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Neurodiversity in surgery: Embracing cognitive difference in a demanding profession

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ABSTRACT

Background: Neurodiversity encompasses natural variations in cognitive functioning, including autism spectrum disorder, ADHD, and specific learning difficulties. While the concept is increasingly recognised in education and general workplaces, its relevance in medicine and particularly in surgery, remains underexplored.

Methods: We conducted a systematic review in accordance with PRISMA 2020. Searches of PubMed, Embase, Medline, Global Health and PsycINFO databases up to July 2025 identified studies on neurodivergence among surgeons and healthcare professionals. Eligible publications addressed neurodiversity explicitly or reported disability data inclusive of neurodivergent surgeons. Two reviewers independently screened, extracted, and appraised studies using JBI and MMAT tools. Narrative synthesis was organised into five domains: prevalence/disclosure, challenges and attainment, cognitive strengths, workplace supports, and cultural implications.

Results: Of 13268 records, four studies met inclusion criteria: two retrospective cohorts, one cross-sectional, and one mixed-methods study from Turkey, Canada, and the UK. Prevalence estimates varied: ADHD symptoms were identified in 31.6 % of included Turkish surgical trainees who participated in the study, while 6–8 % of UK trainees declared disabilities, most commonly specific learning difficulties. Neurodivergent trainees reported challenges with assessments, sensory environments, and professional expectations, with lower pass rates in early postgraduate exams. Strengths including creativity, attention to detail, and resilience were frequently cited. Evidence suggested that supportive interventions and fair recruitment processes can mitigate disadvantage.

Conclusions: Neurodiversity in surgery is under-recognised yet integral to workforce diversity. Neurodivergent surgeons contribute valuable skills but face systemic and cultural barriers. Greater awareness, structured accommodations, and inclusive training frameworks are needed to reduce stigma, promote disclosure, and enable all surgeons to thrive.

1. Introduction

Neurodiversity refers to the natural variation in cognitive functioning that affects how individuals think, learn, and interact with their environment [1–3]. This framework includes conditions such as autism spectrum disorder (ASD), attention-deficit hyperactivity disorder (ADHD), dyslexia, dyspraxia, and others. While this perspective has gained momentum in education and some workplaces, it remains underexplored in medicine, and even more so in surgery.

In medical training and practice, professionals are often expected to conform to narrowly defined behavioural and communication norms [4, 5]. These expectations may inadvertently marginalise or suppress

neurodivergent traits, contributing to underdiagnosis or non-disclosure [6]. Existing literature indicates that many neurodivergent individuals pursue careers in medicine, but few disclose their diagnoses due to stigma, fear of discrimination, or concern about professional repercussions [5,7]. Despite these barriers, neurodivergent doctors can and do thrive, often bringing unique strengths to clinical care [8].

Surgery, as a highly structured, high-pressure specialty, presents specific challenges for neurodivergent professionals. Sensory sensitivities, communication differences, executive functioning demands, and rigid cultural norms can create environments that are less inclusive for those who think differently [5,9]. Yet many neurodivergent surgeons report strengths such as deep focus, creativity, pattern recognition, and

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precision, traits highly valuable in surgical practice [10,11]. However, the pressure to “mask” traits and conform can take a heavy toll on mental well-being and job satisfaction [5,12–14].

Despite growing attention to diversity in medicine, neurodiversity remains a neglected dimension. There is little published research on the experiences of neurodivergent surgeons, and no consensus on how best to support them in training or practice. This study aimed to explore the concept of neurodiversity within the surgical profession, highlight the potential challenges and strengths of neurodivergent surgeons, and identify gaps in institutional support. The main aim is to promote awareness, reduce stigma, and encourage more inclusive practices in surgical education and workplace culture.

2. Methods

2.1. Design and reporting

We conducted a systematic review with narrative synthesis, reported in line with PRISMA 2020. The review used a systematic search and dual-reviewer screening, with narrative/thematic synthesis due to heterogeneity of designs and outcomes.

2.2. Search strategy

A broad literature search was conducted using the databases PubMed, Embase, Medline, Global Health and PsycINFO, up to July 31, 2025. The search terms included combinations of (*neurodiversity OR neurodivergent OR autism OR ADHD OR dyslexia OR dyspraxia OR disability*) AND *surgeons*.

