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Transdiagnostic research and the neurodiversity paradigm: commentary on the transdiagnostic revolution in neurodevelopmental disorders by Astle et al.

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In their comprehensive and articulate paper on the Transdiagnostic Revolution in Neurodevelopmental Disorders, Astle, Holmes, Kievit, and Gathercole (2021) '*consider how well current classifications of neurodevelopmental disorders serve our understanding*'. They examine the lack of mapping between clinical diagnoses such as ADHD or autism, and research data at other levels of explanation, including genetics, neural structure and function, and cognition. The authors come to the conclusion that, if our goal is to explain variability and complexity, understand mechanisms and guide support decisions, '*diagnostic taxonomies that classify individuals in terms of discrete categories are ill-suited*'.

Between this opening statement and final position, Astle and colleagues review what they call the '*transdiagnostic spectrum*' of study designs that can best facilitate research investigation that is not bound by diagnostic nosology. In particular, they draw out the potential of investigations focussed on dimensions and clusters as methods which can challenge the domination of research by clinical diagnosis. These have the potential to better realise the end goal of understanding and effectively supporting neurodevelopmental diversity.

Dimensional methods focus on the derivation of latent constructs from collections of measurements, which can plot neurodevelopment in a multi-dimensional space bounded by these underlying, statistically derived constructs. A concrete, if simplistic, example might be a conceptualisation of educational needs in a three-dimensional space plotting verbal fluency, working memory and number sense – where each of these dimensions is derived from the shared variance between multiple assessments. Clustering operates on a similar basis in that it focuses on data reduction, generating simplified meanings from a large and complex data set. However, in this case the output is not a multi-dimensional space in which individuals can be located, but instead a set of groupings based on shared patterns of characteristics between individuals. As the authors state: '*if a dimensional analysis identifies the broad multi-dimensional space that characterises the sample, clustering techniques allow for the optimal grouping of individuals within that space…*' To continue the example above, a clustering analysis might identify subgroups of children selectively lacking verbal fluency, while others struggle with both working memory and verbal fluency, and still others have a selective difficulty with number sense alone. Such clusters have obvious potential when it comes to planning early years, classroom or workplace accommodations.

Astle and colleagues' primary motivation in this piece seems to be to push back against the diagnostic hegemony that dictates much of how research is done (e.g. selective recruitment procedures and two-group comparisons). These research traditions, as challenged by the paper, inadvertently reinforce that hegemony, limiting potential for real discovery, as well as practical impact on practice and in people's lives. In this commentary, I want also to explore the way in which their account of the transdiagnostic revolution is aligned with and can help to promote the neurodiversity paradigm (Milton, Ridout, Murray, Martin, & Mills, 2020).

In its simplest form, neurodiversity is the fact that humans vary in their neurological make-up and that this variability dictates the ways in which we process information – and therefore our experiences of and responses to the world. These differences can be thought of in terms of dimensional variability between individuals, but also as drivers of clusters, or 'neurotypes' – mapping on to the dimensions and clusters of transdiagnostic research. Individuals thought to be part of the most common neurotype are often described as 'neurotypical', while other groups – overlapping with diagnostic categories such as ADHD, autism, Tourette syndrome and so on – may be referred to as neuro-minorities, or neurodivergent. Crucially, all neurotypes, while not equally *common*, are equally *normal*.

The scientific fact of neurodiversity is incontrovertible, but its sociopolitical implications are more controversial and currently hampered by wide variability in interpretation and application. One important myth to address is the simplistic idea that a neurodiversity model is equivalent to a strengths-based model, whereby the aim is to reconceptualise diagnostic groups in terms of their abilities rather than their challenges. This approach fails to realise

the full transformational potential of neurodiversity on four counts. First, it often retains an individualistic notion of value based on ability, which is inherently capitalist in nature – that is, valuing people by their educational achievements and future/current earning potential. This can be particularly exclusionary of people with a learning disability whose strengths must be measured in more expansive ways. Second, and relatedly, a shift to focus on strengths carries a risk of neglecting the profile of unmet needs experienced by many neurodivergent individuals. Importantly, while not all neurodivergent people will also identify as disabled, neurodivergence does not deny disability. The call to resist default pathologisation – for 'differences' rather than 'disorders' – does not equate to a denial of the disabling effects of being neurodivergent in the context of societal systems built by and for neurotypical people (Den Houting, 2019). Third, an individual-strengths model further neglects the fact that the real strength of neurodiversity lies in the differences between people. It is variability in experience and, therefore, in problem-solving and creativity that drives much of human invention and empathy – two markers of a progressive society. Fourth, relating directly to the arguments made by Astle and colleagues, a shift to identification of core strengths associated with diagnostic groups is subject to virtually all of the same limitations as the existing research literature, overwhelmingly focussed on the identification of core deficits (Astle & Fletcher-Watson, 2020).

