

Fundamental challenges for autism research: the science–practice gap, demarcating autism and the unsuccessful search for the neurobiological basis of autism

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Abstract One of the central aims of autism research is to identify specific neurodevelopmental mechanisms that cause and explain the visible autistic signs and symptoms. In this short paper, I argue that the persistent search for autism-specific pathophysiologicals has two fundamental difficulties. The first regards the growing gap between basic autism science and clinical practice. The second regards the difficulties with demarcating autism as a psychiatric condition. Instead of the unremitting search for the neurobiological basis of autism, I suggest that basic autism research should focus on experiences of impairment and distress, and on how these experiences relate to particular (autistic) behaviors in particular circumstances, regardless of whether we are dealing with an autism diagnosis or not.

Keywords Autism neuroscience · Science–practice gap · Demarcation · Abnormality · Validity

Introduction

Without much hesitation, autism or autism spectrum disorders (ASDs) are considered to be disorders of neurodevelopment. Consequently, one of the central aims of autism research is to identify the specific neurodevelopmental mechanisms that cause, sustain, underlie and explain the visible autistic signs and symptoms. It is commonly thought that fundamental questions (e.g., how to classify autism; how to better diagnose autism; how to treat and

cure autism; how to prevent autism; etc.) can best be answered after there is a better understanding of the neural basis of autism (Insel and Daniels 2011). In view of this biomedical framework, it is no surprise that the majority of autism research indeed focuses on “basic science”—“on neural and cognitive systems, genetics and other risk factors” (Pellicano et al. 2014, p. 757).

In this short conceptual analysis, I will argue that this focus upon the search for autism-specific pathophysiologicals implies two rather underestimated difficulties. These difficulties pose an urgent challenge for contemporary autism research. The first challenge regards the gap between (basic) autism science and the day-to-day difficulties of those diagnosed with autism. Paradoxically, despite the unremitting hope that autism neuroscience will lead to translational benefits for autistic patients, the tenacious effort to identify the underlying neurobiology of autism (see e.g., Jeste and Geschwind 2014) seems to widen the gap between autism science and clinical practice.

The second challenge relates to the difficulties with demarcating the boundaries of autism and, at a somewhat more philosophical level, the boundaries of health. Obviously, this longstanding philosophical problem regarding the distinction between health and disease will not have an easy solution. However, the dramatically increasing prevalence of autism with current estimates of one in 68 children (Centers for Disease Control 2014), the alarming indications and prophecies of medicalization, overdiagnosis, false epidemics and rising healthcare costs (see Frances and Widiger 2012), and—from a different angle—the emergence of neurodiversity movements that proclaim that autism is not a disease to be cured but atypical brain wiring that needs to be respected illustrate the significance of integrating ideas about health and disease in the field of autism (Jaarsma and Welin 2012; Kapp et al. 2012). Of

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course, these very complicated issues will not be fully explored in this short paper. Nevertheless, I will try to demonstrate why these fundamental issues deserve more explicit attention in the dynamic field of autism research.

The science–practice gap

There is a substantial gap between the scientific perception and investigation of autism as a neurodevelopmental or biological ‘thing,’ and the clinical and individual experience of autism as a heterogeneous and variable cluster of symptoms associated with impairment of particular forms of social behavior (APA 2013). Of course, there is nothing suspicious about this gap as such. In order to make generalizing (scientific) claims, reductions of ‘real-world’ problems into measurable and researchable objects are inevitable. Science and everyday practice will never completely coincide. However, attempts to reduce a particular conception of autism to specific neurobiological and cognitive circuits that are thought to underlie and ultimately define autism, have not been very successful yet.

Despite the dominance of (social) neuroscientific research in the field of autism (Pellicano et al. 2014), efforts to identify reliable diagnostic biomarkers, meaningful (biological) subgroups, autism-specific genes or neural circuits, and targets for brain-based and psychopharmacological interventions remain disappointingly unproductive. Current candidate biomarkers for autism—such as particular genetic variants, different brain structures, brain functions, and neuropeptides—are not found in all autism cases (poor sensitivity) and they tend to be associated with many other neurodevelopmental disorders and ‘normal’ conditions (poor specificity). In short, they are not valid or clinically useful (Walsh et al. 2011). In addition, the diagnostic category of autism has proved to be rather variable in time and heterogeneous in its manifestations (Verhoeff 2013; Waterhouse 2013). A general sense of uncertainty and dissatisfaction with autism research is well exemplified by the following comment by autism expert Michael Rutter (2014, p. 55): “It seems decidedly odd that after more than half a century of both research and clinical experience with ASDs, there continue to be arguments on the nature of autism”. In other words, the nature of autism remains disturbingly unknown.