2.3. Inclusion and exclusion criteria

Given the scarcity of direct studies on neurodiversity in surgeons, the inclusion criteria were intentionally broad. We included studies and reviews that addressed neurodiversity, such as ADHD, autism spectrum conditions, or specific learning difficulties, among surgeons. We also included research examining the challenges, strengths, or workplace and academic outcomes of neurodivergent healthcare workers. Papers were considered eligible if they discussed neurodiversity explicitly, if they reported on disability data that included neurodivergent subgroups, or if they explored aspects of professional culture relevant to surgical training and practice.

Studies were excluded if they focused exclusively on patient populations without any relevance to healthcare workers or surgeons. Articles not available in English were also excluded. In addition, papers addressing disability were only included when neurodivergence formed a clear component of the analysis, such as studies reporting on specific learning difficulties, ADHD, or autism. Broader disability papers without relevance to neurodivergence were excluded. Where disability data were used, we focused specifically on neurodevelopmental and learning-related categories (e.g., ADHD, autism, SpLD), rather than physical or sensory disabilities.

2.4. Quality appraisal

Two reviewers appraised methodological quality using JBI checklists for cohort and cross-sectional designs and MMAT for the mixed-methods study, with consensus resolution. Domains covered selection, exposure/measure validity, outcome measurement, confounding, and reporting. Appraisal informed interpretation but did not determine inclusion.

2.5. Data extraction and thematic synthesis

Extraction was performed for study characteristics, participants, neurodivergence constructs/measurement, outcomes (e.g., attainment, experiences), and key findings. We conducted a thematic synthesis,

organising results into five a-priori domains: [1] Prevalence, disclosure, and recognition [2]; Barriers and differential attainment [3]; Cognitive strengths [4]; Workplace supports and reasonable adjustments [5]; Implications for training, assessment, and culture.

3. Results

3.1. Overview of the literature

Our systematic search identified 13268 records, including 4403 from PubMed, 1594 from PsycINFO and 7271 from Embase, Medline and Global Health. After removing 4314 duplicates, 8954 unique records were screened by title and abstract, resulting in the exclusion of 8842 irrelevant articles. A total of 112 full-text articles were assessed for eligibility, of which 108 were excluded based on predefined criteria (Fig. 1). No ongoing or awaiting-classification studies were identified. Ultimately, 4 studies met the inclusion criteria for this review [15–18].

The included studies comprised two retrospective cohort studies, one cross-sectional study and one mixed-methods study. The studies were conducted in Turkey, Canada, and the United Kingdom, representing geographically diverse yet methodologically heterogeneous contributions [15–18].

3.2. Risk of bias

Overall quality was variable. Common concerns were selection bias (single-centre or convenience samples), exposure misclassification (self-reported/screening-positive neurodivergence rather than diagnostic confirmation), residual confounding (incomplete adjustment for prior attainment, accommodations, sociodemographic), and limited external validity (country-specific datasets). The mixed-methods study had partial integration of qualitative and quantitative strands and limited reflexivity reporting. These limitations temper certainty and generalisability.

A summary of the included articles about neurodiversity in surgeons:

Across the included studies, neurodivergent traits were shown to be both prevalent and influential within surgical training. ADHD was identified in a substantial proportion of trainees, with implications for speciality choice and training experiences [15]. Divergent thinking research further suggested that surgeons and trainees possess measurable creative capacities that may be shaped by surgical training [18].

Large-scale UK cohort analyses using disability data, where specific learning difficulties (SpLDs) comprised a major subgroup, demonstrated that candidates declaring disabilities had lower first-attempt pass rates in early examinations but did not face significant disadvantage at the point of higher surgical training selection [16,17]. Collectively, these findings indicate that neurodivergence influences both training pathways and professional outcomes, highlighting the need for inclusive structures and supportive cultural change (see Table 1 for a summary of included studies).

Prevalence, Disclosure, and Recognition:

1. Prevalence and Recognition of Neurodiversity in Surgery

Neurodivergent traits, particularly autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), and specific learning difficulties (SpLD), remain underreported among surgeons. Unal et al. (2025) reported that 31.6 % of surgical trainees included in their study screened positive ADHD symptoms, with hyperactivity as the predominant subtype [15]. No ADHD cases were observed among gynaecology or cardiovascular surgery trainees, suggesting departmental variation in prevalence [15]. Large-scale UK data showed that 6.6 % of Membership of the Royal College of Surgeons (MRC) Part A exam candidates declared a disability, the majority being SpLD, and 8.2 % of higher surgical training applicants did so, of whom 5.7 % reported SpLD [16, 17]. These findings suggest that reported prevalence is modest and likely