The application of the neurodiversity paradigm to developmental sciences should focus not on denial of needs, or blind pursuit of talents, but on identification and acceptance of unmet needs without judgement, followed by provision of appropriate accommodations and supports. Of course, this is what our existing clinical system already aims to do, by identifying and labelling a condition, in a way that is intended to provide a basis for treatment and support recommendations. Transdiagnostic research is clearly exposing the limitations of this approach: for example, diagnostic categories map neither onto researcher-assessed cognitive profiles (Astle, Bathelt, & CALM team, & Holmes, J., 2019) nor onto parent reports of clinical features (Mareva & Holmes, 2019), but if the goal is still identification followed by support, what is the shift we need to make? I would argue that a neurodiversity-informed developmental science will capture profiles of needs that relate directly to real-world outcome, rather than diagnostic grouping. Crucially, this means shifting our focus away from the factors that are most relevant to separating and distinguishing between diagnostic groups and onto the shared dimensions that most influence day to day experience, such as problems with planning, attention or sensory reactivity. In this way, we can take a more direct path from an identified need – such as a child struggling to concentrate in lessons – to intervention in the form of movement breaks, fidget toys or noise-cancelling headphones.

Thus, neurodiversity-informed developmental science is inherently aligned with transdiagnostic research. The depathologisation agenda of the neurodiversity movement (though also see Chapman, 2021, for a richer conceptualisation of this topic) calls for a shift of power away from the clinical establishment which currently determines access to many services, gate-kept by diagnostic labels. The evidence presented by Astle and colleagues provides a much-needed scientific basis for the rejection of the supremacy of clinical diagnosis, which in turn supports a movement towards self-determination for neurodivergent people in pursuit of a good life. This is especially important within the context, highlighted in the paper, that demographic factors play a key role in unequal access to diagnosis (e.g. MacDonald & Deacon, 2019; Mandell et al., 2009). Moreover, transdiagnostic research is an essential tool with which to identify replacements for our current clinical categories – dimensions which map directly onto common areas of need and effective supports. This does not mean that clinical diagnoses will not retain some value. At the time of writing, it is premature to call for their abandonment, not least because of the immense value that a diagnostic label can provide in terms of self-knowledge, identity and community. The benefits of a sense of belonging in a social group are well charted and beginning to be better understood specifically for neurodivergent people (Maitland, Rhodes, O'Hare, & Stewart, 2021).

Transdiagnostic methods like those outlined in Astle et al. also move us away from comparison of groups against a neurotypical 'standard' which is assumed to be ideal by virtue of its being (presumed) most common. For too long, a problematic focus on case-control designs and differences between group means has been compounded by the inevitable interpretation of typically developing performance on any given measure as 'correct' while any other pattern is deficient, or aberrant at best. Instead, a focus on understanding individual profiles of ability in multi-dimensional spaces is value-neutral. It provides a foundation for tackling stigma against minority neurotypes and can facilitate more effective translation of research into recommendations for practice.

Building on this suggestion, transdiagnostic research – an inherently inclusive approach – is a fertile ground for participatory methods. These techniques involve working with community representatives in varying ways from simple consultation to full co-production and community leadership. They are increasingly considered an essential component of neurodevelopmental research (Fletcher-Watson, Brook, Hallett, Murray, & Crompton, 2021) and can help resolve some of the challenges of transdiagnostic methods. One issue sometimes raised is

that the methods of transdiagnostic research lack theoretical integrity and that a better response to heterogeneity is via the application of stricter and narrower clinical definitions (e.g. Frith, 2021; Mottron, 2021). Working with neurodivergent people can provide an external validation for data-driven approaches, tethering statistical discoveries to theoretical models derived from lived experience. Another challenge raised by Astle and colleagues is the selection of measures to feed into dimensional and clustering techniques and the labelling of any derived factors or groups. Neurodivergent people are essential contributors to these study design and interpretive stages. Driving transdiagnostic enquiry from the perspective of what best serves the quality of life goals of neurodivergent people and their families may provide a useful guiding principle. Astle and colleagues described clinical diagnoses as having '*long been adopted as "ground-truth"*'. Instead, the neurodiversity paradigm compels us to recognise lived experience as ground-truth.

In their paper on the *Transdiagnostic Revolution*, Astle, Holmes, Kievit and Gathercole present a compelling vision for the widespread adoption of transdiagnostic methods to generate new knowledge which can feed into beneficial practice. Explicitly combining these scientific arguments with the neurodiversity paradigm can propel us even further towards a science of neurodevelopment that addresses inequality and drives positive societal change.

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