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Author post-print (accepted) deposited by Coventry University's Repository

Original citation & hyperlink:

Clouder, D, Karakus, M, Cinotti, A, Ferreyra, MV, Amador Fierros, G & Rojo, P 2020, 'Neurodiversity in higher education: a narrative synthesis', Higher Education, vol. 80, no. 4, HIGH-D-19-00818R2, pp. 757-778.

<https://dx.doi.org/10.1007/s10734-020-00513-6>

DOI 10.1007/s10734-020-00513-6

ISSN 0018-1560

ESSN 1573-174X

Publisher: Springer

The final publication is available at Springer via <http://dx.doi.org/10.1007/s10734-020-00513-6>

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Neurodiversity in Higher Education: A Narrative Synthesis

Lynn Clouder¹, Mehmet Karakus¹, Alessia Cinotti², María Virginia Ferreyra³, Genoveva Amador Fierros⁴, Patricia Rojo³.

¹ Coventry University, Priory Street, Coventry, United Kingdom

² Università degli Studi di Torino, Italy

³ Universidad Nacional de Rosario, Argentina

⁴ University of Colima, Mexico

Corresponding author

l.clouder@coventry.ac.uk

Tel: 44(0)755 7425036

ORCID 0000-0002-3923-2920

Acknowledgements

No funding was received for this project

Conflict of Interest

The authors declare that they have no conflict of interest.

Word Count

8,796 excluding abstract and keywords

Abstract

Neurodiversity is an umbrella term, including Dyspraxia, Dyslexia, Attention Deficit Hyperactivity Disorder, Dyscalculia, Autistic Spectrum, and Tourette Syndrome. The increasing number of students with learning difficulties associated with neurodiversity entering higher education (HE) poses a shared and growing challenge internationally for teachers and institutional leaders. This narrative synthesis draws together a corpus of international literature on how neurodiverse students experience higher education and the ways in which higher education institutions respond to the cluster of neurodiverse conditions. A systematic review

was carried out to search, retrieve, appraise and synthesize the available evidence to provide an original contribution to the literature and significant insights of worth to higher education internationally.

An inclusive approach to data extraction was used to ensure that all the relevant studies were included. All stages of the review process, including the initial search, screening, sample selection, and analysis, are described. Three main themes and eleven subthemes were identified. Although the majority of publications focus on either Dyslexia, Autistic Spectrum Disorder or ADHD, some common themes are evident in student experience across learning difficulties associated with neurodiversity. Although support services and technologies are available to meet students' specific needs, there is an apparent dislocation between the two. Fear of stigmatization and labelling worsens the divide between what is needed and what is available to ensure neurodiverse students' success in higher education, where good intentions are evidently not enough.

Keywords: Neurodiversity; disclosure; reasonable adjustments; Narrative synthesis

Introduction

An increasing number of students with disabilities are progressing into higher education (HE) internationally (Pino and Mortari 2014). As numbers increase, so too does the literature showcasing support strategies and sharing research on how students experience HE. Yet disability comes in many forms. The definition of the United Nations Convention on the Rights

of Persons with Disabilities includes ‘those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others’ (UNCRPD 2006, p.4).

This narrative synthesis focuses specifically on intellectual impairment but adopts an alternative, nuanced term of ‘neurodiversity,’ an umbrella term, originally coined in relation to autism, for several conditions traditionally pathologized and associated with a deficit, including Dyspraxia, Dyslexia, Attention Deficit Hyperactivity Disorder, Dyscalculia, Autistic Spectrum and Tourette Syndrome (Singer 1999). Commonly acronyms are used¹.

The social model of disability is adopted as a lens for the synthesis. Like the social dynamics resulting from other forms of human diversity, such as ethnicity or gender, which can result in social power inequalities and disadvantage, being disabled by any of these conditions is due, at least in part, to society’s attitudes and actions, rather than to the condition per se. In accordance with the UNCRPD (2006) definition of disability we recognise that people do have impairments but suggest that as a social construction, academia has the means to instigate changes that mitigate many of the hindrances caused by impairment, which create disability.

¹ Common Acronyms:

DCD: Developmental Coordination Disorder.

AD(H)D: Attention Deficit (Hyperactivity) Disorder.

ASD: Autism Spectrum Disorder.

AS: Asperger’s Syndrome.

SpLDs: Specific Learning Difficulties.

