

Scientific Advancements and New Perspectives on Research in Autism and ADHD

James J. Li, Ph.D.

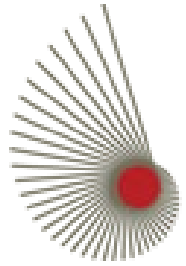
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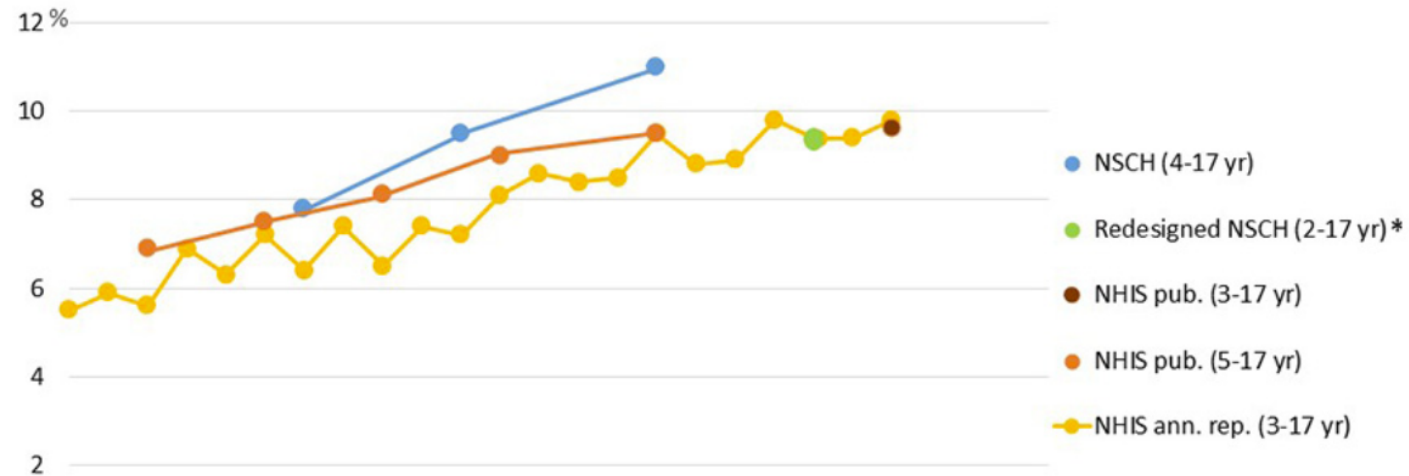


National Institute
of Mental Health

Prevalence rate of ADHD over time

ADHD diagnosis throughout the years: Estimates from published nationally representative survey data

(Percent of children with a parent-reported ADHD diagnosis)



“ADHD”: ~**1,000** per 10,000

2022



ADHD is very commonly observed in autism

- Meta-analysis of 20 years of studies

Prevalence of attention-deficit/hyperactivity disorder in individuals with autism spectrum disorder: A meta-analysis

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ABSTRACT

Background: Comorbidity with attention-deficit/hyperactivity disorder (ADHD) is very common in autism spectrum disorder (ASD), worsening the developmental trajectory of ASD. The reported rates of ADHD in ASD vary widely. However, no meta-analysis has been conducted specifically to assess both the current and lifetime prevalence of ADHD in ASD. This study aims to fill in this gap.

Method: We searched the Web of Science, PubMed, PsycINFO, CINAHL, and Embase databases for eligible articles published between January 1, 2000, and September 5, 2020. The risk of bias tool was used to assess the studies' quality. Overall pooled estimates of the current and lifetime prevalence of ADHD in ASD were obtained using random-effects models. Study heterogeneity was examined by Q and I^2 statistics.

Findings: A total of 63 articles were eventually included, of which 56 studies reported the current prevalence, and 13 studies reported the lifetime prevalence. The results revealed that the pooled current and lifetime prevalence rates of ADHD among ASD were 38.5 % (95 % CI 34.0–43.2) and 40.2 % (95 % CI 34.9–45.7), respectively. Our study also confirmed that age, intellectual disability, recruitment settings, and diagnostic criteria significantly influenced the current prevalence of ADHD in ASD.

Conclusion: ASD has considerable high current or lifetime prevalence rates of co-occurring ADHD. The findings demonstrate that clinicians should consider the high prevalence of ADHD in ASD and especially stay alert to possible ADHD diagnoses in school-age children and adolescents with ASD. Medical institutions should improve the assessment and tracking system of ADHD comorbidity in

- The pooled estimate of the current prevalence of ADHD in ASD was 38.5 %.
- The pooled estimate of the lifetime prevalence of ADHD in ASD was 40.2 %.

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Anxiety and Mood Disorder in Children With Autism Spectrum Disorder and ADHD

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Anxiety and mood problems

- Autistic children with ADHD had a 2.2x and 2.7x increase in risk for developing anxiety and mood disorders, respectively
 - When compared to autistic children w/o ADHD
 - Age was the most significant contributing factor to this risk

abstract

OBJECTIVES: Autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD) frequently co-occur. Understanding the endophenotype of children with both ASD and ADHD may impact clinical management. In this study, we compare the comorbidity of anxiety and mood disorders in children with ASD, with and without ADHD.

METHODS: We performed a cross-sectional study of children with ASD who were enrolled in the Interactive Autism Network, an Internet-mediated, parent-report, autism research registry. Children ages 6 to 17 years with a parent-reported, professional, and questionnaire-verified diagnosis of ASD were included. Data were extracted regarding parent-reported diagnosis and/or treatment of ADHD, anxiety disorder, and mood disorder. ASD severity was measured by using Social Responsiveness Scale total raw scores.

RESULTS: There were 3319 children who met inclusion criteria. Of these, 1503 (45.3%) had ADHD. Comorbid ADHD increased with age ($P < .001$) and was associated with increased ASD severity ($P < .001$). A generalized linear model revealed that children with ASD and ADHD had an increased risk of anxiety disorder (adjusted relative risk 2.20; 95% confidence interval 1.97–2.46) and mood disorder (adjusted relative risk 2.72; 95% confidence interval 2.28–3.24) compared with children with ASD alone. Increasing age was the most significant contributor to the presence of anxiety disorder and mood disorder.

CONCLUSIONS: Co-occurrence of ADHD is common in children with ASD. Children with both ASD and ADHD have an increased risk of anxiety and mood disorders. Physicians who care for children with ASD should be aware of the coexistence of these treatable conditions.



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Dr Gordon-Lipkin conceptualized and designed the study and drafted the initial manuscript; Dr Marvin conceptualized and designed the study, contributed to the registry development and survey design, performed data acquisition and statistical analyses, and reviewed and revised the manuscript; Dr Law conceptualized and designed the study, contributed to the registry development and survey design, and critically reviewed the manuscript; Dr Lipkin conceptualized and designed the study and critically reviewed the manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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WHAT'S KNOWN ON THIS SUBJECT: Autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD) frequently co-occur. Recently, researchers have explored the endophenotype of individuals with both ASD and ADHD. Whether these individuals are more prone to other psychiatric comorbidities than those with ASD alone is unknown.

WHAT THIS STUDY ADDS: We report that children with both ASD and ADHD have higher ASD severity scores and have an increased risk for anxiety and mood disorders when compared with children with ASD alone.

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Lasting adult impairments

- Young adults diagnosed with autism and ADHD were more likely to be **unemployed**, experience worse **sleep quality**, have higher risk of **severe illness** and **autoimmune disorders**

RESEARCH

Open Access

Clinical implications of ADHD, ASD, and their co-occurrence in early adulthood—the prospective ABIS-study



Andrea Lebeña^{1*}, Åshild Faresjö², Tomas Faresjö² and Johnny Ludvigsson^{1,3}

Abstract

Background Attention-deficit/hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) are childhood-onset disorders associated with functional and psychosocial impairments that may persist into adulthood, leading to serious personal and societal costs.

Objective This study aimed to examine the socio-economic difficulties, physical and mental comorbidities, and psycho-social vulnerabilities associated with ADHD, ASD, and their co-occurrence among young adults.

Methods 16 365 families with children born 1997–1999, were involved in the prospective population-based ABIS study (All Babies in Southeast Sweden). A total of 6 233 ABIS young adults answered the questionnaire at the 17–19-year follow-up and were included in this case–control study. Diagnoses of ADHD and ASD from birth up to 17 years of age were obtained from the Swedish National Diagnosis Register. $N=182$ individuals received a single diagnosis of ADHD, $n=78$ of ASD, and $n=51$ received both diagnoses and were considered the co-occurrence group. Multiple multinomial logistic regression analyses were performed.

Results In the univariate analyses all three conditions were significantly associated with concentration difficulties, worse health quality, lower socio-economic status, lower faith in the future, less control over life, and lower social support. In the adjusted analyses, individuals with ADHD were almost three-times more likely to have less money compared with their friends (aOR 2.86; $p < .001$), experienced worse sleep quality (aOR 1.50; $p = .043$) and concentration difficulties (aOR 1.96; $p < .001$). ASD group were two-fold more likely to experience concentration difficulties (aOR 2.35; $p = .002$) and tended not to have faith in the future (aOR .63; $p = .055$), however, showed lesser risk-taking behaviours (aOR .40; $p < .001$). Finally, the co-occurrence was significantly associated with unemployment (aOR 2.64; $p = .007$) and tended to have a higher risk of autoimmune disorders (aOR 2.41; $p = .051$), however, showed a 51% lower risk of stomach pain (aOR .49; $p = .030$).

Conclusions All these conditions significantly deteriorated several areas of life. ADHD/ASD co-occurrence is a heavy burden for health associated with several psychosocial vulnerabilities, that shared a similar morbidity pattern with ADHD although showed less risk cognitive and behavioral profile, similar to the ASD group. Long-term follow-up and support for individuals with these conditions over the life course are crucial.

