Received: 10 September 2024 | Accepted: 2 April 2025

DOI: 10.1111/1467-8578.70020

ORIGINAL ARTICLE

The WISE Room: An innovative multisensory space for self-regulation and immersive support for neurodivergent students

Tor Alexander Bruce[1] | **Eve Champney-Smith**[1] | **Satu Eleftheropoulou**[1] | **Tom Nicholson**[1] | **Mark Lambert**[1] | **Barry Hill**[2]

[1]Health and Life Sciences, Northumbria University, Newcastle upon Tyne, UK

[2]Buckinghamshire New University, High Wycombe, UK

Correspondence
Tom Nicholson, Health and Life Sciences, Northumbria University, Newcastle upon Tyne, UK.
Email: t.nicholson@northumbria.ac.uk

Funding information
Northumbria University

Abstract

The evolving landscape of higher education necessitates a nuanced approach to accommodating the diverse needs of neurodivergent students, including those identifying as having autism, dyslexia, dyspraxia, attention deficit hyperactivity disorder, dyscalculia or Tourette's syndrome. Traditional settings often fail to provide adequate support, with measures implemented without consulting those directly affected. This can lead to conditioned apologetic behaviour, thoughts of withdrawal from education and diminished student well-being. Recognising this gap, the well-being in student education (WISE) room was conceptualised to offer a tailored space conducive to neurodivergent students' academic journey. Given that approximately 20% of students within the Faculty of Health and Life Sciences at Northumbria University identify as neurodivergent, this explorative study examines their perspectives on shaping an inclusive environment. Using workshops and an in-situ trial involving 18 neurodivergent students as experts by experience, we coalesced individual insights with communal aspirations. Thematic analysis of the qualitative data revealed the key factors influencing the creation of an inclusive digital environment. Findings highlight a pervasive sense of disconnection among neurodivergent students due to the lack of dedicated spaces, exacerbating feelings of marginalisation and impeding integration into campus life. A one-month reflective follow-up revealed optimism and appreciation for efforts towards inclusiveness. This study contributes to broader discussions about accessibility in higher education. By foregrounding neurodivergent perspectives, initiatives like The WISE Room hold promise for fostering equitable educational environments. Our findings raise critical questions about providing accessible spaces that truly meet the needs of neurodivergent students.

KEYWORDS
agency, autonomy, computer interaction, exploratory, extended reality environments, human, multisensory, neurodevelopmental, neurodivergent, neuroinclusivity

Key points

- As the population of neurodivergent students within higher education grows, it is vital that academic institutions respond to the needs of these students through environmental adaptations. This could include multisensory environments with inclusive design at the forefront.
- Immersive 'room-size' environments are common features across global education and health facilities. The potential for extended reality (XR) and

virtual reality (VR) experiences can be as innovative as the imagination of the developer(s). Future researchers might consider these settings instead of or in conjunction with, for example, a headset or other tech-related hardware or software.
- From the perspective of a user who could be challenged by conventional settings, The WISE Room's architecture provides affordances not typical to an average room, as a self-supporting system. From the viewpoint of personal autonomy, the experiential and in-person interactive functionality of immersive-type settings offers a reimagining of how spaces in general might accommodate individuals with alternative-to-conventional needs.
- Future developers of technologies like The WISE Room might consider how, in an educational, health or therapeutic context, these settings are not just spaces to enter and leave. The elements of whole-body engagement—where brain, body and environment engage seamlessly as one—could offer life-changing prospects.

INTRODUCTION

The increasing diversity of student populations in higher education presents challenges for institutions striving to provide effective and inclusive support. Neurodivergent students often experience a disconnect between the available support services and their lived experiences, underscoring the need for more integrated, personalised interventions (Clouder et al., 2020). The term neurodiversity, commonly attributed to Judy Singer (1998), has been reconsidered in light of more recent scholarship. Botha et al. (2024) argue that the concept did not originate from a single individual but was collectively developed within the autistic self-advocacy community. Figures such as Jim Sinclair and other early autistic activists played a foundational role in shaping the movement, which has since evolved to encompass broader neurodivergent identities. This shift in understanding is significant, as it reflects the broader participatory and co-constructed nature of neurodiversity theory rather than crediting one scholar.