LD: Learning Disabilities.

Use of the term, neurodiversity, , focuses on differences in individual brain function and behavioural traits, regarded as part of normal variation in the population. Terms, such as 'atypical developmental pathways' (Kapp, Gillespie-Lynch, Sherman and Hutman 2012) can be challenged by the stance that 'there is no typical mental capacity – no normal brain to which all others brains are compared' – neurodiversity simply means being 'wired' in a different way rather than 'wrongly' (Armstrong 2012 p. 11). Notwithstanding the fact that some impairments result in cognitive processing that is problematic and impacts on an individual's capacities to engage meaningfully with wider society, many neurodiverse conditions bestow talents or benefits. For example, Robertson (2008) highlights strengths and capabilities associated with ASD: preference for structure and consistency, aptitude for repetition, and a detailed, sophisticated world understanding. Nevertheless, despite some increased awareness and acceptance of neurodiversity in HE, , without a supportive culture and neurodiversity awareness, the focus continues to be on the deficit (Robertson 2008). The extent of the challenge cannot be underestimated. Statistics on the prevalence of neurodiversity in HE are by no means straightforward as they are reliant on self-disclosure, subject to definitional variation, and tend to be condition specific. However, prevalence can be extrapolated from general population data. Referring to the most common neurodiverse condition, Knight (2018) claims 5-10% of the global population has dyslexia which is reflected in the HE population. The World Health Organisation (WHO) (2019) estimates that 1 in 160 children has ASD worldwide, although prevalence in many low-and middle-income countries is unknown. The influx of students with ASD in HE (Hillier et al, 2018) should not be surprising when despite varying levels of intellectual functioning, from profound impairment to superior levels, average or above

average IQ scores (IQ >85) occur in 44% of people with ASD

<https://www.autismspeaks.org/autism-facts-and-figures>

Clearly neurodiversity should not preclude school leavers progressing into HE, yet Hillier et al (2018, p. 20) observe that 'post high-school graduation outcomes remain bleak.' In some countries, conditions such as dyslexia are not recognized as disabling, whilst in others, they are considered to be a mental disability suggesting that disability is culturally determined. Narrow definitions of disability and/or underreporting can result in highly skewed and unreliable data on prevalence (Sida 2014), lack of identified need for support and therefore no stimulus to be inclusive (Konza 2008). Matthews (2009) argues that although inclusivity is no panacea, anticipating teaching and learning issues eradicates the special needs of some disabled students altogether. This narrative synthesis aims to explore the current state of awareness, attitudes, and responses of staff to the needs of neurodiverse students and how they experience contemporary HE.

Method

Rodgers et al (2009) suggest making sense of large bodies of evidence, adopting a range of research methods, is a challenge that narrative synthesis addresses to add to a body of knowledge rather than simply summarising research findings. Thus we have aimed to integrate relevant literature to provide conceptual insights that are greater than the sum of the parts (Weed, 2015), identifying themes that have breadth of significance across specific

conditions classed as neurodiverse and across cultures. Syntheses are conducted in response to particular research questions, in this case:

- 1) What is the experience of neurodiverse students in contemporary HE?
- 2) How does HE respond to neurodiversity?
- 3) What strategies, processes, and resources are in place to support success?

Literature Search Procedure

The initial literature search included electronic databases: Scopus, Science Direct, British Education Index, ERIC, and PsychINFO. The terms 'higher education' and 'college' were used with Boolean Operator 'AND' (but not OR, NOT or AND NOT) in conjunction with neurodiversity, Dyspraxia, Dyslexia, Attention Deficit Hyperactivity Disorder, Dyscalculia, Autistic Spectrum, and Tourette Syndrome. Variations including 'autistic', 'autism', 'autistic spectrum disorder', neurodiverse and neurodiversity were included.

The inclusion criteria comprised: (1) conducted in the HE setting; (2) focusing on neurodiversity and/or learning difficulties; (3) empirical rather than theoretical (4) including a methodology and scientific background; (5) written in English; (5) published between 2008 -20th May 2019. A PRISMA flowchart (Moher et al. 2009) is used to display the flow of information through different phases of this study (Figure 1). Identification was based on article titles and key words where available. Screening included reading of abstracts. Following initial screening, full texts were assessed against inclusion criteria. The final corpus consisted of 48 studies to be included in the narrative synthesis.

