les étiquettes puissent sembler importantes, tant pour la recherche que pour les patients, ne devrions-nous pas nous concentrer sur le bien-être des individus et les aider quelle que soit l'étiquette que l'on puisse leur coller ? Les étiquettes sont importantes pour fournir la bonne approche thérapeutique en cas de besoin, mais elles sont également restrictives pour la réflexion sur la théorie et l'expérimentation dans la pratique.

Aujourd'hui, la question de l'autisme semble divisée en trois éléments plus ou moins larges et hermétiques : le courant médical et psychiatrique qui pathologise l'autisme et le considère comme un handicap et un trouble, le courant génétique qui voit dans l'autisme une variation naturelle organisée autour des statistiques des traits de distribution et affirme parfois que les troubles n'existent tout simplement pas et appartiennent aux extrêmes de la normalité, et enfin le courant psycho-social, culturel et politique qui exprime la nécessité d'une acceptation de toutes les différences et d'une réorganisation de la société (en termes d'urbanisme, d'éducation, de travail...) pour une meilleure inclusion de tous. Tous ces courants ne sont pas en contradiction totale sur tous les points, mais il n'est pas impossible qu'ils s'opposent et s'affrontent davantage dans les années à venir. Il devient donc nécessaire de trouver des moyens de les concilier et d'inventer de nouveaux cadres et paradigmes médicaux, sociaux, politiques, éducatifs et philosophiques pour aborder la (vive) question de l'autisme. En tout cas, tous ces débats et tensions ne sont-ils pas un signe de bonne santé de la recherche scientifique sur la question de l'autisme et des troubles neurodéveloppementaux ?

References

- Abdulmir, H. A., Abdul-Rasheed, O. F., & Abdulghani, E. A. (2018). Serotonin and serotonin transporter levels in autistic children. *Saudi medical journal*, 39(5), 487–494. <https://doi.org/10.15537/smj.2018.5.21751>
- Abi-Dargham A. (2007). Alterations of serotonin transmission in schizophrenia. *International review of neurobiology*, 78, 133–164. [https://doi.org/10.1016/S0074-7742\(06\)78005-9](https://doi.org/10.1016/S0074-7742(06)78005-9)
- Abi-Dargham, A. (2014). Schizophrenia: overview and dopamine dysfunction. *The Journal of clinical psychiatry*, 75(11), e31. <https://doi.org/10.4088/JCP.13078tx2c>
- Abrahams, B. S., & Geschwind, D. H. (2008). Advances in autism genetics: on the threshold of a new neurobiology. *Nature reviews. Genetics*, 9(5), 341–355. <https://doi.org/10.1038/nrg2346>
- Acevedo, B. P., Jagiellowicz, J., Aron, E., Marhenke, R., & Aron, A. (2017). Sensory processing sensitivity and childhood quality's effects on neural responses to emotional stimuli. *Clinical Neuropsychiatry: Journal of Treatment Evaluation*, 14(6), 359–373.
- Adak, P., Sinha, S., & Banerjee, N. (2021). An Association Study of Gamma-Aminobutyric Acid Type A Receptor Variants and Susceptibility to Autism Spectrum Disorders. *Journal of autism and developmental disorders*, 51(11), 4043–4053. <https://doi.org/10.1007/s10803-020-04865-x>
- Akabaliev, V. H., Sivkov, S. T., & Mantarkov, M. Y. (2014). Minor physical anomalies in schizophrenia and bipolar I disorder and the neurodevelopmental continuum of psychosis. *Bipolar disorders*, 16(6), 633–641. <https://doi.org/10.1111/bdi.12211>
- Albajara Sáenz, A., Septier, M., Van Schuerbeek, P., Baijot, S., Deconinck, N., Defresne, P., Delvenne, V., Passeri, G., Raeymaekers, H., Salvesen, L., Victoor, L., Villemonteix, T., Willaye, E., Peigneux, P., & Massat, I. (2020). ADHD and ASD: distinct brain patterns of inhibition-related activation?. *Translational psychiatry*, 10(1), 24. <https://doi.org/10.1038/s41398-020-0707-z>
- Alloy, L. B., & Nusslock, R. (2019). Future Directions for Understanding Adolescent Bipolar Spectrum Disorders: A Reward Hypersensitivity Perspective. *Journal of clinical child and adolescent psychology : the official journal for the Society of Clinical Child and Adolescent Psychology*, American Psychological Association, Division 53, 48(4), 669–683. <https://doi.org/10.1080/15374416.2019.1567347>
- Ament, S. A., Szelinger, S., Glusman, G., Ashworth, J., Hou, L., Akula, N., Shekhtman, T., Badner, J. A., Brunkow, M. E., Mauldin, D. E., Stittrich, A.-B., Rouleau, K., Detera-Wadleigh, S. D., Nurnberger, J. I., Edenberg, H. J., Gershon, E. S., Schork, N., Study, T. B. G., Price, N. D., ... Roach, J. C. (2015). Rare variants in neuronal excitability genes influence risk for bipolar disorder. *Proceedings of the National Academy of Sciences*, 112(11), 3576–3581. <https://doi.org/10.1073/pnas.1424958112>
- American Psychiatric Association. (1952). *Diagnostic and statistical manual of mental disorders* (1st ed.).
- American Psychiatric Association. (1968). *Diagnostic and statistical manual of mental disorders* (2nd ed.).
- American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.).
- American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., text rev.).

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

American Psychiatric Association. (1994). Diagnostic and statistical manual of mental disorders (4th ed.).

American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders (4th ed., text rev.).

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.).

American Psychiatric Association. (2022). Diagnostic and statistical manual of mental disorders (5th ed., text rev.).

Angyal, N., Horvath, E. Z., Tarnok, Z., Richman, M. J., Bogнар, E., Lakatos, K., Sasvari-Szekely, M., & Nemoda, Z. (2018). Association analysis of norepinephrine transporter polymorphisms and methylphenidate response in ADHD patients. *Progress in neuro-psychopharmacology & biological psychiatry*, 84(Pt A), 122–128. <https://doi.org/10.1016/j.pnpbp.2018.01.013>

Anomitri, C., & Lazaratou, H. (2017). Asperger syndrome and schizophrenia: Neurodevelopmental continuum or separated clinical entities?. *Psychiatrike = Psychiatriki*, 28(2), 175–182. <https://doi.org/10.22365/jpsych.2017.282.175>

Antshel, K. M., & Russo, N. (2019). Autism Spectrum Disorders and ADHD: Overlapping Phenomenology, Diagnostic Issues, and Treatment Considerations. *Current psychiatry reports*, 21(5), 34. <https://doi.org/10.1007/s11920-019-1020-5>

Antshel, K. M., Zhang-James, Y., & Faraone, S. V. (2013). The comorbidity of ADHD and autism spectrum disorder. *Expert review of neurotherapeutics*, 13(10), 1117–1128. <https://doi.org/10.1586/14737175.2013.840417>

Antshel, K. M., Zhang-James, Y., Wagner, K. E., Ledesma, A., & Faraone, S. V. (2016). An update on the comorbidity of ADHD and ASD: a focus on clinical management. *Expert review of neurotherapeutics*, 16(3), 279–293. <https://doi.org/10.1586/14737175.2016.1146591>

Arias-Carrión, O., & Pöppel, E. (2007). Dopamine, learning, and reward-seeking behavior. *Acta neurobiologiae experimentalis*, 67(4), 481–488.

Armocida, G., Licata, M., Gorini, I., & Ciliberti, R. (2019). The Acetylcholine Therapy in the Treatment of Schizophrenia - The Experience of Mario Fiamberti in the Hospital of Varese (1937). *Acta medico-historica adriatica : AMHA*, 17(1), 91–102. <https://doi.org/10.31952/amha.17.1.5>

Arrúe, A., Dávila, R., Zumárraga, M., Basterreche, N., González-Torres, M. A., Goienetxea, B., Zamalloa, M. I., Anguiano, J. B., & Guimón, J. (2010). GABA and homovanillic acid in the plasma of Schizophrenic and bipolar I patients. *Neurochemical research*, 35(2), 247–253. <https://doi.org/10.1007/s11064-009-0048-z>

Ashok, A. H., Marques, T. R., Jauhar, S., Nour, M. M., Goodwin, G. M., Young, A. H., & Howes, O. D. (2017). The dopamine hypothesis of bipolar affective disorder: the state of the art and implications for treatment. *Molecular psychiatry*, 22(5), 666–679. <https://doi.org/10.1038/mp.2017.16>

Asperger, H. (1944). Die “Autistischen Psychopathen” im Kindesalter. *Archiv f. Psychiatrie* 117, 76–136. <https://doi.org/10.1007/BF01837709>

Assary, E., Zavos, H. M. S., Krapohl, E., Keers, R., & Pluess, M. (2021). Genetic architecture of environmental sensitivity reflects multiple heritable components: A twin study with adolescents. *Molecular Psychiatry*, 26(9), 4896–4904. <https://doi.org/10.1038/s41380-020-0783-8>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Austin P. (2011). Genes, animal models and the current understanding of psychiatric disease. *BMC biology*, 9, 78. <https://doi.org/10.1186/1741-7007-9-78>

Autism Spectrum Disorders Working Group of The Psychiatric Genomics Consortium (2017). Meta-analysis of GWAS of over 16,000 individuals with autism spectrum disorder highlights a novel locus at 10q24.32 and a significant overlap with schizophrenia. *Molecular autism*, 8, 21. <https://doi.org/10.1186/s13229-017-0137-9>

Azzam, A. A. A., Bahgat, D. M. R., Shahin, R. M. H., & Nasralla, R. M. A. (2018). Association study between polymorphisms of dopamine transporter gene (SLC6A3), dopamine D1 receptor gene (DRD1), and autism. *Journal of Medicine in Scientific Research*, 1(1), 59. https://doi.org/10.4103/JMISR.JMISR_8_18

Bacchelli, E., Battaglia, A., Cameli, C., Lomartire, S., Tancredi, R., Thomson, S., Sutcliffe, J. S., & Maestrini, E. (2015). Analysis of CHRNA7 rare variants in autism spectrum disorder susceptibility. *American Journal of Medical Genetics. Part A*, 167A(4), 715-723. <https://doi.org/10.1002/ajmg.a.36847>

Baehne, C. G., Ehli, A.-C., Plichta, M. M., Conzelmann, A., Pauli, P., Jacob, C., Gutknecht, L., Lesch, K.-P., & Fallgatter, A. J. (2009). Tph2 gene variants modulate response control processes in adult ADHD patients and healthy individuals. *Molecular Psychiatry*, 14(11), 1032-1039. <https://doi.org/10.1038/mp.2008.39>

Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Prentice-Hall.

Banerjee, E., & Nandagopal, K. (2015). Does serotonin deficit mediate susceptibility to ADHD?. *Neurochemistry international*, 82, 52–68. <https://doi.org/10.1016/j.neuint.2015.02.001>

Baou, M., Boumba, V. A., Petrikis, P., Rallis, G., Vougiouklakis, T., & Mavreas, V. (2016). A review of genetic alterations in the serotonin pathway and their correlation with psychotic diseases and response to atypical antipsychotics. *Schizophrenia research*, 170(1), 18–29. <https://doi.org/10.1016/j.schres.2015.11.003>

Baptista, J., Belsky, J., Mesquita, A., & Soares, I. (2017). Serotonin transporter polymorphism moderates the effects of caregiver intrusiveness on ADHD symptoms among institutionalized preschoolers. *European child & adolescent psychiatry*, 26(3), 303–313. <https://doi.org/10.1007/s00787-016-0890-x>

Barkley, R. A., Smith, K. M., & Fischer, M. (2019). ADHD risk genes involved in dopamine signaling and metabolism are associated with reduced estimated life expectancy at young adult follow-up in hyperactive and control children. *American journal of medical genetics. Part B, Neuropsychiatric genetics : the official publication of the International Society of Psychiatric Genetics*, 180(3), 175–185. <https://doi.org/10.1002/ajmg.b.32711>

Barlati, S., Minelli, A., Ceraso, A., Nibbio, G., Carvalho Silva, R., Deste, G., Turrina, C., & Vita, A. (2020). Social Cognition in a Research Domain Criteria Perspective: A Bridge Between Schizophrenia and Autism Spectra Disorders. *Frontiers in psychiatry*, 11, 806. <https://doi.org/10.3389/fpsyt.2020.00806>

Barr, C. L., Kroft, J., Feng, Y., Wigg, K., Roberts, W., Malone, M., Ickowicz, A., Schachar, R., Tannock, R., & Kennedy, J. L. (2002). The norepinephrine transporter gene and attention-deficit hyperactivity disorder. *American journal of medical genetics*, 114(3), 255–259. <https://doi.org/10.1002/ajmg.10193>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

- Bast, N., Poustka, L., & Freitag, C. M. (2018). The locus coeruleus-norepinephrine system as pacemaker of attention - a developmental mechanism of derailed attentional function in autism spectrum disorder. *The European journal of neuroscience*, 47(2), 115–125. <https://doi.org/10.1111/ejn.13795>
- Baweja, R., Waschbusch, D. A., Pelham, W. E., 3rd, Pelham, W. E., Jr, & Waxmonsky, J. G. (2021). The Impact of Persistent Irritability on the Medication Treatment of Paediatric Attention Deficit Hyperactivity Disorder. *Frontiers in psychiatry*, 12, 699687. <https://doi.org/10.3389/fpsyt.2021.699687>
- Beane, M., & Marrocco, R. T. (2004). Norepinephrine and acetylcholine mediation of the components of reflexive attention: implications for attention deficit disorders. *Progress in neurobiology*, 74(3), 167–181. <https://doi.org/10.1016/j.pneurobio.2004.09.001>
- Belsky, J. (1997). Variation in susceptibility to environmental influence: An evolutionary argument. *Psychological Inquiry*, 8(3), 182–186. https://doi.org/10.1207/s15327965pli0803_3
- Belsky, J. (2013). Differential Susceptibility to Environmental Influences. *ICEP* 7, 15–31. <https://doi.org/10.1007/2288-6729-7-2-15>
- Bennett, R. H., Somandepalli, K., Roy, A. K., & Di Martino, A. (2017). The Neural Correlates of Emotional Lability in Children with Autism Spectrum Disorder. *Brain connectivity*, 7(5), 281–288. <https://doi.org/10.1089/brain.2016.0472>
- Berk, M., Dodd, S., Kauer-Sant'anna, M., Malhi, G. S., Bourin, M., Kapczinski, F., & Norman, T. (2007). Dopamine dysregulation syndrome: implications for a dopamine hypothesis of bipolar disorder. *Acta psychiatrica Scandinavica. Supplementum*, (434), 41–49. <https://doi.org/10.1111/j.1600-0447.2007.01058.x>
- Berrettini, W. H. (2000). Genetics of psychiatric disease. *Annual review of medicine*, 51, 465–479. <https://doi.org/10.1146/annurev.med.51.1.465>
- Betancur C. (2011). Etiological heterogeneity in autism spectrum disorders: more than 100 genetic and genomic disorders and still counting. *Brain research*, 1380, 42–77. <https://doi.org/10.1016/j.brainres.2010.11.078>
- Beutler, L. E., & Malik, M. L. (Eds.). (2002). *Rethinking the DSM: A psychological perspective*. American Psychological Association. <https://doi.org/10.1037/10456-000>
- Beversdorf, D. Q. (2020). The Role of the Noradrenergic System in Autism Spectrum Disorders, Implications for Treatment. *Seminars in pediatric neurology*, 35, 100834. <https://doi.org/10.1016/j.spen.2020.100834>
- Bhagwagar, Z., Wylezinska, M., Jezzard, P., Evans, J., Ashworth, F., Sule, A., Matthews, P. M., & Cowen, P. J. (2007). Reduction in occipital cortex gamma-aminobutyric acid concentrations in medication-free recovered unipolar depressed and bipolar subjects. *Biological psychiatry*, 61(6), 806–812. <https://doi.org/10.1016/j.biopsych.2006.08.048>
- Birtwistle, J., & Baldwin, D. (1998). Role of dopamine in schizophrenia and Parkinson's disease. *British journal of nursing (Mark Allen Publishing)*, 7(14), 832–841. <https://doi.org/10.12968/bjon.1998.7.14.5636>
- Biscaldi, M., Rauh, R., Müller, C., Irion, L., Saville, C. W., Schulz, E., & Klein, C. (2015). Identification of neuromotor deficits common to autism spectrum disorder and attention deficit/hyperactivity disorder, and imitation deficits specific to autism spectrum disorder. *European child & adolescent psychiatry*, 24(12), 1497–1507. <https://doi.org/10.1007/s00787-015-0753-x>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Blashfield, R. K., Keeley, J. W., Flanagan, E. H., & Miles, S. R. (2014). The cycle of classification: DSM-I through DSM-5. *Annual review of clinical psychology*, 10, 25–51. <https://doi.org/10.1146/annurev-clinpsy-032813-153639>

Blatt, G. J., & Fatemi, S. H. (2011). Alterations in GABAergic biomarkers in the autism brain: Research findings and clinical implications. *Anatomical Record (Hoboken, N.J.: 2007)*, 294(10), 1646-1652. <https://doi.org/10.1002/ar.21252>

Bleich, A., Brown, S. L., Kahn, R., & van Praag, H. M. (1988). The role of serotonin in schizophrenia. *Schizophrenia bulletin*, 14(2), 297–315. <https://doi.org/10.1093/schbul/14.2.297>

Bleuler E. (1911). *Dementia Praecox oder Gruppe der Schizophrenien*. Deuticke.

Bleuler E. (1950). *Dementia Praecox or the Group of Schizophrenias* (Trans. J. Zinkin). International Universities. (Original work published 1911).

Bleuler, E. (2011). *Les Problèmes de la schizoïdie et de la syntonie*. (P. Von Massow, Trans.). *L'information psychiatrique*, vol. 87, no. 1, pp. 37-51. <https://doi.org/10.3917/inpsy.8701.0037> (Original work published 1918).

Boedhoe, P., van Rooij, D., Hoogman, M., Twisk, J., Schmaal, L., Abe, Y., Alonso, P., Ameis, S. H., Anikin, A., Anticevic, A., Arango, C., Arnold, P. D., Asherson, P., Assogna, F., Auzias, G., Banaschewski, T., Baranov, A., Batistuzzo, M. C., Baumeister, S., Baur-Streubel, R., ... van den Heuvel, O. A. (2020). Subcortical Brain Volume, Regional Cortical Thickness, and Cortical Surface Area Across Disorders: Findings From the ENIGMA ADHD, ASD, and OCD Working Groups. *The American journal of psychiatry*, 177(9), 834–843. <https://doi.org/10.1176/appi.ajp.2020.19030331>

Bojesen, K. B., Broberg, B. V., Fagerlund, B., Jessen, K., Thomas, M. B., Sigvard, A., Tangmose, K., Nielsen, M. Ø., Andersen, G. S., Larsson, H., Edden, R., Rostrup, E., & Glenthøj, B. Y. (2021). Associations Between Cognitive Function and Levels of Glutamatergic Metabolites and Gamma-Aminobutyric Acid in Antipsychotic-Naïve Patients With Schizophrenia or Psychosis. *Biological psychiatry*, 89(3), 278–287. <https://doi.org/10.1016/j.biopsych.2020.06.027>

Bokor, G., & Anderson, P. D. (2014). Attention-Deficit/Hyperactivity Disorder. *Journal of pharmacy practice*, 27(4), 336–349. <https://doi.org/10.1177/0897190014543628>

Bolat, H., Ercan, E. S., Ünsel-Bolat, G., Tahillioğlu, A., Yazici, K. U., Bacanlı, A., Pariltay, E., Aygüneş Jafari, D., Kosova, B., Özgül, S., Rohde, L. A., & Akin, H. (2020). DRD4 genotyping may differentiate symptoms of attention-deficit/hyperactivity disorder and sluggish cognitive tempo. *Revista brasileira de psiquiatria (Sao Paulo, Brazil : 1999)*, 42(6), 630–637. <https://doi.org/10.1590/1516-4446-2019-0630>

Bollmann, S., Ghisleni, C., Poil, S. S., Martin, E., Ball, J., Eich-Höchli, D., Edden, R. A., Klaver, P., Michels, L., Brandeis, D., & O'Gorman, R. L. (2015). Developmental changes in gamma-aminobutyric acid levels in attention-deficit/hyperactivity disorder. *Translational psychiatry*, 5(6), e589. <https://doi.org/10.1038/tp.2015.79>

Bora, E., & Pantelis, C. (2016). Meta-analysis of social cognition in attention-deficit/hyperactivity disorder (ADHD): comparison with healthy controls and autistic spectrum disorder. *Psychological medicine*, 46(4), 699–716. <https://doi.org/10.1017/S0033291715002573>

Bowton, E., Saunders, C., Reddy, I. A., Campbell, N. G., Hamilton, P. J., Henry, L. K., Coon, H., Sakrikar, D., Veenstra-VanderWeele, J. M., Blakely, R. D., Sutcliffe, J., Matthies, H. J. G., Erreger, K., & Galli, A. (2014). SLC6A3 coding variant Ala559Val found in two autism probands alters dopamine transporter function and trafficking. *Translational Psychiatry*, 4, e464. <https://doi.org/10.1038/tp.2014.90>

- Bradshaw, J. L., & Sheppard, D. M. (2000). The neurodevelopmental frontostriatal disorders: evolutionary adaptiveness and anomalous lateralization. *Brain and language*, 73(2), 297–320. <https://doi.org/10.1006/brln.2000.2308>
- Brady, R. O., Jr, McCarthy, J. M., Prescott, A. P., Jensen, J. E., Cooper, A. J., Cohen, B. M., Renshaw, P. F., & Ongür, D. (2013). Brain gamma-aminobutyric acid (GABA) abnormalities in bipolar disorder. *Bipolar disorders*, 15(4), 434–439. <https://doi.org/10.1111/bdi.12074>
- Brainstorm Consortium, Anttila, V., Bulik-Sullivan, B., Finucane, H. K., Walters, R. K., Bras, J., Duncan, L., Escott-Price, V., Falcone, G. J., Gormley, P., Malik, R., Patsopoulos, N. A., Ripke, S., Wei, Z., Yu, D., Lee, P. H., Turley, P., Grenier-Boley, B., Chouraki, V., Kamatani, Y., ... Murray, R. (2018). Analysis of shared heritability in common disorders of the brain. *Science (New York, N.Y.)*, 360(6395), eaap8757. <https://doi.org/10.1126/science.aap8757>
- Brambilla, P., Perez, J., Barale, F., Schettini, G., & Soares, J. C. (2003). GABAergic dysfunction in mood disorders. *Molecular psychiatry*, 8(8), 721–715. <https://doi.org/10.1038/sj.mp.4001362>
- Breier, A., Wolkowitz, O. M., Roy, A., Potter, W. Z., & Pickar, D. (1990). Plasma norepinephrine in chronic schizophrenia. *The American journal of psychiatry*, 147(11), 1467–1470. <https://doi.org/10.1176/ajp.147.11.1467>
- Brieber, S., Neufang, S., Bruning, N., Kamp-Becker, I., Remschmidt, H., Herpertz-Dahlmann, B., Fink, G. R., & Konrad, K. (2007). Structural brain abnormalities in adolescents with autism spectrum disorder and patients with attention deficit/hyperactivity disorder. *Journal of child psychology and psychiatry, and allied disciplines*, 48(12), 1251–1258. <https://doi.org/10.1111/j.1469-7610.2007.01799.x>
- Bursztejn, C., Ferrari, P., Dreux, C., Braconnier, A., & Lancrenon, S. (1988). Métabolisme de la sérotonine dans l'autisme infantile [Metabolism of serotonin in autism in children]. *L'Encephale*, 14(6), 413–419.
- Cabana-Domínguez, J., Torrico, B., Reif, A., Fernández-Castillo, N., & Cormand, B. (2022). Comprehensive exploration of the genetic contribution of the dopaminergic and serotonergic pathways to psychiatric disorders. *Translational psychiatry*, 12(1), 11. <https://doi.org/10.1038/s41398-021-01771-3>
- Calabrò, M., Mandelli, L., Crisafulli, C., Lee, S. J., Jun, T. Y., Wang, S. M., Patkar, A. A., Masand, P. S., Benedetti, F., Han, C., Pae, C. U., & Serretti, A. (2018). Neuroplasticity, Neurotransmission and Brain-Related Genes in Major Depression and Bipolar Disorder: Focus on Treatment Outcomes in an Asiatic Sample. *Advances in therapy*, 35(10), 1656–1670. <https://doi.org/10.1007/s12325-018-0781-2>
- Carpenter, W. T. (2016). The RDoC Controversy: Alternate Paradigm or Dominant Paradigm? *American Journal of Psychiatry*, 173(6), 562–563. [doi:10.1176/appi.ajp.2016.16030](https://doi.org/10.1176/appi.ajp.2016.16030)
- Casey, B. J., Craddock, N., Cuthbert, B. N., Hyman, S. E., Lee, F. S., & Ressler, K. J. (2013). DSM-5 and RDoC: progress in psychiatry research?. *Nature reviews. Neuroscience*, 14(11), 810–814. <https://doi.org/10.1038/nrn3621>
- Caspi, A., Houts, R. M., Belsky, D. W., Goldman-Mellor, S. J., Harrington, H., Israel, S., Meier, M. H., Ramrakha, S., Shalev, I., Poulton, R., & Moffitt, T. E. (2014). The p Factor: One General Psychopathology Factor in the Structure of Psychiatric Disorders?. *Clinical psychological science : a journal of the Association for Psychological Science*, 2(2), 119–137. <https://doi.org/10.1177/2167702613497473>

Caylak E. (2012). Biochemical and genetic analyses of childhood attention deficit/hyperactivity disorder. *American journal of medical genetics. Part B, Neuropsychiatric genetics: the official publication of the International Society of Psychiatric Genetics*, 159B(6), 613–627. <https://doi.org/10.1002/ajmg.b.32077>

Cerebello-thalamo-cortical hyperconnectivity as a state-independent functional neural signature for psychosis prediction and characterization. *Nature Communications*, 9(1), 1-9. <https://doi.org/10.1038/s41467-018-06350-7>

Chamberlain, S. R., & Robbins, T. W. (2013). Noradrenergic modulation of cognition: therapeutic implications. *Journal of psychopharmacology (Oxford, England)*, 27(8), 694–718. <https://doi.org/10.1177/0269881113480988>