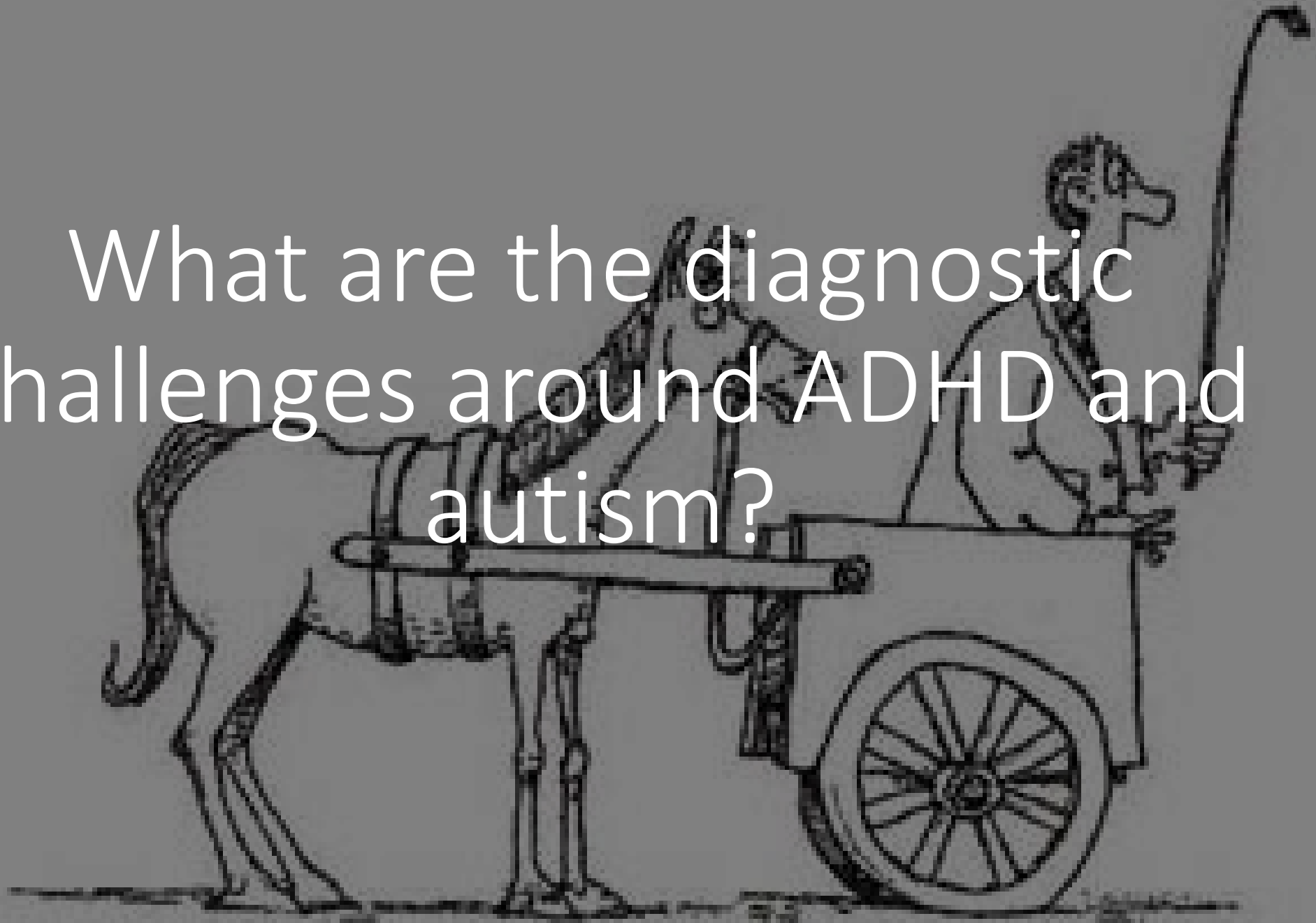
Keywords ADHD, ASD, Co-occurrence, ABIS, Impact on health, Psychosocial vulnerabilities, Young adults

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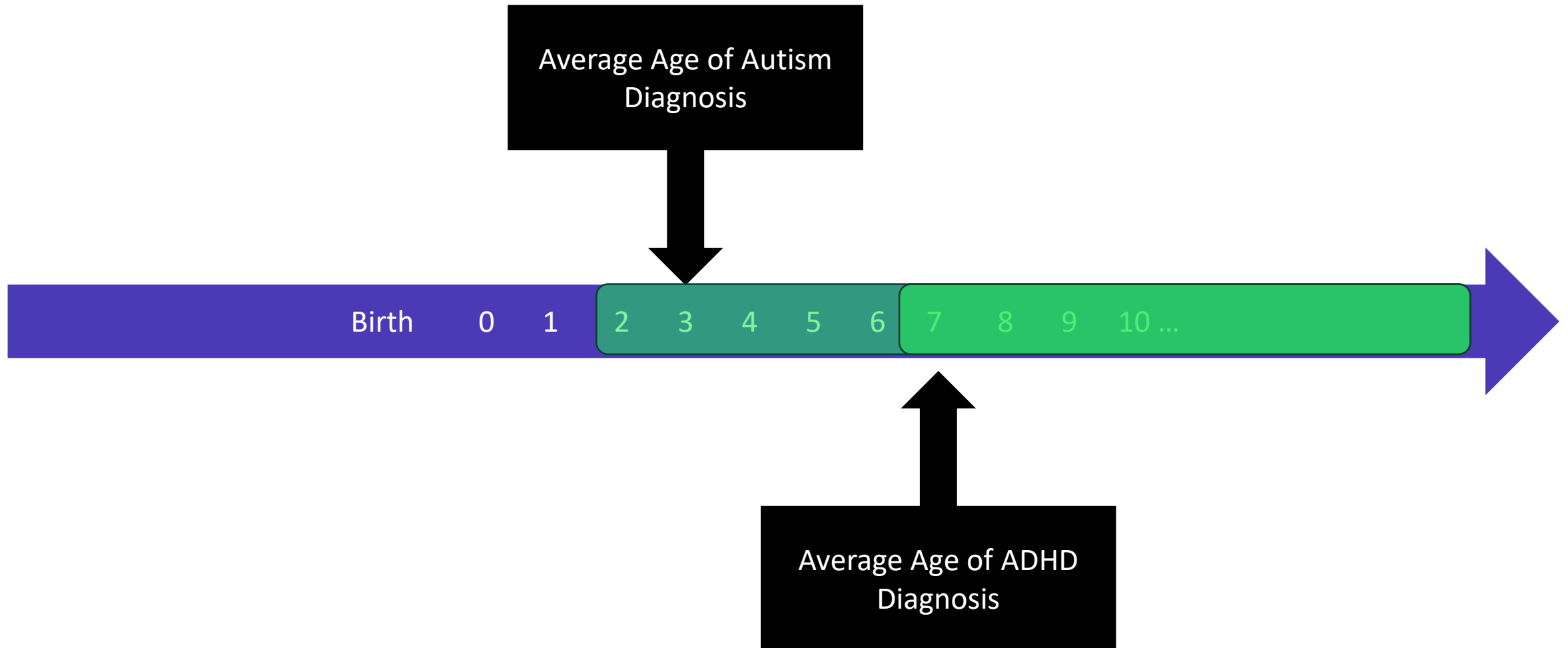
ADHD treatments aren't as efficacious for autistic youths

- 86% of autistic youths with ADHD are prescribed a medication for ADHD symptoms
 - 40% are prescribed two or more psychotropic medications simultaneously
 - 85% of prescribers treating autistic youths with ADHD prescribed stimulants medications
 - Most common symptom targets: aggression and hyperactivity/impulsivity
- Mixed evidence that autistic children with ADHD respond to these ADHD treatments
 - Stimulant response for ADHD symptom reduction (>25%) in autistic youths “well-below” rates in non-autistic youths – 50% vs. 70% response (Handen et al., 2015)

What are the diagnostic challenges around ADHD and autism?



The diagnostic timing for ADHD doesn't line up with timing of autism diagnosis



Contending with assessment of ADHD in autism

- Some ADHD symptoms may be due to impairment in social communication and skills, and NOT to underlying difficulties in inattention or hyperactivity/impulsivity
- E.g., “does not seem to listen when spoken to directly”
 - inattention?
 - ...or difficulties in social skills to engage and disengage from an interaction appropriately (i.e., autism)?



Autism Spectrum Disorders and ADHD: Overlapping Phenomenology, Diagnostic Issues, and Treatment Considerations

Kevin M. Antshel¹ · Natalie Russo¹

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Abstract

Purpose of Review Autism spectrum disorder (ASD) and attention deficit/hyperactivity disorder (ADHD) are both increasing in prevalence and commonly co-occur with each other. The goal of this review is to outline what has been published recently on the topics of ASD, ADHD, and the comorbid state (ASD+ADHD) with a particular focus on shared phenomenology, differential diagnosis, and treatment considerations.

Recent Findings ASD and ADHD have shared genetic heritability and are both associated with shared impairments in social functioning and executive functioning. Quantitative and qualitative differences exist, however, in the phenotypic presentations of the impairments which characterize ASD and ADHD. For ASD interventions to be maximally efficacious, comorbid ADHD needs to be considered (and vice versa).

Summary The research on ASD and ADHD suggests some overlap between the two disorders yet enough differences to indicate that these conditions are sufficiently distinct to warrant separate diagnostic categories.

Keywords ADHD · Autism · Autism spectrum disorder · Neurodevelopmental disorder · Comorbidity · Diagnosis · DSM-5

Introduction

Attention deficit/hyperactivity disorder (ADHD) and autism spectrum disorder (ASD) are both neurodevelopmental disorders which typically onset in childhood. ADHD is defined by the presence of impairing symptoms of inattention and/or hyperactivity-impulsivity that onset before age 12, is present across two or more settings, and cannot be better explained by another condition [1]. ASD is characterized by enduring and impairing social communication and interaction deficits that occur across multiple contexts along with the presence of restricted, repetitive behaviors, interests or activities, or sensory symptoms [1].

Prior to the *Diagnostic and Statistical Manual for Mental Disorders – 5th edition* (DSM-5) [1] in 2013, clinicians were unable to make an ADHD diagnosis in the context of ASD. It

was presumed that any symptoms of inattention and/or hyperactivity-impulsivity were secondary to ASD and not due to an additional ADHD diagnosis [2]. With this exclusionary criterion lifted in the DSM-5, it is not surprising that a vast literature has been published within the past several years on the topic of ADHD, ASD, and ASD+ADHD. (Please see Fig. 1 for graphical representation of this increase in research activity.)

Both ADHD [3] and ASD [4] are increasing in prevalence and the symptoms and impairments of both conditions often persist into adulthood [5•]. When considered in the context of the substantial impairments and societal costs (e.g., reduced parental quality of life [6]) associated with ADHD [7], ASD [8], and the amplification of those negative outcomes in the comorbid condition (ASD+ADHD) [9–14], it is clear that ADHD, ASD, and ASD+ADHD represent a public health problem. For example, children with ASD constitute 8% and children with ADHD represent 13% of all youth receiving school-based services under the Individuals with Disabilities Education Act [15]. Thus, these two conditions alone account for nearly one-fourth of all children receiving school-based services.

ASD and ADHD often co-occur [16]; 13% of youth in a large epidemiological ADHD study were diagnosed with

This article is part of the Topical Collection on *Attention-Deficit Disorder*

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New Perspectives and Research in Autism and ADHD

Integrating two emerging mental health perspectives over the past decade

Autism reflects
neurodiversity

Deficits, or *differences*?

TABLE 6.1 | Diagnostic Criteria for **Autism Spectrum Disorder**

	DSM-5
(A) Persistent deficits in social communication and social interaction across multiple contexts, as manifested by the following, currently or by history (examples are illustrative not exhaustive):	
(1) Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and failure of normal back-and-forth conversation; to reduced sharing of interests, emotions, or affect; to failure to initiate or respond to social interactions.	
(2) Deficits in nonverbal communicative behaviors used for social interaction, ranging, for example, from poorly integrated verbal and nonverbal communication; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and nonverbal communication.	
(3) Deficits in developing, maintaining and understanding relationships, ranging, for example, from difficulties adjusting behavior to suit various social contexts; to difficulties in sharing imaginative play or in making friends; to absence of interest in peers.	
Specify current severity based on social communication impairments and restricted, repetitive patterns of behavior.	
(B) Restricted, repetitive patterns of behavior, interests, or activities, as manifested by at least two of the following, currently or by history (examples are illustrative, not exhaustive):	
(1) Stereotyped or repetitive motor movements, use of objects, or speech (e.g., simple motor stereotypies, lining up toys or flipping objects, echolalia, idiosyncratic phrases).	
(2) Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat same food every day).	
(3) Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interests).	
(4) Hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of environment (e.g., apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).	