INSERT Figure 1 PRISMA flowchart about here

Data Analysis

The study involved a systematic approach to analysis using narrative synthesis which allows researchers to classify the contents of related studies (Posthuma, Morgeson, and Campion 2002). Relevant publications are retrieved, critically appraised, summarized, and reconciled regarding a specific research problem (Petticrew and Roberts 2006). The approach to data extraction was inclusive rather than selective (Pino and Mortari 2014) to ensure that all relevant findings were included. The findings and/or results sections of the selected studies, were read critically by one researcher (MK) against the research questions. Findings were then subjected to thematic analysis to determine recurring themes (Braun and Clarke 2006; Pino and Mortari 2014) using the following steps: (1) texts were read repeatedly; (2) relevant units of meaning were identified; (3) all units were labelled with descriptive codes; (4) codes were grouped into themes; and (5) themes were grouped under main themes. Since similar themes were named differently in different studies, efforts were made to reconcile the themes using an integrative approach (Barnett-Page and Thomas 2009; Parry and Land 2013). Finally, the identified themes were summarized descriptively under the thematic headings using narrative synthesis.

The research questions provided an *a priori* framework of three main themes. The narrative analysis gave rise to 11 subthemes. In this analysis, an article could be coded under multiple themes. The final corpus of studies is shown in Table 1. The numbers in Table 1 are cross-referenced to Table 2.

Insert Table I Summary of Thematic Analysis about here

Results

The researchers identified 48 relevant studies and analysed them to produce the summary displayed in Table 2. The majority of studies were conducted by scholars from the USA (22) and the UK (14), and published as research articles (44) or doctoral dissertations (4). Research samples mostly comprised current and/or former HE students (41). The remaining studies featured HE students and their parents (2), or HE students, and academic or technical support staff (5). One study focused on analyzing higher education institution (HEI) websites. Studies using a qualitative research design were in the majority (29), but mixed methods (7), experimental (1), and quantitative studies (11) were included. Dyslexia (18), Autism Spectrum Disorder (ASD) (14), and ADHD (12) studies were most common, with fewer studies examining all types of neurodiversity (6), dyspraxia (2), Asperger's Syndrome (AS) (2), and dysgraphia (1).

Insert Table II Description of the studies included in the thematic analysis (N=38) about here

The experience of neurodiverse students in contemporary HE

Emotional reactions and wellbeing:

Most students with learning disabilities experience frustrations due to negative university experiences, especially if the necessary learning tools are not readily available (21). Leaving behind familiar structures, people, and environments to face challenging situations such as

variable course schedules is frightening (36; 44), and students can feel isolated, alone, stressed, anxious, unhappy, tired, depressed, and overwhelmed (1). Dyslexic students experience helplessness and hopelessness as a result of a fear of stigmatization, feelings of inadequacy, and a lack of understanding (13); they also have short-term memory problems and often feel too embarrassed to ask questions (10). Stigma in autism has been associated with cultural difference and perceived need to conform to societal norms (41).

Cognitive impairment for students with ADHD can result in emotional difficulties (e.g., feeling hostile, overwhelmed and depressed) (27). They tend to act impulsively, are introspective, repeatedly think about and regret past events, underestimate themselves, engage in a continuous cycle of worry, and are anxious about the future (24; 43). Impairment leads to lower levels of intrapersonal skills, engagement, and self-evaluations of academic and psychosocial functioning, which can influence their persistence in HE (27). Similarly, students with ASD (and their parents) experience feelings of ambivalence, stress, and anxiety when they are confronted with challenges in the HE environment (31; 35). Students with ASD and ADHD have high levels of anxiety about their future personal and professional lives because of the anticipated difficulties they might face (25; 36). Common disorders for students with ASD and ADHD include generalized anxiety, social anxiety, depression, bipolar disorder, obsessive-compulsive disorder, borderline personality disorder, dyslexia, and dysgraphia (22; 25; 30). Sources of support consistent with a Universal Design (UD) approach, which caters for different preferences, leisure activities and a sufficient amount of rest, and social learning, all have a part to play in helping these students to manage their stress and anxiety (12; 14; 36).