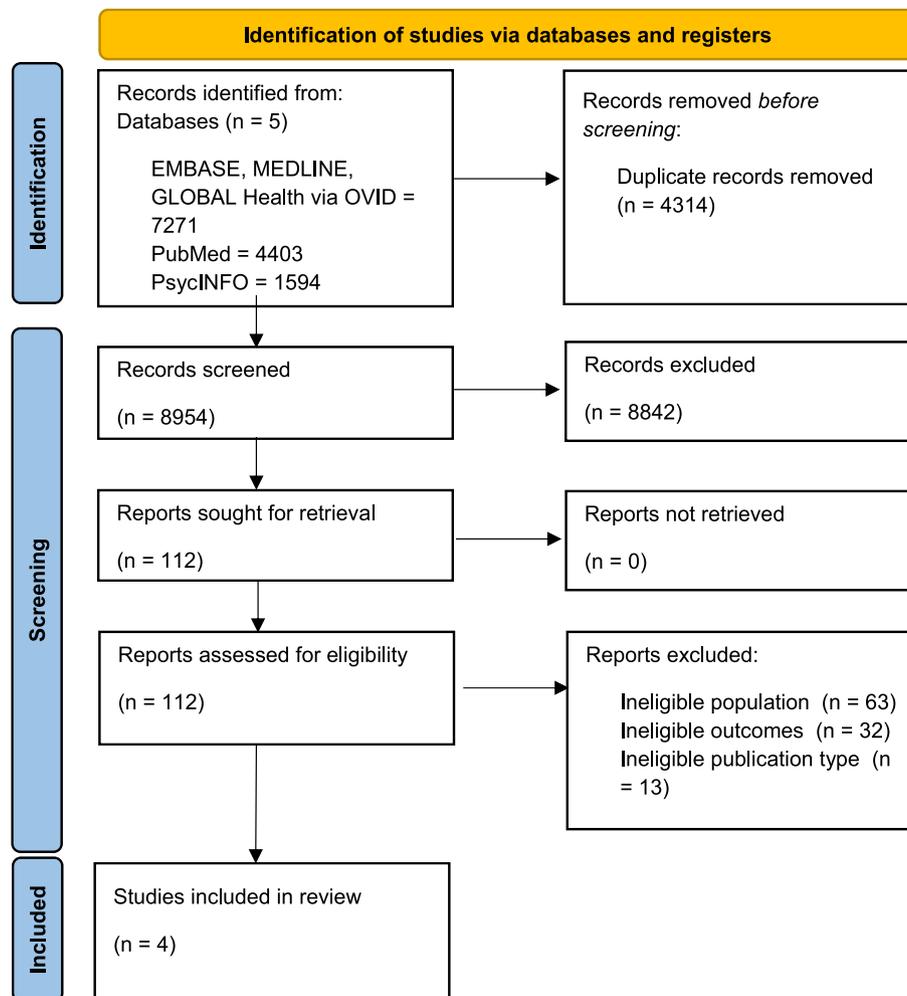


Fig. 1. PRISMA diagram of included citations.

Table 1
Summary of included studies.

Author	Year	Journal	Study Type	Participants/Subjects	Aim	Conclusion
Unal et al.	2025	BMC Medical Education	Cross-sectional study	114 surgical trainees (32.5 % female, 66.7 % male; mean age 28.21 ± 2.43)	Investigate prevalence of adult ADHD among Turkish surgical trainees and explore its impact on surgical specialty choice	ADHD is common among surgical trainees and may influence specialty choice. The demanding surgical environment may allow trainees to channel ADHD traits into focused, goal-directed performance.
Thabane et al.	2024	BMJ Open	Mixed-methods study	82 surgeons and trainees (43 junior, 28 seniors; 51.2 % female; ages 24–73; specialties: general surgery, orthopaedics, plastic surgery 71.9 %)	Assess creative potential using divergent thinking measures; identify associated factors; explore value of creativity in surgery	Divergent thinking in surgeons is generally comparable to normative adult populations, but originality may be below average. Structured support may help leverage creative potential.
Ellis et al.	2024	The Surgeon	Retrospective cohort	2690 UK graduates undergoing Higher Surgical Training (ST3) selection (2012–2019)	Investigate impact of disability on HST selection success	No significant difference in likelihood of success at Higher Surgical Training (HST) selection between applicants with and without disabilities. Differential attainment exists among other sociodemographic groups, requiring further exploration.
Ellis et al.	2022	Journal of the Royal Society of Medicine	Retrospective cohort study	9600 MRCS Part A and 4560 Part B candidates (2007–2017) with linked UK- medical education database (UKMED) disability data	Assess impact of disability on MRCS exam performance	Candidates with registered disabilities may perform less well in formal written exams, but with comparable prior academic performance, they are equally likely to pass MRCS at first attempt. Early career attainment differences need further investigation for equity.

underestimates true levels due to underdiagnosis and reluctance to disclose (Table 2).