Neurodiversity paradigm

- Autism is a part of the **range of natural variation** in human neurological development
- Typical neurodevelopment is neither superior nor inferior to divergent neurodevelopment
- Neurodiversity helps to create a **healthy and sustainable cognitive** environment
- There are no right or wrong brains, all forms of neurodevelopment are **equally valid**

Mental health is on a
spectrum too!

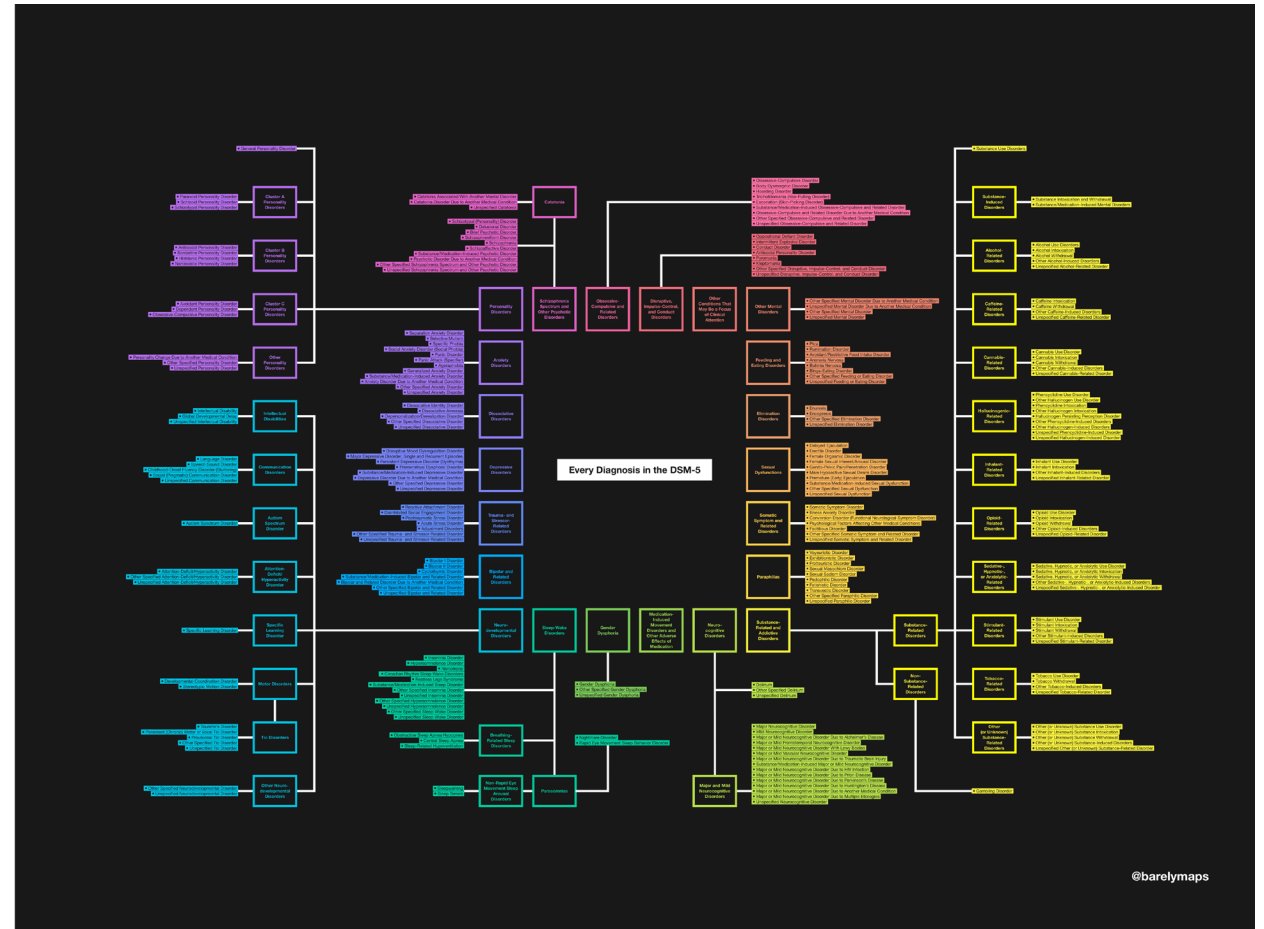
Existing paradigm

“You have it, or you don’t”

Own symptoms and criteria

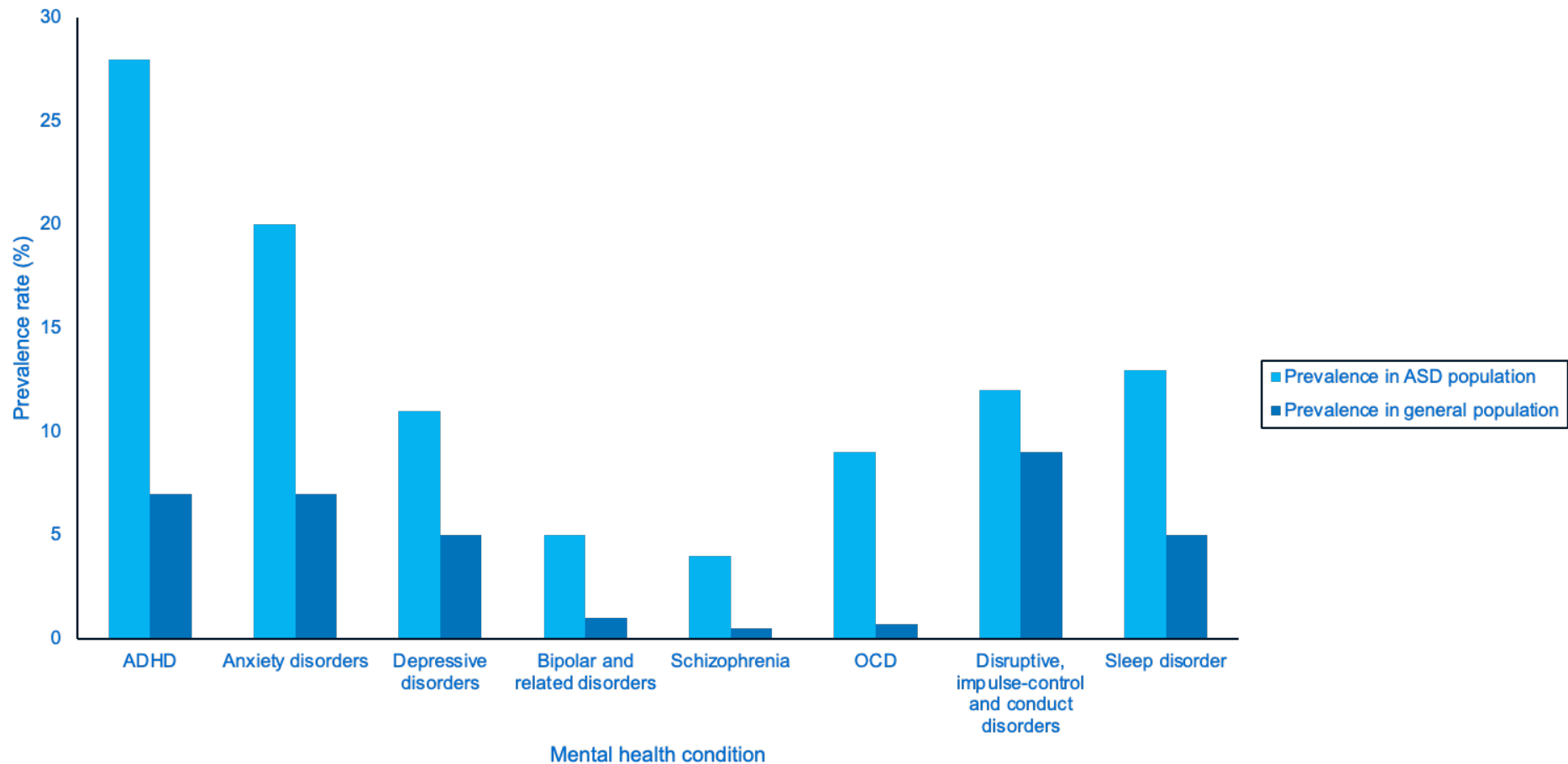
Own etiology.

Own treatments for them.