Personal and social life:

Neurodiverse students feel anxious interacting with others and are inclined to isolate themselves from their peers (1; 36), despite a strong desire to make friends whilst at university (31; 36). Bullying, rejection, and stonewalling from the peers are not uncommon (1; 13; 25). Students with ASD have particular problems with verbal and non-verbal communication and are oversensitive to change (23). Their inability to read social cues and other people's expectations are barriers to initiating and sustaining social relationships (36). Social anxiety, fear of loneliness, nervousness, and lack of spaces free from over-stimulation are the main barriers to socialization for students with ASD (31). Impairment associated with ADHD means that students have difficulties building and maintaining social relationships and with emotional outbursts (24; 25) that can be helped by parental involvement (28). While impairment means that poor motor skills isolate dyspraxic students (4), deficiency in executive functioning (e.g., cognitive processes, such as self-monitoring, prioritizing, understanding different points of view) is the main barrier resulting in students living at home with parents (5).

For autistic students the transition to HE is characterized by apprehension (31), poor quality sleep, lack of structure, loneliness, and sensitivity to noise, light or smells which affect their ability to cope or study (30). Unpredictability in HE programs impacts time management and the organization of daily activities (36), and students need assistance to foster daily living skills, such as cleaning, buying groceries, and cooking (25). Students with ADHD experience similar challenges (24) but are less engaged in academic work, more inclined to health risk-behaviours,

such as substances abuse (44), and spend more time playing video or computer games, partying, and online social networking than their peers (27). Despite aiming to be independent (35), most students with AS and ASD require support to navigate university life (29).

Academic life:

Although arguably integral to a university education, reading, writing, comprehension, decoding, word recognition, pronunciation, grammar, and meaning-making (18; 12), or the technical aspects of writing, marginalize students with dyslexia (20). Academic achievement especially when higher-order skills, such as planning and organization, are needed (21) can also be compromised. Despite adopting a deeper approach to learning, compared to students without dyslexia (42), dyslexic students are easily distracted during lectures, note-taking is poor (10) and whilst face-to-face lectures with PowerPoint slides are helpful they can be difficult to follow (9). UD initiatives, including clear instructions in multiple formats, optional group work, peer mentorship, digitally accessible materials and varied and flexible teaching approaches are helpful (2; 37; 39).

Students with ASD have problems in identifying critical points amongst detail, information processing, directing and shifting attention, and cognitive flexibility (23). They procrastinate, lack concentration and focus, struggle to prioritize, and complete tasks efficiently, resulting in poor academic performance and achievement (24; 25), which despite creating anxiety (30) does not lead to seeking help.

Identity and possible selves:

Neurodiverse students entering HE have to assume adult roles and construct new social identities (35). Difference (otherness) is a prominent part of the self-concept of neurodiverse students (31) leading to different perceptions of 'self' and their learning difficulties. Whilst some students with ASD do not consider themselves to be disabled (40), positive acceptance of difference shifts focus to emphasize strengths to overcome difficulties (13; 14) and promotes positive action, such as disclosing difficulties to teaching staff (21). Students with ADHD exhibit low levels of self-efficacy (43), a quality that together with resilience is essential to success for dyslexic students (16) who associate strongly with a dyslexic identity (8). Despite making their lives more difficult, students perceive their dyslexia gives them strength to overcome difficulties (13) and draw on their social surroundings and familial support to help them achieve their aspirations (11).

HE's response to neurodiversity

Disclosure and diagnosis:

It is hard to support neurodiverse students in HE if they are unwilling to disclose their disabilities (30; 38). Staff are reliant on information provided by students and their parents (38). Some autistic students reject disclosure because they wish to develop independence and their new social identity (35), whilst others are concerned about the impact on their privacy and a lack of supportive policies (36). For dyslexic students non-disclosure is fuelled by fear of being stigmatized, separated from the class, and not being able to get good grades (25; 18; 38). Some students only disclose their disabilities when they can no longer cope, realize a specific support

need, or perceive that it is safe to disclose (36). Others do not want to be labelled, and as a consequence, have less support and a poorer university experience (30).

Encouragement to disclose and subsequent screening to confirm students' learning disabilities (6; 27) leads to provision of assistive software tools and other assistance depending on identified need (19). However, a UD teaching framework emphasising strengths could potentially decrease reliance on support and remove the necessity to disclose problems at all (30).