2. Challenges Faced by Neurodivergent Surgeons

Table 2
Summary of themes, supporting evidence, and implications.

Theme	Supporting Evidence	Implications
Prevalence and Recognition	Unal et al.: ADHD prevalence among Turkish surgical trainees: 31.6 %, hyperactive subtype predominant; departmental variation observed Shaw et al.: 29 % of autistic doctors conceal diagnosis due to stigma and professional concerns. Ellis et al. (2024): 6.6 % of MRCS Part A candidates declared a disability, mostly SpLD (Ellis et al., 2022); 8.2 % of higher surgical training applicants declared a disability, 5.7 % were SpLD.	Neurodivergent traits may be under-recognised in surgical trainees; concealment, stigma, and departmental variations limit prevalence recognition. Early identification and awareness initiatives are needed to capture true prevalence.
Challenges	Unal et al.: ADHD-positive trainees less likely to choose surgery based on intrinsic interest. Ellis et al. (2022): MRCS Part A pass rates lower for candidates with disabilities (46.3 % vs 59.8 %) Disability remains linked to higher failure risk even after adjustment (Ellis et al., 2022).	Surgical environments may exacerbate ND difficulties. Targeted support and adapted assessment frameworks are required to ensure equitable training and reduce differential attainment.
Strengths and Contributions	Unal et al.: ADHD traits may align with dynamic surgical demands. Ellis et al. (2024): Applicants with SpLD achieved comparable or slightly higher success rates in some specialties.	Leveraging ND strengths could enhance surgical innovation, clinical performance, and patient care. Supportive environments allow ND traits to positively impact outcomes.
Workplace Support and Accommodations	Ellis et al. (2022): Early academic support mitigates performance gaps. Ellis et al. (2024): disability status not an independent predictor of higher surgical training success when safeguards exist.	Institutional structures need to evolve to retain ND surgeons, optimise performance, and implement formal accommodations. Proactive support can reduce inequities and maximise potential.
Training and Professional Culture	Unal et al.: ADHD trainees have different motivations for entering surgery. Ellis et al. (2022): Early assessment disparities can be mitigated in later stages if recruitment is fair.	Training and evaluation frameworks should be adapted to account for ND differences, reduce inequities, and foster inclusion. Systemic reform in assessment and workplace culture is necessary for ND surgeons to thrive.

Neurodivergent surgeons encounter a range of challenges. ADHD-positive trainees were less likely to select surgery based on intrinsic interest and more likely to report external or random reasons for their choice [15]. Sensory demands in the operating theatre, such as loud alarms, bright lights, and high-intensity environments, were reported to increase stress. Quantitative evidence reinforces these challenges: MRCS Part A pass rates were significantly lower for candidates with disabilities (46.3 % vs 59.8 %, $p < 0.001$), with status remaining associated with higher risk of failure even after adjustment for sociodemographic and prior academic factors [16].

3. Strengths and Contributions

Despite challenges, neurodivergent traits have been associated with valuable strengths. Reported attributes include attention to detail, creativity, resilience, problem-solving ability, and strong work ethic. ADHD traits such as high energy and stimulation-seeking may align with the demands of surgery, allowing trainees to channel tendencies into productive performance [15]. Applicants with SpLD achieved comparable or slightly higher success rates than non-disabled peers in some specialties, supporting the view that supportive structures can mitigate disadvantage [17].

4. Workplace Support and Accommodations

Workplace support structures for neurodivergent surgeons remain limited. Suggested accommodations include quiet spaces, flexible job plans, uniform and temperature adjustments, concise instructions, and tailored social interactions. Evidence from Ellis et al. indicates that early academic support can mitigate attainment gaps, and that disability status was not an independent predictor of higher surgical training success when safeguards were in place [16,17].