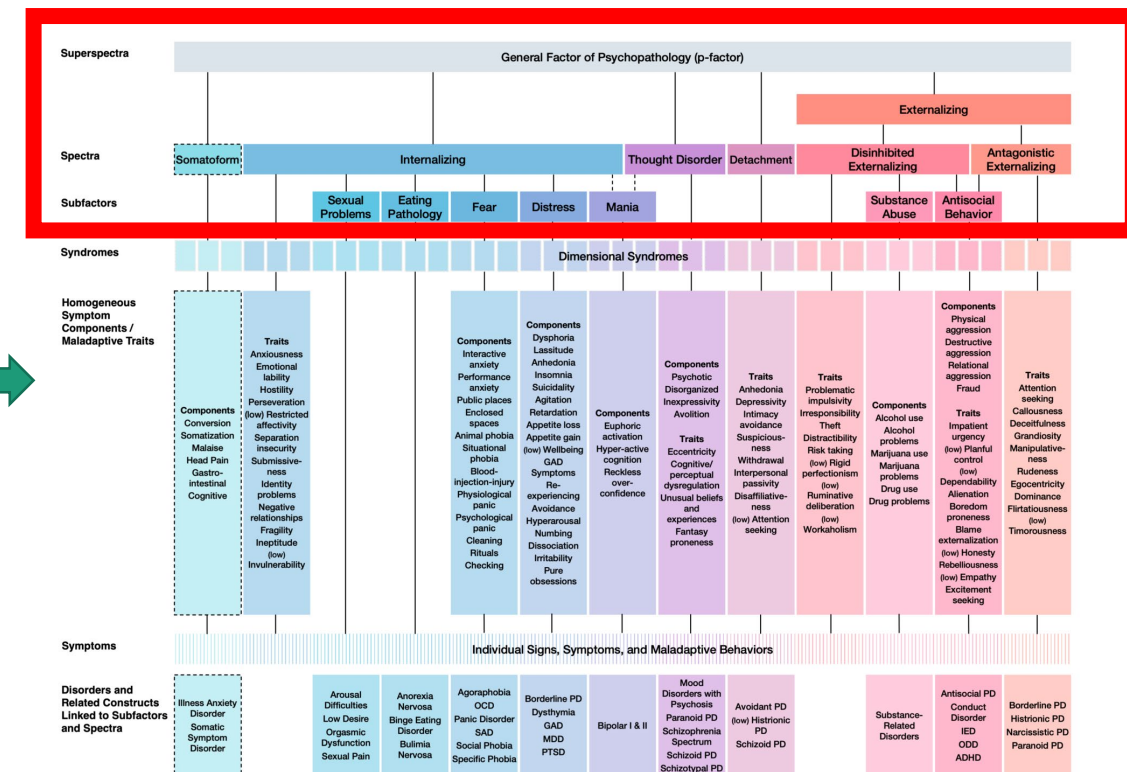
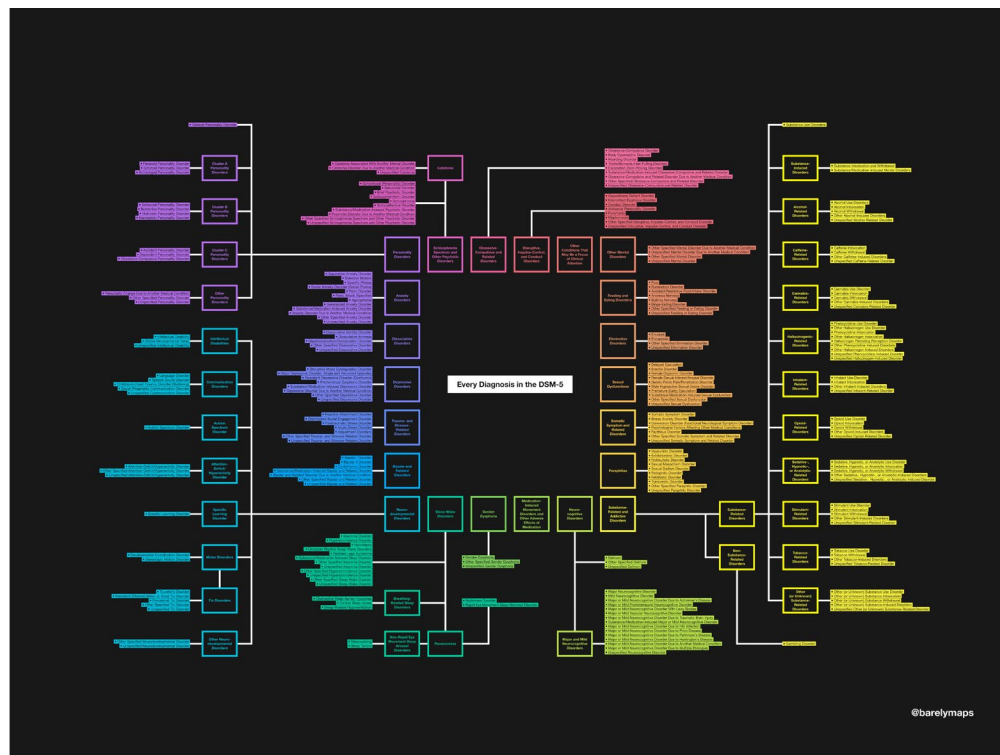


Co-occurring mental health conditions and disorders in autism (based on meta-analysis of 96 studies)

Prevalence of co-occurring mental health conditions in ASD vs. general population (from Lai et al., 2019, *Lancet Psychiatry*)



The Hierarchical Taxonomy of Psychopathology (HiTOP)



From a ton of “distinct” categories in the DSM

To a few “spectra” in HiTOP organized by signs and symptoms

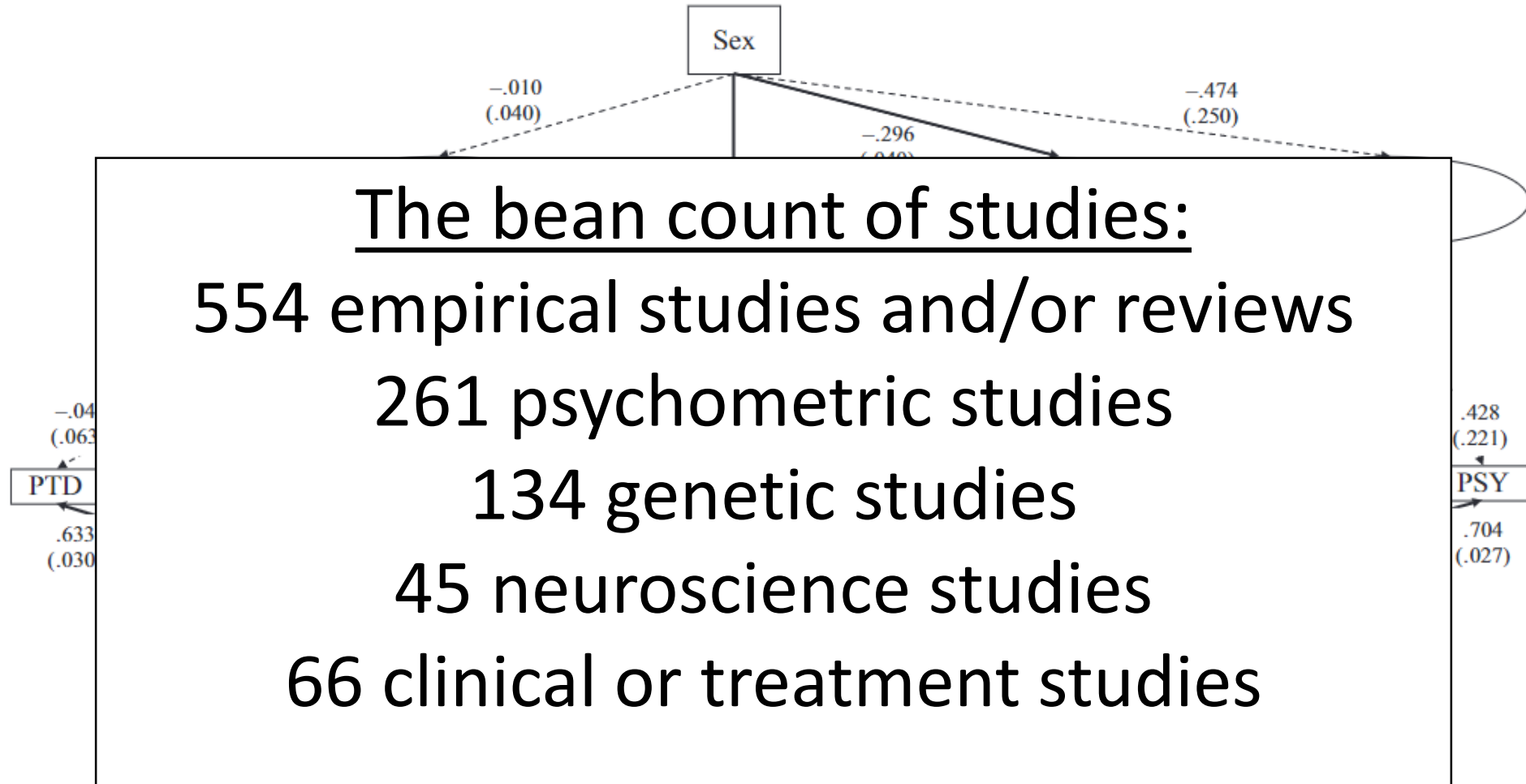
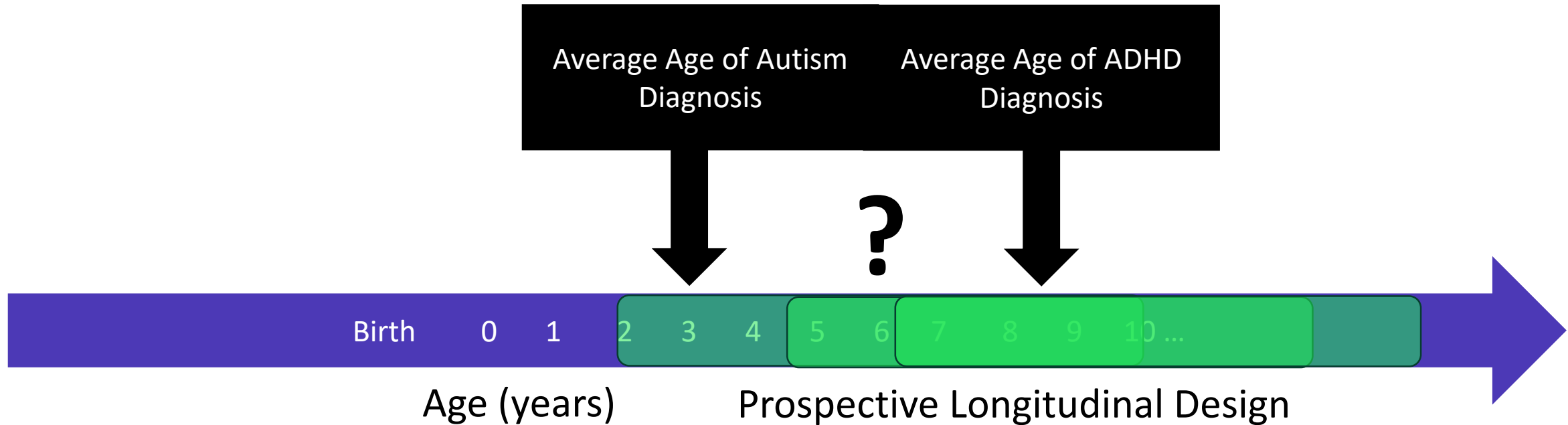


Figure 2 The bifactor three-factor model in EAs, with factor loadings represented for each pathway. All values are standardized, with standard errors in parentheses. Non-significant pathways are represented by dashed lines.