Reasonable adjustments:

Although some students with ADHD do not use adjustments offered (48), the experience of neurodiverse students can be positive if, and when, reasonable adjustments are made (2). For instance, dyslexic students benefit from out-of-class support, in-class-support, examination adjustments, access to a resource centre, lecture capture and assistive technology (9; 10; 14). Advanced sight of lecture materials, extra time for coursework, and permissions to tape lectures benefit learning (16). However, adjustments focusing on academic needs but ignoring sensory and social needs are inadequate for students with ASD (2) for whom sensory overload negates benefits of other adjustments on campus (36). In wider university life, self-catering halls of residence challenge students with weaknesses in executive functioning (5). These students might opt to attend an HEI closer to home where they can access support from parents and family (36).

Academic attitudes and expectations:

Notwithstanding the importance of upholding academic standards, the literature suggests that the conditions imposed by academia can challenge neurodiverse students. Emphasis on written assessments and focus on grammar, spelling, and punctuation can penalize dyslexic students (12; 20). Students with ASD struggle with traditional teaching and assessment methods (23). Students with ASD and ADHD find coping with academic demands, such as timed homework and quizzes, in-class notes, and overall course load testing stressful (25; 30), despite being realistic in expecting to be challenged (27). In general, neurodiverse students report poor treatment, lack of support, inflexibility from lecturers (1; 13; 17; 25; 31) and perceptions of discrimination and judgmental attitudes when they disclose their learning difficulties (15; 25; 38). Such negative teacher attitudes are detrimental to the self-efficacy beliefs of these students (20) in need of institutional advocacy (15; 38).

Institutional support and pastoral care:

Despite negative reports by neurodiverse students, support structures are in place in many HEIs. Support groups, counselling services (campus orientation, academic and psychological support, and career advice), supervised social activities, and summer transition programs are the most commonly provided support services in HE (29; 38). However, because support can come from several areas within an HEI, conflict and communication difficulties can lead to lack of consistency of support (1). Some areas fall beyond the scope of services, impacting on adjustments, and there can be barriers to providing discipline-specific support (17). Lack of funding and professionals specialized in neurodiversity (29; 38) can hamper program

effectiveness resulting in students withdrawing from programs due to lack of follow-up, support, and resources (30). Dobson (2018) identified variability in in-class adaptations/support, additional learning support (including mentoring and coaching), assistive technology and ICT, examination support, and general disability support but found general screening of learning needs, dyslexia screening, and full psychological assessment were available (7). These services were evaluated as helpful but difficult and time-consuming to organize (7; 9).

Emotional, instrumental, informational, and appraisal support (from college staff, counsellors, friends, and family) buffer students' college-related stress and facilitate academic success (12; 14; 15; 16; 21; 25). One study suggests that most students with ASD are satisfied with academic support services, but are dissatisfied with non-academic support (30). Funding to access library helper assistance, mentorship, proof-reading assistance, examination support, note-taking support, help with essay and report writing, and mathematics and statistics support can be fundamental to success (19).

Counselling services and guidance on educational progress are crucial to the success of students with ADHD (22), although they have been deemed less effective than services available in high school (21). Where parental involvement is high, these students have the lowest levels of impairment (28). However, peers, teachers, counsellors, and other HEI staff all have roles to play in the academic and social life of students with ADHD and ASD (22; 25; 37). Strengths-based approaches and activities focusing on self-determination and regulation skills,

particularly for autistic students, can empower (1; 34; 36; 37). Given the intensive time and emotional demands on staff, made by these students, recruiting passionate individuals is crucial (29) if they are to respond to a demand-driven support approach that encourages participation (35). Overall, students need personalized coping strategies and customized support services to meet their unique needs (15; 18; 26; 27; 33; 34; 35; 36; 37).

Teaching, learning and assessment strategies

Teaching and learning approaches:

In order to achieve deep learning in the light of cognitive impairment, students with learning disabilities require extra time to access specialized support and master technologies, alongside flexible learning opportunities (17; 39). An inclusive curriculum eradicates potential barriers to students' academic achievement (20). Students with ADHD perceive that they benefit most from interactive teaching approaches, group work activities (22) and coaching interventions (26; 46), whereas tutoring is best for addressing academic skills and knowledge deficits (26). Autistic students preferred to be monitored and supported by a personal coach, in educational, student, and personal life (36) but peer mentoring was also beneficial (37). Participatory transition programming, utilising mentorship, fosters self-efficacy and social skills for students with ASD (33; 34) and ASD and AS students' social and executive skills benefit from practical activities, such as giving a class seminar (29). Non-traditional educational approaches, such as tactile learning experiences, help dyslexic students learn more readily (14). For this reason, work-based learning experiences help to integrate theory and practice for these students (15).