This study follows the widely accepted distinction between neurodivergent and neurodiverse. Neurodivergent refers to individuals whose cognitive functioning diverges from the neurological majority, encompassing conditions such as autism, attention deficit hyperactivity disorder (ADHD), dyslexia and dyspraxia. Neurodiverse, on the other hand, describes groups that contain individuals with a mix of neurotypes, including both neurodivergent and neurotypical individuals (Botha et al., 2024). While there is ongoing debate over terminology, particularly in global contexts, this distinction aligns with how many neurodivergent communities describe themselves (Nair et al., 2024). The use of terminology in this study was informed by discussions with neurodivergent student participants to ensure that the language used aligns with their preferences.

In England, more than 1.5 million school-aged children have special educational needs (SEN), with a rising percentage of those lacking an education and health care plan. Secondary schools report key areas of need, including autism spectrum disorder (ASD); multisensory impairment; and social, emotional and mental health (SEMH) difficulties (Gov.UK, 2023). Among these conditions, ADHD is one of the most diagnosed neurodevelopmental disorders, affecting an estimated 5%–7% of school-age children and 2.5% of adults (Faraone et al., 2021). ADHD is associated with poorer academic performance, lower self-esteem and higher dropout rates (Sedgwick, 2018).

In higher education, students with autism often experience heightened anxiety due to the pressure to appear 'normal', highlighting the importance of fostering inclusive and supportive environments (Gerbuz et al., 2018). As increasing numbers of students with physical, emotional and cognitive challenges enter higher education (Pino & Mortari, 2014), institutions are struggling to provide adequate support. A lack of staff awareness and ineffective student support systems often result in neurodivergent conditions, such as ADHD, being grouped with mental health difficulties, leading to non-specific interventions that fail to address students' distinct needs (Sedgwick-Müller et al., 2022). A consensus statement from the UK Adult ADHD Network (UKAAN) recommends 'multimodal interventions', including environmental modifications and initiatives that combat stigma (Sedgwick-Müller et al., 2022). These measures can help build neurodivergent community identities by creating socially and environmentally safe spaces.

Beyond meeting basic human needs, such as shelter and sustenance, purpose and belonging are fundamental to personal identity and well-being. Identity formation and a sense of purpose reinforce each other (Bronk, 2012), which may particularly benefit neurodivergent students facing the complexities of university life (Clouder et al., 2020). Sensory needs, a recognised diagnostic criterion for autism (American Psychiatric Association, 2022) and a common challenge for ADHD students (Barkley, 2015), are critical in neuroinclusive design. Sensory sensitivities—ranging from hypersensitivity (intensified sensory experiences leading to avoidance) to hyposensitivity (reduced sensory perception

driving sensory-seeking behaviours)—can impact all eight senses, including interoception, proprioception and vestibular function. Autistic students report that university campuses can be both 'enabling and challenging' due to sensory factors, citing difficulties with noisy, crowded and bright environments but finding comfort in spaces designed with sensory needs in mind (O'Connor et al., 2024). Similarly, Howe's (2023) doctoral research found that most sensory experiences for autistic university students were negative.

The challenges extend beyond education. Only 29% of autistic adults are in any form of paid employment (Office for National Statistics, 2021), underscoring the importance of inclusive university environments that support neurodivergent students in developing their educational and professional potential. For those outside the predominant neurotype, a strong sense of purpose in an inclusive academic setting is critical to improving long-term opportunities and outcomes.

The design process

The layout and design of buildings and rooms—including elements such as noise, temperature, colour and clutter—significantly influence how individuals interact with their environment. There is growing recognition of the need to create built environments that are more accommodating to neurodiverse populations. Thoughtful design choices can enhance accessibility and comfort, particularly for those with sensory sensitivities. Developing an understanding of how design decisions impact users is essential in fostering inclusive participation (Black et al., 2022).

A study by Kimura et al. (2023) surveyed 372 respondents to evaluate the effectiveness of the *inclusive quiet room* (Figure 1). Their findings revealed that the room provided a sense of security and warmth, particularly benefiting individuals with sensory hypersensitivities. This research highlights the importance of incorporating inclusive design principles to create spaces that support neurodivergent individuals and enhance their overall well-being.