NICHD P50HD105353; Research Project PIs: Li and Travers, Site PI: Chang



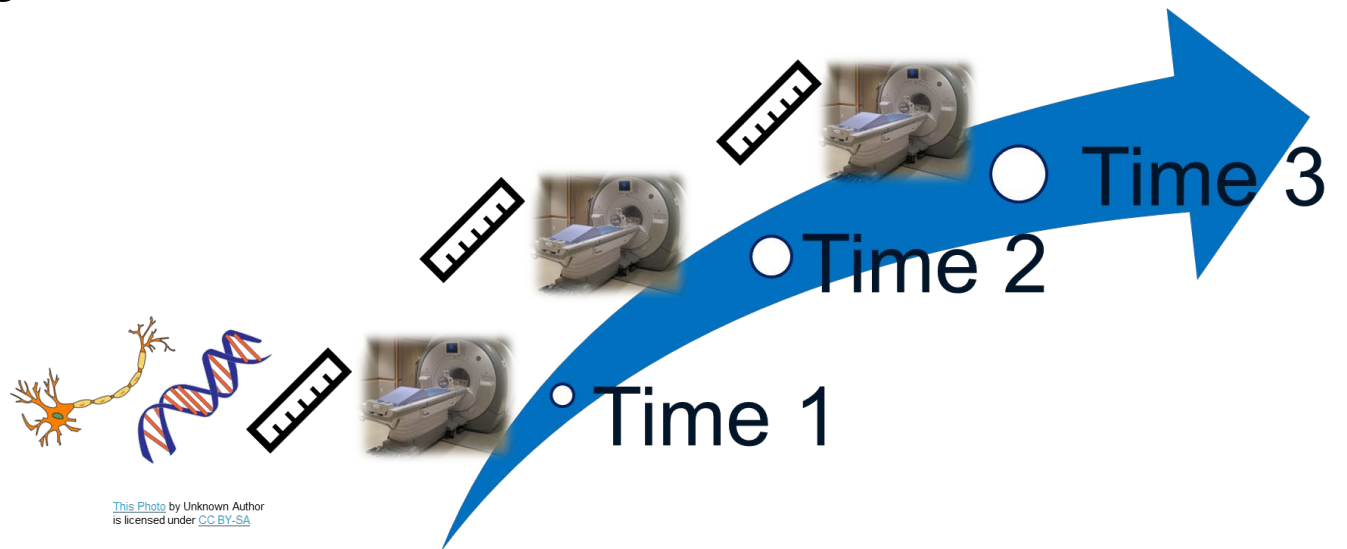


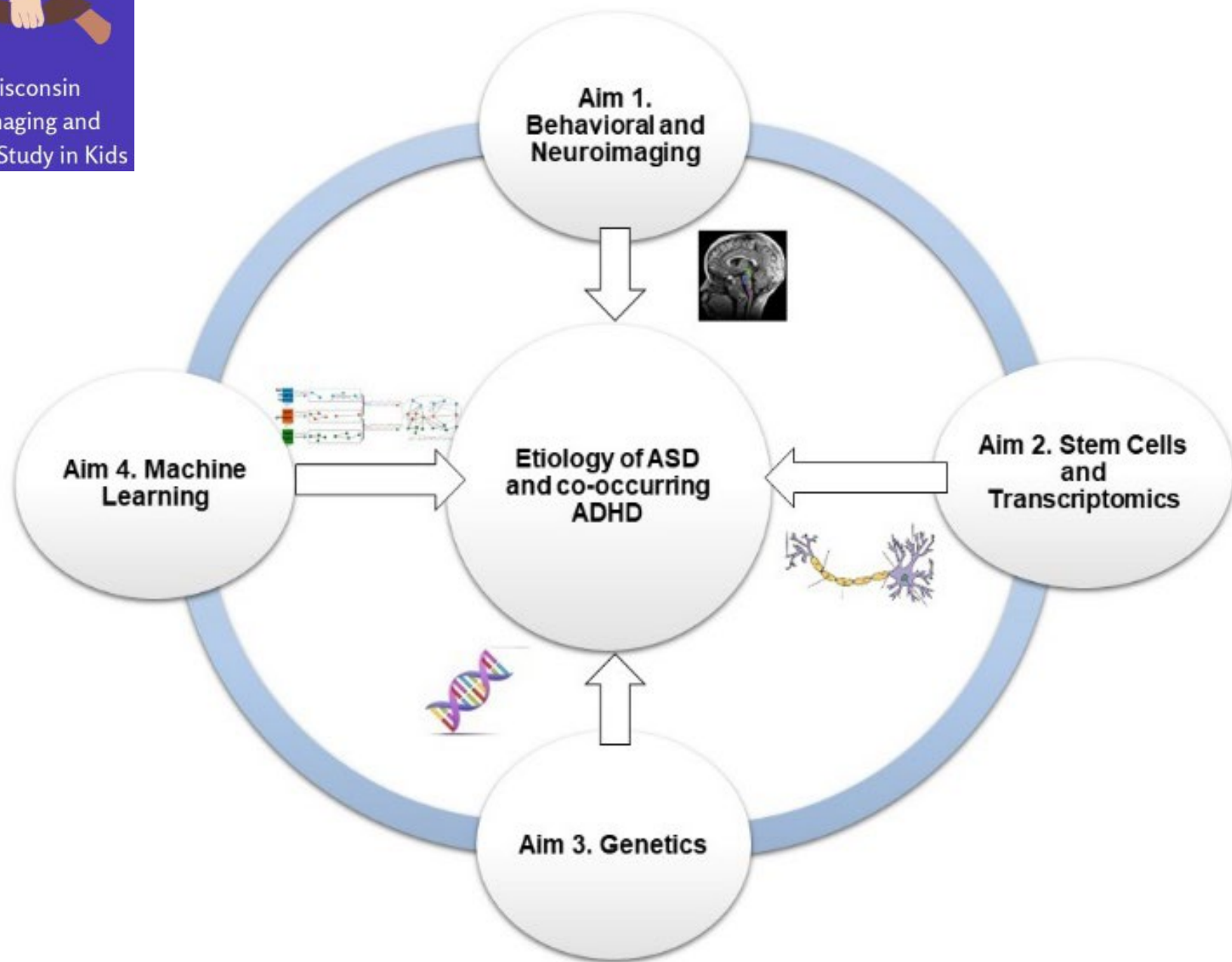
Which autistic children will and will not go on to have an ADHD diagnosis?

- Cognitive and behavioral features
- Brain structure and microstructures
- Genetics
- Retrospective and prospective treatment history, family environment (e.g., parenting)

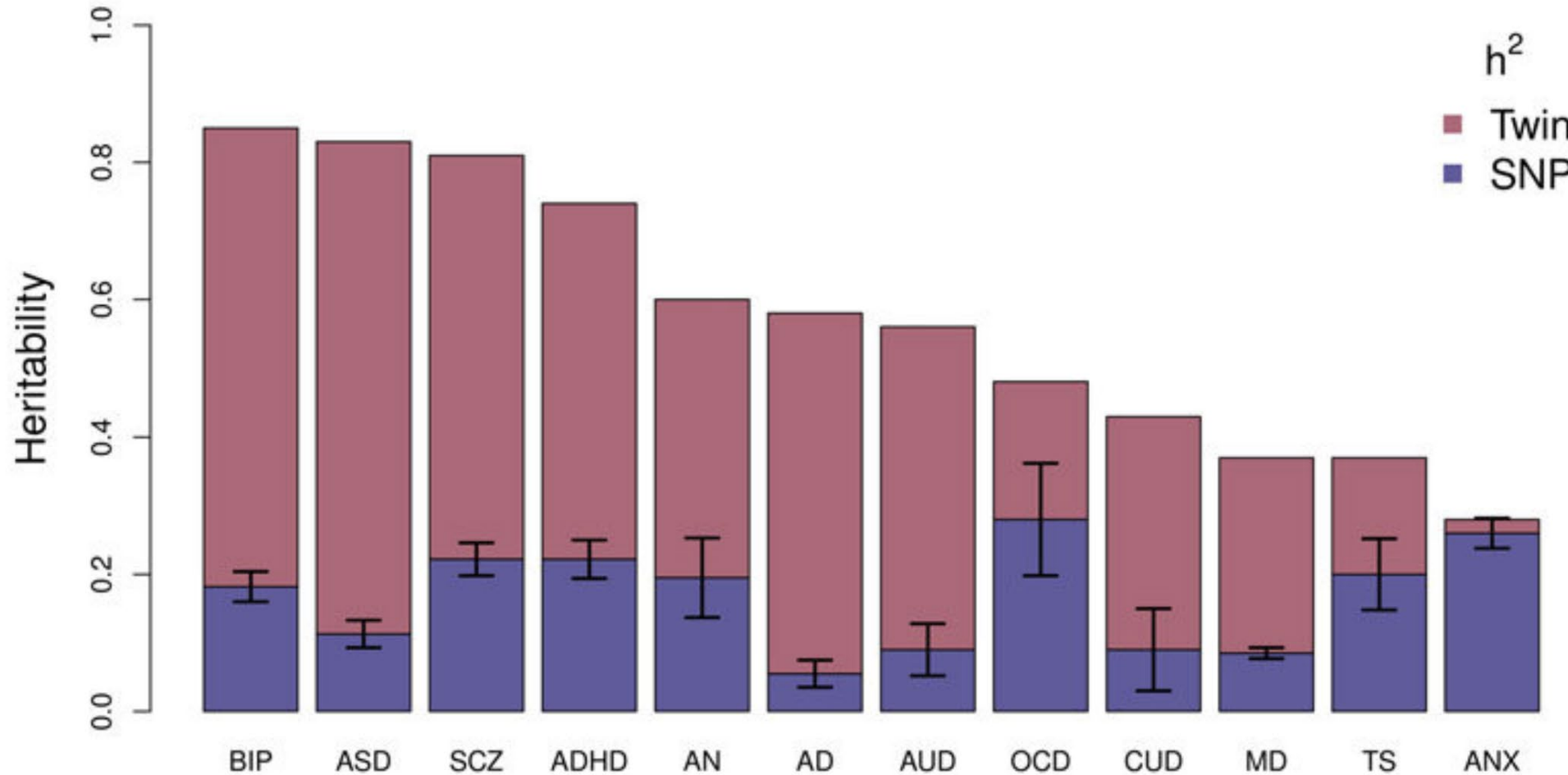
Goal: Develop earlier and more precise diagnoses and ADHD treatments among autistic youths

- Data collection began in 2021
- 120 autistic youths, ages 4-7
 - 60 with ADHD features (i.e., 3 or more symptoms of either IA/HI)
 - Recruited primarily from local autism clinics
- Followed yearly, over 3 years
- Still recruiting!





Genetics of mental health



h^2

Twin

SNP

Psychological Medicine
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Invited Review Article

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Genetic contributions to bipolar disorder: current status and future directions

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Abstract
Bipolar disorder (BD) is a highly heritable mental disorder and is estimated to affect about 50 million people worldwide. Our understanding of the genetic etiology of BD has greatly increased in recent years with advances in technology and methodology as well as the adoption of international consortiums and large population-based biobanks. It is clear that BD is also highly heterogeneous and polygenic and shows substantial genetic overlap with other psychiatric disorders. Genetic studies of BD suggest that the number of associated loci is expected to substantially increase in larger future studies and with it, improved genetic prediction of the disorder. Still, a number of challenges remain to fully characterize the genetic architecture of BD. First among these is the need to incorporate ancestrally diverse samples to move research away from a Eurocentric bias that has the potential to exacerbate health disparities already seen in BD. Furthermore, incorporation of population biobanks, registry data, and electronic health records will be required to increase the sample size necessary for continued genetic discovery, while increased deep phenotyping is necessary to elucidate subtypes within BD. Lastly, the role of rare variation in BD remains to be determined. Meeting these challenges will enable improved identification of causal variants for the disorder and also allow for equitable future clinical applications of both genetic risk prediction and therapeutic interventions.

Definition of illness

Affective disorders are classified along a spectrum from unipolar depression to bipolar disorder (BD) type II and type I (Carvalho, Firth, & Vieta, 2010; Grande, Berk, Rimman, & Vieta, 2016). The presence of recurring manic or hypomanic episodes alternating with euthymia or depressive episodes distinguishes BD from other affective disorders (American Psychiatric Association, 2013; World Health Organization et al., 1992). BD type I (BDI) is characterized by alternating manic and depressive episodes (Fig. 1). Psychotic symptoms also occur in a majority of these patients which may lead to compromised functioning and hospitalization. The Diagnostic and Statistical Manual of Mental Disorder, Fifth Edition (DSM-5) also allows for individuals impaired by manic episodes without depression to still be diagnosed with BD (American Psychiatric Association, 2013). In comparison, a diagnosis of BD type II (BDII) is based on the occurrence of at least one depressive and one hypomanic episode during the lifetime, but no manic episodes (Fig. 1). A diagnosis of BD not otherwise specified or BD unspecified may be given when a patient has bipolar symptoms that do not fit within these major subtype categories. The DSM-5 also includes specifiers which define the clinical features of episodes and the course of the disorder, namely, anxious distress, mixed features, rapid cycling, melancholic features, atypical features, psychotic features (mood-congruent and mood-incongruent), catatonia, peripartum onset, and seasonal pattern (American Psychiatric Association, 2013). In addition, the DSM-5 includes schizoaffective BD as a distinct diagnosis wherein individuals suffer from psychotic symptoms as well as episodes of mania or depression (American Psychiatric Association, 2013).