Given that strategies to support neurodiverse students depends on their unique needs, the aim should be to mainstream initiatives consistent with a UD strategy, to meet individual needs that avoid segregation and isolation (14; 26; 27; 29; 30; 37; 47) and enable students to study to their strengths rather than emphasizing deficits (30).

Technological support:

Consistent with UDL principles, lecture-capture (9; 10; 30), provision of learning materials in alternative or accessible formats (3; 19), and use of technology in the classroom (i.e., laptops, smart pens) (2) benefit many students. Ability to access relevant learning materials online at least a day before a teaching session is highly beneficial (19). Autistic students, in particular, gain from assistive technology that provides access to internet resources, reducing reliance on textbooks (10). Although varied teaching methods are welcome, students suggest an increase in the use of visual material, uploading videos to present content onto virtual learning platforms, hands-on activities, and group work (12). Students with AS can successfully participate in teamwork with the use of online communication, which promotes inclusivity (32).

Despite students experiencing challenges associated with virtual learning environments (45), technology is hugely beneficial for the technical aspects of reading, writing, and planning (20). Provision of free personal computers and/or additional assistive software, such as transcription software, text to speech systems, recording devices (audio and voice recorders), mind-mapping tools, interactive thesaurus/dictionary software and roaming user profiles is also beneficial (7;

16; 19). A UD strategy might also include access to specialized programmes, apps, personal digital assistants and electronic organisers (39).

Assessment approaches:

Although assessment can vary, traditional written forms, such as essays, continue to predominate (13). Neurodiverse students can benefit from alternative equivalent forms of assessment, such as multiple-choice and extended matching-question exams which are seen as dyslexia-friendly (13; 19), although most dyslexic students still need additional time for examinations (2; 16; 19). Sensitivity is needed in providing these adjustments as, although they support success, some students dislike being identified and labelled by these strategies (13).

Autistic students also benefit from examination assistance, such as extended test time, distraction-free test areas (i.e., in a quiet room, testing alone), and flexible or extended due dates for assignments (2). Spreading exams over time (to allow rest days between exams), doing alternative assignments instead of group work, and taking exams in smaller than usual groups are also effective strategies which help students with ASD (23; 30; 36). Exam adjustments are perceived to be the most helpful type of support by the students with ASD (30) although adopting a UD approach to developing assignments which allow increased flexibility for all students might potentially be fairer (47).

Discussion

The reported experience of neurodiverse students in contemporary HE is sobering. A repeated theme is the *anxiety* that accompanies students through the personal, social, and academic aspects of their studies, overlaying their learning difficulties with mental health and wellbeing concerns. The transition to HE is challenging for most students (Jackson 2010), but as Vincent et al. (2017) highlight, the perceived sense of *difference* which is a prominent part of the self-concept of neurodiverse students, makes their transition overwhelmingly challenging. Many students feel out of place in what they perceive to be a highly competitive university environment (Shaw and Anderson 2018). However, aside from their engagement with academic expectations, their entire university experience, including management of change, negotiation of social interactions and striving to achieve a degree of independence, is clouded by past experiences and apprehensions (Kwon, Kim & Kwak, 2018). The fear is that without adequate support students turn to diversionary tactics, such as substance abuse (DuPaul et al. 2017b). Yet, fear of stigmatization and labelling (Wennås Brante 2013); Bolourian, Zeedyk and Blacher 2018), again probably as a result of earlier experiences, prevents or delays students disclosing their learning difficulties, resulting in an even poorer university experience (Anderson, Carter and Stephenson 2018).

As student perspectives confirm, it is crucial that HEIs find ways of encouraging students to disclose their disabilities, assess learning needs and put in place relevant support mechanisms (DuPaul et al. 2017B; Taylor et al. 2016). A wide range of support systems and assistive technology is available, but the onus is on students to trigger this by disclosing their difficulties. However, these processes can be time-consuming and frustrating to navigate (MacCullagh,

Bosanquet, and Badcock 2017), suggesting room for improvement. Van Hees, Moyson, and Roeyers (2015) point out that students will only disclose when they can no longer cope or when they perceive that it is safe to do so. Reaching a crisis should be avoided, therefore creating a trusting and inclusive environment tolerant of difference is essential (Glazzard and Dale 2015).