Chang, C. C., Lu, R. B., Ma, K. H., Chang, H. A., Chen, C. L., Huang, C. C., Lin, W. W., & Huang, S. Y. (2007). Association study of the norepinephrine transporter gene polymorphisms and bipolar disorder in Han Chinese population. *The world journal of biological psychiatry : the official journal of the World Federation of Societies of Biological Psychiatry*, 8(3), 188–195. <https://doi.org/10.1080/15622970601136195>

Chao, H. T., Chen, H., Samaco, R. C., Xue, M., Chahrour, M., Yoo, J., Neul, J. L., Gong, S., Lu, H. C., Heintz, N., Ekker, M., Rubenstein, J. L., Noebels, J. L., Rosenmund, C., & Zoghbi, H. Y. (2010). Dysfunction in GABA signalling mediates autism-like stereotypies and Rett syndrome phenotypes. *Nature*, 468(7321), 263–269. <https://doi.org/10.1038/nature09582>

Chaste, P., Klei, L., Sanders, S. J., Hus, V., Murtha, M. T., Lowe, J. K., Willsey, A. J., Moreno-De-Luca, D., Yu, T. W., Fombonne, E., Geschwind, D., Grice, D. E., Ledbetter, D. H., Mane, S. M., Martin, D. M., Morrow, E. M., Walsh, C. A., Sutcliffe, J. S., Lese Martin, C., Beaudet, A. L., ... Devlin, B. (2015). A genome-wide association study of autism using the Simons Simplex Collection: Does reducing phenotypic heterogeneity in autism increase genetic homogeneity?. *Biological psychiatry*, 77(9), 775–784. <https://doi.org/10.1016/j.biopsych.2014.09.017>

Chen, J., Fang, Y., Kemp, D. E., Calabrese, J. R., & Gao, K. (2010). Switching to hypomania and mania: differential neurochemical, neuropsychological, and pharmacologic triggers and their mechanisms. *Current psychiatry reports*, 12(6), 512–521. <https://doi.org/10.1007/s11920-010-0157-z>

Chen, K., Kardys, A., Chen, Y., Flink, S., Tabakoff, B., & Shih, J. C. (2017). Altered gene expression in early postnatal monoamine oxidase A knockout mice. *Brain research*, 1669, 18–26. <https://doi.org/10.1016/j.brainres.2017.05.017>

Chen, L. H., Lee, C., Ho, T., Hung, S., Tang, C., Garcia-Barcelo, M., ... Leung, P. W.-L. (2019). GENETIC OVERLAP BETWEEN ADHD AND ASD IN SHANK GENES IN CHINESE POPULATION. *European Neuropsychopharmacology*, 29, S956–S957. <https://doi.org/10.1016/j.euroneuro.2017.08.312>

Chen, S., Qian, A., Tao, J., Zhou, R., Fu, C., Yang, C., Lin, Q., Zhou, J., Li, J., Huang, X., & Wang, M. (2022). Different effects of the DRD4 genotype on intrinsic brain network connectivity strength in drug-naïve children with ADHD and healthy controls. *Brain imaging and behavior*, 16(1), 464–475. <https://doi.org/10.1007/s11682-021-00521-9>

Cheng, L., Liu, J., & Chen, Z. (2021). The Histaminergic System in Neuropsychiatric Disorders. *Biomolecules*, 11(9), 1345. <https://doi.org/10.3390/biom11091345>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Chevrier, A., Bhaijiwala, M., Lipszyc, J., Cheyne, D., Graham, S., & Schachar, R. (2019). Disrupted reinforcement learning during post-error slowing in ADHD. *PloS one*, 14(2), e0206780. <https://doi.org/10.1371/journal.pone.0206780>

Chisholm, K., Lin, A., Abu-Akel, A., & Wood, S. J. (2015). The association between autism and schizophrenia spectrum disorders: A review of eight alternate models of co-occurrence. *Neuroscience and biobehavioral reviews*, 55, 173–183. <https://doi.org/10.1016/j.neubiorev.2015.04.012>

Chiu, P. W., Lui, S., Hung, K., Chan, R., Chan, Q., Sham, P. C., Cheung, E., & Mak, H. (2018). In vivo gamma-aminobutyric acid and glutamate levels in people with first-episode schizophrenia: A proton magnetic resonance spectroscopy study. *Schizophrenia research*, 193, 295–303. <https://doi.org/10.1016/j.schres.2017.07.021>

Choo, M., Hwang, J. A., Jeon, S. W., Oh, S. Y., Yoon, H. K., Lee, H. J., & Kim, Y. K. (2015). Association Study between Norepinephrine Transporter Gene Polymorphism and Schizophrenia in a Korean Population. *Psychiatry investigation*, 12(4), 551–558. <https://doi.org/10.4306/pi.2015.12.4.551>

Christakou, A., Murphy, C. M., Chantiluke, K., Cubillo, A. I., Smith, A. B., Giampietro, V., Daly, E., Ecker, C., Robertson, D., MRC AIMS consortium, Murphy, D. G., & Rubia, K. (2013). Disorder-specific functional abnormalities during sustained attention in youth with Attention Deficit Hyperactivity Disorder (ADHD) and with autism. *Molecular psychiatry*, 18(2), 236–244. <https://doi.org/10.1038/mp.2011.185>

Chugani, D. C. (2004). Serotonin in autism and pediatric epilepsies. *Mental retardation and developmental disabilities research reviews*, 10(2), 112–116. <https://doi.org/10.1002/mrdd.20021>

Chung, A. K., Chan, W. M., Law, J. K., & Tse, C. Y. (2021). Ketamine abusers with SLC6A3 rs393795 genotype showed a preliminary association with psychosis and schizophrenia: A pilot case-control study. *Schizophrenia research*, 230, 24–25. <https://doi.org/10.1016/j.schres.2021.02.014>

Cieslinska, A., Fiedorowicz, E., Jarmolowska, B., Kordulewska, N., Kostyra, E., Moszynska, M., & Savelkoul, H. F. (2019). Polymorphisms rs6313 and rs6314 in Serotonin Receptor Gene (HTR2A) and Serotonin Concentration in Autistic Children. 9(1), 2021–2028. <https://doi.org/10.4172/Neuropsychiatry.1000547>

Clark, L., & Goodwin, G. M. (2004). State- and trait-related deficits in sustained attention in bipolar disorder. *European archives of psychiatry and clinical neuroscience*, 254(2), 61–68. <https://doi.org/10.1007/s00406-004-0460-y>

Clark, T., Feehan, C., Tinline, C., & Vostanis, P. (1999). Autistic symptoms in children with attention deficit-hyperactivity disorder. *European child & adolescent psychiatry*, 8(1), 50–55. <https://doi.org/10.1007/s007870050083>

Cochran, D. M., Sikoglu, E. M., Hodge, S. M., Edden, R. A., Foley, A., Kennedy, D. N., Moore, C. M., & Frazier, J. A. (2015). Relationship among Glutamine, γ -Aminobutyric Acid, and Social Cognition in Autism Spectrum Disorders. *Journal of child and adolescent psychopharmacology*, 25(4), 314–322. <https://doi.org/10.1089/cap.2014.0112>

Colla, M., Ende, G., Alm, B., Deuschle, M., Heuser, I., & Kronenberg, G. (2008). Cognitive MR spectroscopy of anterior cingulate cortex in ADHD: Elevated choline signal correlates with slowed hit reaction times. *Journal of Psychiatric Research*, 42(7), 587–595. <https://doi.org/10.1016/j.jpsychires.2007.06.006>

Collins, A. (2010). Apprentissage et contrôle cognitif : Une théorie computationnelle de la fonction exécutive préfrontale humaine. <https://tel.archives-ouvertes.fr/tel-00814840/document>

Collins, A. L., Ma, D., Whitehead, P. L., Martin, E. R., Wright, H. H., Abramson, R. K., Hussman, J. P., Haines, J. L., Cuccaro, M. L., Gilbert, J. R., & Pericak-Vance, M. A. (2006). Investigation of autism and GABA receptor subunit genes in multiple ethnic groups. *Neurogenetics*, 7(3), 167–174. <https://doi.org/10.1007/s10048-006-0045-1>

Cook, E. H., & Leventhal, B. L. (1996). The serotonin system in autism. *Current opinion in pediatrics*, 8(4), 348–354. <https://doi.org/10.1097/00008480-199608000-00008>

Coon, H., Dunn, D., Lainhart, J., Miller, J., Hamil, C., Battaglia, A., Tancredi, R., Leppert, M. F., Weiss, R., & McMahon, W. (2005). Possible association between autism and variants in the brain-expressed tryptophan hydroxylase gene (TPH2). *American Journal of Medical Genetics. Part B, Neuropsychiatric Genetics: The Official Publication of the International Society of Psychiatric Genetics*, 135B(1), 42–46. <https://doi.org/10.1002/ajmg.b.30168>

Cope, Z. A., Lavadia, M. L., Joosen, A., van de Cappelle, C., Lara, J. C., Huval, A., Kwiatkowski, M. K., Picciotto, M. R., Mineur, Y. S., Dulcis, D., & Young, J. W. (2020). Converging evidence that short-active photoperiod increases acetylcholine signaling in the hippocampus. *Cognitive, affective & behavioral neuroscience*, 20(6), 1173–1183. <https://doi.org/10.3758/s13415-020-00824-2>

Corbett, B. A., Constantine, L. J., Hendren, R., Rocke, D., & Ozonoff, S. (2009). Examining executive functioning in children with autism spectrum disorder, attention deficit hyperactivity disorder and typical development. *Psychiatry research*, 166(2-3), 210–222. <https://doi.org/10.1016/j.psychres.2008.02.005>

Costa, A., Riedel, M., Müller, U., Möller, H. J., & Ettinger, U. (2011). Relationship between SLC6A3 genotype and striatal dopamine transporter availability: a meta-analysis of human single photon emission computed tomography studies. *Synapse (New York, N.Y.)*, 65(10), 998–1005. <https://doi.org/10.1002/syn.20927>

Cousins, D. A., Butts, K., & Young, A. H. (2009). The role of dopamine in bipolar disorder. *Bipolar disorders*, 11(8), 787–806. <https://doi.org/10.1111/j.1399-5618.2009.00760.x>

Couture, S. M., Penn, D. L., Losh, M., Adolphs, R., Hurley, R., & Piven, J. (2010). Comparison of social cognitive functioning in schizophrenia and high functioning autism: more convergence than divergence. *Psychological medicine*, 40(4), 569–579. <https://doi.org/10.1017/S003329170999078X>

Craddock, N., O'Donovan, M. C., & Owen, M. J. (2006). Genes for schizophrenia and bipolar disorder? Implications for psychiatric nosology. *Schizophrenia bulletin*, 32(1), 9–16. <https://doi.org/10.1093/schbul/sbj033>

Cravedi, E., Deniau, E., Giannitelli, M., Xavier, J., Hartmann, A., & Cohen, D. (2017). Tourette syndrome and other neurodevelopmental disorders: a comprehensive review. *Child and adolescent psychiatry and mental health*, 11, 59. <https://doi.org/10.1186/s13034-017-0196-x>

Cristino, A. S., Williams, S. M., Hawi, Z., An, J. Y., Bellgrove, M. A., Schwartz, C. E., Costa, L., & Claudianos, C. (2014). Neurodevelopmental and neuropsychiatric disorders represent an interconnected molecular system. *Molecular psychiatry*, 19(3), 294–301. <https://doi.org/10.1038/mp.2013.16>

Cross-Disorder Group of the Psychiatric Genomics Consortium (2013). Identification of risk loci with shared effects on five major psychiatric disorders: a genome-wide analysis. *Lancet (London, England)*, 381(9875), 1371–1379. [https://doi.org/10.1016/S0140-6736\(12\)62129-1](https://doi.org/10.1016/S0140-6736(12)62129-1)

Cross-Disorder Group of the Psychiatric Genomics Consortium, Lee, S. H., Ripke, S., Neale, B. M., Faraone, S. V., Purcell, S. M., Perlis, R. H., Mowry, B. J., Thapar, A., Goddard, M. E., Witte, J. S.,

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Absher, D., Agartz, I., Akil, H., Amin, F., Andreassen, O. A., Anjorin, A., Anney, R., Anttila, V., Arking, D. E., ... International Inflammatory Bowel Disease Genetics Consortium (IBDGC) (2013). Genetic relationship between five psychiatric disorders estimated from genome-wide SNPs. *Nature genetics*, 45(9), 984–994. <https://doi.org/10.1038/ng.2711>

Cross-Disorder Group of the Psychiatric Genomics Consortium. Electronic address: plee0@mgh.harvard.edu, & Cross-Disorder Group of the Psychiatric Genomics Consortium (2019). Genomic Relationships, Novel Loci, and Pleiotropic Mechanisms across Eight Psychiatric Disorders. *Cell*, 179(7), 1469–1482.e11. <https://doi.org/10.1016/j.cell.2019.11.020>

Cuthbert, B. N., & Insel, T. R. (2013). Toward the future of psychiatric diagnosis: the seven pillars of RDoC. *BMC medicine*, 11, 126. <https://doi.org/10.1186/1741-7015-11-126>

Davis, K. L., Kahn, R. S., Ko, G., & Davidson, M. (1991). Dopamine in schizophrenia: a review and reconceptualization. *The American journal of psychiatry*, 148(11), 1474–1486. <https://doi.org/10.1176/ajp.148.11.1474>

de Bartolomeis, A., Buonaguro, E. F., Iasevoli, F., & Tomasetti, C. (2014). The emerging role of dopamine-glutamate interaction and of the postsynaptic density in bipolar disorder pathophysiology: Implications for treatment. *Journal of psychopharmacology (Oxford, England)*, 28(6), 505–526. <https://doi.org/10.1177/0269881114523864>

De Deurwaerdère, P., & Di Giovanni, G. (2020). Serotonin in Health and Disease. *International journal of molecular sciences*, 21(10), 3500. <https://doi.org/10.3390/ijms21103500>

de Jonge, J. C., Vinkers, C. H., Hulshoff Pol, H. E., & Marsman, A. (2017). GABAergic Mechanisms in Schizophrenia: Linking Postmortem and In Vivo Studies. *Frontiers in Psychiatry*, 8, 118. <https://doi.org/10.3389/fpsy.2017.00118>

De Luca, F. (2020). Endocrinological Abnormalities in Autism. *Seminars in pediatric neurology*, 35, 100582. <https://doi.org/10.1016/j.spen.2016.04.001>

Dehaene, S. (2014). Fondements cognitifs des apprentissages scolaires. https://www.college-de-france.fr/media/stanislas-dehaene/UPL2812985053430393578_Cours_2_Fondements_cognitifs_des_apprentissages_scolaires_v6.pdf

Del Campo, N., Chamberlain, S. R., Sahakian, B. J., & Robbins, T. W. (2011). The roles of dopamine and noradrenaline in the pathophysiology and treatment of attention-deficit/hyperactivity disorder. *Biological psychiatry*, 69(12), e145–e157. <https://doi.org/10.1016/j.biopsych.2011.02.036>

Demazeux, S., & Pidoux, V. (2015). Le projet RDoC - La classification psychiatrique de demain ? [The RDoC Project: the neuropsychiatric classification of tomorrow?]. *Medecine sciences: M/S*, 31(8-9), 792–796. <https://doi.org/10.1051/medsci/20153108019>

Dempster, E. L., Pidsley, R., Schalkwyk, L. C., Owens, S., Georgiades, A., Kane, F., Kalidindi, S., Picchioni, M., Kravariti, E., Touloupoulou, T., Murray, R. M., & Mill, J. (2011). Disease-associated epigenetic changes in monozygotic twins discordant for schizophrenia and bipolar disorder. *Human molecular genetics*, 20(24), 4786–4796. <https://doi.org/10.1093/hmg/ddr416>

Deutsch, S. I., & Burket, J. A. (2020). An Evolving Therapeutic Rationale for Targeting the $\alpha 7$ Nicotinic Acetylcholine Receptor in Autism Spectrum Disorder. *Current topics in behavioral neurosciences*, 45, 167–208. https://doi.org/10.1007/7854_2020_136

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Deutsch, S. I., Urbano, M. R., Neumann, S. A., Burket, J. A., & Katz, E. (2010). Cholinergic abnormalities in autism: is there a rationale for selective nicotinic agonist interventions?. *Clinical neuropharmacology*, 33(3), 114–120. <https://doi.org/10.1097/WNF.0b013e3181d6f7ad>

Dhossche, D., Applegate, H., Abraham, A., Maertens, P., Bland, L., Bencsath, A., & Martinez, J. (2002). Elevated plasma gamma-aminobutyric acid (GABA) levels in autistic youngsters: stimulus for a GABA hypothesis of autism. *Medical science monitor : international medical journal of experimental and clinical research*, 8(8), PR1–PR6.

Di Martino, A., Zuo, X. N., Kelly, C., Grzadzinski, R., Mennes, M., Schvarcz, A., Rodman, J., Lord, C., Castellanos, F. X., & Milham, M. P. (2013). Shared and distinct intrinsic functional network centrality in autism and attention-deficit/hyperactivity disorder. *Biological psychiatry*, 74(8), 623–632. <https://doi.org/10.1016/j.biopsych.2013.02.011>

DiCarlo, G. E., Aguilar, J. I., Matthies, H. J., Harrison, F. E., Bundschuh, K. E., West, A., Hashemi, P., Herborg, F., Rickhag, M., Chen, H., Gether, U., Wallace, M. T., & Galli, A. (2019). Autism-linked dopamine transporter mutation alters striatal dopamine neurotransmission and dopamine-dependent behaviors. *The Journal of clinical investigation*, 129(8), 3407–3419. <https://doi.org/10.1172/JCI127411>

Dimick, M. K., Cazes, J., Fiksenbaum, L. M., Zai, C. C., Tampakeras, M., Freeman, N., Youngstrom, E. A., Kennedy, J. L., & Goldstein, B. I. (2020). Proof-of-concept study of a multi-gene risk score in adolescent bipolar disorder. *Journal of affective disorders*, 262, 211–222. <https://doi.org/10.1016/j.jad.2019.11.009>

Doernberg, E., & Hollander, E. (2016). Neurodevelopmental Disorders (ASD and ADHD): DSM-5, ICD-10, and ICD-11. *CNS spectrums*, 21(4), 295–299. <https://doi.org/10.1017/S1092852916000262>

Doherty, J. L., & Owen, M. J. (2014). Genomic insights into the overlap between psychiatric disorders: implications for research and clinical practice. *Genome medicine*, 6(4), 29. <https://doi.org/10.1186/gm546>

Dölen, G. (2015). Autism: Oxytocin, serotonin, and social reward. *Social neuroscience*, 10(5), 450–465. <https://doi.org/10.1080/17470919.2015.1087875>

Dougherty, C. C., Evans, D. W., Myers, S. M., Moore, G. J., & Michael, A. M. (2016). A Comparison of Structural Brain Imaging Findings in Autism Spectrum Disorder and Attention-Deficit Hyperactivity Disorder. *Neuropsychology review*, 26(1), 25–43. <https://doi.org/10.1007/s11065-015-9300-2>

Du, Y., Fu, Z., Xing, Y., Lin, D., Pearlson, G., Kochunov, P., Hong, L. E., Qi, S., Salman, M., Abrol, A. & Calhoun, V. D. (2021). Evidence of shared and distinct functional and structural brain signatures in schizophrenia and autism spectrum disorder. *Commun Biol* 4, 1073 (2021). <https://doi.org/10.1038/s42003-021-02592-2>

Dudas, R. B., Lovejoy, C., Cassidy, S., Allison, C., Smith, P., & Baron-Cohen, S. (2017). The overlap between autistic spectrum conditions and borderline personality disorder. *PloS one*, 12(9), e0184447. <https://doi.org/10.1371/journal.pone.0184447>

Duman, R. S., Sanacora, G., & Krystal, J. H. (2019). Altered Connectivity in Depression: GABA and Glutamate Neurotransmitter Deficits and Reversal by Novel Treatments. *Neuron*, 102(1), 75–90. <https://doi.org/10.1016/j.neuron.2019.03.013>

Durán-González, J., Leal-Ugarte, E., Cruz-Alcalá, L. E., Gutiérrez-Angulo, M., Gallegos-Arreola, M. P., Meza-Espinoza, J. P., Reyes-Zurita, I., Padilla-Macías, P. L., Campo, E. C.-M. del, & Peralta-Leal, V. (2018). Association of the SLC6A4 gene 5HTTLPR polymorphism and ADHD with epilepsy,

gestational diabetes, and parental substance abuse in Mexican mestizo children. *Salud Mental*, 41(5), 223-227. <https://doi.org/10.17711/SM.0185-3325.2018.033>

Dyck, M. J., Piek, J. P., & Patrick, J. (2011). The validity of psychiatric diagnoses: the case of 'specific' developmental disorders. *Research in developmental disabilities*, 32(6), 2704–2713. <https://doi.org/10.1016/j.ridd.2011.06.001>

Edden, R. A., Crocetti, D., Zhu, H., Gilbert, D. L., & Mostofsky, S. H. (2012). Reduced GABA concentration in attention-deficit/hyperactivity disorder. *Archives of general psychiatry*, 69(7), 750–753. <https://doi.org/10.1001/archgenpsychiatry.2011.2280>

Egerton, A., Grace, A. A., Stone, J., Bossong, M. G., Sand, M., & McGuire, P. (2020). Glutamate in schizophrenia: Neurodevelopmental perspectives and drug development. *Schizophrenia research*, 223, 59–70. <https://doi.org/10.1016/j.schres.2020.09.013>

Egerton, A., Modinos, G., Ferrera, D., & McGuire, P. (2017). Neuroimaging studies of GABA in schizophrenia: A systematic review with meta-analysis. *Translational Psychiatry*, 7(6), e1147. <https://doi.org/10.1038/tp.2017.124>

Eissa, N., Jayaprakash, P., Stark, H., Łażewska, D., Kieć-Kononowicz, K., & Sadek, B. (2020). Simultaneous Blockade of Histamine H3Receptors and Inhibition of Acetylcholine Esterase Alleviate Autistic-Like Behaviors in BTBR T+ tf/J Mouse Model of Autism. *Biomolecules*, 10(9), 1251. <https://doi.org/10.3390/biom10091251>

Eissa, N., Sadeq, A., Sasse, A., & Sadek, B. (2020). Role of Neuroinflammation in Autism Spectrum Disorder and the Emergence of Brain Histaminergic System. Lessons Also for BPSD?. *Frontiers in pharmacology*, 11, 886. <https://doi.org/10.3389/fphar.2020.00886>

El-Mallakh, R. S., & Ali, Z. (2021). Extra-synaptic modulation of GABAA and efficacy in bipolar disorder. *Medical hypotheses*, 147, 110501. <https://doi.org/10.1016/j.mehy.2021.110501>

Ellis, S. E., Panitch, R., West, A. B., & Arking, D. E. (2016). Transcriptome analysis of cortical tissue reveals shared sets of downregulated genes in autism and schizophrenia. *Translational Psychiatry*, 6, e817. <https://doi.org/10.1038/tp.2016.87>

Ende, G., Cackowski, S., Van Eijk, J., Sack, M., Demirakca, T., Kleindienst, N., Bohus, M., Sobanski, E., Krause-Utz, A., & Schmahl, C. (2016). Impulsivity and Aggression in Female BPD and ADHD Patients: Association with ACC Glutamate and GABA Concentrations. *Neuropsychopharmacology : official publication of the American College of Neuropsychopharmacology*, 41(2), 410–418. <https://doi.org/10.1038/npp.2015.153>

English, B. A., Hahn, M. K., Gizer, I. R., Mazei-Robison, M., Steele, A., Kurnik, D. M., Stein, M. A., Waldman, I. D., & Blakely, R. D. (2009). Choline transporter gene variation is associated with attention-deficit hyperactivity disorder. *Journal of neurodevelopmental disorders*, 1(4), 252-263. <https://doi.org/10.1007/s11689-009-9033-8>

Erfurth, A., Michael, N., Stadtland, C., & Arolt, V. (2002). Bupropion as add-on strategy in difficult-to-treat bipolar depressive patients. *Neuropsychobiology*, 45 Suppl 1, 33–36. <https://doi.org/10.1159/000049259>

Erlander, M. G., Tillakaratne, N. J. K., Feldblum, S., Patel, N., & Tobin, A. J. (1991). Two genes encode distinct glutamate decarboxylases. *Neuron*, 7(1), 91-100. [https://doi.org/10.1016/0896-6273\(91\)90077-D](https://doi.org/10.1016/0896-6273(91)90077-D)

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Eugene, A. R., Masiak, J., Masiak, M., & Kapica, J. (2014). Isolating the Norepinephrine Pathway Comparing Lithium in Bipolar Patients to SSRIs in Depressive Patients. *Brain : broad research in artificial intelligence and neuroscience*, 5(1-4), 5–15.

Eysenck, H. J. (1998b). *Intelligence: a new look*. Transactions Publishers.

Faltraco, F., Palm, D., Uzoni, A., Borchert, L., Simon, F., Tucha, O., & Thome, J. (2021). Dopamine adjusts the circadian gene expression of Per2 and Per3 in human dermal fibroblasts from ADHD patients. *Journal of neural transmission* (Vienna, Austria : 1996), 128(7), 1135–1145. <https://doi.org/10.1007/s00702-021-02374-4>

Fernell, E. (2019). Further studies of GABA and Glutamate imbalances in autism are important challenges for future research. *Acta paediatrica* (Oslo, Norway : 1992), 108(2), 200–201. <https://doi.org/10.1111/apa.14589>

Fisher, N. M., Seto, M., Lindsley, C. W., & Niswender, C. M. (2018). Metabotropic Glutamate Receptor 7: A New Therapeutic Target in Neurodevelopmental Disorders. *Frontiers in Molecular Neuroscience*, 11. <https://doi.org/10.3389/fnmol.2018.00387>

Fitzgerald, M. (2019). The Future of Psychiatry and Neurodevelopmental Disorders: A Paradigm Shift. In (Ed.), *Neurodevelopment and Neurodevelopmental Disorder*. IntechOpen. <https://doi.org/10.5772/intechopen.88540>

Fitzgerald, P. J. (2014). Is elevated norepinephrine an etiological factor in some cases of schizophrenia?. *Psychiatry research*, 215(3), 497–504. <https://doi.org/10.1016/j.psychres.2014.01.011>

Fleisher, C., & McGough, J. (2014). Sofinicline: a novel nicotinic acetylcholine receptor agonist in the treatment of attention-deficit/hyperactivity disorder. *Expert opinion on investigational drugs*, 23(8), 1157–1163. <https://doi.org/10.1517/13543784.2014.934806>

Frank, M. J., & Fossella, J. A. (2011). Neurogenetics and pharmacology of learning, motivation, and cognition. *Neuropsychopharmacology : official publication of the American College of Neuropsychopharmacology*, 36(1), 133–152. <https://doi.org/10.1038/npp.2010.96>

Frankl, G. (1957). *Autism in childhood, an attempt of an analysis* [Unpublished manuscript]. <http://hdl.handle.net/1808/30591>

Freedman R. (2014). $\alpha 7$ -nicotinic acetylcholine receptor agonists for cognitive enhancement in schizophrenia. *Annual review of medicine*, 65, 245–261. <https://doi.org/10.1146/annurev-med-092112-142937>

Frydecka, D., Misiak, B., Piotrowski, P., Bielawski, T., Pawlak, E., Kłosińska, E., Krefft, M., Al Noaimy, K., Rymaszewska, J., Moustafa, A. A., & Drapała, J. (2021). The Role of Dopaminergic Genes in Probabilistic Reinforcement Learning in Schizophrenia Spectrum Disorders. *Brain sciences*, 12(1), 7. <https://doi.org/10.3390/brainsci12010007>

Furgo-Olszewska, M., & Jarosz, M. (1993). Dalsze badania nad kształtowaniem się proporcji syntoniczno-autystycznej w schizofrenii paranoidalnej [Further research into the formation of the sytonic-autistic relationship in paranoid schizophrenia]. *Psychiatria polska*, 27(3), 293–302.