Epidemiology

BD is projected to affect about 50 million people worldwide (GRD 2016 Disease and Injury Incidence and Prevalence Collaborators, 2017). The BD subtypes each have an estimated lifetime prevalence of approximately 1% (Marrangoni et al., 2007, 2011) although large ranges in lifetime prevalence have been reported (BDI: 1.1–1.7%, BDII: 0.1–3.0%) (Angold, 1998; Merikangas et al., 2007, 2011). Most studies report no gender differences in the prevalence of BD; however, women may be at increased risk for BDII, rapid cycling, and mixed episodes (Diforio & Jones, 2016; Nivoli et al., 2011). The mean age of onset of BD is at approximately 20 years. An earlier age of onset is associated with poorer prognosis, increased comorbidity, onset beginning with depression, and more severe depressive episodes, as well as longer

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Genetics of autism

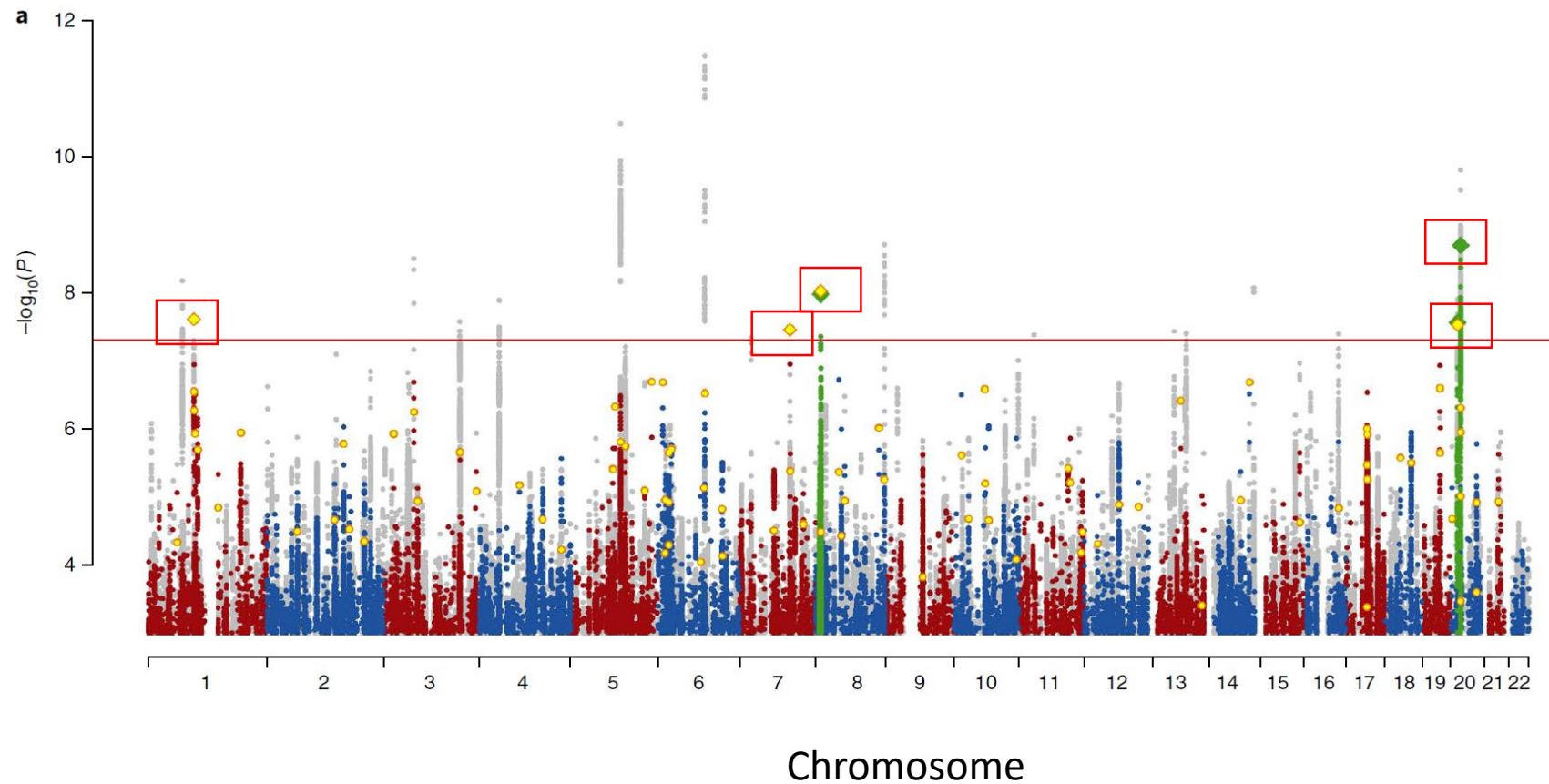
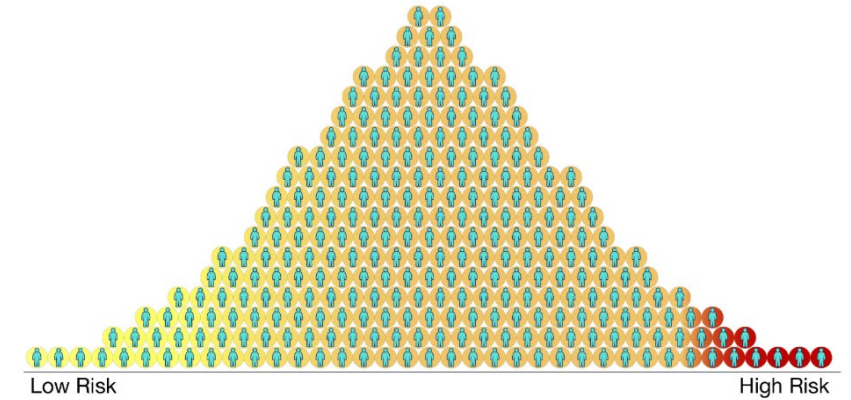
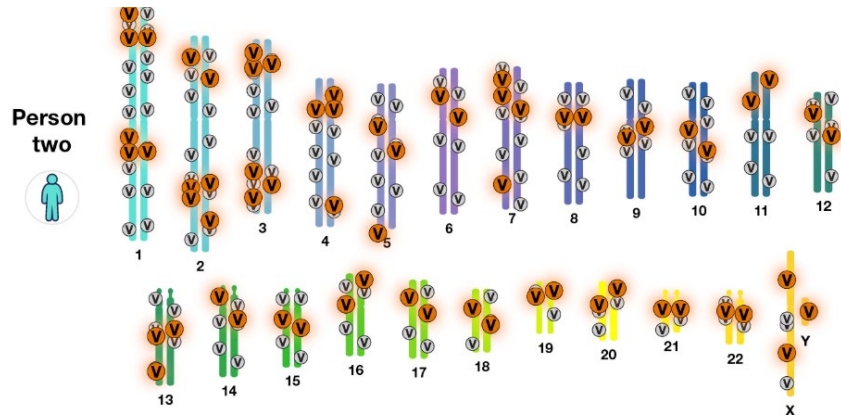
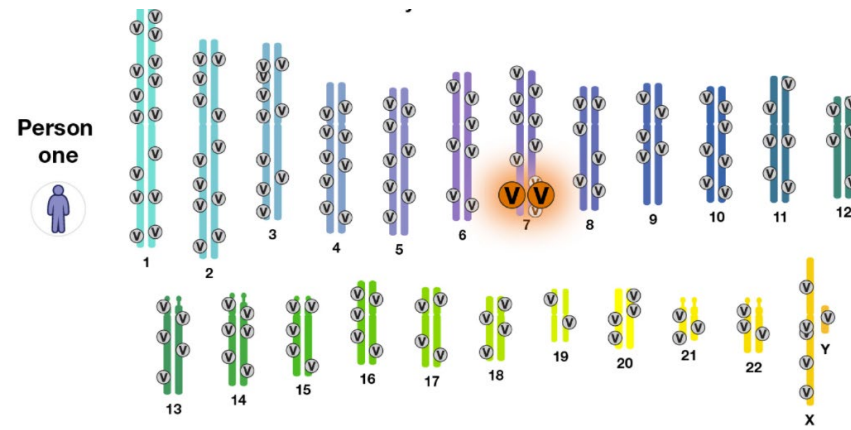
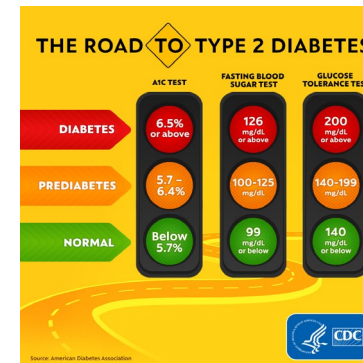


Fig. 1 | Manhattan plots. The x axis shows genomic position (chromosomes 1–22), and the y axis shows statistical significance as $-\log_{10}(P)$ of z statistics. **a**, The main ASD scan (18,381 cases and 27,969 controls), with the results of the combined analysis with the follow-up sample (2,119 cases and 142,379 controls) in yellow in the foreground. Genome-wide-significant clumps are green, and index SNPs are shown as diamonds. **b–d**: Manhattan plots for three MTAG scans of ASD together with schizophrenia¹⁵ (34,129 cases and 45,512 controls; **b**), educational attainment²¹ ($n = 328,917$; **c**) and major depression²⁵ (111,902 cases and 312,113 controls; **d**). Full-size plots are shown in Supplementary Figs. 45–48. In all panels, the results of the composite of the five analyses (consisting of the minimal P value of the five for each marker) is shown in gray in the background.