The usual response to this uncertainty about the nature of autism is an appeal to complexity; autism researchers try to “explain the enigma”, “unravel the mystery”, and “solve the puzzle” of autism (see Frith 1989). This appeal to complexity legitimizes further research and, together with the optimistic hope of actually unraveling this mystery of autism in the near future, it guarantees the flow of autism research funds. Potential unifying accounts of autism

varied from cognitive deficits (e.g., a defective theory of mind or weak central coherence) in the 1980s, to genetic and structural abnormalities in the 1990s, to the functional and neurodevelopmental disturbances of the twenty-first century (e.g., Geschwind and Levitt 2007). And today, the uncertain search for a common denominator continues at increasingly complex levels of molecular genetics and neural connectivity (see Auffray 2014). Hypotheses regarding distinct neural circuits that involve many genes, different brain areas, connectivity patterns, developmental trajectories and functional brain networks are the new promises for a neuroscientific basis of the autism spectrum. The ‘enigmatic’ image of autism; the faith in the very existence of a complex neurobiological basis of autism (Kiser et al. 2015); the growing socio-economic ‘burden’ of autism (Buescher et al. 2014); and the high hopes for and prophecies of specific biological treatments for autism, resulted in a significant growth in basic autism research in the past few decades (Bishop 2010). In the future, these factors will only further attract funding for autism neuroscience in order to unravel the mystery of autism and, accordingly, they will enable promising careers for autism neuroscientists (Dawson 2013).

However, instead of clarifying and alleviating the devastating behavioral and cognitive difficulties and distress of those diagnosed with autism, basic autism research increasingly complicates the neurobiological image of autism. Furthermore, the numerous attempts to identify specific pathophysiological mechanisms and cognitive deficits, and the construction of the symptom-based autism category affect each other constantly (Verhoeff 2014). While autism researchers are digging deeper into the unrestricted complexities of the brain, on the clinical side of the divide, autism has become a common, broad, heterogeneous, and—in clinical terms of prognosis, course and response to treatment—unspecific category for people with restricted patterns of behavior and deficits in social interaction (APA 2013). In a dynamic process, the search for common neurobiological (causal) mechanisms has to rely on this heterogeneous category of autism symptoms, and, the other way around, the lack of decisive and distinctive findings from basic autism research played an important role in conceptualizing autism as a broad spectrum disorder (Happé 2011).

The tentative, probabilistic, multilevel and multifactorial hypotheses regarding the neural basis of the elusive category of autism do not give much hope for future clinically valuable translations from the neurosciences (see also Waterhouse 2013, chapter 8). Instead, current ideas about the biological nature of autism seem to be moving away from the everyday, very diverse and contextual ailments of those diagnosed with autism. Thus far, the very idea of autism, an autism spectrum, or several autisms, in

combination with the idea of specific neurobiological mechanisms that are supposed to underlie these clinical syndromes, has driven basic autism research further and further into the infinite complexities of the brain. Whether and how the complex molecular levels at which autism is currently imagined will ever become clinically valuable is very uncertain and should be a topic of urgent debate in the field of autism. This debate should include a critical evaluation of the scientific and clinical benefits of the autism (spectrum) phenotype and of current attempts to identify its neurobiological foundation.

Demarcating autism

Another challenge for autism research regards the issue of demarcating autism as a psychiatric condition. What makes autism a pathological condition? Where does autism stop and normality begin? What is appropriate social interaction? Who is a suitable case for treatment? Whose treatment should be reimbursed? Undeniably, these types of questions concerning the boundaries of particular ailments are as old as the discipline of medicine itself. However, today the biomedical and neurosciences are expected to solve these challenging issues. Demarcating autism can and should be done—it is thought—by identifying the underlying malfunctioning neurobiological circuits. For it is in these brain circuits, in their neural connections, in their systems of neurotransmission, in their genetic, cellular and molecular processes and their patterns of activity that ‘true’ psychiatric syndromes should be delineated (see Cuthbert and Insel 2010). This approach would not only enable nosologists to solve persistent debates about whether it is better to lump autism as a single entity or to split autism into various subtypes according to distinct neuronal and cognitive pathways, but it would also distinguish between the dysfunctional and the normal neural circuitry of the social brain.

However, until now, autism neuroscientists have not been able to point out how and when parts of the brain work improperly. What we currently know about neurobiological ‘abnormalities’ in autism derives merely from associations with the autism phenotype, and not from conceptions of (failures of) normal biological or cognitive functioning provided by the neurosciences. Theoretically challenging ideas about brain dysfunctions or dysfunctional neural pathways have not provided psychiatry with concrete methods to demarcate its territory. Nevertheless, the neurosciences are saddled with this daunting task of ultimately demarcating autism. And because the burden of truly defining autism and its specific neurobiological substrate lies on the brain sciences, revisions of diagnostic criteria are mainly directed at creating a valid category that

facilitates the identification of pathophysiological mechanisms (APA 2013). In this search for specific neurobiological dysfunctions, demarcating the healthy from the suitable cases for treatment is of lesser importance. For instance, difficult demarcation issues like how to separate appropriate from inappropriate ‘back-and-forth conversation’ or a normal need for regularity from abnormal ‘insistence on sameness’ (APA 2013) are not addressed in a theoretical or methodical way.¹ Instead, creating a valid disease category is primarily focused on clustering separate signs and symptoms into a statistically coherent whole.