Gadow, K. D., Roohi, J., DeVincent, C. J., Kirsch, S., & Hatchwell, E. (2009). Association of COMT (Val158Met) and BDNF (Val66Met) Gene Polymorphisms with Anxiety, ADHD and Tics in Children with Autism Spectrum Disorder. *Journal of autism and developmental disorders*, 39(11), 1542–1551. <https://doi.org/10.1007/s10803-009-0794-4>

- Gandal, M. J., Haney, J. R., Parikshak, N. N., Leppa, V., Ramaswami, G., Hartl, C., Schork, A. J., Appadurai, V., Buil, A., Werge, T. M., Liu, C., White, K. P., CommonMind Consortium, PsychENCODE Consortium, iPSYCH-BROAD Working Group, Horvath, S., & Geschwind, D. H. (2018). Shared molecular neuropathology across major psychiatric disorders parallels polygenic overlap. *Science (New York, N.Y.)*, 359(6376), 693–697. <https://doi.org/10.1126/science.aad6469>
- Gao, J., Jia, M., Qiao, D., Qiu, H., Sokolove, J., Zhang, J., & Pan, Z. (2016). TPH2 gene polymorphisms and bipolar disorder: A meta-analysis. *American Journal of Medical Genetics. Part B, Neuropsychiatric Genetics: The Official Publication of the International Society of Psychiatric Genetics*, 171B(2), 145-152. <https://doi.org/10.1002/ajmg.b.32381>
- Gargaro, B. A., May, T., Tonge, B. J., Sheppard, D. M., Bradshaw, J. L., & Rinehart, N. J. (2018). Attentional Mechanisms in Autism, ADHD, and Autism-ADHD Using a Local-Global Paradigm. *Journal of attention disorders*, 22(14), 1320–1332. <https://doi.org/10.1177/1087054715603197>
- Gass, N., Weber-Fahr, W., Sartorius, A., Becker, R., Didriksen, M., Stensbøl, T. B., Bastlund, J. F., Meyer-Lindenberg, A., & Schwarz, A. J. (2016). An acetylcholine alpha7 positive allosteric modulator rescues a schizophrenia-associated brain endophenotype in the 15q13.3 microdeletion, encompassing CHRNA7. *European Neuropsychopharmacology: The Journal of the European College of Neuropsychopharmacology*, 26(7), 1150-1160. <https://doi.org/10.1016/j.euroneuro.2016.03.013>
- Gelernter, J., & van Kammen, D. P. (1988). Schizophrenia: instability in norepinephrine, serotonin, and gamma-aminobutyric acid systems. *International review of neurobiology*, 29, 309–347. [https://doi.org/10.1016/s0074-7742\(08\)60091-4](https://doi.org/10.1016/s0074-7742(08)60091-4)
- Gellynck, E., Heyninck, K., Andressen, K. W., Haegeman, G., Levy, F. O., Vanhoenacker, P., & Van Craenenbroeck, K. (2013). The serotonin 5-HT7 receptors: two decades of research. *Experimental brain research*, 230(4), 555–568. <https://doi.org/10.1007/s00221-013-3694-y>
- Ghamari, R., Yazarlou, F., Khosravizadeh, Z., Moradkhani, A., Abdollahi, E., & Alizadeh, F. (2022). Serotonin transporter functional polymorphisms potentially increase risk of schizophrenia separately and as a haplotype. *Scientific reports*, 12(1), 1336. <https://doi.org/10.1038/s41598-022-05206-x>
- Ghirardi, L., Brikell, I., Kuja-Halkola, R., Freitag, C. M., Franke, B., Asherson, P., Lichtenstein, P., & Larsson, H. (2018). The familial co-aggregation of ASD and ADHD: a register-based cohort study. *Molecular psychiatry*, 23(2), 257–262. <https://doi.org/10.1038/mp.2017.17>
- Ghirardi, L., Pettersson, E., Taylor, M. J., Freitag, C. M., Franke, B., Asherson, P., Larsson, H., & Kuja-Halkola, R. (2019). Genetic and environmental contribution to the overlap between ADHD and ASD trait dimensions in young adults: a twin study. *Psychological medicine*, 49(10), 1713–1721. <https://doi.org/10.1017/S003329171800243X>
- Gialluisi, A., Andlauer, T., Mirza-Schreiber, N., Moll, K., Becker, J., Hoffmann, P., Ludwig, K. U., Czamara, D., Pourcain, B. S., Honbolygó, F., Tóth, D., Csépe, V., Huguet, G., Chaix, Y., Iannuzzi, S., Demonet, J. F., Morris, A. P., Hulslander, J., Willcutt, E. G., DeFries, J. C., ... Schulte-Körne, G. (2021). Genome-wide association study reveals new insights into the heritability and genetic correlates of developmental dyslexia. *Molecular psychiatry*, 26(7), 3004–3017. <https://doi.org/10.1038/s41380-020-00898-x>
- Gigante, A. D., Bond, D. J., Lafer, B., Lam, R. W., Young, L. T., & Yatham, L. N. (2012). Brain glutamate levels measured by magnetic resonance spectroscopy in patients with bipolar disorder: a meta-analysis. *Bipolar disorders*, 14(5), 478–487. <https://doi.org/10.1111/j.1399-5618.2012.01033.x>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Gillberg C. (2010). The ESSENCE in child psychiatry: Early Symptomatic Syndromes Eliciting Neurodevelopmental Clinical Examinations. *Research in developmental disabilities*, 31(6), 1543–1551. <https://doi.org/10.1016/j.ridd.2010.06.002>

Gillberg, C., Allely, C., Bourgeron, T., Coleman, M., Fernell, E., Hadjikhani, N., & Sarovic, D. (2019). The Neurobiology of Autism. *Autism and Pervasive Developmental Disorders*, 129–157. <https://doi.org/10.1017/9781108297769.007>

Gillentine, M., & Schaaf, C. P. (2015). The Human Clinical Phenotypes of Altered CHRNA7 Copy Number. *Biochemical pharmacology*, 97(4), 352–362. <https://doi.org/10.1016/j.bcp.2015.06.012>

Gisbert, L., Richarte, V., Corrales, M., Ibáñez, P., Bosch, R., Bellina, M., Fadeuilhe, C., Casas, M., & Ramos-Quiroga, J. A. (2019). The Relationship Between Neuropsychological Deficits and Emotional Lability in Adults With ADHD. *Journal of attention disorders*, 23(12), 1514–1525. <https://doi.org/10.1177/1087054718780323>

Globus, J. J. (2002). The ADHD-Autism Connection: A Step Toward More Accurate Diagnosis and Effective Treatments. *Primary Care Companion to The Journal of Clinical Psychiatry*, 4(3), 115.

Godoy, P., Shephard, E., Milosavljevic, B., Johnson, M. H., Charman, T., & BASIS Team (2021). Brief Report: Associations Between Cognitive Control Processes and Traits of Autism Spectrum Disorder (ASD), attention-Deficit/Hyperactivity Disorder (ADHD) and Anxiety in Children at Elevated and Typical Familial Likelihood for ASD. *Journal of autism and developmental disorders*, 51(8), 3001–3013. <https://doi.org/10.1007/s10803-020-04732-9>

Goes, F. S., Pirooznia, M., & Parla, J. S. (2016). Exome Sequencing of Familial Bipolar Disorder. *JAMA Psychiatry*, 6(73), 590–597. <https://doi.org/10.1001/jamapsychiatry.2016.0251>

Golubev, S. A., Lezheiko, T. V., Korovaitseva, G. I., Gabaeva, M. V., Kolesina, N. Y., Kaleda, V. G., & Golimbet, V. E. (2021). Otsenka prognoza funktsional'nogo iskhoda shizofrenii s pomoshch'yu mul'tigennogo testa [Prognosis of the functional outcome of schizophrenia using a multigene panel]. *Zhurnal nevrologii i psikiatrii imeni S.S. Korsakova*, 121(7), 70–76. <https://doi.org/10.17116/jnevro202112107170>

Gong, P., Liu, J., Blue, P. R., Li, S., & Zhou, X. (2015). Serotonin receptor gene (HTR2A) T102C polymorphism modulates individuals' perspective taking ability and autistic-like traits. *Frontiers in Human Neuroscience*, 9. <https://doi.org/10.3389/fnhum.2015.00575>

González-Peñas, J., Costas, J. C., García-Alcón, A., Penzol, M. J., Rodríguez, J., Rodríguez-Fontenla, C., Alonso-González, A., Fernández-Prieto, M., Carracedo, Á., Arango, C., & Parellada, M. (2020). Psychiatric comorbidities in Asperger syndrome are related with polygenic overlap and differ from other Autism subtypes. *Translational psychiatry*, 10(1), 258. <https://doi.org/10.1038/s41398-020-00939-7>

Gosso, F. M., de Geus, E. J., Polderman, T. J., Boomsma, D. I., Posthuma, D., & Heutink, P. (2007). Exploring the functional role of the CHRM2 gene in human cognition: results from a dense genotyping and brain expression study. *BMC medical genetics*, 8, 66. <https://doi.org/10.1186/1471-2350-8-66>

Gourion, D., Gourevitch, R., Le Provost, J.-B., Olié, J.-P., Lôo, H., & Krebs, M.-O. (2004). L'hypothèse neurodéveloppementale dans la schizophrénie. *L'Encéphale*, 30(2), 109–118. doi:10.1016/s0013-7006(04)95421-8

Grace, A. A., & Gomes, F. V. (2019). The Circuitry of Dopamine System Regulation and its Disruption in Schizophrenia: Insights Into Treatment and Prevention. *Schizophrenia bulletin*, 45(1), 148–157. <https://doi.org/10.1093/schbul/sbx199>

- Grados, M. A., Atkins, E. B., Kovacikova, G. I., & McVicar, E. (2015). A selective review of glutamate pharmacological therapy in obsessive-compulsive and related disorders. *Psychology research and behavior management*, 8, 115–131. <https://doi.org/10.2147/PRBM.S58601>
- Green, E. K., Grozeva, D., Jones, I., Jones, L., Kirov, G., Caesar, S., Gordon-Smith, K., Fraser, C., Forty, L., Russell, E., Hamshere, M. L., Moskvina, V., Nikolov, I., Farmer, A., McGuffin, P., Wellcome Trust Case Control Consortium, Holmans, P. A., Owen, M. J., O'Donovan, M. C., & Craddock, N. (2010a). The bipolar disorder risk allele at CACNA1C also confers risk of recurrent major depression and of schizophrenia. *Molecular psychiatry*, 15(10), 1016–1022. <https://doi.org/10.1038/mp.2009.49>
- Greven, C. U., van der Meer, J., Hartman, C. A., Lappenschaar, M., Buitelaar, J. K., & Rommelse, N. (2018). Do High and Low Extremes of ADHD and ASD Trait Continua Represent Maladaptive Behavioral and Cognitive Outcomes? A Population-Based Study. *Journal of attention disorders*, 22(10), 924–932. <https://doi.org/10.1177/1087054715577136>
- Grossberg S. (2017). Acetylcholine Neuromodulation in Normal and Abnormal Learning and Memory: Vigilance Control in Waking, Sleep, Autism, Amnesia and Alzheimer's Disease. *Frontiers in neural circuits*, 11, 82. <https://doi.org/10.3389/fncir.2017.00082>
- Grossman, F., & Potter, W. Z. (1999). Catecholamines in depression: a cumulative study of urinary norepinephrine and its major metabolites in unipolar and bipolar depressed patients versus healthy volunteers at the NIMH. *Psychiatry research*, 87(1), 21–27. [https://doi.org/10.1016/s0165-1781\(99\)00055-4](https://doi.org/10.1016/s0165-1781(99)00055-4)
- Grotzinger A. D. (2021). Shared genetic architecture across psychiatric disorders. *Psychological medicine*, 51(13), 2210–2216. <https://doi.org/10.1017/S0033291721000829>
- Grzadzinski, R., Di Martino, A., Brady, E., Mairena, M. A., O'Neale, M., Petkova, E., Lord, C., & Castellanos, F. X. (2011). Examining autistic traits in children with ADHD: does the autism spectrum extend to ADHD?. *Journal of autism and developmental disorders*, 41(9), 1178–1191. <https://doi.org/10.1007/s10803-010-1135-3>
- Gul, M. K., Sener, E. F., Onal, M. G., & Demirci, E. (2021). Role of the norepinephrine transporter polymorphisms in atomoxetine treatment: From response to side effects in children with ADHD. *Journal of psychopharmacology (Oxford, England)*, 2698811211015245. Advance online publication. <https://doi.org/10.1177/02698811211015245>
- Guo, T., Wang, W., Liu, B., Chen, H., & Yang, C. (2013). Catechol-O-methyltransferase Val158Met polymorphism and risk of autism spectrum disorders. *Journal of International Medical Research*, 41(3), 725–734. <https://doi.org/10.1177/0300060513479871>
- Guo, Y. P., & Commons, K. G. (2017). Serotonin neuron abnormalities in the BTBR mouse model of autism. *Autism research : official journal of the International Society for Autism Research*, 10(1), 66–77. <https://doi.org/10.1002/aur.1665>
- Gupta, S., & Kulhara, P. (2010). What is schizophrenia: A neurodevelopmental or neurodegenerative disorder or a combination of both? A critical analysis. *Indian journal of psychiatry*, 52(1), 21–27. <https://doi.org/10.4103/0019-5545.58891>
- Guptill, J. T., Booker, A. B., Gibbs, T. T., Kemper, T. L., Bauman, M. L., & Blatt, G. J. (2007). [3H]-flunitrazepam-labeled benzodiazepine binding sites in the hippocampal formation in autism: A multiple concentration autoradiographic study. *Journal of Autism and Developmental Disorders*, 37(5), 911–920. <https://doi.org/10.1007/s10803-006-0226-7>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

- Hai, T., Swansburg, R., Kahl, C. K., Frank, H., Lemay, J. F., & MacMaster, F. P. (2020). Magnetic Resonance Spectroscopy of γ -Aminobutyric Acid and Glutamate Concentrations in Children With Attention-Deficit/Hyperactivity Disorder. *JAMA network open*, 3(10), e2020973. <https://doi.org/10.1001/jamanetworkopen.2020.20973>
- Hamshere, M. L., Stergiakouli, E., Langley, K., Martin, J., Holmans, P., Kent, L., Owen, M. J., Gill, M., Thapar, A., O'Donovan, M., & Craddock, N. (2013). Shared polygenic contribution between childhood attention-deficit hyperactivity disorder and adult schizophrenia. *The British journal of psychiatry: the journal of mental science*, 203(2), 107–111. <https://doi.org/10.1192/bjp.bp.112.117432>
- Harikumar, A., Evans, D. W., Dougherty, C. C., Carpenter, K., & Michael, A. M. (2021). A Review of the Default Mode Network in Autism Spectrum Disorders and Attention Deficit Hyperactivity Disorder. *Brain connectivity*, 11(4), 253–263. <https://doi.org/10.1089/brain.2020.0865>
- Haruvi-Lamdan, N., Horesh, D., Zohar, S., Kraus, M., & Golan, O. (2020). Autism Spectrum Disorder and Post-Traumatic Stress Disorder: An unexplored co-occurrence of conditions. *Autism : the international journal of research and practice*, 24(4), 884–898. <https://doi.org/10.1177/1362361320912143>
- Harris J. C. (2019). The Necessity to Identify Subtypes of Autism Spectrum Disorder. *JAMA psychiatry*, 76(11), 1116–1117. <https://doi.org/10.1001/jamapsychiatry.2019.1928>
- Harris, A. D., Gilbert, D. L., Horn, P. S., Crocetti, D., Cecil, K. M., Edden, R., Huddleston, D. A., Mostofsky, S. H., & Puts, N. (2021). Relationship between GABA levels and task-dependent cortical excitability in children with attention-deficit/hyperactivity disorder. *Clinical neurophysiology : official journal of the International Federation of Clinical Neurophysiology*, 132(5), 1163–1172. <https://doi.org/10.1016/j.clinph.2021.01.023>
- Harrison, L. A. Kats, A., Kilroy, E., Butera, C., Jayashankar, A., Keles, U., & Aziz-Zadeh, L. (2021). Motor and sensory features successfully decode autism spectrum disorder and combine with the original RDoC framework to boost diagnostic classification. *Scientific Reports*, 11(1), 1-16. <https://doi.org/10.1038/s41598-021-87455-w>
- Hasan, A., Malchow, B., Falkai, P., & Schmitt, A. (2014). Die Glutamathypothese der Schizophrenie [The glutamate hypothesis of schizophrenia]. *Fortschritte der Neurologie-Psychiatrie*, 82(8), 447–456. <https://doi.org/10.1055/s-0034-1366571>
- Hayashi, W., Hanawa, Y., Saga, N., Nakamura, D., & Iwanami, A. (2022). ASD symptoms in adults with ADHD: a comparative study using ADOS-2. *European archives of psychiatry and clinical neuroscience*, 10.1007/s00406-021-01362-9. Advance online publication. <https://doi.org/10.1007/s00406-021-01362-9>
- Hayes, D. J., Jupp, B., Sawiak, S. J., Merlo, E., Caprioli, D., & Dalley, J. W. (2014). Brain γ -aminobutyric acid: a neglected role in impulsivity. *The European journal of neuroscience*, 39(11), 1921–1932. <https://doi.org/10.1111/ejn.12485>
- Hellmer, K., & Nyström, P. (2017). Infant acetylcholine, dopamine, and melatonin dysregulation: Neonatal biomarkers and causal factors for ASD and ADHD phenotypes. *Medical hypotheses*, 100, 64–66. <https://doi.org/10.1016/j.mehy.2017.01.015>
- Hendry, A., Jones, E., Bedford, R., Andersson Konke, L., Begum Ali, J., Bölte, S., Brocki, K. C., Demurie, E., Johnson, M., Pijl, M., Roeyers, H., Charman, T., & Eurosibs Team (2020). Atypical Development of Attentional Control Associates with Later Adaptive Functioning, Autism and ADHD Traits. *Journal of autism and developmental disorders*, 50(11), 4085–4105. <https://doi.org/10.1007/s10803-020-04465-9>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Hennessey, T., Andari, E., & Rainnie, D. G. (2018). RDoC-based categorization of amygdala functions and its implications in autism. *Neuroscience and biobehavioral reviews*, 90, 115–129. <https://doi.org/10.1016/j.neubiorev.2018.04.007>

Hietala, J., & Syvälahti, E. (1996). Dopamine in schizophrenia. *Annals of medicine*, 28(6), 557–561. <https://doi.org/10.3109/07853899608999120>

Higley, M. J., & Picciotto, M. R. (2014). Neuromodulation by acetylcholine: Examples from schizophrenia and depression. *Current Opinion in Neurobiology*, 29, 88–95. <https://doi.org/10.1016/j.conb.2014.06.004>

Higley, M. J., & Picciotto, M. R. (2014). Neuromodulation by acetylcholine: examples from schizophrenia and depression. *Current opinion in neurobiology*, 29, 88–95. <https://doi.org/10.1016/j.conb.2014.06.004>

Hiraoka, Y., Sugiyama, K., Nagaoka, D., Tsutsui-Kimura, I., Tanaka, K. F., & Tanaka, K. (2021). Mice with reduced glutamate transporter GLT1 expression exhibit behaviors related to attention-deficit/hyperactivity disorder. *Biochemical and biophysical research communications*, 567, 161–165. <https://doi.org/10.1016/j.bbrc.2021.06.057>

Hoeffding, L. K., Duong, L. T., Ingason, A., Rosengren, A., Sorbanski, E., Witt, S. H., Djurovic, S., Andreassen, O. A., Hansen, T., Werge, T., & Rasmussen, H. B. (2016). Identification of rare high-risk copy number variants affecting the dopamine transporter gene in mental disorders. *Nordic journal of psychiatry*, 70(4), 276–279. <https://doi.org/10.3109/08039488.2015.1095944>

Hoftman, G. D., Dienel, S. J., Bazmi, H. H., Zhang, Y., Chen, K., & Lewis, D. A. (2018). Altered Gradients of Glutamate and Gamma-Aminobutyric Acid Transcripts in the Cortical Visuospatial Working Memory Network in Schizophrenia. *Biological psychiatry*, 83(8), 670–679. <https://doi.org/10.1016/j.biopsych.2017.11.029>

Hornykiewicz, O. (1986). Brain noradrenaline and schizophrenia. *Progress in brain research*, 65, 29–39. [https://doi.org/10.1016/S0079-6123\(08\)60639-1](https://doi.org/10.1016/S0079-6123(08)60639-1)

Hosang, G. M., Fisher, H. L., Cohen-Woods, S., McGuffin, P., & Farmer, A. E. (2017). Stressful life events and catechol-O-methyl-transferase (COMT) gene in bipolar disorder. *Depression and Anxiety*, 34(5), 419–426. <https://doi.org/10.1002/da.22606>

Hou, Y. W., Xiong, P., Gu, X., Huang, X., Wang, M., & Wu, J. (2018). Association of Serotonin Receptors with Attention Deficit Hyperactivity Disorder: A Systematic Review and Meta-analysis. *Current medical science*, 38(3), 538–551. <https://doi.org/10.1007/s11596-018-1912-3>

Howes, O. D., McCutcheon, R., Owen, M. J., & Murray, R. M. (2017). The Role of Genes, Stress, and Dopamine in the Development of Schizophrenia. *Biological psychiatry*, 81(1), 9–20. <https://doi.org/10.1016/j.biopsych.2016.07.014>

Howes, O. D., Rogdaki, M., Findon, J. L., Wichers, R. H., Charman, T., King, B. H., Loth, E., McAlonan, G. M., McCracken, J. T., Parr, J. R., Povey, C., Santosh, P., Wallace, S., Simonoff, E., & Murphy, D. G. (2018). Autism spectrum disorder: Consensus guidelines on assessment, treatment and research from the British Association for Psychopharmacology. *Journal of psychopharmacology (Oxford, England)*, 32(1), 3–29. <https://doi.org/10.1177/0269881117741766>

Howes, O., McCutcheon, R., & Stone, J. (2015). Glutamate and dopamine in schizophrenia: An update for the 21st century. *Journal of psychopharmacology (Oxford, England)*, 29(2), 97–115. <https://doi.org/10.1177/0269881114563634>

Howes, O., McCutcheon, R., & Stone, J. (2015). Glutamate and dopamine in schizophrenia: an update for the 21st century. *Journal of psychopharmacology* (Oxford, England), 29(2), 97–115. <https://doi.org/10.1177/0269881114563634>

Hranilovic, D., Blazevic, S., Stefulj, J., & Zill, P. (2016). DNA Methylation Analysis of HTR2A Regulatory Region in Leukocytes of Autistic Subjects. *Autism Research: Official Journal of the International Society for Autism Research*, 9(2), 204–209. <https://doi.org/10.1002/aur.1519>

Hrovatin, K., Kunej, T., & Dolžan, V. (2020). Genetic variability of serotonin pathway associated with schizophrenia onset, progression, and treatment. *American journal of medical genetics. Part B, Neuropsychiatric genetics : the official publication of the International Society of Psychiatric Genetics*, 183(2), 113–127. <https://doi.org/10.1002/ajmg.b.32766>

Hsueh, Y. S., Lin, C. Y., Chiu, N. T., Yang, Y. K., Chen, P. S., & Chang, H. H. (2021). Changes in striatal dopamine transporters in bipolar disorder and valproate treatment. *European psychiatry: the journal of the Association of European Psychiatrists*, 64(1), e9. <https://doi.org/10.1192/j.eurpsy.2021.1>

Huang, X., Wang, M., Zhang, Q., Chen, X., & Wu, J. (2019). The role of glutamate receptors in attention-deficit/hyperactivity disorder: From physiology to disease. *American Journal of Medical Genetics. Part B, Neuropsychiatric Genetics: The Official Publication of the International Society of Psychiatric Genetics*, 180(4), 272–286. <https://doi.org/10.1002/ajmg.b.32726>

Huber, R. S., Kondo, D. G., Shi, X. F., Prescott, A. P., Clark, E., Renshaw, P. F., & Yurgelun-Todd, D. A. (2018). Relationship of executive functioning deficits to N-acetyl aspartate (NAA) and gamma-aminobutyric acid (GABA) in youth with bipolar disorder. *Journal of affective disorders*, 225, 71–78. <https://doi.org/10.1016/j.jad.2017.07.052>

Huguet, G., Ey, E., & Bourgeron, T. (2013). The genetic landscapes of autism spectrum disorders. *Annual review of genomics and human genetics*, 14, 191–213. <https://doi.org/10.1146/annurev-genom-091212-153431>

Hung, C. C., Lin, C. H., & Lane, H. Y. (2021). Cystine/Glutamate Antiporter in Schizophrenia: From Molecular Mechanism to Novel Biomarker and Treatment. *International journal of molecular sciences*, 22(18), 9718. <https://doi.org/10.3390/ijms22189718>

Hyman S. E. (2010). The diagnosis of mental disorders: the problem of reification. *Annual review of clinical psychology*, 6, 155–179. <https://doi.org/10.1146/annurev.clinpsy.3.022806.091532>