Polygenic scores (PGS)



$$\text{Polygenic Score} = \sum x_{ij} \beta_j$$



Cholesterol levels for children, ages 6–19

AMOUNT (mg/dL)	TOTAL	LDL	HDL	TRIGLYCERIDES
Ideal	<170	<110	>45	<150
Borderline	170–199	110–129	N/A	150–199
Too high or low	>200	>130	<45	High: 200–499 Very high: >500

Source: American Academy of Pediatrics and US National Library of Medicine

INSIDER

Autism genes overlap with lots of other heritable traits

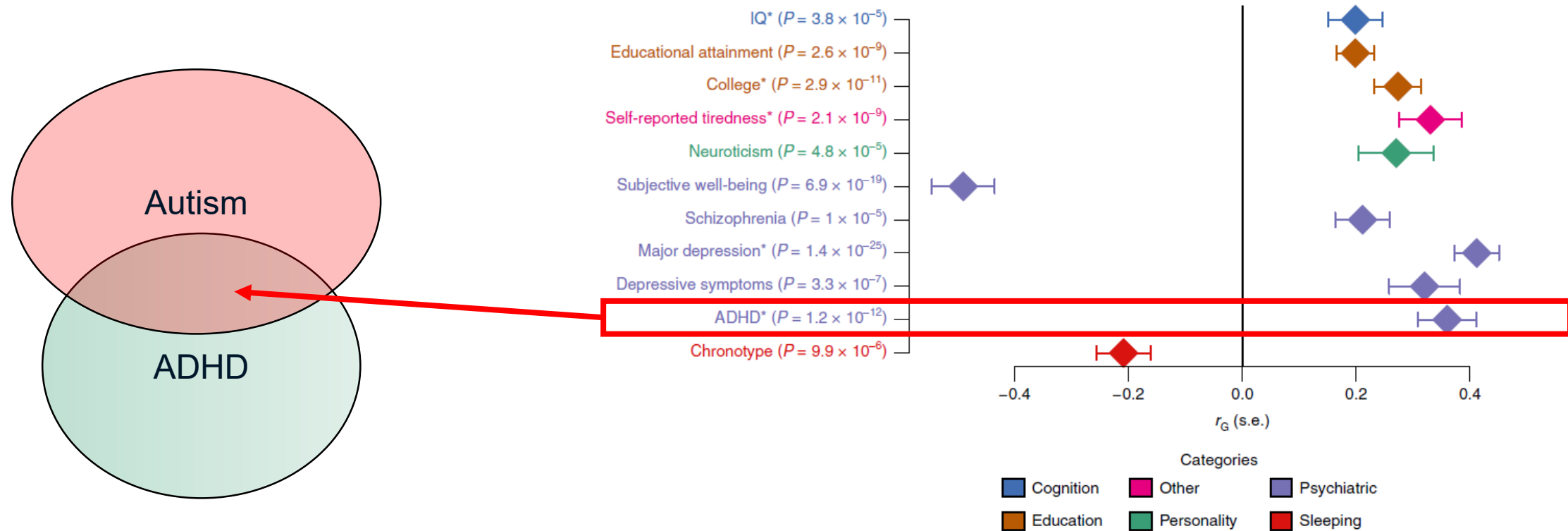
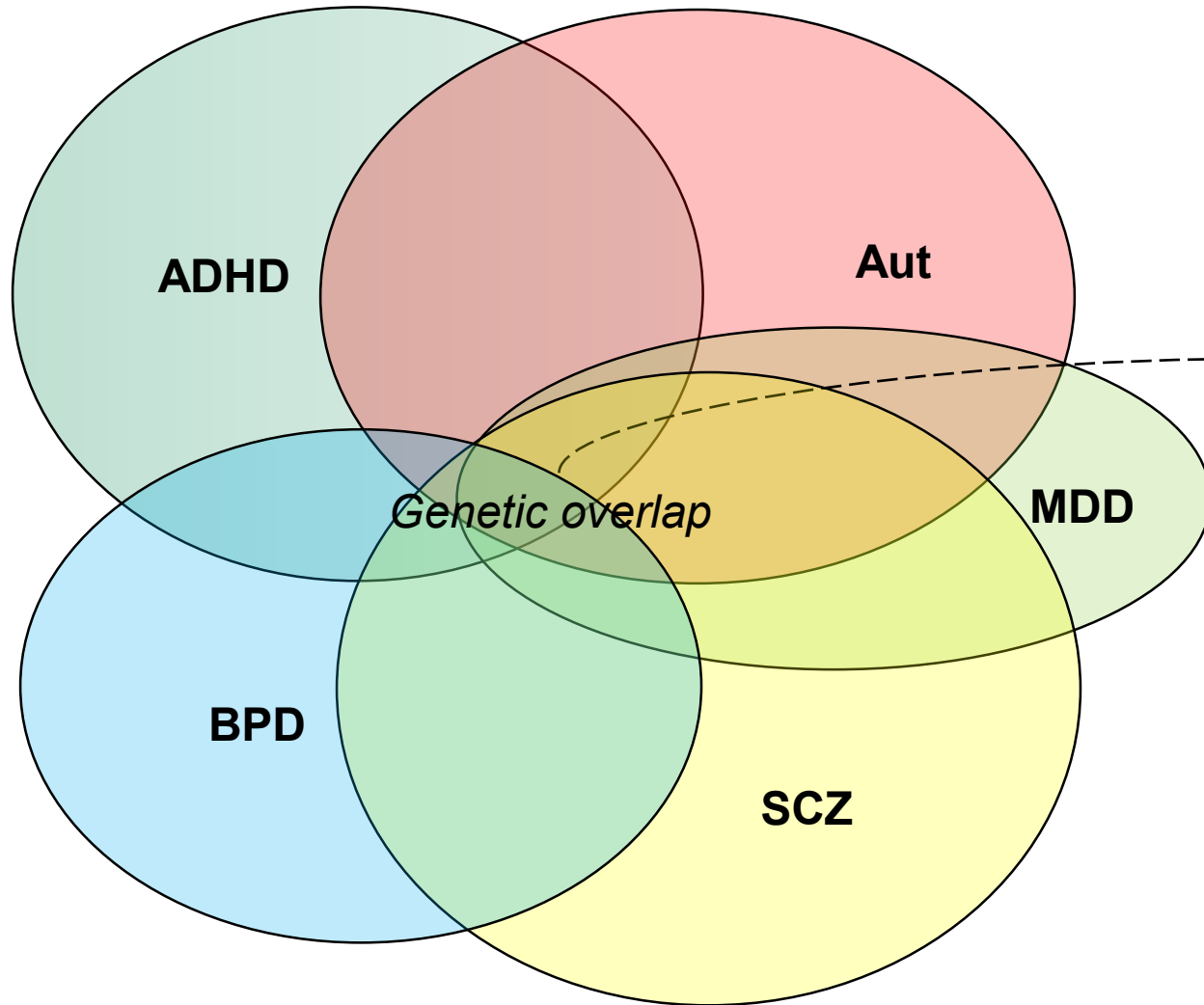
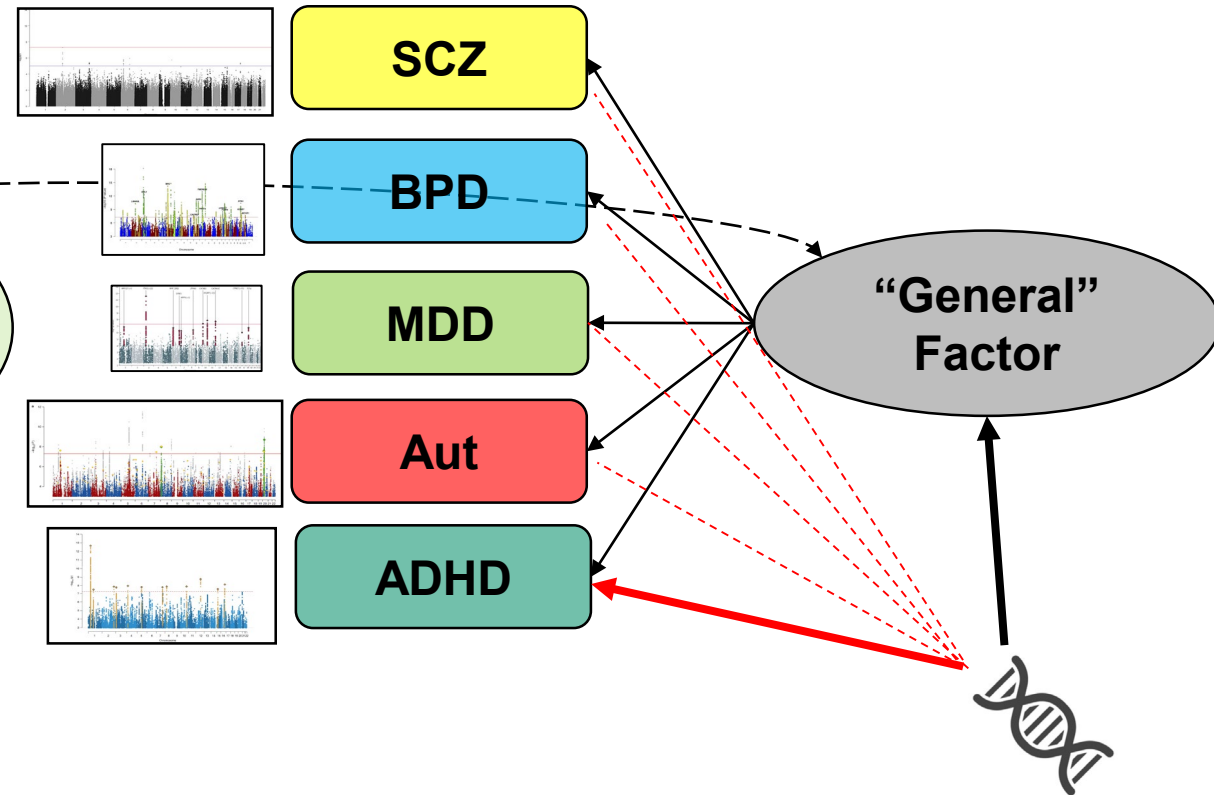


Fig. 2 | Genetic correlation with other traits. Significant genetic correlations between ASD ($n = 46,350$) and other traits after Bonferroni correction for testing a total of 234 traits available at LD Hub with the addition of several new phenotypes. Estimates and tests were performed with LDSC¹⁹. The results shown correspond to the following GWAS analyses: IQ⁴¹ ($n = 78,308$), educational attainment²¹ ($n = 328,917$), college⁵⁵ ($n = 111,114$), self-reported tiredness⁵⁶ ($n = 108,976$), neuroticism²³ ($n = 170,911$), subjective well-being²³ ($n = 298,420$), schizophrenia¹⁵ ($n = 82,315$), major depression²⁵ ($n = 480,359$), depressive symptoms²³ ($n = 161,460$), attention deficit/hyperactivity disorder (ADHD)²⁶ ($n = 53,293$), and chronotype⁴² ($n = 128,266$). Supplementary Table 5 shows the full output of this analysis. Asterisks indicate values are from in-house analyses of new summary statistics not yet included in LD Hub.