In the meantime, prevalence rates of autism keep rising (Centers for Disease Control 2014). More and more children are recognized as autistic, as socially impaired, as restricted in their interests, and as neurodevelopmentally disordered. Simultaneously, criticisms of the medicalization and pathologization of normal childhood, of the lack of tolerance and acceptance of human diversity, and of the (Big Pharma-induced) creation of false epidemics have become commonplace. The field of autism does not convincingly answer these criticisms and these criticisms tend to erode public confidence and trust in autism research and practice. Why is it that certain forms of social interaction, eye-contact, body language, imaginative play, and so on, are considered deviant, and at what point do they become deviant? This issue remains implicit and hardly debated in the process of classifying autism. It is not demarcating abnormal or unhealthy behavior as such, but creating a valid cluster of signs and symptoms and identifying a neurobiological substrate that is paramount in classifying autism. This approach has lost its vital connection with present-day clinical and societal concerns.

Furthermore, this disconnection between constructing a valid category of particular behaviors and ideas about ‘the pathological’ or the need for psychiatric treatment, made the emergence of neurodiversity movements possible (Jaarsma and Welin 2012; Kapp et al. 2012). For these movements, autism has nothing to do with being healthy or unhealthy. Autism, they claim, is not a disease to be cured but a valid biological category of atypical brain wiring that needs to be respected. According to Jaarsma and Welin (2012, p. 28), ‘some autism ... can be seen as a natural variation on par with for example homosexuality’. This idea will not help to demarcate autism, but it does bring us

¹ Of course, specific cases of autism need to be demarcated in some way. In clinical practice, this is done with DSM criteria including the criterion of clinical significance. That is, symptoms must cause clinically significant distress or impairment in social or occupational functioning. However, as the definition of mental disorder in DSM-5 (APA 2013) illustrates, distress and impairment in mental disorder are secondary and need to be caused by biological or psychological dysfunctions. The clinical significance criterion is seen as a currently necessary but imprecise and unscientific threshold for mental disorders.

to the daunting demarcation problem that needs more attention in the field of autism: how do we separate those (with autism) who need medical treatment and support from those (with autism) who only need acceptance and respect.

Discussion

This paper merely touched upon some major uncertainties in the field of autism. But, relative to the enormous number of autism studies that are being conducted, these grand themes are rarely discussed and deserve an active debate. A recent special issue in *Autism* titled *Autism and Society* advocated that ‘high-quality research into the social dimensions of autism is as necessary and valuable as basic scientific research into autism’ (Singh and Elsabbagh 2014, p. 754). It is hard to disagree with this, but I think it is also time to reconsider the objectives and fundamental assumptions of basic autism research itself. I argue that current scientific perceptions of autism as a complex neurodevelopmental disorder drift away from the diversity of the problems and experiences of those diagnosed with autism. Today, much autism research centers its hope on the neurosciences, but in order to reconnect with the growing socio-cultural, economic and clinical concerns regarding, among other things, the ‘autism epidemic,’ autism research should not wait for the neurosciences to illuminate this phenomenon.

Instead of the persistent search for the neurobiological basis of autism, I suggest that basic autism research needs to focus more on notions and experiences of impairment, disability, suffering and distress, and on how these experiences relate to particular (autistic) behaviors in particular circumstances, regardless of whether we are dealing with an official autism diagnosis or not. Obviously, this is not to exclude neuroscientific or fundamental research. Rather, basic autism research could, for instance, focus on the neurobiological mechanisms that are involved in distinct behavioral difficulties and patterns of impairment and distress that occur in specific social, familial and cultural contexts, instead of explaining these vital experiences away by referring to the elusive entity of autism. This would require a diagnostic system that is not based on abstract disease entities, but on concrete behaviors and types of distress. By focusing on the various types of impairment, capabilities, experiences and resilience of the ailing individual, autism research will need to emphasize what it means to be healthy or diseased, and it will need to stress the contextual elements of autistic behavior that cannot be explained by neurobiology alone. In doing so, autism research will come closer to clinical practice and the everyday struggles of those we have come to call autistic.

Furthermore, with such a focus on various and contextual types of impairment and suffering, autism research will be equipped to constructively contribute to heated public debates concerning the medicalization and pathologization of childhood. These suggestions are, obviously, preliminary and not much more than an invitation to rethink some of the fundamental objectives and assumptions of basic autism research.

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