Ibrahim, K., & Sukhodolsky, D. G. (2018). RDoC and Autism. *Encyclopedia of Autism Spectrum Disorders*, 1–2. doi:10.1007/978-1-4614-6435-8_102261-1

Ide, M., Yaguchi, A., Sano, M., Fukatsu, R., & Wada, M. (2019). Higher Tactile Temporal Resolution as a Basis of Hypersensitivity in Individuals with Autism Spectrum Disorder. *Journal of autism and developmental disorders*, 49(1), 44–53. <https://doi.org/10.1007/s10803-018-3677-8>

Ikegame, T., Hidaka, Y., Nakachi, Y., Murata, Y., Watanabe, R., Sugawara, H., Asai, T., Kiyota, E., Saito, T., Ikeda, M., Sasaki, T., Hashimoto, M., Ishikawa, T., Takebayashi, M., Iwata, N., Kakiuchi, C., Kato, T., Kasai, K., Bundo, M., & Iwamoto, K. (2021). Identification and functional characterization of the extremely long allele of the serotonin transporter-linked polymorphic region. *Translational psychiatry*, 11(1), 119. <https://doi.org/10.1038/s41398-021-01242-9>

Insel, T., Cuthbert, B., Garvey, M., Heinssen, R., Pine, D. S., Quinn, K., Sanislow, C., & Wang, P. (2010). Research domain criteria (RDoC): toward a new classification framework for research on mental disorders. *The American journal of psychiatry*, 167(7), 748–751. <https://doi.org/10.1176/appi.ajp.2010.09091379>

International Schizophrenia Consortium, Purcell, S. M., Wray, N. R., Stone, J. L., Visscher, P. M., O'Donovan, M. C., Sullivan, P. F., & Sklar, P. (2009). Common polygenic variation contributes to risk of schizophrenia and bipolar disorder. *Nature*, 460(7256), 748–752. <https://doi.org/10.1038/nature08185>

Iqbal, N., & van Praag, H. M. (1995). The role of serotonin in schizophrenia. *European neuropsychopharmacology : the journal of the European College of Neuropsychopharmacology*, 5 Suppl, 11–23. [https://doi.org/10.1016/0924-977x\(95\)00027-m](https://doi.org/10.1016/0924-977x(95)00027-m)

Ishikawa, M., & Hashimoto, K. (2011). $\alpha 7$ nicotinic acetylcholine receptor as a potential therapeutic target for schizophrenia. *Current pharmaceutical design*, 17(2), 121–129. <https://doi.org/10.2174/138161211795049561>

James, D., Lam, V. T., Jo, B., & Fung, L. K. (2022). Region-specific associations between gamma-aminobutyric acid A receptor binding and cortical thickness in high-functioning autistic adults. *Autism research : official journal of the International Society for Autism Research*, 10.1002/aur.2703. Advance online publication. <https://doi.org/10.1002/aur.2703>

Janušonis, S. (2014). Serotonin dynamics in and around the central nervous system: is autism solvable without fundamental insights?. *International journal of developmental neuroscience : the official journal of the International Society for Developmental Neuroscience*, 39, 9–15. <https://doi.org/10.1016/j.ijdevneu.2014.05.009>

Jensen, C. M., & Steinhausen, H. C. (2015). Comorbid mental disorders in children and adolescents with attention-deficit/hyperactivity disorder in a large nationwide study. *Attention deficit and hyperactivity disorders*, 7(1), 27–38. <https://doi.org/10.1007/s12402-014-0142-1>

Jepsen, J., Rydkjaer, J., Fagerlund, B., Pagsberg, A. K., Jespersen, R., Glenthøj, B. Y., & Oranje, B. (2018). Overlapping and disease specific trait, response, and reflection impulsivity in adolescents with first-episode schizophrenia spectrum disorders or attention-deficit/hyperactivity disorder. *Psychological medicine*, 48(4), 604–616. <https://doi.org/10.1017/S0033291717001921>

Jin, Z., Zang, Y. F., Zeng, Y. W., Zhang, L., & Wang, Y. F. (2001). Striatal neuronal loss or dysfunction and choline rise in children with attention-deficit hyperactivity disorder: A 1H-magnetic resonance spectroscopy study. *Neuroscience Letters*, 315(1-2), 45-48. [https://doi.org/10.1016/s0304-3940\(01\)02315-1](https://doi.org/10.1016/s0304-3940(01)02315-1)

Jokiranta-Olkonien, E., Cheslack-Postava, K., Sucksdorff, D., Suominen, A., Gyllenberg, D., Chudal, R., Leivonen, S., Gissler, M., Brown, A. S., & Sourander, A. (2016). Risk of Psychiatric and Neurodevelopmental Disorders Among Siblings of Proband With Autism Spectrum Disorders. *JAMA psychiatry*, 73(6), 622–629. <https://doi.org/10.1001/jamapsychiatry.2016.0495>

Jones C. (2018). $\alpha 7$ Nicotinic Acetylcholine Receptor: A Potential Target in Treating Cognitive Decline in Schizophrenia. *Journal of clinical psychopharmacology*, 38(3), 247–249. <https://doi.org/10.1097/JCP.0000000000000859>

Joshi, G., Faraone, S. V., Wozniak, J., Tarko, L., Fried, R., Galdo, M., Furtak, S. L., & Biederman, J. (2017). Symptom Profile of ADHD in Youth With High-Functioning Autism Spectrum Disorder: A Comparative Study in Psychiatrically Referred Populations. *Journal of attention disorders*, 21(10), 846–855. <https://doi.org/10.1177/1087054714543368>

Joyce, J. N. (1993). The dopamine hypothesis of schizophrenia: limbic interactions with serotonin and norepinephrine. *Psychopharmacology*, 112(1 Suppl), S16–S34. <https://doi.org/10.1007/BF02245004>

Juckel G. (2015). Serotonin: from sensory processing to schizophrenia using an electrophysiological method. *Behavioural brain research*, 277, 121–124. <https://doi.org/10.1016/j.bbr.2014.05.042>

Kaat, A. J., Gadow, K. D., & Lecavalier, L. (2013). Psychiatric symptom impairment in children with autism spectrum disorders. *Journal of abnormal child psychology*, 41(6), 959–969. <https://doi.org/10.1007/s10802-013-9739-7>

Kahneman, D. (2011). *Thinking, Fast and Slow*. Farrar, Straus and Giroux.

Kamal, M. M., Nady, G. H. E., Abushady, A. M., & Khalil, M. F. M. (2017). Association of dopamine D4 receptor gene variants with autism. *International Journal of Research in Medical Sciences*, 3(10), 2658–2663. <https://doi.org/10.18203/2320-6012.ijrms20150809>

Kamoun, P., & Douay, O. (1980). Sérotonine et autisme [Serotonin and autism]. *Annales de biologie clinique*, 38(4), 201–205.

Kandaswamy, R., McQuillin, A., Curtis, D., & Gurling, H. (2014). Allelic association, DNA resequencing and copy number variation at the metabotropic glutamate receptor GRM7 gene locus in bipolar disorder. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics*, 165(4), 365–372. <https://doi.org/10.1002/ajmg.b.32239>

Kanellopoulos, A. K., Mariano, V., Spinazzi, M., Woo, Y. J., McLean, C., Pech, U., Li, K. W., Armstrong, J. D., Giangrande, A., Callaerts, P., Smit, A. B., Abrahams, B. S., Fiala, A., Achsel, T., & Bagni, C. (2020). Aralar Sequesters GABA into Hyperactive Mitochondria, Causing Social Behavior Deficits. *Cell*, 180(6), 1178–1197.e20. <https://doi.org/10.1016/j.cell.2020.02.044>

Kanner L. (1949). Problems of nosology and psychodynamics of early infantile autism. *The American journal of orthopsychiatry*, 19(3), 416–426. <https://doi.org/10.1111/j.1939-0025.1949.tb05441.x>

Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child*, 2, 217–250.

Kanner, L. (1971). Follow-up study of eleven autistic children originally reported in 1943. *Journal of Autism and Childhood Schizophrenia*, 1(2), 119–145. <https://doi.org/10.1007/bf01537953>

Karvat, G., & Kimchi, T. (2014). Acetylcholine elevation relieves cognitive rigidity and social deficiency in a mouse model of autism. *Neuropsychopharmacology : official publication of the American College of Neuropsychopharmacology*, 39(4), 831–840. <https://doi.org/10.1038/npp.2013.274>

Katz, J., d'Albis, M. A., Boisgontier, J., Poupon, C., Mangin, J. F., Guevara, P., Duclap, D., Hamdani, N., Petit, J., Monnet, D., Le Corvoisier, P., Leboyer, M., Delorme, R., & Houenou, J. (2016). Similar white matter but opposite grey matter changes in schizophrenia and high-functioning autism. *Acta psychiatrica Scandinavica*, 134(1), 31–39. <https://doi.org/10.1111/acps.12579>

Kaufman, R. E., Ostacher, M. J., Marks, E. H., Simon, N. M., Sachs, G. S., Jensen, J. E., Renshaw, P. F., & Pollack, M. H. (2009). Brain GABA levels in patients with bipolar disorder. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, 33(3), 427–434. <https://doi.org/10.1016/j.pnpbp.2008.12.025>

Kawada, K., Kuramoto, N., & Mimori, S. (2021). Possibility that the Onset of Autism Spectrum Disorder is Induced by Failure of the Glutamine-Glutamate Cycle. *Current molecular pharmacology*, 14(2), 170–174. <https://doi.org/10.2174/1874467213666200319125109>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

- Keehn, B., Kadlaskar, G., Bergmann, S., McNally Keehn, R., & Francis, A. (2021). Attentional Disengagement and the Locus Coeruleus - Norepinephrine System in Children With Autism Spectrum Disorder. *Frontiers in integrative neuroscience*, 15, 716447. <https://doi.org/10.3389/fnint.2021.716447>
- Kelsoe, J. R., Remick, R. A., Sadovnick, A. D., Kristbjarnarson, H., Flodman, P., Spence, M. A., Morison, M., Mroczkowski-Parker, Z., Bergesch, P., Rapaport, M. H., Mirow, A. L., Blakely, R. D., Helgason, T., & Egeland, J. A. (1996). Genetic linkage study of bipolar disorder and the serotonin transporter. *American journal of medical genetics*, 67(2), 215–217. [https://doi.org/10.1002/\(SICI\)1096-8628\(19960409\)67:2<215::AID-AJMG14>3.0.CO;2-M](https://doi.org/10.1002/(SICI)1096-8628(19960409)67:2<215::AID-AJMG14>3.0.CO;2-M)
- Kemali, D., & Maj, M. (1986). CSF noradrenaline and schizophrenia. *The American journal of psychiatry*, 143(1), 126–127. <https://doi.org/10.1176/ajp.143.1.126b>
- Kendell, R., & Jablensky, A. (2003). Distinguishing between the validity and utility of psychiatric diagnoses. *The American journal of psychiatry*, 160(1), 4–12. <https://doi.org/10.1176/appi.ajp.160.1.4>
- Kern, J. K., Geier, D. A., Sykes, L. K., Geier, M. R., & Deth, R. C. (2015). Are ASD and ADHD a Continuum? A Comparison of Pathophysiological Similarities Between the Disorders. *Journal of attention disorders*, 19(9), 805–827. <https://doi.org/10.1177/1087054712459886>
- Kesby, J. P., Eyles, D. W., McGrath, J. J., & Scott, J. G. (2018). Dopamine, psychosis and schizophrenia: the widening gap between basic and clinical neuroscience. *Translational psychiatry*, 8(1), 30. <https://doi.org/10.1038/s41398-017-0071-9>
- Khaled Abd-Elhaleim El Azazy, M., Kamel Mohamed, E. A., Ismail Abo El-Fadl, H. M., Abd El-Razik, F. H., & Abu Elfotuh, K. (2021). Omega-3 Rich Oils Attenuate ADHD-Like Behaviour Induced by Dietary Monosodium Glutamate in Rats. *Pakistan journal of biological sciences : PJBS*, 24(8), 868–880. <https://doi.org/10.3923/pjbs.2021.868.880>
- Kim, J. S., Kim, S., Jung, W., Im, C. H., & Lee, S. H. (2016). Auditory evoked potential could reflect emotional sensitivity and impulsivity. *Scientific reports*, 6, 37683. <https://doi.org/10.1038/srep37683>
- Kim, S. Y., Kim, H. N., Jeon, S. W., Lim, W. J., Kim, S. I., Lee, Y. J., Kim, S. Y., & Kim, Y. K. (2021). Association between genetic variants of the norepinephrine transporter gene (SLC6A2) and bipolar I disorder. *Progress in neuro-psychopharmacology & biological psychiatry*, 107, 110227. <https://doi.org/10.1016/j.pnpbp.2020.110227>
- Kinderman, P. (2014). *A Prescription for Psychiatry: Why We Need a Whole New Approach to Mental Health and Wellbeing*. Palgrave Macmillan.
- King, B. H., & Lord, C. (2011). Is schizophrenia on the autism spectrum?. *Brain research*, 1380, 34–41. <https://doi.org/10.1016/j.brainres.2010.11.031>
- Kirkovski, M., Suo, C., Enticott, P. G., Yücel, M., & Fitzgerald, P. B. (2018). Short communication: Sex-linked differences in gamma-aminobutyric acid (GABA) are related to social functioning in autism spectrum disorder. *Psychiatry research. Neuroimaging*, 274, 19–22. <https://doi.org/10.1016/j.psychresns.2018.02.004>
- Kirov, G., Rees, M., Jones, I., MacCandless, F., Owen, M. J., & Craddock, N. (1999). Bipolar disorder and the serotonin transporter gene: a family-based association study. *Psychological medicine*, 29(5), 1249–1254. <https://doi.org/10.1017/s003329179900882x>
- Klein, M., van Donkelaar, M., Verhoef, E., & Franke, B. (2017). Imaging genetics in neurodevelopmental psychopathology. *American journal of medical genetics. Part B, Neuropsychiatric*

genetics : the official publication of the International Society of Psychiatric Genetics, 174(5), 485–537. <https://doi.org/10.1002/ajmg.b.32542>

Klimkeit, E. I., & Bradshaw, J. L. (2006). Anomalous lateralisation in neurodevelopmental disorders. *Cortex; a journal devoted to the study of the nervous system and behavior*, 42(1), 113–116. [https://doi.org/10.1016/s0010-9452\(08\)70334-4](https://doi.org/10.1016/s0010-9452(08)70334-4)

Klimkeit, E. I., & Bradshaw, J. L. (2006). Heritable mental disorders: You can't choose your relatives, but it is they who may really count. *Behavioral and Brain Sciences*, 29(4), 414–415. <https://doi.org/10.1017/S0140525X06329093>

Kloiber, S., Rosenblat, J. D., Husain, M. I., Ortiz, A., Berk, M., Quevedo, J., Vieta, E., Maes, M., Birmaher, B., Soares, J. C., & Carvalho, A. F. (2020). Neurodevelopmental pathways in bipolar disorder. *Neuroscience and biobehavioral reviews*, 112, 213–226. <https://doi.org/10.1016/j.neubiorev.2020.02.005>

Knott, R., Johnson, B. P., Tiego, J., Mellahn, O., Finlay, A., Kallady, K., Kouspos, M., Mohanakumar Sindhu, V. P., Hawi, Z., Arnatkeviciute, A., Chau, T., Maron, D., Mercieca, E. C., Furley, K., Harris, K., Williams, K., Ure, A., Fornito, A., Gray, K., Coghill, D., ... Bellgrove, M. A. (2021). The Monash Autism-ADHD genetics and neurodevelopment (MAGNET) project design and methodologies: a dimensional approach to understanding neurobiological and genetic aetiology. *Molecular autism*, 12(1), 55. <https://doi.org/10.1186/s13229-021-00457-3>

Kollins, S. H., & Adcock, R. A. (2014). ADHD, altered dopamine neurotransmission, and disrupted reinforcement processes: implications for smoking and nicotine dependence. *Progress in neuro-psychopharmacology & biological psychiatry*, 52, 70–78. <https://doi.org/10.1016/j.pnpbp.2014.02.002>

Kolodny, T., Schallmo, M. P., Gerdt, J., Edden, R., Bernier, R. A., & Murray, S. O. (2020). Concentrations of Cortical GABA and Glutamate in Young Adults With Autism Spectrum Disorder. *Autism research : official journal of the International Society for Autism Research*, 13(7), 1111–1129. <https://doi.org/10.1002/aur.2300>

Kopecková, M., Paclt, I., & Goetz, P. (2006). Polymorphisms and low plasma activity of dopamine-beta-hydroxylase in ADHD children. *Neuro endocrinology letters*, 27(6), 748–754.

Kotov, R., Krueger, R. F., Watson, D., Achenbach, T. M., Althoff, R. R., Bagby, R. M., Brown, T. A., Carpenter, W. T., Caspi, A., Clark, L. A., Eaton, N. R., Forbes, M. K., Forbush, K. T., Goldberg, D., Hasin, D., Hyman, S. E., Ivanova, M. Y., Lynam, D. R., Markon, K., Miller, J. D., ... Zimmerman, M. (2017). The Hierarchical Taxonomy of Psychopathology (HiTOP): A dimensional alternative to traditional nosologies. *Journal of abnormal psychology*, 126(4), 454–477. <https://doi.org/10.1037/abn0000258>

Kraepelin, E. (1896). *Psychiatrie: Ein Lehrbuch für Studierende und Ärzte*. Fünfte, vollständig umgearbeitete Auflage. Leipzig.

Krakowski, A. D., Cost, K. T., Szatmari, P., Anagnostou, E., Crosbie, J., Schachar, R., Duku, E., Georgiades, S., Ayub, M., Kelley, E., Nicolson, R., Pullenayegum, E., & Barnett-Tapia, C. (2022). Characterizing the ASD-ADHD phenotype: measurement structure and invariance in a clinical sample. *Journal of child psychology and psychiatry, and allied disciplines*, 10.1111/jcpp.13609. Advance online publication. <https://doi.org/10.1111/jcpp.13609>

Krause, J., Krause, K. H., Dresel, S. H., la Fougere, C., & Ackenheil, M. (2006). ADHD in adolescence and adulthood, with a special focus on the dopamine transporter and nicotine. *Dialogues in clinical neuroscience*, 8(1), 29–36. <https://doi.org/10.31887/DCNS.2006.8.1/jkrause>

Kretschmer, E. (1921). *Körperbau und Charakter*. Springer.

Kubota, M., Fujino, J., Tei, S., Takahata, K., Matsuoka, K., Tagai, K., Sano, Y., Yamamoto, Y., Shimada, H., Takado, Y., Seki, C., Itahashi, T., Aoki, Y. Y., Ohta, H., Hashimoto, R. I., Zhang, M. R., Suhara, T., Nakamura, M., Takahashi, H., Kato, N., ... Higuchi, M. (2020). Binding of Dopamine D1 Receptor and Noradrenaline Transporter in Individuals with Autism Spectrum Disorder: A PET Study. *Cerebral cortex* (New York, N.Y. : 1991), 30(12), 6458–6468. <https://doi.org/10.1093/cercor/bhaa211>

Kumar, J., Liddle, E. B., Fernandes, C. C., Palaniyappan, L., Hall, E. L., Robson, S. E., Simmonite, M., Fiesal, J., Katshu, M. Z., Qureshi, A., Skelton, M., Christodoulou, N. G., Brookes, M. J., Morris, P. G., & Liddle, P. F. (2020). Glutathione and glutamate in schizophrenia: a 7T MRS study. *Molecular psychiatry*, 25(4), 873–882. <https://doi.org/10.1038/s41380-018-0104-7>

Kummer, A., & Teixeira, A. L. (2008). Dopamine and bipolar disorder. *Acta psychiatrica Scandinavica*, 117(5), 398–399. <https://doi.org/10.1111/j.1600-0447.2008.01176.x>

Kurita, M. (2016). Noradrenaline plays a critical role in the switch to a manic episode and treatment of a depressive episode. *Neuropsychiatric disease and treatment*, 12, 2373–2380. <https://doi.org/10.2147/NDT.S109835>

Kurita, M., Nishino, S., Numata, Y., Okubo, Y., & Sato, T. (2014). The noradrenaline metabolite MHPG is a candidate biomarker from the manic to the remission state in bipolar disorder I: a clinical naturalistic study. *PloS one*, 9(6), e100634. <https://doi.org/10.1371/journal.pone.0100634>

Kushki, A., Anagnostou, E., Hammill, C., Duez, P., Brian, J., Iaboni, A., Schachar, R., Crosbie, J., Arnold, P., & Lerch, J. P. (2019). Examining overlap and homogeneity in ASD, ADHD, and OCD: a data-driven, diagnosis-agnostic approach. *Translational psychiatry*, 9(1), 318. <https://doi.org/10.1038/s41398-019-0631-2>

LaBianca, S., LaBianca, J., Pagsberg, A. K., Jakobsen, K. D., Appadurai, V., Buil, A., & Werge, T. (2021). Copy Number Variants and Polygenic Risk Scores Predict Need of Care in Autism and/or ADHD Families. *Journal of autism and developmental disorders*, 51(1), 276–285. <https://doi.org/10.1007/s10803-020-04552-x>

Lake, C. R., Ziegler, M. G., & Murphy, D. L. (1977). Increased norepinephrine levels and decreased dopamine-beta-hydroxylase activity in primary autism. *Archives of general psychiatry*, 34(5), 553–556. <https://doi.org/10.1001/archpsyc.1977.01770170063005>

Lam, K. S., Aman, M. G., & Arnold, L. E. (2006). Neurochemical correlates of autistic disorder: a review of the literature. *Research in developmental disabilities*, 27(3), 254–289. <https://doi.org/10.1016/j.ridd.2005.03.003>

Lau, C. I., Wang, H. C., Hsu, J. L., & Liu, M. E. (2013). Does the dopamine hypothesis explain schizophrenia?. *Reviews in the neurosciences*, 24(4), 389–400. <https://doi.org/10.1515/revneuro-2013-0011>

Le Quang, G. & Gansel, Y. (2016). Le projet RDoC, catalyseur d'une révolution scientifique en psychiatrie ?. *PSN*, 14, 31-42. <https://doi.org/10.3917/psn.143.0031>

Lee, Y. A., Kim, Y. J., Lee, J. S., Lee, S., & Goto, Y. (2021). Imbalance between dopamine and serotonin caused by neonatal habenula lesion. *Behavioural brain research*, 409, 113316. <https://doi.org/10.1016/j.bbr.2021.113316>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Leff, J. P. (1976). Schizophrenia and sensitivity to the family environment. *Schizophrenia Bulletin*, 2(4), 566–574. <https://doi.org/10.1093/schbul/2.4.566>

Leitner Y. (2014). The co-occurrence of autism and attention deficit hyperactivity disorder in children - what do we know?. *Frontiers in human neuroscience*, 8, 268. <https://doi.org/10.3389/fnhum.2014.00268>

Lener, M. S., Niciu, M. J., Ballard, E. D., Park, M., Park, L. T., Nugent, A. C., & Zarate, C. A., Jr (2017). Glutamate and Gamma-Aminobutyric Acid Systems in the Pathophysiology of Major Depression and Antidepressant Response to Ketamine. *Biological psychiatry*, 81(10), 886–897. <https://doi.org/10.1016/j.biopsych.2016.05.005>

Lesch, K. P., Merker, S., Reif, A., & Novak, M. (2013). Dances with black widow spiders: dysregulation of glutamate signalling enters centre stage in ADHD. *European neuropsychopharmacology : the journal of the European College of Neuropsychopharmacology*, 23(6), 479–491. <https://doi.org/10.1016/j.euroneuro.2012.07.013>

Levy, F. (2009). Dopamine vs noradrenaline: inverted-U effects and ADHD theories. *The Australian and New Zealand journal of psychiatry*, 43(2), 101–108. <https://doi.org/10.1080/00048670802607238>

Levy, F., & Swanson, J. M. (2001). Timing, space and ADHD: the dopamine theory revisited. *The Australian and New Zealand journal of psychiatry*, 35(4), 504–511. <https://doi.org/10.1046/j.1440-1614.2001.00923.x>

Lewis, D. A., & Moghaddam, B. (2006). Cognitive dysfunction in schizophrenia: convergence of gamma-aminobutyric acid and glutamate alterations. *Archives of neurology*, 63(10), 1372–1376. <https://doi.org/10.1001/archneur.63.10.1372>

Leyfer, O. T., Folstein, S. E., Bacalman, S., Davis, N. O., Dinh, E., Morgan, J., Tager-Flusberg, H., & Lainhart, J. E. (2006). Comorbid psychiatric disorders in children with autism: interview development and rates of disorders. *Journal of autism and developmental disorders*, 36(7), 849–861. <https://doi.org/10.1007/s10803-006-0123-0>

Liao, J. W., Wang, S. S., Yang, H. H., Ma, P., Li, C. R., & Pan, J. Y. (2020). *Zhonghua yi xue za zhi*, 100(23), 1800–1804. <https://doi.org/10.3760/cma.j.cn112137-20191025-02319>

Lichtenstein, P., Carlström, E., Råstam, M., Gillberg, C., & Anckarsäter, H. (2010). The genetics of autism spectrum disorders and related neuropsychiatric disorders in childhood. *The American journal of psychiatry*, 167(11), 1357–1363. <https://doi.org/10.1176/appi.ajp.2010.10020223>

Lim, L., Chantiluke, K., Cubillo, A. I., Smith, A. B., Simmons, A., Mehta, M. A., & Rubia, K. (2015). Disorder-specific grey matter deficits in attention deficit hyperactivity disorder relative to autism spectrum disorder. *Psychological medicine*, 45(5), 965–976. <https://doi.org/10.1017/S0033291714001974>

Crow, T. J. (2000). Schizophrenia as the price that homo sapiens pays for language: a resolution of the central paradox in the origin of the species. *Brain research. Brain research reviews*, 31(2-3), 118–129. [https://doi.org/10.1016/s0165-0173\(99\)00029-6](https://doi.org/10.1016/s0165-0173(99)00029-6)

Liu, J., Fu, H., Kong, J., Yu, H., & Zhang, Z. (2021). Association between autism spectrum disorder and polymorphisms in genes encoding serotone and dopamine receptors. *Metabolic brain disease*, 36(5), 865–870. <https://doi.org/10.1007/s11011-021-00699-3>

Liu, Y., Zhang, Y., Zhao, D., Dong, R., Yang, X., Tammimies, K., Uddin, M., Scherer, S. W., & Gai, Z. (2015). Rare de novo deletion of metabotropic glutamate receptor 7 (GRM7) gene in a patient with

autism spectrum disorder. *American Journal of Medical Genetics. Part B, Neuropsychiatric Genetics: The Official Publication of the International Society of Psychiatric Genetics*, 168B(4), 258-264. <https://doi.org/10.1002/ajmg.b.32306>

