

**Written evidence submitted by the National Association for Disabled Staff Networks
(NADSN) STEM Working Group Follow Up from Evidence Session.**

First of all we would like to point out that there is a critical M missing from STEM. It should be science, technology, engineering, math **and medicine**.

1. Further Evidence.

Neurodivergence needs better recognition, as there is ample neuroscientific evidence that the brain processes information differently in many individuals. This can include language processing, visual processing, sensory processing, and various combinations thereof. This can cover but is not an exhaustive list of conditions:

Dyslexia

1. Ebrahimi L, Pouretamad H, Khatibi A, Stein J. Magnocellular Based Visual Motion Training Improves Reading in Persian. *Sci Rep*. 2019;9(1):1142. doi:[10.1038/s41598-018-37753-7](https://doi.org/10.1038/s41598-018-37753-7)
2. Gialluisi A, Andlauer TFM, Mirza-Schreiber N, et al. Genome-wide association scan identifies new variants associated with a cognitive predictor of dyslexia. *Transl Psychiatry*. 2019;9(1):77. doi:[10.1038/s41398-019-0402-0](https://doi.org/10.1038/s41398-019-0402-0)
3. Jones MW, Kuipers JR, Thierry G. ERPs Reveal the Time-Course of Aberrant Visual-Phonological Binding in Developmental Dyslexia. *Front Hum Neurosci*. 2016;10. doi:[10.3389/fnhum.2016.00071](https://doi.org/10.3389/fnhum.2016.00071)
4. Jones MW, Snowling MJ, Moll K. What automaticity deficit? Activation of lexical information by readers with dyslexia in a rapid automatized naming Stroop-switch task. *Journal of Experimental Psychology: Learning, Memory, and Cognition*. 2016;42(3):465-474. doi:[10.1037/xlm0000186](https://doi.org/10.1037/xlm0000186)
5. Ray NJ, Fowler S, Stein JF. Yellow Filters Can Improve Magnocellular Function: Motion Sensitivity, Convergence, Accommodation, and Reading. *Annals of the New York Academy of Sciences*. 2005;1039(1):283-293. doi:[10.1196/annals.1325.027](https://doi.org/10.1196/annals.1325.027)
6. Stein J. The magnocellular theory of developmental dyslexia. *Dyslexia*. 2001;7(1):12-36. doi:[10.1002/dys.186](https://doi.org/10.1002/dys.186)
7. Stein J. Reply to: “The Relationship between Eye Movements and Reading Difficulties”, Blythe, Kirkby & Liversedge. *Brain Sciences*. 2018;8(6):99. doi:[10.3390/brainsci8060099](https://doi.org/10.3390/brainsci8060099)
8. Stein J. The current status of the magnocellular theory of developmental dyslexia. *Neuropsychologia*. 2019;130:66-77. doi:[10.1016/j.neuropsychologia.2018.03.022](https://doi.org/10.1016/j.neuropsychologia.2018.03.022)

9. Stein JF. Akinesia, motor oscillations and the pedunculopontine nucleus in rats and men. *Experimental Neurology*. 2009;215(1):1-4. doi:[10.1016/j.expneurol.2008.09.022](https://doi.org/10.1016/j.expneurol.2008.09.022)
10. Stein JF. Does dyslexia exist? *Language, Cognition and Neuroscience*. 2018;33(3):313-320. doi:[10.1080/23273798.2017.1325509](https://doi.org/10.1080/23273798.2017.1325509)