Here lies the primary challenge: the response to neurodiversity amongst staff appears, at best, mixed. Lecturers can be inflexible, unsupportive, and judgmental (Bolourian, Zeedyk and Blacher 2018; Shaw and Anderson 2018; Vincent et al. 2017; Couzens et al. 2015; Child and Langford 2011; Griffin and Pollak 2009). These people are not bad people; their attitudes are likely fuelled by low levels of knowledge and awareness that militate against difference and willingness to think inclusively. This is reflected in reliance on traditional teaching and assessment methods, that penalize neurodiverse students (Jansen et al. 2017; Smith 2017) and create academic demands and workload that is unbending, and risks attrition and failure (Bolourian, Zeedyk, and Blacher 2018; Anderson, Carter and Stephenson 2018).

A distinct finding highlighted across the neurodiversity spectrum is the need to see each individual as having unique needs (Barnhill 2016) that challenges a one-size-fits-all ethos that can prevail in HE. Educational practices adapted for varied learning preferences or UDL (Sarrett, 2018) is evident in many of the articles in the synthesis. However, explicit reference to universal design for learning principles (UDL) and its adoption as a consistent strategy appears less common. Sarrett (2018) suggests that UDL implementation is inconsistent and students have difficulty in obtaining adjustments, whilst others argue that it is poorly understood by academic

staff highlighting the need for training (Couzens et al, 2015). Perhaps not surprisingly, student attitudes to UD initiatives appear to be mixed but increased flexibility and breadth of awareness are identified as important in addressing different needs. Many of the ideas are simple to implement and could be mainstreamed to potentially benefit all students thus avoiding labelling and segregation of differently-abled neurodiverse students (Anderson, Carter, and Stephenson 2018; Berry 2018; Shattuck et al 2014).

Limitations

We acknowledge that by adopting a social model of disability we give prominence to the influences of the environment alone on how disability is experienced. Our choice to diminish the impact of cognitive impairment associated with neurodiversity is based on the rationale that as a socially constructed environment, academia has a major role in minimising disability caused by the impact of impairment. While an alternative social cognitive lens might provide a more nuanced view of disability for future researchers, it brings impairment back into view, and as such, provides sufficient scope for ambiguity to obfuscate the need for change.

Despite aiming to offer an international perspective, the majority of research accessed as part of this review comes from a limited number of mainly English-speaking countries in the northern hemisphere. Insight into practices in countries in Oceania, South America, a large part of Africa, and some parts of Asia are excluded, at least partially because non-English language publications were excluded. We are also conscious that, like general disability research (Thompson 2016), the analysis focuses on neurodiversity to the exclusion of other

characteristics such as ethnicity, we, therefore, assume that we portray a largely white perspective. Interestingly, only a small number of studies include academic and/or technical support staff perspectives creating the risk of an account biased by emotive experiences, disenfranchisement, and marginalization. Furthermore, the predominant research approach was qualitative in nature, with fewer studies using mixed and quantitative designs. As highlighted previously (DuPaul et al. 2017A; DuPaul et al. 2017B) there is a need to design more interventional and longitudinal studies using methodological triangulation to improve our understanding of neurodiversity in HE.

Conclusions

The increasing number of neurodiverse students entering HE poses a shared and growing challenge internationally for teachers and institutional leaders. This narrative review of studies highlighting neurodiverse students' experience HE, and the ways in which HEIs respond, integrates a wide range of literature to provide new and significant insight into unexpected commonalities in student experience, some good practices in place in HEIs, and yet considerable room for improvement. Many HEIs appear to be neurodiversity 'cold spots' despite the existence of support services; the dislocation maintained by low levels of staff awareness, ambivalence and inflexible teaching and assessment approaches. Reflecting the generic disability picture in HE, and potentially of greater impact, disclosure of learning difficulties is a major issue from which all academic and pastoral support and adjustments flow. Intransigence persists, despite the number of neurodiverse students entering HE rising. Universal design strategies that offer customized support services, flexibility and neurodiverse-

friendly environments can help to meet students' unique needs but their use appears piecemeal. A major catalyst appears to be the creation of a trusting and inclusive environment tolerant of difference that does not need labels, adjustments, or special measures that will allow *all students* to flourish.

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