Lu, H., Qiao, J., Shao, Z., Wang, T., Huang, S., & Zeng, P. (2021). A comprehensive gene-centric pleiotropic association analysis for 14 psychiatric disorders with GWAS summary statistics. *BMC medicine*, 19(1), 314. <https://doi.org/10.1186/s12916-021-02186-z>

Lydon, S., Healy, O., Reed, P., Mulhern, T., Hughes, B. M., & Goodwin, M. S. (2016). A systematic review of physiological reactivity to stimuli in autism. *Developmental neurorehabilitation*, 19(6), 335–355. <https://doi.org/10.3109/17518423.2014.971975>

M'Bailara, K. (2009). Une relecture des troubles bipolaires à travers la réactivité émotionnelle. *Le Journal des psychologues*, 273, 24-27. <https://doi.org/10.3917/jdp.273.0024>

Ma, S. L., Chen, L. H., Lee, C. C., Lai, K., Hung, S. F., Tang, C. P., Ho, T. P., Shea, C., Mo, F., Mak, T., Sham, P. C., & Leung, P. (2021). Genetic Overlap Between Attention Deficit/Hyperactivity Disorder and Autism Spectrum Disorder in SHANK2 Gene. *Frontiers in neuroscience*, 15, 649588. <https://doi.org/10.3389/fnins.2021.649588>

Madison, J. M., Zhou, F., Nigam, A., Hussain, A., Barker, D. D., Nehme, R., ... Haggarty, S. J. (2015). Characterization of bipolar disorder patient-specific induced pluripotent stem cells from a family reveals neurodevelopmental and mRNA expression abnormalities. *Molecular Psychiatry*, 20(6), 703–717. <https://doi.org/10.1038/mp.2015.7>

Mahajan, R., Dirlikov, B., Crocetti, D., & Mostofsky, S. H. (2016). Motor Circuit Anatomy in Children with Autism Spectrum Disorder With or Without Attention Deficit Hyperactivity Disorder. *Autism research: official journal of the International Society for Autism Research*, 9(1), 67–81. <https://doi.org/10.1002/aur.1497>

Mäki-Marttunen, V., Andreassen, O. A., & Espeseth, T. (2020). The role of norepinephrine in the pathophysiology of schizophrenia. *Neuroscience and biobehavioral reviews*, 118, 298–314. <https://doi.org/10.1016/j.neubiorev.2020.07.038>

Mallet, J., Godin, O., Mazer, N., Le Strat, Y., Bellivier, F., Belzeaux, R., ... Henry, C. (2021). Handedness in bipolar disorders is associated with specific neurodevelopmental features: results of the BD-FACE cohort. *European Archives of Psychiatry and Clinical Neuroscience*. <https://doi.org/10.1007/s00406-021-01314-3>

Maltezos, S., Horder, J., Coghlan, S., Skirrow, C., O'Gorman, R., Lavender, T. J., Mendez, M. A., Mehta, M., Daly, E., Xenitidis, K., Paliokosta, E., Spain, D., Pitts, M., Asherson, P., Lythgoe, D. J., Barker, G. J., & Murphy, D. G. (2014). Glutamate/glutamine and neuronal integrity in adults with ADHD: a proton MRS study. *Translational psychiatry*, 4(3), e373. <https://doi.org/10.1038/tp.2014.11>

Mandic-Maravic, V., Grujicic, R., Milutinovic, L., Munjiza-Jovanovic, A., & Pejovic-Milovancevic, M. (2022). Dopamine in Autism Spectrum Disorders-Focus on D2/D3 Partial Agonists and Their Possible Use in Treatment. *Frontiers in psychiatry*, 12, 787097. <https://doi.org/10.3389/fpsyt.2021.787097>

Mansour, H. A., Talkowski, M. E., Wood, J., Pless, L., Bamne, M., Chowdari, K. V., Allen, M., Bowden, C. L., Calabrese, J., El-Mallakh, R. S., Fagiolini, A., Faraone, S. V., Fossey, M. D., Friedman, E. S., Gyulai, L., Hauser, P., Ketter, T. A., Loftis, J. M., Marangell, L. B., Miklowitz, D. J., ... Nimgaonkar, V. L. (2005). Serotonin gene polymorphisms and bipolar I disorder: focus on the serotonin transporter. *Annals of medicine*, 37(8), 590–602. <https://doi.org/10.1080/07853890500357428>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

- Mariggiò, M. A., Palumbi, R., Vinella, A., Laterza, R., Petruzzelli, M. G., Pescechiera, A., Gabellone, A., Gentile, O., Vincenti, A., & Margari, L. (2021). DRD1 and DRD2 Receptor Polymorphisms: Genetic Neuromodulation of the Dopaminergic System as a Risk Factor for ASD, ADHD and ASD/ADHD Overlap. *Frontiers in neuroscience*, 15, 705890. <https://doi.org/10.3389/fnins.2021.705890>
- Marotta, R., Risoleo, M. C., Messina, G., Parisi, L., Carotenuto, M., Vetri, L., & Roccella, M. (2020). The Neurochemistry of Autism. *Brain sciences*, 10(3), 163. <https://doi.org/10.3390/brainsci10030163>
- Marsman, A., van den Heuvel, M. P., Klomp, D. W., Kahn, R. S., Luijten, P. R., & Hulshoff Pol, H. E. (2013). Glutamate in schizophrenia: a focused review and meta-analysis of ¹H-MRS studies. *Schizophrenia bulletin*, 39(1), 120–129. <https://doi.org/10.1093/schbul/sbr069>
- Martin, J., Taylor, M. J., & Lichtenstein, P. (2018). Assessing the evidence for shared genetic risks across psychiatric disorders and traits. *Psychological medicine*, 48(11), 1759–1774. <https://doi.org/10.1017/S0033291717003440>
- Martin, L. F., & Freedman, R. (2007). Schizophrenia and the alpha7 nicotinic acetylcholine receptor. *International review of neurobiology*, 78, 225–246. [https://doi.org/10.1016/S0074-7742\(06\)78008-4](https://doi.org/10.1016/S0074-7742(06)78008-4)
- Martinez, G., Alexandre, C., Mam-Lam-Fook, C., Bendjemaa, N., Gaillard, R., Garel, P., Dziobek, I., Amado, I., & Krebs, M. O. (2017). Phenotypic continuum between autism and schizophrenia: Evidence from the Movie for the Assessment of Social Cognition (MASC). *Schizophrenia research*, 185, 161–166. <https://doi.org/10.1016/j.schres.2017.01.012>
- Masino, S. A., Fortin, J. A., Murphy, M. I., Saa, L., & Ruskin, D. N. (2016). Autism spectrum disorder and homeostasis. In D. Boison & S. A. Masino (Eds.), *Homeostatic control of brain function* (pp. 586–609). Oxford University Press.
- Mayes, S. D., Calhoun, S. L., Baweja, R., & Waschbusch, D. A. (2021). Relative Frequency of Psychiatric, Neurodevelopmental, and Somatic Symptoms as Reported by Mothers of Children with Autism Compared with ADHD and Typical Samples. *Journal of autism and developmental disorders*, 51(7), 2297–2307. <https://doi.org/10.1007/s10803-020-04697-9>
- Mayes, S. D., Calhoun, S. L., Mayes, R. D., & Molitoris, S. (2012). Autism and ADHD: Overlapping and discriminating symptoms. *Research in Autism Spectrum Disorders*, 6(1), 277–285. <https://doi.org/10.1016/j.rasd.2011.05.009>
- McEvoy, J. P., & Allen, T. B. (2002). The importance of nicotinic acetylcholine receptors in schizophrenia, bipolar disorder and Tourette's syndrome. *Current drug targets. CNS and neurological disorders*, 1(4), 433–442. <https://doi.org/10.2174/1568007023339210>
- McPartland, J. C., Reichow, B., & Volkmar, F. R. (2012). Sensitivity and specificity of proposed DSM-5 diagnostic criteria for autism spectrum disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, 51(4), 368–383. <https://doi.org/10.1016/j.jaac.2012.01.007>
- Mendez, M. A., Horder, J., Myers, J., Coghlan, S., Stokes, P., Erritzoe, D., Howes, O., Lingford-Hughes, A., Murphy, D., & Nutt, D. (2013). The brain GABA-benzodiazepine receptor alpha-5 subtype in autism spectrum disorder: A pilot [¹¹C]Ro15-4513 positron emission tomography study. *Neuropharmacology*, 68, 195–201. <https://doi.org/10.1016/j.neuropharm.2012.04.008>
- Meng, H. R., Suenaga, T., Edamura, M., Fukuda, A., Ishida, Y., Nakahara, D., & Murakami, G. (2021). Functional MHCI deficiency induces ADHD-like symptoms with increased dopamine D1 receptor expression. *Brain, behavior, and immunity*, 97, 22–31. <https://doi.org/10.1016/j.bbi.2021.05.015>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Mick, E., & Faraone, S. V. (2008). Genetics of Attention Deficit Hyperactivity Disorder. *Child and Adolescent Psychiatric Clinics of North America*, 17(2), 261-284. <https://doi.org/10.1016/j.chc.2007.11.011>

Miodovnik, A., Harstad, E., Sideridis, G., & Huntington, N. (2015). Timing of the Diagnosis of Attention-Deficit/Hyperactivity Disorder and Autism Spectrum Disorder. *Pediatrics*, 136(4), e830–e837. <https://doi.org/10.1542/peds.2015-1502>

Mitchell, C., McLanahan, S., Brooks-Gunn, J., Garfinkel, I., Hobcraft, J., & Notterman, D. (2013). Genetic differential sensitivity to social environments: implications for research. *American journal of public health*, 103 Suppl 1(Suppl 1), S102–S110. <https://doi.org/10.2105/AJPH.2013.301382>

Mizuno, Y., Jung, M., Fujisawa, T. X., Takiguchi, S., Shimada, K., Saito, D. N., Kosaka, H., & Tomoda, A. (2017). Catechol-O-methyltransferase polymorphism is associated with the cortico-cerebellar functional connectivity of executive function in children with attention-deficit/hyperactivity disorder. *Scientific Reports*, 7(1), 1-8. <https://doi.org/10.1038/s41598-017-04579-8>

Möhler, H., & Rudolph, U. (2017). Disinhibition, an emerging pharmacology of learning and memory. *F1000Research*, 6, F1000 Faculty Rev-101. <https://doi.org/10.12688/f1000research.9947.1>

Mori, T., Mori, K., Fujii, E., Toda, Y., Miyazaki, M., Harada, M., Hashimoto, T., & Kagami, S. (2012). Evaluation of the GABAergic nervous system in autistic brain: 123I-iomazenil SPECT study. *Brain and Development*, 34(8), 648-654. <https://doi.org/10.1016/j.braindev.2011.10.007>

Morimoto, Y., Yamamoto, N., Kanegae, S., Matsuzaka, R., Ozawa, H., & Imamura, A. (2021). Genetic Overlap Among Autism Spectrum Disorders and Other Neuropsychiatric Disorders. In A. M. Gruber (Ed.), *Autism Spectrum Disorders*. Exon Publications.

Morris-Rosendahl, D. J., & Crocq, M. A. (2020). Neurodevelopmental disorders-the history and future of a diagnostic concept . *Dialogues in clinical neuroscience*, 22(1), 65–72. <https://doi.org/10.31887/DCNS.2020.22.1/macrocq>

Morrison, K. E., Pinkham, A. E., Penn, D. L., Kelsven, S., Ludwig, K., & Sasson, N. J. (2017). Distinct profiles of social skill in adults with autism spectrum disorder and schizophrenia. *Autism research : official journal of the International Society for Autism Research*, 10(5), 878–887. <https://doi.org/10.1002/aur.1734>

Mottron, L. (2019). Radio Canada - Le diagnostic de l'autisme remis en question au terme d'une révision de la recherche. https://ici.radio-canada.ca/nouvelle/1269267/psychiatrie-troubles-mentaux-spectre-enfants?fbclid=IwAR3_YTaBLsyy8DvdktvyN8TtUTl7Q6aSy3snMLBdcX2CmMkFe5m6OqyQ4Rk

Mottron, L. (2021). A radical change in our autism research strategy is needed: Back to prototypes. *Autism research: official journal of the International Society for Autism Research*, 14(10), 2213–2220. <https://doi.org/10.1002/aur.2494>

Moutin, E., Sakkaki, S., Compan, V., Bouquier, N., Giona, F., Areias, J., Goyet, E., Hemonnot-Girard, A. L., Seube, V., Glasson, B., Benac, N., Chastagnier, Y., Raynaud, F., Audinat, E., Groc, L., Maurice, T., Sala, C., Verpelli, C., & Perroy, J. (2021). Restoring glutamate receptor dynamics at synapses rescues autism-like deficits in Shank3-deficient mice. *Molecular psychiatry*, 26(12), 7596–7609. <https://doi.org/10.1038/s41380-021-01230-x>

Mpoulimari, I., & Zintzaras, E. (2022). Synthesis of genetic association studies on autism spectrum disorders using a genetic model-free approach. *Psychiatric genetics*, YPG.0000000000000316. Advance online publication. <https://doi.org/10.1097/YPG.0000000000000316>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Muntané, G., Farré, X., Bosch, E., Martorell, L., Navarro, A., & Vilella, E. (2021). The shared genetic architecture of schizophrenia, bipolar disorder and lifespan. *Human genetics*, 140(3), 441–455. <https://doi.org/10.1007/s00439-020-02213-8>

Muratori, F., Calderoni, S., & Bizzari, V. (2021). George Frankl: an undervalued voice in the history of autism. *European child & adolescent psychiatry*, 30(8), 1273–1280. <https://doi.org/10.1007/s00787-020-01622-4>

Murray, R. M., Sham, P., Van Os, J., Zanelli, J., Cannon, M., & McDonald, C. (2004). A developmental model for similarities and dissimilarities between schizophrenia and bipolar disorder. *Schizophrenia research*, 71(2-3), 405–416. <https://doi.org/10.1016/j.schres.2004.03.002>

Myin-Germeys, I., Delespaul, P. A., & deVries, M. W. (2000). Schizophrenia patients are more emotionally active than is assumed based on their behavior. *Schizophrenia bulletin*, 26(4), 847–854. <https://doi.org/10.1093/oxfordjournals.schbul.a033499>

Myin-Germeys, I., van Os, J., Schwartz, J. E., Stone, A. A., & Delespaul, P. A. (2001). Emotional reactivity to daily life stress in psychosis. *Archives of general psychiatry*, 58(12), 1137–1144. <https://doi.org/10.1001/archpsyc.58.12.1137>

Naaijen, J., Forde, N. J., Lythgoe, D. J., Akkermans, S. E., Openneer, T. J., Dietrich, A., Zwiers, M. P., Hoekstra, P. J., & Buitelaar, J. K. (2016). Fronto-striatal glutamate in children with Tourette's disorder and attention-deficit/hyperactivity disorder. *NeuroImage. Clinical*, 13, 16–23. <https://doi.org/10.1016/j.nicl.2016.11.013>

Nagai, J., Rajbhandari, A. K., Gangwani, M. R., Hachisuka, A., Coppola, G., Masmanidis, S. C., Faselow, M. S., & Khakh, B. S. (2019). Hyperactivity with Disrupted Attention by Activation of an Astrocyte Synaptogenic Cue. *Cell*, 177(5), 1280–1292.e20. <https://doi.org/10.1016/j.cell.2019.03.019>

Nagamitsu, S., Yamashita, Y., Tanigawa, H., Chiba, H., Kaida, H., Ishibashi, M., Kakuma, T., Croarkin, P. E., & Matsuishi, T. (2015). Upregulated GABA Inhibitory Function in ADHD Children with Child Behavior Checklist–Dysregulation Profile: 123I-Iomazenil SPECT Study. *Frontiers in Psychiatry*, 6. <https://doi.org/10.3389/fpsyt.2015.00084>

Nanjappa, M. S., Voyiaziakis, E., Pradhan, B., & Mannekote Thippaiah, S. (2020). Use of selective serotonin and norepinephrine reuptake inhibitors (SNRIs) in the treatment of autism spectrum disorder (ASD), comorbid psychiatric disorders and ASD-associated symptoms: a clinical review. *CNS spectrums*, 1–8. Advance online publication. <https://doi.org/10.1017/S109285292000214X>

Nho, K., Ramanan, V. K., Horgusluoglu, E., Kim, S., Inlow, M. H., Risacher, S. L., McDonald, B. C., Farlow, M. R., Foroud, T. M., Gao, S., Callahan, C. M., Hendrie, H. C., Niculescu, A. B., Saykin, A. J., & Alzheimer's Disease Neuroimaging Initiative (ADNI). (2015). Comprehensive gene- and pathway-based analysis of depressive symptoms in older adults. *Journal of Alzheimer's Disease: JAD*, 45(4), 1197-1206. <https://doi.org/10.3233/JAD-148009>

NIMH. (2013). Research priorities. <https://web.archive.org/web/20130609051825/http://www.nimh.nih.gov/research-priorities/rdoc/nimh-research-domain-criteria-rdoc.shtml>

NIMH. (2021). About RDoC. <https://www.nimh.nih.gov/research/research-funded-by-nimh/rdoc/about-rdoc>

NIMH. (2022a). RDoC matrix. <https://www.nimh.nih.gov/research/research-funded-by-nimh/rdoc/constructs/rdoc-matrix>

NIMH. (2022b). RDoC Unit of Analysis. <https://www.nimh.nih.gov/research/research-funded-by-nimh/rdoc/units/units-of-analysis>

Niu, W., Huang, X., Yu, T., Chen, S., Li, X., Wu, X., Cao, Y., Zhang, R., Bi, Y., Yang, F., Wang, L., Li, W., Xu, Y., He, L., & He, G. (2015). Association study of GRM7 polymorphisms and schizophrenia in the Chinese Han population. *Neuroscience Letters*, 604, 109-112. <https://doi.org/10.1016/j.neulet.2015.07.047>

Nivard, M. G., Gage, S. H., Hottenga, J. J., van Beijsterveldt, C., Abdellaoui, A., Bartels, M., Baselmans, B., Ligthart, L., Pourcain, B. S., Boomsma, D. I., Munafò, M. R., & Middeldorp, C. M. (2017). Genetic Overlap Between Schizophrenia and Developmental Psychopathology: Longitudinal and Multivariate Polygenic Risk Prediction of Common Psychiatric Traits During Development. *Schizophrenia bulletin*, 43(6), 1197–1207. <https://doi.org/10.1093/schbul/sbx031>

Noll, R. (2012). Dementia praecox, 1886: a new turning point? *History of Psychiatry*, 23(2), 255–256. <https://doi.org/10.1177/0957154X11428420>

Noroozi, R., Taheri, M., Movafagh, A., Mirfakhraie, R., Solgi, G., Sayad, A., Mazdeh, M., & Darvish, H. (2016). Glutamate receptor, metabotropic 7 (GRM7) gene variations and susceptibility to autism: A case-control study. *Autism Research: Official Journal of the International Society for Autism Research*, 9(11), 1161-1168. <https://doi.org/10.1002/aur.1640>

Nurnberger, J. I., Jr, & Foroud, T. (2000). Genetics of bipolar affective disorder. *Current psychiatry reports*, 2(2), 147–157. <https://doi.org/10.1007/s11920-000-0060-0>

O'Connell, K. S., Shadrin, A., Bahrami, S., Smeland, O. B., Bettella, F., Frei, O., Krull, F., Askeland, R. B., Walters, G. B., Davíðsdóttir, K., Haraldsdóttir, G. S., Guðmundsson, Ó. Ó., Stefánsson, H., Fan, C. C., Steen, N. E., Reichborn-Kjennerud, T., Dale, A. M., Stefánsson, K., Djurovic, S., & Andreassen, O. A. (2021). Identification of genetic overlap and novel risk loci for attention-deficit/hyperactivity disorder and bipolar disorder. *Molecular psychiatry*, 26(8), 4055–4065. <https://doi.org/10.1038/s41380-019-0613-z>

O'Donovan, M. C., & Owen, M. J. (2016). The implications of the shared genetics of psychiatric disorders. *Nature medicine*, 22(11), 1214–1219. <https://doi.org/10.1038/nm.4196>

O'Shea, K. S., & McInnis, M. G. (2016). Neurodevelopmental origins of bipolar disorder: iPSC models. *Molecular and cellular neurosciences*, 73, 63–83. <https://doi.org/10.1016/j.mcn.2015.11.006>

Oades R. D. (2007). Role of the serotonin system in ADHD: treatment implications. *Expert review of neurotherapeutics*, 7(10), 1357–1374. <https://doi.org/10.1586/14737175.7.10.1357>

Oades, R. D. (2008). Dopamine-serotonin interactions in attention-deficit hyperactivity disorder (ADHD). *Progress in brain research*, 172, 543–565. [https://doi.org/10.1016/S0079-6123\(08\)00926-6](https://doi.org/10.1016/S0079-6123(08)00926-6)

Oblak, A. L., Gibbs, T. T., & Blatt, G. J. (2010). Decreased GABA(B) receptors in the cingulate cortex and fusiform gyrus in autism. *Journal of Neurochemistry*, 114(5), 1414-1423. <https://doi.org/10.1111/j.1471-4159.2010.06858.x>

Oblak, A. L., Gibbs, T. T., & Blatt, G. J. (2011). Reduced GABAA receptors and benzodiazepine binding sites in the posterior cingulate cortex and fusiform gyrus in autism. *Brain research*, 1380, 218-228. <https://doi.org/10.1016/j.brainres.2010.09.021>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Ochoa, E. L. M., & Lasalde-Dominicci, J. (2007). Cognitive Deficits in Schizophrenia: Focus on Neuronal Nicotinic Acetylcholine Receptors and Smoking. *Cellular and molecular neurobiology*, 27(5), 609-639. <https://doi.org/10.1007/s10571-007-9149-x>

Ohmura, Y., Tsutsui-Kimura, I., & Yoshioka, M. (2012). Impulsive behavior and nicotinic acetylcholine receptors. *Journal of pharmacological sciences*, 118(4), 413–422. <https://doi.org/10.1254/jphs.11r06cr>

Omura, Y., Lu, D., Jones, M. K., Nihrane, A., Duvvi, H., Shimotsuura, Y., & Ohki, M. (2015). Early Detection of Autism (ASD) by a Non-invasive Quick Measurement of Markedly Reduced Acetylcholine & DHEA and Increased β -Amyloid (1-42), Asbestos (Chrysotile), Titanium Dioxide, Al, Hg & often Coexisting Virus Infections (CMV, HPV 16 and 18), Bacterial Infections etc. in the Brain and Corresponding Safe Individualized Effective Treatment. *Acupuncture & electro-therapeutics research*, 40(3), 157–187. <https://doi.org/10.3727/036012915x14473562232941>

Öngür, D. (2017). Dopamine Dysfunction in Schizophrenia and Bipolar Disorder-Never the Twain Shall Meet?. *JAMA psychiatry*, 74(12), 1187–1188. <https://doi.org/10.1001/jamapsychiatry.2017.2330>

Ongür, D., Prescott, A. P., McCarthy, J., Cohen, B. M., & Renshaw, P. F. (2010). Elevated gamma-aminobutyric acid levels in chronic schizophrenia. *Biological psychiatry*, 68(7), 667–670. <https://doi.org/10.1016/j.biopsych.2010.05.016>

Owen M. J. (2012). Intellectual disability and major psychiatric disorders: a continuum of neurodevelopmental causality. *The British journal of psychiatry : the journal of mental science*, 200(4), 268–269. <https://doi.org/10.1192/bjp.bp.111.105551>

Owen, M. J. (2012). Intellectual disability and major psychiatric disorders: a continuum of neurodevelopmental causality. *The British journal of psychiatry: the journal of mental science*, 200(4), 268–269. <https://doi.org/10.1192/bjp.bp.111.105551>

Owen, M. J. (2015). Psychotic Disorders and the Neurodevelopmental Continuum. In K. Nikolich (Eds.) et. al., *Translational Neuroscience: Toward New Therapies*. MIT Press.