ADHD

1. Bacanlı A, Unsel-Bolat G, Suren S, et al. Effects of the dopamine transporter gene on neuroimaging findings in different attention deficit hyperactivity disorder presentations. *Brain Imaging and Behavior*. 2021;15(2):1103-1114. doi:[10.1007/s11682-020-00437-w](https://doi.org/10.1007/s11682-020-00437-w)
2. Bauer J, Werner A, Kohl W, et al. Hyperactivity and impulsivity in adult attention-deficit/hyperactivity disorder is related to glutamatergic dysfunction in the anterior cingulate cortex. *The World Journal of Biological Psychiatry*. 2018;19(7):538-546. doi:[10.1080/15622975.2016.1262060](https://doi.org/10.1080/15622975.2016.1262060)
3. Briguglio M, Dell'Osso B, Panzica G, et al. Dietary Neurotransmitters: A Narrative Review on Current Knowledge. *Nutrients*. 2018;10(5):591. doi:[10.3390/nu10050591](https://doi.org/10.3390/nu10050591)
4. Brown AB, Biederman J, Valera EM, et al. Effect of dopamine transporter gene (SLC6A3) variation on dorsal anterior cingulate function in attention-deficit/hyperactivity disorder. *Am J Med Genet*. 2010;153B(2):365-375. doi:[10.1002/ajmg.b.31022](https://doi.org/10.1002/ajmg.b.31022)
5. Fernández G, Krapacher F, Ferreras S, et al. Lack of Cdk5 activity is involved on Dopamine Transporter expression and function: Evidences from an animal model of Attention-Deficit Hyperactivity Disorder. *Experimental Neurology*. 2021;346:113866. doi:[10.1016/j.expneurol.2021.113866](https://doi.org/10.1016/j.expneurol.2021.113866)
6. Grünblatt E, Werling AM, Roth A, Romanos M, Walitza S. Association study and a systematic meta-analysis of the VNTR polymorphism in the 3'-UTR of dopamine transporter gene and attention-deficit hyperactivity disorder. *J Neural Transm*. 2019;126(4):517-529. doi:[10.1007/s00702-019-01998-x](https://doi.org/10.1007/s00702-019-01998-x)
7. Mousain-Bosc M, Roche M, Rapin J, Bali JP. Magnesium VitB6 intake reduces central nervous system hyperexcitability in children. *J Am Coll Nutr*. 2004;23(5):545S-548S. doi:[10.1080/07315724.2004.10719400](https://doi.org/10.1080/07315724.2004.10719400)
8. Pineau G, Villemonteix T, Slama H, et al. Dopamine transporter genotype modulates brain activity during a working memory task in children with ADHD. *Research in Developmental Disabilities*. 2019;92:103430. doi:[10.1016/j.ridd.2019.103430](https://doi.org/10.1016/j.ridd.2019.103430)
9. Tai YC, Chi MH, Chu CL, et al. Availability of Striatal Dopamine Transporter in Healthy Individuals With and Without a Family History of ADHD. *J Atten Disord*. 2019;23(7):665-670. doi:[10.1177/1087054716654570](https://doi.org/10.1177/1087054716654570)

10. Wiers CE, Lohoff FW, Lee J, et al. Methylation of the dopamine transporter gene in blood is associated with striatal dopamine transporter availability in ADHD: A preliminary study. *Eur J Neurosci*. 2018;48(3):1884-1895. doi:[10.1111/ejn.14067](https://doi.org/10.1111/ejn.14067)

Autism

1. Bastiaansen JA, Thioux M, Nanetti L, et al. Age-related increase in inferior frontal gyrus activity and social functioning in autism spectrum disorder. *Biol Psychiatry*. 2011;69(9):832-838. doi:[10.1016/j.biopsych.2010.11.007](https://doi.org/10.1016/j.biopsych.2010.11.007)

2. Hahamy A, Behrmann M, Malach R. The idiosyncratic brain: distortion of spontaneous connectivity patterns in autism spectrum disorder. *Nat Neurosci*. 2015;18(2):302-309. doi:[10.1038/nn.3919](https://doi.org/10.1038/nn.3919)

3. Hubl D, Bolte S, Feineis-Matthews S, et al. Functional imbalance of visual pathways indicates alternative face processing strategies in autism. *Neurology*. 2003;61(9):1232-1237. doi:[10.1212/01.WNL.0000091862.22033.1A](https://doi.org/10.1212/01.WNL.0000091862.22033.1A)

4. Lau-Zhu A, Fritz A, McLoughlin G. Overlaps and distinctions between attention deficit/hyperactivity disorder and autism spectrum disorder in young adulthood: Systematic review and guiding framework for EEG-imaging research. *Neuroscience & Biobehavioral Reviews*. 2019;96:93-115. doi:[10.1016/j.neubiorev.2018.10.009](https://doi.org/10.1016/j.neubiorev.2018.10.009)

5. Takahashi H, Nakahachi T, Komatsu S, Ogino K, Iida Y, Kamio Y. Hyperreactivity to weak acoustic stimuli and prolonged acoustic startle latency in children with autism spectrum disorders. *Mol Autism*. 2014;5(1):23. doi:[10.1186/2040-2392-5-23](https://doi.org/10.1186/2040-2392-5-23)

6. Takarae Y, Sweeney J. Neural Hyperexcitability in Autism Spectrum Disorders. *Brain Sciences*. 2017;7(12):129. doi:[10.3390/brainsci7100129](https://doi.org/10.3390/brainsci7100129)

7. Zhou Y, Shi L, Cui X, Wang S, Luo X. Functional Connectivity of the Caudal Anterior Cingulate Cortex Is Decreased in Autism. Stamatakis EA, ed. *PLoS ONE*. 2016;11(3):e0151879. doi:[10.1371/journal.pone.0151879](https://doi.org/10.1371/journal.pone.0151879)