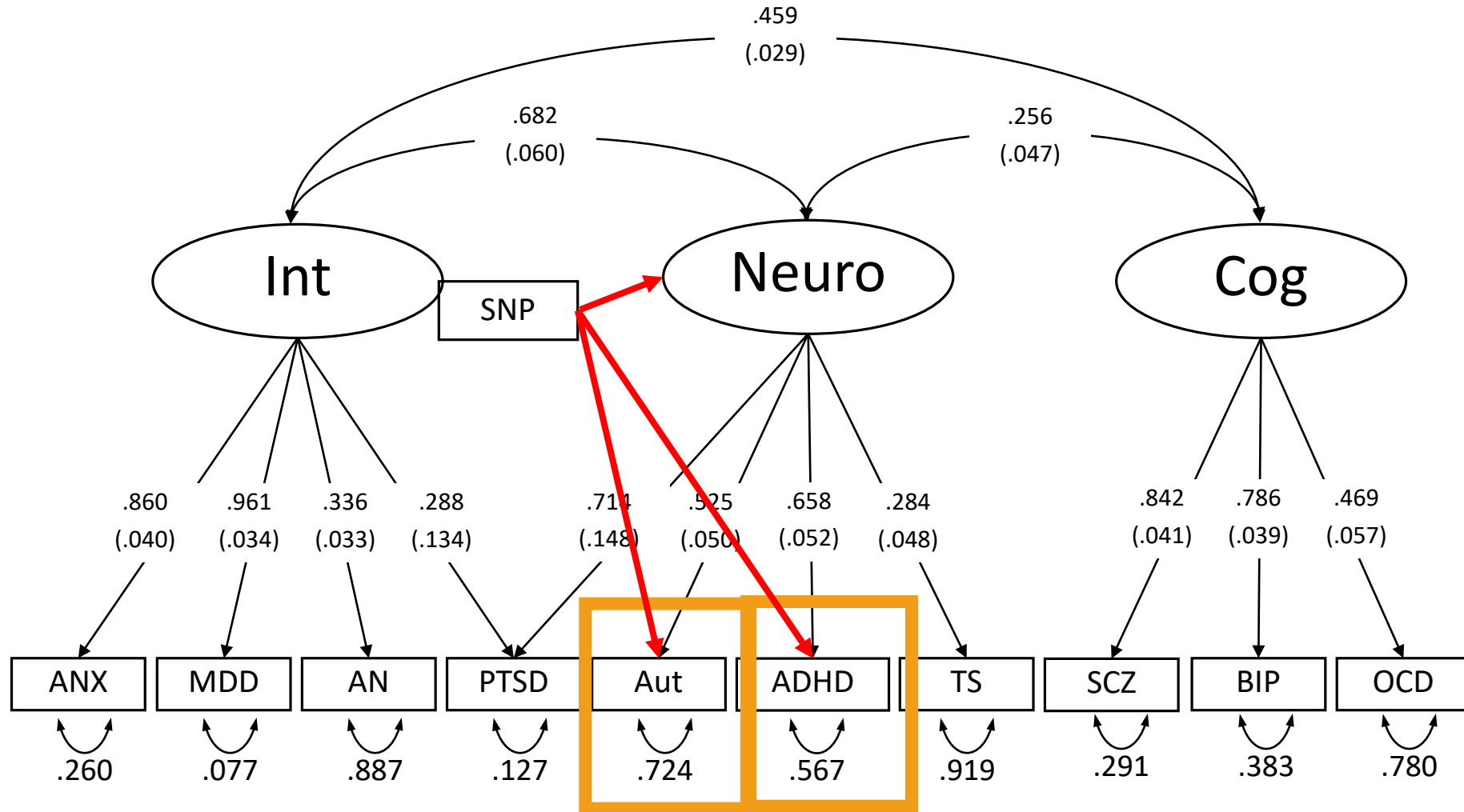
A HiTOP perspective enhances genetic predictive precision



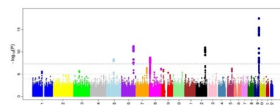
	ADHD	ASD	BIP	SCZ	MDD
Study	PGC-2017-EUR	PGC2019	PGC-2018	Pardinas et al.	Howard et al.
Sample Size	53,293	46,351	51,710	105,318	500,199
Case	19,099	18,382	20,352	40,675	170,756
Control	34,194	27,969	31,358	64,643	329,443



The full model...



Enhancing predictive precision in the PGS: ADHD and autism

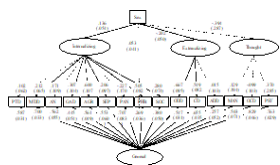


Aut PGS

$B=.207, se=.025, p=6.61 \times 10^{-16}$



Aut

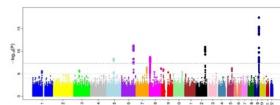


Optimized Aut PGS

$B=.199, se=.025, p=6.28 \times 10^{-15}$



Aut

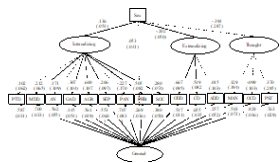


ADHD PGS

$B=.067, se=.026, p=.009$



Aut



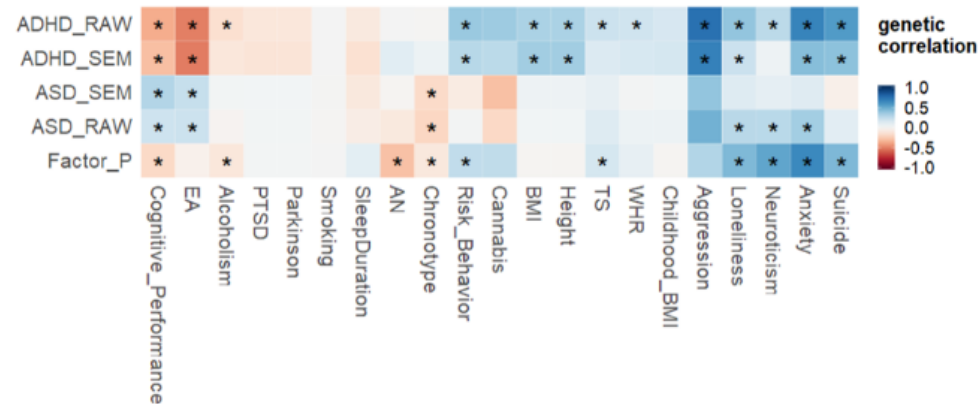
Optimized ADHD PGS

$B=.017, se=.025, p=.505$



Aut

Attenuated genetic correlations with other traits



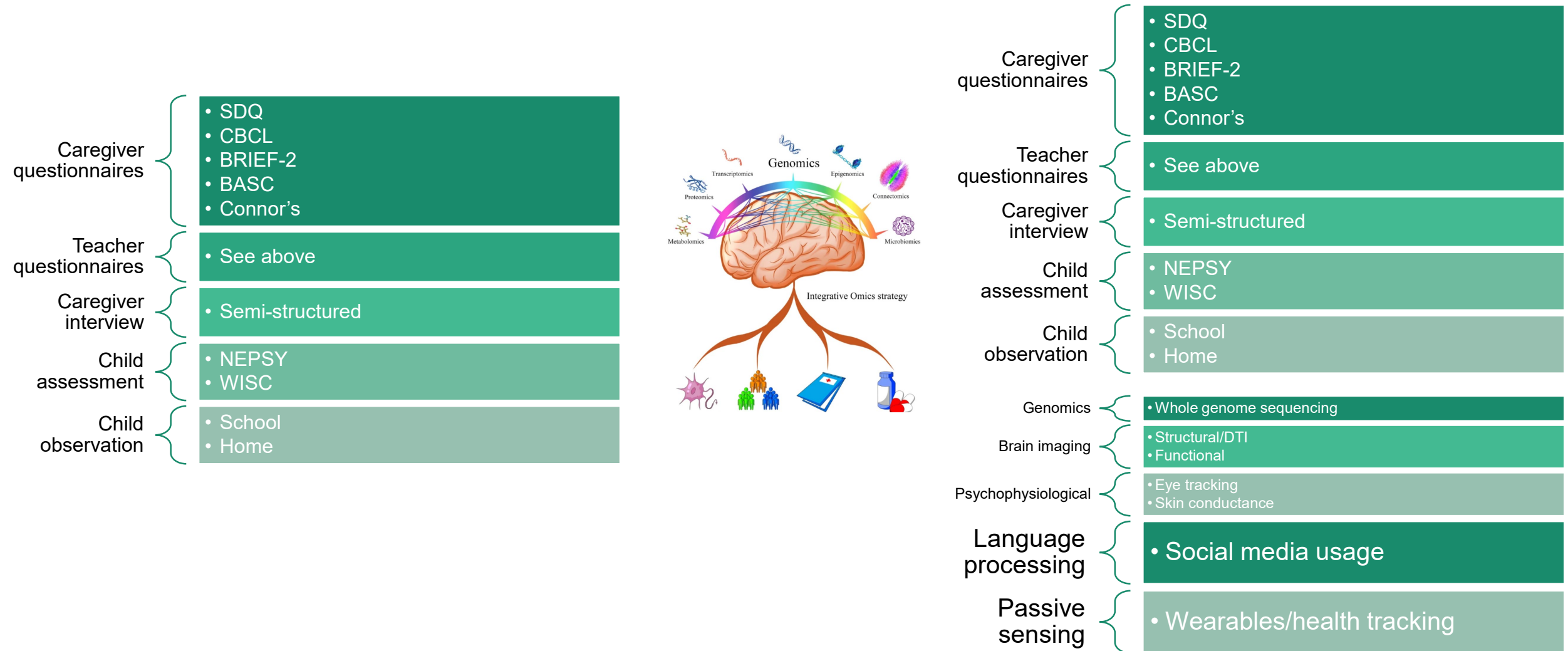
Optimized ADHD PGS: 4 of the 13 significant genetic correlations no longer significant (e.g., substance use, neuroticism, Tourette's Syndrome)

Optimized Aut PGS: 3 of the 6 previously significant genetic correlations no longer significant (e.g., loneliness, neuroticism, and anxiety)

Take home: Aut and ADHD PGS can be optimized to increase its discriminant validity when accounting for other dimensions of mental health

(a) Genetic Correlations with External Traits

Leveraging –omics in mental health diagnosis





NEWS RELEASES

Tuesday, September 12, 2023

NIH awards \$50.3 million for “multi-omics” research on human health and disease

New research consortium will develop innovative strategies for clinical studies involving ancestrally diverse populations.

The National Institutes of Health is establishing the Multi-Omics for Health and Disease Consortium, with approximately \$11 million awarded in the consortium’s first year of funding. The new consortium aims to advance the generation and analysis of “multi-omic” data for human health research.

Multi-omics refers to a research approach that incorporates several “omics” data types derived from different research areas — such as genomics, epigenomics, transcriptomics, proteomics and metabolomics. Each of these data types reveals distinct information about different aspects of a biological system, and leveraging all these data types at once is becoming increasingly possible with advances in high-throughput technologies and data science.

Institute/Center

National Human Genome Research
Institute (NHGRI)

Contact

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301-402-0911

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Integrating neurodiversity and HiTOP

- Beyond autism, all mental health can also be viewed as spectra (across a few major dimensions)
 - Functional impairments across dimensions may necessitate individual treatment, but so too are accommodations and social environmental changes (e.g., reducing stigma, acceptance)
- Impairment in mental health dimensions are typically exacerbated in autistic populations
 - Instead of treating individual disorders one-by-one and one-at-a-time (e.g., ADHD in autism, anxiety in autism, etc. etc.), researchers and clinicians can create more unified treatments that cut across single disorders



Social and Behavioral Development Lab

Investigating How Biology and Environments Impact Children's Development



<https://lilab.waisman.wisc.edu/>



Waisman Center

Advancing knowledge of human development, developmental disabilities, and neurodegenerative diseases.

The UW LINK Research Team

All of our participants and their families!

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He, Brooke Sasia, Emily Skaletski, Olivia Surgent,
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