Owen, M. J., & O'Donovan, M. C. (2017). Schizophrenia and the neurodevelopmental continuum:evidence from genomics. *World psychiatry : official journal of the World Psychiatric Association (WPA)*, 16(3), 227–235. <https://doi.org/10.1002/wps.20440>

Owen, M. J., O'Donovan, M. C., Thapar, A., & Craddock, N. (2011). Neurodevelopmental hypothesis of schizophrenia. *The British journal of psychiatry: the journal of mental science*, 198(3), 173–175. <https://doi.org/10.1192/bjp.bp.110.084384>

Palm, D., Uzoni, A., Simon, F., Tucha, O., Thome, J., & Faltraco, F. (2021). Norepinephrine influences the circadian clock in human dermal fibroblasts from study participants with a diagnosis of attention-deficit hyperactivity disorder. *Journal of neural transmission (Vienna, Austria : 1996)*, 128(7), 1147–1157. <https://doi.org/10.1007/s00702-021-02376-2>

Park, M., Raznahan, A., Shaw, P., Gogtay, N., Lerch, J. P., & Chakravarty, M. M. (2018). Neuroanatomical phenotypes in mental illness: identifying convergent and divergent cortical phenotypes across autism, ADHD and schizophrenia. *Journal of psychiatry & neuroscience: JPN*, 43(3), 201–212. <https://doi.org/10.1503/jpn.170094>

Park, S. H., Guastella, A. J., Lynskey, M., Agrawal, A., Constantino, J. N., Medland, S. E., Song, Y., Martin, N. G., & Colodro-Conde, L. (2017). Neuroticism and the Overlap Between Autistic and ADHD Traits: Findings From a Population Sample of Young Adult Australian Twins. *Twin research and human genetics: the official journal of the International Society for Twin Studies*, 20(4), 319–329. <https://doi.org/10.1017/thg.2017.38>

- Park, S., Jung, S. W., Kim, B. N., Cho, S. C., Shin, M. S., Kim, J. W., Yoo, H. J., Cho, D. Y., Chung, U. S., Son, J. W., & Kim, H. W. (2013a). Association between the GRM7 rs3792452 polymorphism and attention deficit hyperactivity disorder in a Korean sample. *Behavioral and brain functions: BBF*, 9, 1. <https://doi.org/10.1186/1744-9081-9-1>
- Park, S., Lee, J.-M., Kim, J.-W., Cho, D.-Y., Yun, H. J., Han, D. H., Cheong, J. H., & Kim, B.-N. (2015). Associations between serotonin transporter gene (SLC6A4) methylation and clinical characteristics and cortical thickness in children with ADHD. *Psychological Medicine*, 45(14), 3009-3017. <https://doi.org/10.1017/S003329171500094X>
- Park, T. W., Park, Y. H., Kwon, H. J., & Lim, M. H. (2013b). Association Between TPH2 Gene Polymorphisms and Attention Deficit Hyperactivity Disorder in Korean Children. *Genetic Testing and Molecular Biomarkers*, 17(4), 301-306. <https://doi.org/10.1089/gtmb.2012.0376>
- Partonen, T., & Lönngqvist, J. (1998). Seasonal affective disorder. *Lancet (London, England)*, 352(9137), 1369–1374. [https://doi.org/10.1016/S0140-6736\(98\)01015-0](https://doi.org/10.1016/S0140-6736(98)01015-0)
- Pascucci, T., Colamartino, M., Fiori, E., Sacco, R., Coviello, A., Ventura, R., Puglisi-Allegra, S., Turriziani, L., & Persico, A. M. (2020). P-cresol Alters Brain Dopamine Metabolism and Exacerbates Autism-Like Behaviors in the BTBR Mouse. *Brain sciences*, 10(4), 233. <https://doi.org/10.3390/brainsci10040233>
- Paulsen, B., Velasco, S., Kedaigle, A. J., Pignoni, M., Quadrato, G., Deo, A. J., Adiconis, X., Uzquiano, A., Sartore, R., Yang, S. M., Simmons, S. K., Symvoulidis, P., Kim, K., Tsafou, K., Podury, A., Abbate, C., Tucewicz, A., Smith, S. N., Albanese, A., Barrett, L., ... Arlotta, P. (2022). Autism genes converge on asynchronous development of shared neuron classes. *Nature*, 602(7896), 268–273. <https://doi.org/10.1038/s41586-021-04358-6>
- Pavál, D. (2017). A Dopamine Hypothesis of Autism Spectrum Disorder. *Developmental neuroscience*, 39(5), 355–360. <https://doi.org/10.1159/000478725>
- Pavál, D., & Micluța, I. V. (2021). The Dopamine Hypothesis of Autism Spectrum Disorder Revisited: Current Status and Future Prospects. *Developmental neuroscience*, 43(2), 73–83. <https://doi.org/10.1159/000515751>
- Pettersson, E., Anckarsäter, H., Gillberg, C., & Lichtenstein, P. (2013). Different neurodevelopmental symptoms have a common genetic etiology. *Journal of child psychology and psychiatry, and allied disciplines*, 54(12), 1356–1365. <https://doi.org/10.1111/jcpp.12113>
- Petty, F., Kramer, G. L., Fulton, M., Moeller, F. G., & Rush, A. J. (1993). Low plasma GABA is a trait-like marker for bipolar illness. *Neuropsychopharmacology: Official Publication of the American College of Neuropsychopharmacology*, 9(2), 125-132. <https://doi.org/10.1038/npp.1993.51>
- Phung, J., Penner, M., Pirlot, C., & Welch, C. (2021). What I Wish You Knew: Insights on Burnout, Inertia, Meltdown, and Shutdown From Autistic Youth. *Frontiers in psychology*, 12, 741421. <https://doi.org/10.3389/fpsyg.2021.741421>
- Pick, A (1891) Ueber primäre chronische Demenz (so. Dementia praecox) im jugendlichen Alter. *Prager medizinische Wochenschrift* 16: 313–315.

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Pinkham, A. E., Hopfinger, J. B., Pelphrey, K. A., Piven, J., & Penn, D. L. (2008). Neural bases for impaired social cognition in schizophrenia and autism spectrum disorders. *Schizophrenia research*, 99(1-3), 164–175. <https://doi.org/10.1016/j.schres.2007.10.024>

Pinto, R., Rijdsdijk, F., Ronald, A., Asherson, P., & Kuntsi, J. (2016). The Genetic Overlap of Attention-Deficit/Hyperactivity Disorder and Autistic-like Traits: an Investigation of Individual Symptom Scales and Cognitive markers. *Journal of abnormal child psychology*, 44(2), 335–345. <https://doi.org/10.1007/s10802-015-0037-4>

Pizzarelli, R., & Cherubini, E. (2011). Alterations of GABAergic Signaling in Autism Spectrum Disorders. *Neural Plasticity*, 2011. <https://doi.org/10.1155/2011/297153>

Plitman, E., Nakajima, S., de la Fuente-Sandoval, C., Gerretsen, P., Chakravarty, M. M., Kobylanskii, J., Chung, J. K., Caravaggio, F., Iwata, Y., Remington, G., & Graff-Guerrero, A. (2014). Glutamate-mediated excitotoxicity in schizophrenia: a review. *European neuropsychopharmacology : the journal of the European College of Neuropsychopharmacology*, 24(10), 1591–1605. <https://doi.org/10.1016/j.euroneuro.2014.07.015>

Plomin, R., Haworth, C. M., & Davis, O. S. (2009). Common disorders are quantitative traits. *Nature reviews. Genetics*, 10(12), 872–878. <https://doi.org/10.1038/nrg2670>

Plummer, J. T., Gordon, A. J., & Levitt, P. (2016). The Genetic Intersection of Neurodevelopmental Disorders and Shared Medical Comorbidities - Relations that Translate from Bench to Bedside. *Frontiers in psychiatry*, 7, 142. <https://doi.org/10.3389/fpsyt.2016.00142>

Polan, M. B., Pastore, M. T., Steingass, K., Hashimoto, S., Thrush, D. L., Pyatt, R., Reshmi, S., Gastier-Foster, J. M., Astbury, C., & McBride, K. L. (2014). Neurodevelopmental disorders among individuals with duplication of 4p13 to 4p12 containing a GABAA receptor subunit gene cluster. *European Journal of Human Genetics*, 22(1), 105–109. <https://doi.org/10.1038/ejhg.2013.99>

Potter, A. S., Schaubhut, G., & Shipman, M. (2014). Targeting the nicotinic cholinergic system to treat attention-deficit/hyperactivity disorder: rationale and progress to date. *CNS drugs*, 28(12), 1103–1113. <https://doi.org/10.1007/s40263-014-0208-9>

Prisciandaro, J. J., Tolliver, B. K., Prescott, A. P., Brenner, H. M., Renshaw, P. F., Brown, T. R., & Anton, R. F. (2017). Unique prefrontal GABA and glutamate disturbances in co-occurring bipolar disorder and alcohol dependence. *Translational Psychiatry*, 7(7), e1163. <https://doi.org/10.1038/tp.2017.141>

Purkayastha, P., Malapati, A., Yogeewari, P., & Sriram, D. (2015). A Review on GABA/Glutamate Pathway for Therapeutic Intervention of ASD and ADHD. *Current medicinal chemistry*, 22(15), 1850–1859. <https://doi.org/10.2174/0929867322666150209152712>

Purper-Ouakil, D., Lepagnol-Bestel, A. M., Grosbellet, E., Gorwood, P., & Simonneau, M. (2010). Neurobiologie du trouble déficit de l'attention/hyperactivité [Neurobiology of attention deficit/hyperactivity disorder]. *Medecine sciences : M/S*, 26(5), 487–496. <https://doi.org/10.1051/medsci/2010265487>

Puts, N. A., Ryan, M., Oeltzschner, G., Horska, A., Edden, R., & Mahone, E. M. (2020). Reduced striatal GABA in unmedicated children with ADHD at 7T. *Psychiatry research. Neuroimaging*, 301, 111082. <https://doi.org/10.1016/j.psychresns.2020.111082>

Quist, J. F., & Kennedy, J. L. (2001). Genetics of childhood disorders: XXIII. ADHD, Part 7: The serotonin system. *Journal of the American Academy of Child and Adolescent Psychiatry*, 40(2), 253–256. <https://doi.org/10.1097/00004583-200102000-00022>

- Rao, P. A., & Landa, R. J. (2014). Association between severity of behavioral phenotype and comorbid attention deficit hyperactivity disorder symptoms in children with autism spectrum disorders. *Autism: the international journal of research and practice*, 18(3), 272–280. <https://doi.org/10.1177/1362361312470494>
- Ray, M. A., Graham, A. J., Lee, M., Perry, R. H., Court, J. A., & Perry, E. K. (2005). Neuronal nicotinic acetylcholine receptor subunits in autism: an immunohistochemical investigation in the thalamus. *Neurobiology of disease*, 19(3), 366–377. <https://doi.org/10.1016/j.nbd.2005.01.017>
- Rebecchi, K., & Asperger, H. (2021). *Les enfants autistes*. Independently published.
- Rebecchi, K., & Kanner, L. (2022b). *Les enfants autistes*. Independently published.
- Rebecchi, K., & Sukhareva, G. E. (2022a). *Les enfants autistes*. Independently published.
- Rebecchi, K., & Frankl, G. (2022c). *Les enfants autistes*. Independently published.
- Reid M. A. (2021). Glutamate and Gamma-Aminobutyric Acid Abnormalities in Antipsychotic-Naïve Patients With Schizophrenia: Evidence From Empirical and Meta-analytic Studies Using Magnetic Resonance Spectroscopy. *Biological psychiatry*, 89(3), e1–e3. <https://doi.org/10.1016/j.biopsych.2020.11.005>
- Reiersen A. M. (2011). Links between autism spectrum disorder and ADHD symptom trajectories: important findings and unanswered questions. *Journal of the American Academy of Child and Adolescent Psychiatry*, 50(9), 857–859. <https://doi.org/10.1016/j.jaac.2011.06.012>
- Reiersen, A. M., Constantino, J. N., & Todd, R. D. (2008). Co-occurrence of motor problems and autistic symptoms in attention-deficit/hyperactivity disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, 47(6), 662–672. <https://doi.org/10.1097/CHI.0b013e31816bff88>
- Reiersen, A. M., Constantino, J. N., Grimmer, M., Martin, N. G., & Todd, R. D. (2008). Evidence for shared genetic influences on self-reported ADHD and autistic symptoms in young adult Australian twins. *Twin research and human genetics: the official journal of the International Society for Twin Studies*, 11(6), 579–585. <https://doi.org/10.1375/twin.11.6.579>
- Remington G. (2008). Alterations of dopamine and serotonin transmission in schizophrenia. *Progress in brain research*, 172, 117–140. [https://doi.org/10.1016/S0079-6123\(08\)00906-0](https://doi.org/10.1016/S0079-6123(08)00906-0)
- Robertson, C. E., Ratai, E.-M., & Kanwisher, N. (2016). Reduced GABAergic Action in the Autistic Brain. *Current Biology: CB*, 26(1), 80-85. <https://doi.org/10.1016/j.cub.2015.11.019>
- Robinson, E. B., Lichtenstein, P., Anckarsäter, H., Happé, F., & Ronald, A. (2013). Examining and interpreting the female protective effect against autistic behavior. *Proceedings of the National Academy of Sciences of the United States of America*, 110(13), 5258–5262. <https://doi.org/10.1073/pnas.1211070110>
- Robinson, E. B., St Pourcain, B., Anttila, V., Kosmicki, J. A., Bulik-Sullivan, B., Grove, J., Maller, J., Samocha, K. E., Sanders, S. J., Ripke, S., Martin, J., Hollegaard, M. V., Werge, T., Hougaard, D. M., iPSYCH-SSI-Broad Autism Group, Neale, B. M., Evans, D. M., Skuse, D., Mortensen, P. B., Børglum, A. D., ... Daly, M. J. (2016). Genetic risk for autism spectrum disorders and neuropsychiatric variation in the general population. *Nature genetics*, 48(5), 552–555. <https://doi.org/10.1038/ng.3529>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Rojas, D. C. (2014). The role of glutamate and its receptors in autism and the use of glutamate receptor antagonists in treatment. *Journal of neural transmission* (Vienna, Austria : 1996), 121(8), 891–905. <https://doi.org/10.1007/s00702-014-1216-0>

Romeo, B., Choucha, W., Fossati, P., & Rotge, J. Y. (2018). Meta-analysis of central and peripheral γ -aminobutyric acid levels in patients with unipolar and bipolar depression. *Journal of psychiatry & neuroscience : JPN*, 43(1), 58–66. <https://doi.org/10.1503/jpn.160228>

Rommelse, N. N., Franke, B., Geurts, H. M., Hartman, C. A., & Buitelaar, J. K. (2010). Shared heritability of attention-deficit/hyperactivity disorder and autism spectrum disorder. *European child & adolescent psychiatry*, 19(3), 281–295. <https://doi.org/10.1007/s00787-010-0092-x>

Rommelse, N. N., Geurts, H. M., Franke, B., Buitelaar, J. K., & Hartman, C. A. (2011). A review on cognitive and brain endophenotypes that may be common in autism spectrum disorder and attention-deficit/hyperactivity disorder and facilitate the search for pleiotropic genes. *Neuroscience and biobehavioral reviews*, 35(6), 1363–1396. <https://doi.org/10.1016/j.neubiorev.2011.02.015>

Ronald, A., Larsson, H., Anckarsäter, H., & Lichtenstein, P. (2014). Symptoms of autism and ADHD: a Swedish twin study examining their overlap. *Journal of abnormal psychology*, 123(2), 440–451. <https://doi.org/10.1037/a0036088>

Rosello, B., Berenguer, C., Raga, J. M., Baixauli, I., & Miranda, A. (2020). Executive functions, effortful control, and emotional lability in adults with ADHD. implications for functional outcomes. *Psychiatry research*, 293, 113375. <https://doi.org/10.1016/j.psychres.2020.113375>

Rumball, F., Brook, L., Happé, F., & Karl, A. (2021). Heightened risk of posttraumatic stress disorder in adults with autism spectrum disorder: The role of cumulative trauma and memory deficits. *Research in developmental disabilities*, 110, 103848. <https://doi.org/10.1016/j.ridd.2020.103848>

Rumball, F., Happé, F., & Grey, N. (2020). Experience of Trauma and PTSD Symptoms in Autistic Adults: Risk of PTSD Development Following DSM-5 and Non-DSM-5 Traumatic Life Events. *Autism research: official journal of the International Society for Autism Research*, 13(12), 2122–2132. <https://doi.org/10.1002/aur.2306>

Ryan, A. E., Mowry, B. J., Kesby, J. P., Scott, J. G., & Greer, J. M. (2019). Is there a role for antibodies targeting muscarinic acetylcholine receptors in the pathogenesis of schizophrenia?. *The Australian and New Zealand journal of psychiatry*, 53(11), 1059–1069. <https://doi.org/10.1177/0004867419864438>

Sadkowski, M., Dennis, B., Clayden, R. C., Elsheikh, W., Rangarajan, S., Dejesus, J., & Samaan, Z. (2013). The role of the serotonergic system in suicidal behavior. *Neuropsychiatric disease and treatment*, 9, 1699–1716. <https://doi.org/10.2147/NDT.S50300>

Salazar, F., Baird, G., Chandler, S., Tseng, E., O'sullivan, T., Howlin, P., Pickles, A., & Simonoff, E. (2015). Co-occurring Psychiatric Disorders in Preschool and Elementary School-Aged Children with Autism Spectrum Disorder. *Journal of autism and developmental disorders*, 45(8), 2283–2294. <https://doi.org/10.1007/s10803-015-2361-5>

Salunkhe, G., Weissbrodt, K., Feige, B., Saville, C., Berger, A., Dundon, N. M., Bender, S., Smyrnis, N., Beauducel, A., Biscaldi, M., & Klein, C. (2021). Examining the Overlap Between ADHD and Autism Spectrum Disorder (ASD) Using Candidate Endophenotypes of ADHD. *Journal of attention disorders*, 25(2), 217–232. <https://doi.org/10.1177/1087054718778114>

Sánchez-Morán, M., Hernández, J. A., Duñabeitia, J. A., Estévez, A., Bárcena, L., González-Lahera, A., Bajo, M. T., Fuentes, L. J., Aransay, A. M., & Carreiras, M. (2018). Genetic association study of

dyslexia and ADHD candidate genes in a Spanish cohort: Implications of comorbid samples. *PloS one*, 13(10), e0206431. <https://doi.org/10.1371/journal.pone.0206431>

Sapey-Triomphe, L.-A., Lamberton, F., Sonié, S., Mattout, J., & Schmitz, C. (2019). Tactile hypersensitivity and GABA concentration in the sensorimotor cortex of adults with autism. *Autism Research: Official Journal of the International Society for Autism Research*, 12(4), 562-575. <https://doi.org/10.1002/aur.2073>

Sari, S. A., Ulger, D., Ersan, S., Bakir, D., Uzun Cicek, A., & Ismailoglu, F. (2020). Effects of agmatine, glutamate, arginine, and nitric oxide on executive functions in children with attention deficit hyperactivity disorder. *Journal of neural transmission (Vienna, Austria : 1996)*, 127(12), 1675–1684. <https://doi.org/10.1007/s00702-020-02261-4>

Sasson, N. J., Pinkham, A. E., Carpenter, K. L., & Belger, A. (2011). The benefit of directly comparing autism and schizophrenia for revealing mechanisms of social cognitive impairment. *Journal of neurodevelopmental disorders*, 3(2), 87–100. <https://doi.org/10.1007/s11689-010-9068-x>

Satterstrom, F. K., Walters, R. K., Singh, T., Wigdor, E. M., Lescai, F., Demontis, D., Kosmicki, J. A., Grove, J., Stevens, C., Bybjerg-Grauholm, J., Bækvad-Hansen, M., Palmer, D. S., Maller, J. B., iPSYCH-Broad Consortium, Nordentoft, M., Mors, O., Robinson, E. B., Hougaard, D. M., Werge, T. M., Bo Mortensen, P., ... Daly, M. J. (2019). Autism spectrum disorder and attention deficit hyperactivity disorder have a similar burden of rare protein-truncating variants. *Nature neuroscience*, 22(12), 1961–1965. <https://doi.org/10.1038/s41593-019-0527-8>

Savransky, A., Chiappelli, J., Du, X., Carino, K., Kvarta, M., Bruce, H., Kochunov, P., Goldwaser, E., Tan, Y., Hare, S., & Hong, L. E. (2021). Association of working memory and elevated overnight urinary norepinephrine in patients with schizophrenia. *Journal of psychiatric research*, 137, 89–95. <https://doi.org/10.1016/j.jpsychires.2021.02.005>

Scandurra, V., Emberti Gialloreti, L., Barbanera, F., Scordo, M. R., Pierini, A., & Canitano, R. (2019). Neurodevelopmental Disorders and Adaptive Functions: A Study of Children With Autism Spectrum Disorders (ASD) and/or Attention Deficit and Hyperactivity Disorder (ADHD). *Frontiers in psychiatry*, 10, 673. <https://doi.org/10.3389/fpsy.2019.00673>

Schalbroeck, R., van Velden, F., de Geus-Oei, L. F., Yaqub, M., van Amelsvoort, T., Booij, J., & Selten, J. P. (2021). Striatal dopamine synthesis capacity in autism spectrum disorder and its relation with social defeat: an [18F]-FDOPA PET/CT study. *Translational psychiatry*, 11(1), 47. <https://doi.org/10.1038/s41398-020-01174-w>

Scholl, J. & Philippe, P. (2012). Bipolarité et ADHD. Recherche sémiologique : continuum développemental de la petite enfance à l'âge adulte et diagnostic différentiel. *La psychiatrie de l'enfant*, 55, 125-195. <https://doi.org/10.3917/psy.551.0125>

Schulze, T. G., Akula, N., Breuer, R., Steele, J., Nalls, M. A., Singleton, A. B., Degenhardt, F. A., Nöthen, M. M., Cichon, S., Rietschel, M., Bipolar Genome Study, & McMahon, F. J. (2014). Molecular genetic overlap in bipolar disorder, schizophrenia, and major depressive disorder. *The world journal of biological psychiatry : the official journal of the World Federation of Societies of Biological Psychiatry*, 15(3), 200–208. <https://doi.org/10.3109/15622975.2012.662282>

Schür, R. R., Draisma, L. W., Wijnen, J. P., Boks, M. P., Koevoets, M. G., Joëls, M., Klomp, D. W., Kahn, R. S., & Vinkers, C. H. (2016). Brain GABA levels across psychiatric disorders: A systematic literature review and meta-analysis of (1) H-MRS studies. *Human brain mapping*, 37(9), 3337–3352. <https://doi.org/10.1002/hbm.23244>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Sebastian Salicru, S. (2020). Categorical Systems and the Biomedical Model of Mental Illness: The Why and the How — A Clinician's Perspective. *Psychology*, 11(8), 1215-1235. <https://doi.org/10.4236/psych.2020.118081>

Seernani, D., Damania, K., Ioannou, C., Penkalla, N., Hill, H., Foulsham, T., Kingstone, A., Anderson, N., Boccignone, G., Bender, S., Smyrnis, N., Biscaldi, M., Ebner-Priemer, U., & Klein, C. (2021). Visual search in ADHD, ASD and ASD + ADHD: overlapping or dissociating disorders?. *European child & adolescent psychiatry*, 30(4), 549–562. <https://doi.org/10.1007/s00787-020-01535-2>

Sen, S. (2014). Shared genetic risk factors for psychiatric illness. *Acta Psychiatrica Scandinavica*, 130(4), 243–243. doi:10.1111/acps.12310

Serretti, A., & Fabbri, C. (2013). Shared genetics among major psychiatric disorders. *Lancet (London, England)*, 381(9875), 1339–1341. [https://doi.org/10.1016/S0140-6736\(13\)60223-8](https://doi.org/10.1016/S0140-6736(13)60223-8)

Shah, U. H., & González-Maeso, J. (2019). Serotonin and Glutamate Interactions in Preclinical Schizophrenia Models. *ACS chemical neuroscience*, 10(7), 3068–3077. <https://doi.org/10.1021/acscemneuro.9b00044>

Shan, L., & Swaab, D. F. (2022). Changes in Histaminergic System in Neuropsychiatric Disorders and the Potential Treatment Consequences. *Current neuropharmacology*, 20(2), 403–411. <https://doi.org/10.2174/1570159X19666210909144930>

Shastry, B. S. (2005). Bipolar disorder: an update. *Neurochemistry international*, 46(4), 273–279. <https://doi.org/10.1016/j.neuint.2004.10.007>

Shaw, P., Stringaris, A., Nigg, J., & Leibenluft, E. (2014). Emotion dysregulation in attention deficit hyperactivity disorder. *The American journal of psychiatry*, 171(3), 276–293. <https://doi.org/10.1176/appi.ajp.2013.13070966>

Sheehan, K., Lowe, N., Kirley, A., Mullins, C., Fitzgerald, M., Gill, M., & Hawi, Z. (2005). Tryptophan hydroxylase 2 (TPH2) gene variants associated with ADHD. *Molecular Psychiatry*, 10(10), 944-949. <https://doi.org/10.1038/sj.mp.4001698>

Shifman, S., Bronstein, M., Sternfeld, M., Pisanté, A., Weizman, A., Reznik, I., Spivak, B., Grisaru, N., Karp, L., Schiffer, R., Kotler, M., Strous, R. D., Swartz-Vanetik, M., Knobler, H. Y., Shinar, E., Yakir, B., Zak, N. B., & Darvasi, A. (2004). COMT: A common susceptibility gene in bipolar disorder and schizophrenia. *American Journal of Medical Genetics. Part B, Neuropsychiatric Genetics: The Official Publication of the International Society of Psychiatric Genetics*, 128B(1), 61-64. <https://doi.org/10.1002/ajmg.b.30032>

Shih, R. A., Belmonte, P. L., & Zandi, P. P. (2004). A review of the evidence from family, twin and adoption studies for a genetic contribution to adult psychiatric disorders. *International review of psychiatry (Abingdon, England)*, 16(4), 260–283. <https://doi.org/10.1080/09540260400014401>

Shnayder, N. A., Novitsky, M. A., Neznanov, N. G., Limankin, O. V., Asadullin, A. R., Petrov, A. V., Dmitrenko, D. V., Narodova, E. A., Popenko, N. V., & Nasyrova, R. F. (2022). Genetic Predisposition to Schizophrenia and Depressive Disorder Comorbidity. *Genes*, 13(3), 457. <https://doi.org/10.3390/genes13030457>

Siegel-Ramsay, J. E., Romaniuk, L., Whalley, H. C., Roberts, N., Branigan, H., Stanfield, A. C., Lawrie, S. M., & Dauvermann, M. R. (2021). Glutamate and functional connectivity - support for the excitatory-inhibitory imbalance hypothesis in autism spectrum disorders. *Psychiatry research. Neuroimaging*, 313, 111302. <https://doi.org/10.1016/j.psychresns.2021.111302>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Siemann, J. K., Veenstra-VanderWeele, J., & Wallace, M. T. (2020). Approaches to Understanding Multisensory Dysfunction in Autism Spectrum Disorder. *Autism research : official journal of the International Society for Autism Research*, 13(9), 1430–1449. <https://doi.org/10.1002/aur.2375>

Silverman, M. R., Bennett, R., Feuerstahler, L., Stadterman, J., Dick, A. S., Graziano, P., & Roy, A. K. (2022). Measuring Emotion Dysregulation in Children With Attention-Deficit/Hyperactivity Disorder: Revisiting the Factor Structure of the Emotion Regulation Checklist. *Behavior therapy*, 53(2), 196–207. <https://doi.org/10.1016/j.beth.2021.07.004>

Simonoff, E., Pickles, A., Charman, T., Chandler, S., Loucas, T., & Baird, G. (2008). Psychiatric disorders in children with autism spectrum disorders: prevalence, comorbidity, and associated factors in a population-derived sample. *Journal of the American Academy of Child and Adolescent Psychiatry*, 47(8), 921–929. <https://doi.org/10.1097/CHI.0b013e318179964f>

Singh, A. S., Chandra, R., Guhathakurta, S., Sinha, S., Chatterjee, A., Ahmed, S., Ghosh, S., & Rajamma, U. (2013). Genetic association and gene-gene interaction analyses suggest likely involvement of ITGB3 and TPH2 with autism spectrum disorder (ASD) in the Indian population. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, 45, 131–143. <https://doi.org/10.1016/j.pnpbp.2013.04.015>

Singh, A., Potter, A., & Newhouse, P. (2004). Nicotinic acetylcholine receptor system and neuropsychiatric disorders. *IDrugs : the investigational drugs journal*, 7(12), 1096–1103.