2. Complaints Backfire.

Researchers studying institutions and leadership have examined Equity, Diversity, and Inclusion (EDI) committees, documentation, complaints procedures, and outcomes across universities both within and outside the United Kingdom. In the Parliamentary Hearing, members suggested that complaints procedures are in place for when members of underrepresented groups in STEMM need to request accommodations or address instances of ableism, racism, and so forth. Whilst this is ostensibly true, complaints procedures are routinely found to be costly, slow, and ineffective at securing any positive results—and in fact, complaints procedures frequently lead to a compounding of the original problem, as ableist

and racist attitudes become inflamed when a person from an underrepresented group ‘complains’:

Making a complaint is never completed by a single action: it often requires you do more and more work. It is exhausting, especially given that what you complain about is already exhausting. [...] Complaints, it seems, go further the extent to which those positioned higher up in an organization express them or give support to them. The path of a complaint, where a complaint goes, how far it goes, teaches us something about how institutions work, what I call... institutional mechanics.

Ahmed S. *Complaint!* Duke University Press; 2021.

Moreover, institutional researchers find that social categories which [are used to] define members of underrepresented groups are persistent and sticky, and the stickiness or weightiness of those categories is often not perceived by those outside them. Institutions make efforts to develop EDI statements and practices which enable them to look past, or look over, such categorical identifications, as if this removes the effects of bias and structural inequities. However,

The very tendency to “look over” how everyday and institutional worlds involve restrictions and blockages is how those restrictions and blockages are reproduced. It is not the time to be over it, if it is not over. It is not even the time to get over it. Social categories are sediments: they go all the way down, and they weigh some of us down. They might even appear lighter and more buoyant to those who can float, as if they are “above” them. Perhaps the experience of aboveness creates the impression of overness. Perhaps lightness and buoyancy are the affects of privilege—the affective worlds inhabited by those whose bodies don’t weigh them down or hold them up.

Ahmed S. *On Being Included: Racism and Diversity in Institutional Life*. Duke University Press; 2012.

It is a light thing to say that those from underrepresented groups have recourse to support via complaints procedures, but the impact of such procedures is similarly light, and they have very little impact in leveraging the institutional mechanics on behalf of the complainant. Instead, what is required is a redesign of such institutional mechanics, so that disabled and neurodivergent professionals in STEMM are accommodated from the outset. Thus, we reiterate the structural proposals we made to the committee as strategies that can have a substantive positive impact on the inclusion and success of members of underrepresented groups in STEMM. This applies equally to other underrepresented groups including LGBT+.

3. Recommendations.

We propose some possible solutions:

- Create a dedicated Access To Work service to serve academia due to the job role and relationship with employer being so different to other jobs. Serving people in STEMM would be helpful due to the different nature of our work, particularly with experimental work using

specialised environments/equipment, involved health and safety assessments, and short-term contracts, as well as the grants process.

- Create a legal framework that impacts funding for disability, such as Athena Swan for gender equality and Race Charter.
- Change UKRI and NIHR policies to make them fairer to people with disabilities.
- Enforce research funding agencies to conduct an EDI assessment of their funding schemes and processes to ensure they are accessible.
- Incorporate disabled voices in all other policies, and embed them from the beginning, not just tickbox 'consultations' at the end.
- Pots of money (similar to UKRI FLF Plus Fund) to support the additional costs of being disabled attached to research grant applications - eg 10% to fund support workers, extra equipment, conference attendance etc which are not part of the peer review process and are awarded automatically on successful peer review.
- Change pension provision rules to allow continued involvement of disabled academics within the sector on a part-time basis.
- Look at disability intersectionally along with other marginalisations – barriers compound.
- Provide education to remove the negative associations around disability. This must be delivered by people with lived experience.
- Raise awareness, to help create an atmosphere where disability / chronic illness / neurodivergence is accepted and not seen as a liability.
- Make collecting statistics on protected characteristics, such as success rates and applicant numbers, a legal requirement for all research funding bodies.
- Ensure that all research funding bodies have an EDI policy in place as a legal requirement and ensure that the policy is co-designed with under-represented groups (i.e. disabled researchers).
- Have inclusive work policies. For example use of face masks when someone has a mild cough or cold can protect all staff and students with immune system disorders from any respiratory infections and provides a more inclusive workspace at little cost. <https://www.nadsn-uk.org/immune-system-disorders-in-the-workplace/>. This will generally reduce sickness across workplace so will benefit all.

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