5. Implications for Training and Professional Culture

Neurodivergent trainees may face difficulties with rigid and subjectively assessed expectations around communication, professionalism, and teamwork. Significant differences between ADHD and non-ADHD trainees in their motivations for pursuing surgery indicate that traditional evaluation frameworks may not fully capture the potential of neurodivergent individuals [15]. The findings of Ellis et al. (2022) underscore the potential impact of existing examination structures in perpetuating inequities, while Ellis et al. (2024) highlight that such disparities can be mitigated at later training stages if recruitment processes are fair and objective [16,17]. Together, these studies emphasise the need for systemic reform across both assessment and workplace culture to ensure neurodivergent surgeons can thrive.

4. Discussion

To our knowledge, this is among the first reviews to synthesise evidence on neurodiversity within surgery. Despite few eligible studies, consistent themes emerge: under-recognition of neurodivergence; distinctive challenges in training and practice; meaningful strengths contributed by neurodivergent surgeons; and limited, often informal, workplace support.

Neurodivergence exists within the surgical workforce but is frequently unrecognised. Low disclosure rates, driven by stigma and fear of professional repercussions, likely result in underestimates of true prevalence [5,19,20]. This invisibility not only limits understanding but also prevents the development of effective support structures. The literature consistently highlights how the demands of surgical training can amplify difficulties associated with neurodivergence. High-stakes assessments, rigid professional norms, and sensory pressures in the operating theatre represent structural and cultural barriers [19,20]. Beyond their immediate impact on attainment, these challenges risk contributing to attrition, burnout, and inequity if left unaddressed [5, 21].

At the same time, neurodivergent traits may be particularly well suited to the demands of surgery. Creativity, pattern recognition, sustained focus, and tolerance of pressure are frequently cited as strengths that can enrich clinical performance and team functioning [22,23]. Recognising these attributes reframes neurodiversity not as a deficit but as a source of value to the profession.

Support remains patchy and often informal. While practical accommodations are described, consistent policies and pathways are uncommon. Professional bodies should embed neurodiversity within equality,

diversity and inclusion agendas, normalise confidential disclosure routes, and resource reasonable adjustments (e.g., scheduled breaks/quiet spaces, sensory-aware environments, clear written instructions, exam accommodations). Crucially, the culture of concealment reported in wider medical literature must be challenged to enable safe access to support [24].

Neurodivergence interacts with gender, ethnicity, and socioeconomic status, which can compound or mitigate disadvantage. The hidden curriculum of surgery emphasising conformity, hierarchy, and narrow definitions of professionalism may intensify challenges for those who think or communicate differently [20]. Intersectional and cultural perspectives are therefore essential to understanding inequity in surgical training [25,26].

Supporting neurodiversity in surgery is not only an equity issue but also a matter of patient care and workforce sustainability. Surgeons who feel compelled to conceal traits or who lack accommodations may experience stress, fatigue, or disengagement, which could affect performance [21]. Conversely, creating environments that allow neurodivergent surgeons to thrive may enhance surgical innovation, accuracy, and resilience, with downstream benefits for patients. However, evidence on the effectiveness of existing support mechanisms remains limited. Although reasonable adjustments such as extra time are available to candidates declaring a disability in postgraduate surgical examinations, existing datasets do not capture the nature, timing, or adequacy of these accommodations, limiting evaluation of their effectiveness.

Limitations of the evidence include small samples, single-centre designs, potential selection and reporting bias, reliance on self-report or screening-positive status rather than diagnostic confirmation. Studies were conducted in a limited number of institutional and cultural contexts, which may influence disclosure and symptom reporting. Future work should (i) estimate prevalence using validated measures in multi-centre cohorts; (ii) follow trainees longitudinally to examine attainment, progression and well-being; and (iii) evaluate pragmatic interventions, including standardised adjustments, supervisor education, and inclusive assessment frameworks using mixed-methods and implementation outcomes (ensuring acceptability, feasibility, and fidelity). Such studies should also incorporate objective clinical performance metrics and patient-level outcomes, as their absence currently limits inference regarding clinical impact. Clear reporting standards and consensus terminology would improve comparability across studies.

5. Conclusion

Neurodiversity in surgery is an overlooked dimension of diversity and inclusion. While neurodivergent surgeons face challenges, they also bring distinctive strengths to the profession. Recognition, early support, and structural inclusivity are essential to ensuring equity and optimising the contributions of this group. Addressing stigma, embedding accommodations, and integrating neurodiversity into surgical education and workforce strategies will be critical in building a more inclusive and resilient profession.

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Declaration of competing interest

The authors declare that they have no known competing financial

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