Sinzig, J., Walter, D., & Doepfner, M. (2009). Attention deficit/hyperactivity disorder in children and adolescents with autism spectrum disorder: symptom or syndrome?. *Journal of attention disorders*, 13(2), 117–126. <https://doi.org/10.1177/1087054708326261>

Smith, I. C., Reichow, B., & Volkmar, F. R. (2015). The Effects of DSM-5 Criteria on Number of Individuals Diagnosed with Autism Spectrum Disorder: A Systematic Review. *Journal of autism and developmental disorders*, 45(8), 2541–2552. <https://doi.org/10.1007/s10803-015-2423-8>

Smoller, J. W., Andreassen, O. A., Edenberg, H. J., Faraone, S. V., Glatt, S. J., & Kendler, K. S. (2019). Psychiatric genetics and the structure of psychopathology. *Molecular psychiatry*, 24(3), 409–420. <https://doi.org/10.1038/s41380-017-0010-4>

Sonmez, A. I., Lewis, C. P., Port, J. D., Cabello-Arreola, A., Blacker, C. J., Seewoo, B. J., McKean, A. J., Leffler, J. M., Frye, M. A., & Croarkin, P. E. (2020). Glutamatergic Correlates of Bipolar Symptoms in Adolescents. *Journal of child and adolescent psychopharmacology*, 30(10), 599–605. <https://doi.org/10.1089/cap.2020.0082>

Sonuga-Barke, E. J. S., Kumsta, R., Schlotz, W., Lasky-Su, J., Marco, R., Miranda, A., Mulas, F., Oades, R. D., Banaschewski, T., Mueller, U., Andreou, P., Christiansen, H., Gabriels, I., Uebel, H., Kuntsi, J., Franke, B., Buitelaar, J., Ebstein, R., Gill, M., ... Faraone, S. V. (2011). A functional variant of the serotonin transporter gene (SLC6A4) moderates impulsive choice in ADHD boys and siblings. *Biological psychiatry*, 70(3), 230–236. <https://doi.org/10.1016/j.biopsych.2011.01.040>

St Pourcain, B., Robinson, E. B., Anttila, V., Sullivan, B. B., Maller, J., Golding, J., Skuse, D., Ring, S., Evans, D. M., Zammit, S., Fisher, S. E., Neale, B. M., Anney, R., Ripke, S., Hollegaard, M. V., Werge, T., iPSYCH-SSI-Broad Autism Group, Ronald, A., Grove, J., Hougaard, D. M., ... Davey Smith, G. (2018). ASD and schizophrenia show distinct developmental profiles in common genetic overlap with population-based social communication difficulties. *Molecular psychiatry*, 23(2), 263–270. <https://doi.org/10.1038/mp.2016.198>

Stachowiak, M. K., Kucinski, A., Curl, R., Syposs, C., Yang, Y., Narla, S., Terranova, C., Prokop, D., Klejbor, I., Bencherif, M., Birkaya, B., Corso, T., Parikh, A., Tzanakakis, E. S., Wersinger, S., &

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Stachowiak, E. K. (2013). Schizophrenia: a neurodevelopmental disorder--integrative genomic hypothesis and therapeutic implications from a transgenic mouse model. *Schizophrenia research*, 143(2-3), 367–376. <https://doi.org/10.1016/j.schres.2012.11.004>

Stahl S. M. (2018). Beyond the dopamine hypothesis of schizophrenia to three neural networks of psychosis: dopamine, serotonin, and glutamate. *CNS spectrums*, 23(3), 187–191. <https://doi.org/10.1017/S1092852918001013>

Stahl, S. M. (2018). Beyond the dopamine hypothesis of schizophrenia to three neural networks of psychosis: dopamine, serotonin, and glutamate. *CNS spectrums*, 23(3), 187–191. <https://doi.org/10.1017/S1092852918001013>

Stergiakouli, E., Davey Smith, G., Martin, J., Skuse, D. H., Viechtbauer, W., Ring, S. M., Ronald, A., Evans, D. E., Fisher, S. E., Thapar, A., & St Pourcain, B. (2017). Shared genetic influences between dimensional ASD and ADHD symptoms during child and adolescent development. *Molecular autism*, 8, 18. <https://doi.org/10.1186/s13229-017-0131-2>

Stevens, T., Peng, L., & Barnard-Brak, L. (2016). The comorbidity of ADHD in children diagnosed with autism spectrum disorder. *Research in Autism Spectrum Disorders*, 31, 11–18. <https://doi.org/10.1016/j.rasd.2016.07.003>

Stoodley, C. J. (2014). Distinct regions of the cerebellum show gray matter decreases in autism, ADHD, and developmental dyslexia. *Frontiers in systems neuroscience*, 8, 92. <https://doi.org/10.3389/fnsys.2014.00092>

Stuart, L., Grahame, V., Honey, E., & Freeston, M. (2020). Intolerance of uncertainty and anxiety as explanatory frameworks for extreme demand avoidance in children and adolescents. *Child and adolescent mental health*, 25(2), 59–67. <https://doi.org/10.1111/camh.12336>

Sugranyes, G., de la Serna, E., Borrás, R., Sanchez-Gistau, V., Pariente, J. C., Romero, S., Baeza, I., Díaz-Caneja, C. M., Rodríguez-Toscano, E., Moreno, C., Bernardo, M., Moreno, D., Vieta, E., & Castro-Fornieles, J. (2017). Clinical, Cognitive, and Neuroimaging Evidence of a Neurodevelopmental Continuum in Offspring of Proband With Schizophrenia and Bipolar Disorder. *Schizophrenia bulletin*, 43(6), 1208–1219. <https://doi.org/10.1093/schbul/sbx002>

Sugranyes, G., Kyriakopoulos, M., Corrigall, R., Taylor, E., & Frangou, S. (2011). Autism spectrum disorders and schizophrenia: meta-analysis of the neural correlates of social cognition. *PloS one*, 6(10), e25322. <https://doi.org/10.1371/journal.pone.0025322>

Sukhareva, G. E. (1926a). Die schizoiden Psychopathien im Kindesalter. (Part 1 of 2). *European Neurology*, 60(3-4), 235–247. <https://doi.org/10.1159/000190478>

Sukhareva, G. E. (1926b). Die schizoiden Psychopathien im Kindesalter. (Part 2 of 2). *European Neurology*, 60(3-4), 248–261. <https://doi.org/10.1159/000316609>

Sukhareva, G. E. (1927a). Die Besonderheiten der schizoiden Psychopathien bei den Mädchen. (Part 1 of 2). *European Neurology*, 62(3), 171–185. <https://doi.org/10.1159/000166291>

Sukhareva, G. E. (1927b). Die Besonderheiten der schizoiden Psychopathien bei den Mädchen. (Part 1 of 2). *European Neurology*, 62(3), 186–200. <https://doi.org/10.1159/000323311>

Sullivan, P. F., Daly, M. J., & O'Donovan, M. (2012). Genetic architectures of psychiatric disorders: the emerging picture and its implications. *Nature reviews. Genetics*, 13(8), 537–551. <https://doi.org/10.1038/nrg3240>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Sun, H., Yuan, F., Shen, X., Xiong, G., & Wu, J. (2014). Role of COMT in ADHD: A systematic meta-analysis. *Molecular Neurobiology*, 49(1), 251–261. <https://doi.org/10.1007/s12035-013-8516-5>

Sundararajan, T., Manzardo, A. M., & Butler, M. G. (2018). Functional analysis of schizophrenia genes using GeneAnalytics program and integrated databases. *Gene*, 641, 25–34. <https://doi.org/10.1016/j.gene.2017.10.035>

Swanson, J. M., Flodman, P., Kennedy, J., Spence, M. A., Moyzis, R., Schuck, S., Murias, M., Morikawa, J., Barr, C., Smith, M., & Posner, M. (2000). Dopamine genes and ADHD. *Neuroscience and biobehavioral reviews*, 24(1), 21–25. [https://doi.org/10.1016/s0149-7634\(99\)00062-7](https://doi.org/10.1016/s0149-7634(99)00062-7)

Takechi, K., Suemaru, K., Kiyoi, T., Tanaka, A., & Araki, H. (2016). The $\alpha 4\beta 2$ nicotinic acetylcholine receptor modulates autism-like behavioral and motor abnormalities in pentylenetetrazol-kindled mice. *European journal of pharmacology*, 775, 57–66. <https://doi.org/10.1016/j.ejphar.2016.02.021>

Tamminga C. A. (1998). Serotonin and schizophrenia. *Biological psychiatry*, 44(11), 1079–1080. [https://doi.org/10.1016/s0006-3223\(98\)00209-1](https://doi.org/10.1016/s0006-3223(98)00209-1)

Tani, M., Akashi, N., Hori, K., Konishi, K., Kitajima, Y., Tomioka, H., Inamoto, A., Hirata, A., Tomita, A., Koganemaru, T., Takahashi, A., & Hachisu, M. (2015). Anticholinergic Activity and Schizophrenia. *Neuro-degenerative diseases*, 15(3), 168–174. <https://doi.org/10.1159/000381523>

Taurines, R., Schwenck, C., Westerwald, E., Sachse, M., Siniatchkin, M., & Freitag, C. (2012). ADHD and autism: differential diagnosis or overlapping traits? A selective review. *Attention deficit and hyperactivity disorders*, 4(3), 115–139. <https://doi.org/10.1007/s12402-012-0086-2>

Taylor, M. J., Charman, T., Robinson, E. B., Plomin, R., Happé, F., Asherson, P., & Ronald, A. (2013). Developmental associations between traits of autism spectrum disorder and attention deficit hyperactivity disorder: a genetically informative, longitudinal twin study. *Psychological medicine*, 43(8), 1735–1746. <https://doi.org/10.1017/S003329171200253X>

Taylor, M. J., Martin, J., Lu, Y., Brikell, I., Lundström, S., Larsson, H., & Lichtenstein, P. (2019). Association of Genetic Risk Factors for Psychiatric Disorders and Traits of These Disorders in a Swedish Population Twin Sample. *JAMA psychiatry*, 76(3), 280–289. <https://doi.org/10.1001/jamapsychiatry.2018.3652>

Teal, L. B., Gould, R. W., Felts, A. S., & Jones, C. K. (2019). Selective allosteric modulation of muscarinic acetylcholine receptors for the treatment of schizophrenia and substance use disorders. *Advances in pharmacology* (San Diego, Calif.), 86, 153–196. <https://doi.org/10.1016/bs.apha.2019.05.001>

Terry, A. V., Jr, & Callahan, P. M. (2020). $\alpha 7$ nicotinic acetylcholine receptors as therapeutic targets in schizophrenia: Update on animal and clinical studies and strategies for the future. *Neuropharmacology*, 170, 108053. <https://doi.org/10.1016/j.neuropharm.2020.108053>

Tesli, M., Espeseth, T., Bettella, F., Mattingsdal, M., Aas, M., Melle, I., Djurovic, S., & Andreassen, O. A. (2014). Polygenic risk score and the psychosis continuum model. *Acta psychiatrica Scandinavica*, 130(4), 311–317. <https://doi.org/10.1111/acps.12307>

Thal, L. B., Tomlinson, I. D., Quinlan, M. A., Kovtun, O., Blakely, R. D., & Rosenthal, S. J. (2019). Single Quantum Dot Imaging Reveals PKC β -Dependent Alterations in Membrane Diffusion and Clustering of an Attention-Deficit Hyperactivity Disorder/Autism/Bipolar Disorder-Associated

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Dopamine Transporter Variant. ACS chemical neuroscience, 10(1), 460–471. <https://doi.org/10.1021/acchemneuro.8b00350>

Thiebaut de Schotten, M., & Forkel, S. J. (2022). The emergent properties of the connected brain. *Science* (New York, N.Y.), 378(6619), 505–510. <https://doi.org/10.1126/science.abq2591>

Thomsen, M. S., Weyn, A., & Mikkelsen, J. D. (2011). Hippocampal $\alpha 7$ nicotinic acetylcholine receptor levels in patients with schizophrenia, bipolar disorder, or major depressive disorder. *Bipolar disorders*, 13(7-8), 701–707. <https://doi.org/10.1111/j.1399-5618.2011.00961.x>

Tripp, G., & Wickens, J. (2012). Reinforcement, dopamine and rodent models in drug development for ADHD. *Neurotherapeutics: the journal of the American Society for Experimental NeuroTherapeutics*, 9(3), 622–634. <https://doi.org/10.1007/s13311-012-0132-y>

Tripp, G., & Wickens, J. R. (2008). Research review: dopamine transfer deficit: a neurobiological theory of altered reinforcement mechanisms in ADHD. *Journal of child psychology and psychiatry, and allied disciplines*, 49(7), 691–704. <https://doi.org/10.1111/j.1469-7610.2007.01851.x>

Tse, M. T., Piantadosi, P. T., & Floresco, S. B. (2015). Prefrontal cortical gamma-aminobutyric acid transmission and cognitive function: drawing links to schizophrenia from preclinical research. *Biological psychiatry*, 77(11), 929–939. <https://doi.org/10.1016/j.biopsych.2014.09.007>

Tsuang, M. T., Faraone, S. V., & Lyons, M. J. (1993). Identification of the phenotype in psychiatric genetics. *European archives of psychiatry and clinical neuroscience*, 243(3-4), 131–142. <https://doi.org/10.1007/BF02190719>

Tupou, J., Curtis, S., Taare-Smith, D., Glasgow, A., & Waddington, H. (2021). Māori and autism: A scoping review. *Autism : the international journal of research and practice*, 25(7), 1844–1858. <https://doi.org/10.1177/13623613211018649>

Tzang, R.-F., Chang, C.-H., Chang, Y.-C., & Lane, H.-Y. (2019). Autism Associated With Anti-NMDAR Encephalitis: Glutamate-Related Therapy. *Frontiers in Psychiatry*, 10. <https://doi.org/10.3389/fpsyt.2019.00440>

Uno, Y., & Coyle, J. T. (2019). Glutamate hypothesis in schizophrenia. *Psychiatry and clinical neurosciences*, 73(5), 204–215. <https://doi.org/10.1111/pcn.12823>

Ure, A., Rose, V., Bernie, C., & Williams, K. (2018). Autism: One or many spectrums?. *Journal of paediatrics and child health*, 54(10), 1068–1072. <https://doi.org/10.1111/jpc.14176>

Vadodaria, K. C., Stern, S., Marchetto, M. C., & Gage, F. H. (2018). Serotonin in psychiatry: in vitro disease modeling using patient-derived neurons. *Cell and tissue research*, 371(1), 161–170. <https://doi.org/10.1007/s00441-017-2670-4>

Vallés, A. S., & Barrantes, F. J. (2021). Dysregulation of Neuronal Nicotinic Acetylcholine Receptor-Cholesterol Crosstalk in Autism Spectrum Disorder. *Frontiers in molecular neuroscience*, 14, 744597. <https://doi.org/10.3389/fnmol.2021.744597>

Valli, I., Fabbri, C., & Young, A. (2019). Uncovering neurodevelopmental features in bipolar affective disorder. *The British Journal of Psychiatry*, 215(1), 383–385. <https://doi.org/10.1192/bjp.2019.117>

Van Den Bogaert, A., Slegers, K., De Zutter, S., Heyrman, L., Norrback, K.-F., Adolfsson, R., Van Broeckhoven, C., & Del-Favero, J. (2006). Association of brain-specific tryptophan hydroxylase, TPH2,

with unipolar and bipolar disorder in a Northern Swedish, isolated population. *Archives of General Psychiatry*, 63(10), 1103-1110. <https://doi.org/10.1001/archpsyc.63.10.1103>

van der Meer, J. M., Oerlemans, A. M., van Steijn, D. J., Lappenschaar, M. G., de Sonnevile, L. M., Buitelaar, J. K., & Rommelse, N. N. (2012). Are autism spectrum disorder and attention-deficit/hyperactivity disorder different manifestations of one overarching disorder? Cognitive and symptom evidence from a clinical and population-based sample. *Journal of the American Academy of Child and Adolescent Psychiatry*, 51(11), 1160–1172.e3. <https://doi.org/10.1016/j.jaac.2012.08.024>

van der Meer, J., Lappenschaar, M., Hartman, C. A., Greven, C. U., Buitelaar, J. K., & Rommelse, N. (2017). Homogeneous Combinations of ASD-ADHD Traits and Their Cognitive and Behavioral Correlates in a Population-Based Sample. *Journal of attention disorders*, 21(9), 753–763. <https://doi.org/10.1177/1087054714533194>

van Enkhuizen, J., Janowsky, D. S., Olivier, B., Minassian, A., Perry, W., Young, J. W., & Geyer, M. A. (2015a). The catecholaminergic-cholinergic balance hypothesis of bipolar disorder revisited. *European journal of pharmacology*, 753, 114–126. <https://doi.org/10.1016/j.ejphar.2014.05.063>

van Enkhuizen, J., Milienne-Petiot, M., Geyer, M. A., & Young, J. W. (2015b). Modeling bipolar disorder in mice by increasing acetylcholine or dopamine: chronic lithium treats most, but not all features. *Psychopharmacology*, 232(18), 3455–3467. <https://doi.org/10.1007/s00213-015-4000-4>

van Hulzen, K., Scholz, C. J., Franke, B., Ripke, S., Klein, M., McQuillin, A., Sonuga-Barke, E. J., PGC ADHD Working Group, Kelsoe, J. R., Landén, M., Andreassen, O. A., PGC Bipolar Disorder Working Group, Lesch, K. P., Weber, H., Faraone, S. V., Arias-Vasquez, A., & Reif, A. (2017). Genetic Overlap Between Attention-Deficit/Hyperactivity Disorder and Bipolar Disorder: Evidence From Genome-wide Association Study Meta-analysis. *Biological psychiatry*, 82(9), 634–641. <https://doi.org/10.1016/j.biopsych.2016.08.040>

van Kammen, D. P., & Kelley, M. (1991). Dopamine and norepinephrine activity in schizophrenia. An integrative perspective. *Schizophrenia research*, 4(2), 173–191. [https://doi.org/10.1016/0920-9964\(91\)90032-m](https://doi.org/10.1016/0920-9964(91)90032-m)

van Rossum, I., Tenback, D., & van Os, J. (2009). Bipolar disorder and dopamine dysfunction: an indirect approach focusing on tardive movement syndromes in a naturalistic setting. *BMC psychiatry*, 9, 16. <https://doi.org/10.1186/1471-244X-9-16>

Vawter, M. P., Freed, W. J., & Kleinman, J. E. (2000). Neuropathology of bipolar disorder. *Biological psychiatry*, 48(6), 486–504. [https://doi.org/10.1016/s0006-3223\(00\)00978-1](https://doi.org/10.1016/s0006-3223(00)00978-1)

Wakefield, J. C. (2016). Diagnostic Issues and Controversies in DSM-5: Return of the False Positives Problem. *Annual review of clinical psychology*, 12, 105–132. <https://doi.org/10.1146/annurev-clinpsy-032814-112800>

Wan Nasru, W. N., Ab Razak, A., Yaacob, N. M., & Wan Azman, W. N. (2021). Alteration of plasma alanine, glutamate, and glycine Level: A potentiate manic episode of bipolar disorder. *The Malaysian journal of pathology*, 43(1), 25–32.

Wang, B., Li, H. H., Yue, X. J., Jia, F. Y., & DU, L. (2018). review on the role of γ -aminobutyric acid signaling pathway in autism spectrum disorder. *Zhongguo dang dai er ke za zhi = Chinese journal of contemporary pediatrics*, 20(11), 974–978. <https://doi.org/10.7499/j.issn.1008-8830.2018.11.019>

Wang, J., Tang, Y., Zhang, T., Cui, H., Xu, L., Zeng, B., Li, Y., Li, G., Li, C., Liu, H., Lu, Z., Zhang, J., & Wang, J. (2016). Reduced γ -Aminobutyric Acid and Glutamate+Glutamine Levels in Drug-Naïve

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Patients with First-Episode Schizophrenia but Not in Those at Ultrahigh Risk. *Neural plasticity*, 2016, 3915703. <https://doi.org/10.1155/2016/3915703>

Wang, P., Zhao, D., Lachman, H. M., & Zheng, D. (2018). Enriched expression of genes associated with autism spectrum disorders in human inhibitory neurons. *Translational Psychiatry*, 8(1), 1-10. <https://doi.org/10.1038/s41398-017-0058-6>

Wang, Y., Li, N., Yang, J. J., Zhao, D. M., Chen, B., Zhang, G. Q., Chen, S., Cao, R. F., Yu, H., Zhao, C. Y., Zhao, L., Ge, Y. S., Liu, Y., Zhang, L. H., Hu, W., Zhang, L., & Gai, Z. T. (2020). Probiotics and fructo-oligosaccharide intervention modulate the microbiota-gut brain axis to improve autism spectrum reducing also the hyper-serotonergic state and the dopamine metabolism disorder. *Pharmacological research*, 157, 104784. <https://doi.org/10.1016/j.phrs.2020.104784>

Wang, Y., Wang, T., Du, Y., Hu, D., Zhang, Y., Li, H., & Pei, W. (2021). Polygenic risk of genes involved in the catecholamine and serotonin pathways for ADHD in children. *Neuroscience letters*, 760, 136086. <https://doi.org/10.1016/j.neulet.2021.136086>

Wankerl, B., Hauser, J., Makulska-Gertruda, E., Reißmann, A., Sontag, T. A., Tucha, O., & Lange, K. W. (2014). Neurobiologische Grundlagen der Aufmerksamkeitsdefizit-/Hyperaktivitätsstörung [Neurobiology of attention deficit hyperactivity disorder]. *Fortschritte der Neurologie-Psychiatrie*, 82(1), 9–29. <https://doi.org/10.1055/s-0033-1355710>

Waterhouse L. (2021). Is autism a unitary biological entity? A revised and extended response to "A radical change in our autism research strategy is needed: Back to prototypes" (Mottron, 2021, *Autism Research*). *Autism research : official journal of the International Society for Autism Research*, 14(10), 2241–2242. <https://doi.org/10.1002/aur.2602>

Waterhouse, L. (2009). Autism is a Portmanteau Syndrome. *Neuropsychology Review*, 19(2), 275–276. <https://doi.org/10.1007/s11065-009-9100-7>

Waterhouse, L., & Gillberg, C. (2014). Why autism must be taken apart. *Journal of autism and developmental disorders*, 44(7), 1788–1792. <https://doi.org/10.1007/s10803-013-2030-5>

Waterhouse, L., London, E., & Gillberg, C. (2017). The ASD diagnosis has blocked the discovery of valid biological variation in neurodevelopmental social impairment. *Autism research: official journal of the International Society for Autism Research*, 10(7), 1182. <https://doi.org/10.1002/aur.1832>

Wei, S. Y., Tseng, H. H., Chang, H. H., Lu, T. H., Chang, W. H., Chiu, N. T., Yang, Y. K., & Chen, P. S. (2020). Dysregulation of oxytocin and dopamine in the corticostriatal circuitry in bipolar II disorder. *Translational psychiatry*, 10(1), 281. <https://doi.org/10.1038/s41398-020-00972-6>

Weitz, J. (1992). *Hitler's Diplomat: Joachim Von Ribbentrop*. Phoenix Giant

Whitney, J., Howe, M., Shoemaker, V., Li, S., Marie Sanders, E., Dijamco, C., Acquaye, T., Phillips, J., Singh, M., & Chang, K. (2013). Socio-emotional processing and functioning of youth at high risk for bipolar disorder. *Journal of affective disorders*, 148(1), 112–117. <https://doi.org/10.1016/j.jad.2012.08.016>

Whooley, O. (2016). Measuring mental disorders: The failed commensuration project of DSM-5. *Social science & medicine* (1982), 166, 33–40. <https://doi.org/10.1016/j.socscimed.2016.08.006>

Wilens, T. E., & Decker, M. W. (2007). Neuronal nicotinic receptor agonists for the treatment of attention-deficit/hyperactivity disorder: focus on cognition. *Biochemical pharmacology*, 74(8), 1212–1223. <https://doi.org/10.1016/j.bcp.2007.07.002>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Williams, E. L., & Casanova, M. F. (2010). Autism and dyslexia: a spectrum of cognitive styles as defined by minicolumnar morphometry. *Medical hypotheses*, 74(1), 59–62. <https://doi.org/10.1016/j.mehy.2009.08.003>

Williams, K., Brignell, A., Randall, M., Silove, N., & Hazell, P. (2013). Selective serotonin reuptake inhibitors (SSRIs) for autism spectrum disorders (ASD). *The Cochrane database of systematic reviews*, (8), CD004677. <https://doi.org/10.1002/14651858.CD004677.pub3>

Wing, L., & Gould, J. (1979). Severe impairments of social interaction and associated abnormalities in children: Epidemiology and classification. *Journal of Autism and Developmental Disorders*, 9(1), 11–29. <https://doi.org/10.1007/BF01531288>

Wing, L., Gould, J., & Gillberg, C. (2011). Autism spectrum disorders in the DSM-V: better or worse than the DSM-IV?. *Research in developmental disabilities*, 32(2), 768–773. <https://doi.org/10.1016/j.ridd.2010.11.003>

Wiste, A. K., Arango, V., Ellis, S. P., Mann, J. J., & Underwood, M. D. (2008). Norepinephrine and serotonin imbalance in the locus coeruleus in bipolar disorder. *Bipolar disorders*, 10(3), 349–359. <https://doi.org/10.1111/j.1399-5618.2007.00528.x>

Wolf, M., van Doorn, G. S., & Weissing, F. J. (2008). Evolutionary emergence of responsive and unresponsive personalities. *Proceedings of the National Academy of Sciences of the United States of America*, 105(41), 15825–15830. <https://doi.org/10.1073/pnas.0805473105>

Wolff, S. (1996). The first account of the syndrome Asperger described? *European Child & Adolescent Psychiatry* 5, 119–132. <https://doi.org/10.1007/BF00571671>

Wood, E. T., Cummings, K. K., Jung, J., Patterson, G., Okada, N., Guo, J., O'Neill, J., Dapretto, M., Bookheimer, S. Y., & Green, S. A. (2021). Sensory over-responsivity is related to GABAergic inhibition in thalamocortical circuits. *Translational psychiatry*, 11(1), 39. <https://doi.org/10.1038/s41398-020-01154-0>

Wright, C., Shin, J. H., Rajpurohit, A., Deep-Soboslay, A., Collado-Torres, L., Brandon, N. J., Hyde, T. M., Kleinman, J. E., Jaffe, A. E., Cross, A. J., & Weinberger, D. R. (2017). Altered expression of histamine signaling genes in autism spectrum disorder. *Translational psychiatry*, 7(5), e1126. <https://doi.org/10.1038/tp.2017.87>

Yamamoto, K., & Hornykiewicz, O. (2004). Proposal for a noradrenaline hypothesis of schizophrenia. *Progress in neuro-psychopharmacology & biological psychiatry*, 28(5), 913–922. <https://doi.org/10.1016/j.pnpbp.2004.05.033>

Yang, A. C., & Tsai, S. J. (2017). New Targets for Schizophrenia Treatment beyond the Dopamine Hypothesis. *International journal of molecular sciences*, 18(8), 1689. <https://doi.org/10.3390/ijms18081689>

Yang, C. J., Tan, H. P., & Du, Y. J. (2014). The developmental disruptions of serotonin signaling may involved in autism during early brain development. *Neuroscience*, 267, 1–10. <https://doi.org/10.1016/j.neuroscience.2014.02.021>

Yang, P., & Chang, C. L. (2014). Glutamate-mediated signaling and autism spectrum disorders: emerging treatment targets. *Current pharmaceutical design*, 20(32), 5186–5193. <https://doi.org/10.2174/1381612819666140110120725>

Yang, Z., Wu, H., Lee, P. H., Tsetsos, F., Davis, L. K., Yu, D., Lee, S. H., Dalsgaard, S., Haavik, J., Barta, C., Zayats, T., Eapen, V., Wray, N. R., Devlin, B., Daly, M., Neale, B., Børglum, A. D., Crowley,

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

- J. J., Scharf, J., Mathews, C. A., ... Paschou, P. (2021). Investigating Shared Genetic Basis Across Tourette Syndrome and Comorbid Neurodevelopmental Disorders Along the Impulsivity-Compulsivity Spectrum. *Biological psychiatry*, 90(5), 317–327. <https://doi.org/10.1016/j.biopsych.2020.12.028>
- Yao, X., Glessner, J. T., Li, J., Qi, X., Hou, X., Zhu, C., Li, X., March, M. E., Yang, L., Mentch, F. D., Hain, H. S., Meng, X., Xia, Q., Hakonarson, H., & Li, J. (2021). Integrative analysis of genome-wide association studies identifies novel loci associated with neuropsychiatric disorders. *Translational psychiatry*, 11(1), 69. <https://doi.org/10.1038/s41398-020-01195-5>
- Yeung, R. K., Xiang, Z.-H., Tsang, S.-Y., Li, R., Ho, T. Y. C., Li, Q., Hui, C.-K., Sham, P.-C., Qiao, M.-Q., & Xue, H. (2018). *Gabrb2* -knockout mice displayed schizophrenia-like and comorbid phenotypes with interneuron–astrocyte–microglia dysregulation. *Translational Psychiatry*, 8(1), 1-14. <https://doi.org/10.1038/s41398-018-0176-9>
- Yip, J., Soghomonian, J.-J., & Blatt, G. J. (2007). Decreased GAD67 mRNA levels in cerebellar Purkinje cells in autism: Pathophysiological implications. *Acta Neuropathologica*, 113(5), 559-568. <https://doi.org/10.1007/s00401-006-0176-3>
- Yoo, H. J., Cho, I. H., Park, M., Yang, S. Y., & Kim, S. A. (2013). Association of the Catechol-o-Methyltransferase Gene Polymorphisms with Korean Autism Spectrum Disorders. *Journal of Korean Medical Science*, 28(9), 1403-1406. <https://doi.org/10.3346/jkms.2013.28.9.1403>
- Yu, G., Li, G. F., & Markowitz, J. S. (2016). Atomoxetine: A Review of Its Pharmacokinetics and Pharmacogenomics Relative to Drug Disposition. *Journal of child and adolescent psychopharmacology*, 26(4), 314–326. <https://doi.org/10.1089/cap.2015.0137>
- Yuan, D., Zhang, M., Huang, Y., Wang, X., Jiao, J., & Huang, Y. (2021). Noradrenergic genes polymorphisms and response to methylphenidate in children with ADHD: A systematic review and meta-analysis. *Medicine*, 100(46), e27858. <https://doi.org/10.1097/MD.00000000000027858>
- Yüksel, C., & Öngür, D. (2010). Magnetic resonance spectroscopy studies of glutamate-related abnormalities in mood disorders. *Biological psychiatry*, 68(9), 785–794. <https://doi.org/10.1016/j.biopsych.2010.06.016>
- Zakharyan, R., Ghazaryan, H., Kocourkova, L., Chavushyan, A., Mkrtchyan, A., Zizkova, V., Arakelyan, A., & Petrek, M. (2020). Association of Genetic Variants of Dopamine and Serotonin In Schizophrenia. *Archives of medical research*, 51(1), 13–20. <https://doi.org/10.1016/j.arcmed.2019.12.011>
- Zhang, L., Huang, C. C., Dai, Y., Luo, Q., Ji, Y., Wang, K., Deng, S., Yu, J., Xu, M., Du, X., Tang, Y., Shen, C., Feng, J., Sahakian, B. J., Lin, C. P., & Li, F. (2020). Symptom improvement in children with autism spectrum disorder following bumetanide administration is associated with decreased GABA/glutamate ratios. *Translational psychiatry*, 10(1), 9. <https://doi.org/10.1038/s41398-020-0692-2>
- Zhang, M., Huang, Y., Jiao, J., Yuan, D., Hu, X., Yang, P., Zhang, R., Wen, L., Situ, M., Cai, J., Sun, X., Guo, K., Huang, X., & Huang, Y. (2022). Transdiagnostic symptom subtypes across autism spectrum disorders and attention deficit hyperactivity disorder: validated by measures of neurocognition and structural connectivity. *BMC Psychiatry* 22, 102. <https://doi.org/10.1186/s12888-022-03734-4>
- Zhao, H., & Nyholt, D. R. (2017). Gene-based analyses reveal novel genetic overlap and allelic heterogeneity across five major psychiatric disorders. *Human genetics*, 136(2), 263–274. <https://doi.org/10.1007/s00439-016-1755-6>

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Zheng, Z., Zhu, T., Qu, Y., & Mu, D. (2016). Blood Glutamate Levels in Autism Spectrum Disorder: A Systematic Review and Meta-Analysis. *PloS one*, 11(7), e0158688. <https://doi.org/10.1371/journal.pone.0158688>

Zhu, X., Need, A. C., Petrovski, S., & Goldstein, D. B. (2014). One gene, many neuropsychiatric disorders: lessons from Mendelian diseases. *Nature neuroscience*, 17(6), 773–781. <https://doi.org/10.1038/nn.3713>

Zhu, Y., Yang, Z., Zhao, J., Li, T., Wang, M., Qian, J., Jiang, Y., Wang, J., Weng, X., Yu, D., & Li, C. (2017). Can interpersonal hypersensitivity under subconscious condition explain paranoid symptom in schizophrenia?. *Asia-Pacific psychiatry : official journal of the Pacific Rim College of Psychiatrists*, 9(2), 10.1111/appy.12221. <https://doi.org/10.1111/appy.12221>

Zink, N., Bensmann, W., Arning, L., Stock, A. K., & Beste, C. (2019). CHRM2 Genotype Affects Inhibitory Control Mechanisms During Cognitive Flexibility. *Molecular neurobiology*, 56(9), 6134–6141. <https://doi.org/10.1007/s12035-019-1521-6>

Tables

Table 1. Genetic and phenotypic overlaps (organized two by two) between ADHD, ASD, BD and SS				
	ASD	ADHD	BD	SS
ASD		Antshel et al., 2016; Biscaldi et al., 2015; Bora & Pantelis, 2016; Brieber et al., 2007; Chen et al., 2019; Clark et al., 1999; Corbett et al., 2009; Gargaro et al., 2018; Geurts et al., 2008; Ghirardi et al., 2018; Ghirardi et al., 2019; Globus, 2022; Greven et al., 2018; Grzadzinski et al., 2011; Harikumar et al., 2021; Hayashi et al., 2022; Hendry et al., 2020; Jensen & Steinhausen, 2015; Jokiranta-Olkonemi et al., 2016; Joshi et al., 2017; Kaat et al., 2013; Kern et al., 2015; Krakowski et al., 2022; Kushki et al., 2019; LaBianca et al., 2021; Leitner, 2014; Leyfer et al., 2006; Lichtenstein et al., 2010; Ma et al., 2021; Mariggio et al., 2021; Mayes et al., 2012; Mayes et al., 2021; Miodovnik et al., 2015; Owen, 2012; Park et al., 2017; Pinto et al., 2016; Rao & Landa, 2014; Reiersen et al., 2008a; Reiersen et al., 2008b; Reiersen, 2011; Rommelse et al., 2010; Rommelse et al., 2011; Ronald et al., 2014; Salazar et al., 2015; Salunkhe et al., 2021; Satterstrom et al., 2019; Scandurra et al., 2019; Simonoff et al., 2008; Stergiakouli et al., 2017; Stevens et al., 2016; Taurines et al., 2012; Taylor et al., 2013; van der Meer et al., 2017	Whitney et al., 2013	Anomitri & Lazaratou, 2015; Autism Spectrum Disorders Working Group of The Psychiatric Genomics Consortium, 2017; Barlati et al., 2020; Chisholm et al., 2015; Couture et al., 2010; Katz et al., 2016; Du et al., 2021; King & Lord, 2011; Martinez et al., 2017; Morrison et al., 2017 ; Pinkham et al., 2008; Sasson et al., 2011; St Pourcain et al., 2018; Sugranyes et al., 2011
ADHD	Antshel et al., 2016; Biscaldi et al., 2015; Bora & Pantelis, 2016; Brieber et al., 2007; Chen et al., 2019; Clark et al., 1999; Corbett et al., 2009; Gargaro et al., 2018; Geurts et al., 2008; Ghirardi et al., 2018; Ghirardi et al., 2019; Globus, 2022; Greven et al., 2018; Grzadzinski et al., 2011; Harikumar et al., 2021; Hayashi et al., 2022; Hendry et al., 2020; Jensen & Steinhausen, 2015; Jokiranta-Olkonemi et al., 2016; Joshi et al., 2017; Kaat et al., 2013; Kern et al., 2015; Krakowski et al., 2022; Kushki et al., 2019; LaBianca et al., 2021; Leitner, 2014; Leyfer et al., 2006; Lichtenstein et al., 2010; Ma et al., 2021; Mariggio et al., 2021; Mayes et al., 2012; Mayes et al., 2021; Miodovnik et al., 2015; Owen, 2012; Park et al., 2017; Pinto et al., 2016; Rao & Landa, 2014; Reiersen et al., 2008a; Reiersen et al., 2008b; Reiersen, 2011; Rommelse et al., 2010; Rommelse et al., 2011; Ronald et al., 2014; Salazar et al., 2015; Salunkhe et al., 2021; Satterstrom et al., 2019; Scandurra et al., 2019; Simonoff et al., 2008; Stergiakouli et al., 2017; Stevens et al., 2016; Taurines et al., 2012; Taylor et al., 2013; van der Meer et al., 2017		O'Connell et al., 2021; van Hulzen et al., 2017	Hamshere et al., 2013; Jepsen et al., 2018; Nivared et al., 2017

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

	al., 2006; Lichtenstein et al., 2010; Ma et al., 2021; Mariggio et al., 2021; Mayes et al., 2012; Mayes et al., 2021; Miodovnik et al., 2015; Owen, 2012; Park et al., 2017; Pinto et al., 2016; Rao & Landa, 2014; Reiersen et al., 2008a; Reiersen et al., 2008b; Reiersen, 2011; Rommelse et al., 2010; Rommelse et al., 2011; Ronald et al., 2014; Salazar et al., 2015; Salunkhe et al., 2021; Satterstrom et al., 2019; Scandurra et al., 2019; Simonoff et al., 2008; Stergiakouli et al., 2017; Stevens et al., 2016; Taurines et al., 2012; Taylor et al., 2013; van der Meer et al., 2017			
BD	Whitney et al., 2013	O'Connell et al., 2021; van Hulzen et al., 2017		Akabaliev et al., 2014; Berrettini, 2000; Craddock et al., 2006; Green et al., 2010; International Schizophrenia Consortium et al., 2009; Muntané et al., 2021; Murray et al., 2004; O'Donovan & Owen, 2016; Schulze et al., 2014; Sen, 2014; Sugranyes et al., 2017; Tesli et al., 2014; Valli et al., 2020
SS	Anomitri & Lazaratou, 2015; Autism Spectrum Disorders Working Group of The Psychiatric Genomics Consortium, 2017; Barlati et al., 2020; Chisholm et al., 2015; Couture et al., 2010; Katz et al., 2016; Du et al., 2021; King & Lord, 2011; Martinez et al., 2017; Morrison et al., 2017; Pinkham et al., 2008; Sasson et al., 2011; St Pourcain et al., 2018; Sugranyes et al., 2011	Hamshere et al., 2013; Jepsen et al., 2018; Nivard et al., 2017	Akabaliev et al., 2014; Berrettini, 2000; Craddock et al., 2006; Green et al., 2010; International Schizophrenia Consortium et al., 2009; Muntané et al., 2021; Murray et al., 2004; O'Donovan & Owen, 2016; Schulze et al., 2014; Sen, 2014; Sugranyes et al., 2017; Tesli et al., 2014	

Table 2. Neurodevelopmental continua	
Overlap between at least three among ASD, ADHD, BD, SS (+ learning disorder including dyslexia, OCD, Tourette syndrome...)	Austin, 2011; Caspi et al., 2014; Cravedi et al., 2017; Gandal et al., 2018; Gialluisi et al., 2021; González-Peñas et al., 2020; Grotzinger, 2021; Martin et al., 2018; Owen & O'Donovan, 2017; Park et al., 2018; Pettersson et al., 2013; Pettersson et al., 2016; Sullivan et al., 2012; Taylor, 2019; Thal et al., 2019; Yang et al., 2021
ASD, ADHD, BD and SS (or more) continuum	Brainstorm Consortium et al., 2018; Cabana-Domínguez et al., 2022; Cross-Disorder Group of the Psychiatric Genomics Consortium, 2013; Cross-Disorder Group of the Psychiatric Genomics Consortium et al., 2013; Cross-Disorder Group of the Psychiatric Genomics Consortium, 2019; Doherty & Owen, 2014; Gonzalez-Mantilla et al., 2016; Lu et al., 2021; Morimoto et al., 2021; Morris-Rosendahl & Crocq, 2020; Plummer et al., 2016; Robinson et al., 2016; Serretti, A & Fabbri, 2013; Yao et al., 2021; Zhao & Nyholt, 2017; Zhu et al., 2014

Table 3. Successive characteristics of DSMs for SS, BD, ADHD and ASD				
	ADHD	ASD	SS	BD
DSM-I		- Schizophrenic reaction, paranoid type - Schizoid personality	- Schizophrenic reactions	- Cyclothymia personality - Affective reactions - Manic depressive reactions
DSM-II	- Non-psychotic organic brain syndromes	- Schizophrenia - Schizoid personality	- Schizophrenia	- Major affective disorders - Cyclothymic personality
DSM-III	- Attention deficit disorder (with hyperactivity, without hyperactivity, residual type)	- Infantile autism	- Schizophrenic disorders	- Affective psychoses (including bipolar affective disorder)
DSM-III-TR	- Attention-deficit Hyperactivity Disorder	- Infantile autism	- Schizophrenia	- Bipolar disorder - Cyclothymia
DSM-IV	Attention deficit and disruptive behavior disorders	- Autistic disorder - Asperger's disorder	- Schizophrenia and other psychotic disorders	- Bipolar disorder - Cyclothymic disorder
DSM-IV-TR	- Removal of 312.89 (Unspecified Onset)	- Autistic disorder - Asperger's disorder - Atypical Autism	- Schizophrenia and other psychotic disorders	- Bipolar disorder - Cyclothymic disorder
DSM-V	- Attention-Deficit/Hyperactivity Disorder	- Autism spectrum disorder	- Schizophrenia spectrum and other psychotic disorders	- Bipolar and related disorders
DSM-V-TR	- Attention-Deficit/Hyperactivity Disorder	- Autism spectrum disorder	- Schizophrenia spectrum and other psychotic disorders	- Bipolar and related disorders

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

Table 4. Global Neurodevelopmental Disorder (GND)			
With or without	Presence - Absence	Specifications of the difficulties	Optional: Prototypical form (yes or no, and specification if yes)
Social communication deficit			
Social interaction deficit			
Restricted, repetitive patterns of behavior, interests, or activities			
Inattention			
Hyperactivity			
Impulsivity			
Period of abnormally and persistently elevated, expansive, or irritable mood			
Abnormally and persistently increased goal-directed activity or energy			
Major Depressive Episode			
Delusions			
Hallucinations			
Disorganized speech			
Grossly disorganized or catatonic behavior			
Negative symptoms			
Others (learning or communication disorder, intellectual disabilities, obsessive and/or compulsive behaviors, motor disorders...)			

Table 5. Alterations in concentration levels and neurotransmission receptors in ADHD, ASD, SS and BD				
	ADHD	ASD	SS	BD
γ-Aminobutyric acid (GABA)	Bollmann et al., 2015; Edden et al., 2012; Hai et al., 2020; Harris et al., 2021; Hayes et al., 2014; Nagai et al., 2019; Nagamitsu et al., 2015; Puts et al., 2020; Schür et al., 2016; Wood et al., 2021	Blatt & Fatemi, 2011; Chao et al., 2010; Cochran et al., 2015; Dhossche et al., 2002; Edden et al., 2012; Guptill et al., 2007; Howes et al., 2018; James et al., 2022; Kanellopoulos et al., 2020; Kirkovski et al., 2018; Mendez et al., 2013; Möhler & Rudolph, 2017; Mori et al., 2012; Oblak et al., 2010, 2011; Paulsen et al., 2022; Pizzarelli & Cherubini, 2011; Sapey-Triomphe et al., 2019; Wang et al., 2018; Yip et al., 2007	Bojesen et al., 2021; Chiu et al., 2018; de Jonge et al., 2017; Egerton et al., 2017; Gelernter & van Kammen, 1988; Hoftman et al., 2018; Lewis & Moghaddam, 2006; Ongür et al., 2010; Reid, 2021; Tse et al., 2015; Wang et al., 2016	Arrúe et al., 2010; Bhagwagar et al., 2007; Brady et al., 2013; Brambilla et al., 2003; El-Mallakh & Ali, 2021; Huber et al., 2018; Kaufman et al., 2009; Liao et al., 2020; Petty et al., 1993; Prisciandaro et al., 2017; Romeo et al., 2018
Acetylcholine (ACh)	Beane & Marrocco, 2004; Chevrier et al., 2019; Colla et al., 2008; Fleisher & McGough, 2014; Hellmer & Nyström, 2017; Jin et al., 2001; Ohmura et al., 2012; Potter et al., 2014; Singh et al., 2004; Wilens & Decker, 2007	Deutsch et al., 2010; Deutsch & Burket, 2020; Eissa et al., 2020; Grossberg, 2017; Karvat & Kimchi, 2014; Omura et al., 2015; Ray et al., 2005; Takechi et al., 2016; Vallés & Barrantes, 2021	Armocida et al., 2019; Freedman, 2014; Higley & Picciotto, 2014; Ishikawa & Hashimoto, 2011; Jones, 2018; Martin & Freedman, 2007; Ochoa & Lasalde-Dominicci, 2007; Ryan et al., 2019; Tani et al., 2015; Teal et al., 2019; Terry & Callahan, 2020	Cao et al., 2017; Chen et al., 2010; Cope et al., 2020; McEvoy & Allen, 2002; Thomsen et al., 2011; van Enkhuizen et al., 2015a; van Enkhuizen et al., 2015b
Dopamine (DA)	Barkley et al., 2019; Del Campo et al., 2011; Faltraco et al., 2021; Kollins & Adcock, 2014; Kopecková et al., 2006; Krause et al., 2006; Levy & Swanson, 2001; Meng et al., 2021; Oades, 2008; Swanson et al., 2000; Tripp & Wickens, 2008; Tripp & Wickens, 2012	De Luca, 2020; DiCarlo et al., 2019; Liu et al., 2021; Mandic-Maravic et al., 2022; Marotta et al., 2020; Pascucci et al., 2020; Pavál, 2017; Pavál & Micluția, 2021; Schalbroeck et al., 2021; Wang et al., 2020	Abi-Dargham, 2014; Birtwistle & Baldwin, 1998; Davis et al., 1991; Grace & Gomes, 2019; Hietala & Syvälahti, 1996; Howes et al., 2015; Howes et al., 2017; Kesby et al., 2018; Lau et al., 2013; Stahl, 2018; Yang & Tsai, 2017	Ashok et al., 2017; Berk et al., 2007; de Bartolomeis et al., 2014; Cousins et al., 2009; Hsueh et al., 2021; Kummer & Teixeira, 2008; Öngür, 2017; van Rossum et al., 2009; Wei et al., 2020
Glutamic acid (Glu)	Ende et al., 2016; Grados et al., 2015; Hiraoka et al., 2021; Huang et al., 2019; Khaled Abd-Elhaleim El Azazy et al., 2021; Lesch et al., 2013; Maltezos et al., 2014; Naaijen et al., 2016; Purkayastha et al., 2015; Sari et al., 2020	Fernell, 2019; Kawada et al., 2021; Kolodny et al., 2020; Moutin et al., 2021; Rojas, 2014; Siegel-Ramsay et al., 2021; Tzang et al., 2019; Yang & Chang, 2014; Zheng et al., 2016	Egerton et al., 2020; Hasan et al., 2014; Howes et al., 2015; Hung et al., 2021; Kumar et al., 2020; Marsman et al., 2013; Plitman et al., 2014; Stahl, 2018; Uno & Coyle, 2019	de Bartolomeis et al., 2014; Duman et al., 2019; Gigante et al., 2012; Lener et al., 2017; Liao et al., 2020; Prisciandaro et al., 2017; Sonmez et al., 2020; Wan Yasru et al.,

Autism: the continuum hypothesis - Autisme : l'hypothèse du continuum

				2021; Yüksel & Öngür, 2010
Serotonin (5-HT)	Oades, 2007; Oades, 2008; Quist & Kennedy, 2001; Wang et al., 2021	Abdulmir et al., 2018; Bursztejn et al., 1988; Chugani, 2004; Cook & Leventhal, 1996; Dölen, 2015; Guo & Commons, 2017; Janušonis, 2014; Kamoun & Douay, 1980; Williams et al., 2013; Yang et al., 2014	Abi-Dargham, 2007; Bleich et al., 1988; Iqbal & van Praag, 1995; Juckel, 2015; Hrovatin et al., 2020; Remington, 2008; Shah & González-Maeso, 2019; Stahl, 2018; Tamminga, 1998; Zakharyan et al., 2020	Baou et al., 2016; Gellynck, 2013; Kelsoe, 1996; Kirov, 1999; Mansour, 2005; Nurnberger & Foroud, 2000; Vadodaria, 2018; Wiste, 2008
Norepinephrine (NE)	Angyal et al., 2018; Bokor & Anderson, 2014; Chamberlain & Robbins, 2013; Del Campo et al., 2011; Levy, 2009; Palm et al., 2021; Purper-Ouakil et al., 2010; Wankerl et al., 2014; Yu et al., 2016	Bast et al., 2018; Beversdorf et al., 2020; De Luca, 2020; Keehn et al., 2021; Kubota et al., 2020; Lake et al., 1977; Lam et al., 2006; Nanjappa et al., 2020	Breier et al., 1990; Fitzgerald, 2014; Hornykiewicz, 1986; Joyce, 1993; Kemali & Maj, 1986; Mäki-Marttunen et al., 2020; Savransky et al., 2021; van Kammen & Kelley, 1991; Yamamoto & Hornykiewicz, 2004	Clark & Goodwin, 2004; Erfurth et al., 2002; Eugene et al., 2014; Grossman & Potter, 1999; Kurita, 2016; Kurita et al., 2014; Shastry, 2005; Vawter et al., 2000; Wiste et al., 2008

Table 6. Genetic variations related to neurotransmission systems in ADHD, ASD, SS and BD				
	ADHD	ASD	SS	BD
γ-Aminobutyric acid (<i>GABRA3, GABRA4, GABRB1, GABRB3, GABRG1, GABRQ</i> genes)	Polan et al., 2014	Adak et al., 2021 ; Collins et al., 2006; Polan et al., 2014; Robertson et al., 2016	Craddock et al., 2010; Green et al., 2010a; Yeung et al., 2018	Ament et al., 2015; Green et al., 2010a
Acetylcholine (ACh) (<i>SLC5A7</i> gene)	English et al., 2009; Mick & Faraone, 2008	Bacchelli et al., 2015	Gass et al., 2016	Gillentine & Schaaf, 2015
Dopamine (DA) (<i>COMT, DRD4, SLC6A3</i> genes)	Bolat et al., 2020; Chen et al., 2022; Klein et al., 2017; Mizuno et al., 2017; O'Donnell et al., 2017; Sun et al., 2014	Azzam et al., 2018; Bowton et al., 2014; Gadow et al., 2009; Grady et al., 2005; Guo et al., 2013; Kamal et al., 2017; Reiersen & Todorov, 2011; Yoo et al., 2013	Chung et al., 2021; Frydecka, 2020	Dimick, 2020; Hoeffding et al., 2016; Hosang et al., 2017; Shifman et al., 2004
Glutamic acid (Glu) (<i>GRM7</i> gene)	Fisher et al., 2018; Park et al., 2013a	Liu et al., 2015; Noroozi et al., 2016	Li et al., 2016; Nho et al., 2015; Niu et al., 2015; Noroozi et al., 2016	Kandaswamy et al., 2014; Nho et al., 2015
Serotonin (5-HT) (<i>5-HTR2A, SLC6A4, TPH2</i> genes)	Baehne et al., 2009; Caylak, 2012; Durán-González et al., 2018; Park et al., 2013b; Park et al., 2015; Sheehan et al., 2005; Sonuga-Barke et al., 2011	Cieslinska et al., 2019; Coon et al., 2005; Gong et al., 2015; Hranilovic et al., 2016; Mpoulmari & Zintzaras, 2022; Singh et al., 2013	Ghamari et al., 2022; Golubev et al., 2021; Shnayder et al., 2022	Calabrò et al., 2018; Gao et al., 2016; Ikegame et al., 2021; Van Den Bogaert et al., 2006
Norepinephrine (NE) (<i>NET1</i> gene)	Barr et al., 2002; Gul et al., 2021; Yuan et al., 2021	Chen et al., 2017; Kubota et al., 2020	Choo et al., 2015; Sundararajan et al., 2017	Chang et al., 2007; Kim et al., 2021