Physical, as well as social or pedagogical, aspects of the learning environment can disadvantage neurodivergent students; decision makers should consider factors such as lighting, seating and accessibility to quiet spaces (Hamilton & Petty, 2023). Similarly, Dwyer et al. (2023) highlighted interior design choices based on diversity, equity and inclusion (DEI) (Dwyer et al., 2023). Further research supports considering an environment's inclusivity as less of an add-on and more thoroughly as a part of the design from day one, thus supporting the very nature of inclusivity which is to not exclude anyone:

> Universal design strategies that offer customised 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.
>
> (Clouder et al., 2020, p. 775)

Development of The WISE Room

The well-being in student education (WISE) room was developed for students within the Faculty of Health and Life Sciences at Northumbria University, where approximately 20% of students are statistically recognised as neurodivergent. However, this figure raises questions about institutional categorisation. Student accessibility plans (SAPs) are support-to-study plans that provide tailored accommodations, but they do not necessarily capture

FIGURE 1 Inclusive quiet room. *Source*: Kimura et al. (2023).

the full spectrum of neurodivergent students. Many neurodivergent individuals do not access formal disability services, either due to stigma, lengthy diagnostic waiting times (Nicholson, 2023) or personal preference (O'Nions et al., 2023). As a result, the actual number of neurodivergent students requiring support is likely to be significantly higher than official figures suggest. Across the university, approximately 2100 students have identified themselves as requiring accessibility support, but this figure only accounts for those who have formally accessed student disability services. The actual number of neurodivergent students is likely to be significantly higher, as many may not have sought or received an official diagnosis.

A key challenge is the lengthy waiting times for adult ADHD and autism assessments in the local area, which range from three to five years. As a result, students who begin to recognise traits of neurodivergence during their time at university are unlikely to receive a formal diagnosis before completing their studies. This gap highlights the need for proactive institutional support, regardless of formal diagnoses.

While the university has implemented measures to promote inclusivity, there are limited designated spaces specifically designed to support neurodivergent students. Instead, students must often seek out existing spaces that may only partially meet their needs. Notably, the number of students requiring alternative learning support has increased by 36% over the past two academic years, further emphasising the demand for dedicated, neuroinclusive environments.

As a proof-of-concept prototype, The WISE Room provides a practical space where inclusivity-focused design ideas for neurodivergent students can be tested and refined. Figure 2a,b show members of the student accessibility team and students engaging with the space. The room incorporates both audio and visual elements and features interactive wall sensors to create an immersive experience. Through this study, we are exploring how The WISE Room can support student education, placement preparation and overall well-being.

METHOD

Researcher positionality

This project's team included a diverse range of expertise and experience in relation to neurodiversity. Most of the authors are neurodivergent, and the team included academic as well as university disabled student support staff, all with an interest in neurodiversity and/or inclusion.

We acknowledge the diverse positionality of the authors in relation to this work. This collective experience as academics and/or student support staff engaging as autism specialists on a daily basis has helped scaffold an understanding of how to approach our study from a neuroinclusive viewpoint, particularly when devising workshops and creating a data workbook, allowing students to engage in their own way and using words or visuals to express themselves.

Research questions

Our study asked the following research questions:

1. How do neurodivergent students describe themselves in terms of representing a diverse population?
2. What barriers have neurodivergent students experienced in the context of existing spaces or settings?
3. What are the initial thoughts relating to The WISE Room and how can it be enhanced in a context of neuroinclusivity?
4. How did the neurodivergent students experience the room? How did students reflect on their experience after one month?

Recruitment, sampling, data collection and analysis

The participant pool comprised 18 people, aged between 18 and 33 (10 female, 4 male, 3 non-binary, 1 gender nonconforming). Recruitment was via an Induction Day event and an access to autism working group, led by the student accessibility team. We adopted a non-homogeneous convenience sampling strategy and collected data at three intervals, with each student attending three workshops:

- Workshop 1: Initial discussion to identify barriers and observation of visuals relating to The WISE Room.
- Workshop 2: In-situ trial of The WISE Room.
- Workshop 3: Reflection and evaluation.

The data was transcribed and imported into NVivo. To extract codes and themes and examine both surface 'semantic' and underlying 'latent' meaning (Maguire & Delahunt, 2017), we employed a standard Braun and Clarke six-step analysis (Braun & Clarke, 2006). The data were initially entered by one team member before being reviewed across the wider team.

RESULTS

Students were initially requested to describe in their own words how they describe themselves in the context of Neurodivergence (ND) or Specific Learning Difference (SpLD). Their responses are shown in Table 1.

Prior to completion of the workbook throughout workshops 1 to 3, each student was asked to describe any barriers they had identified throughout their student

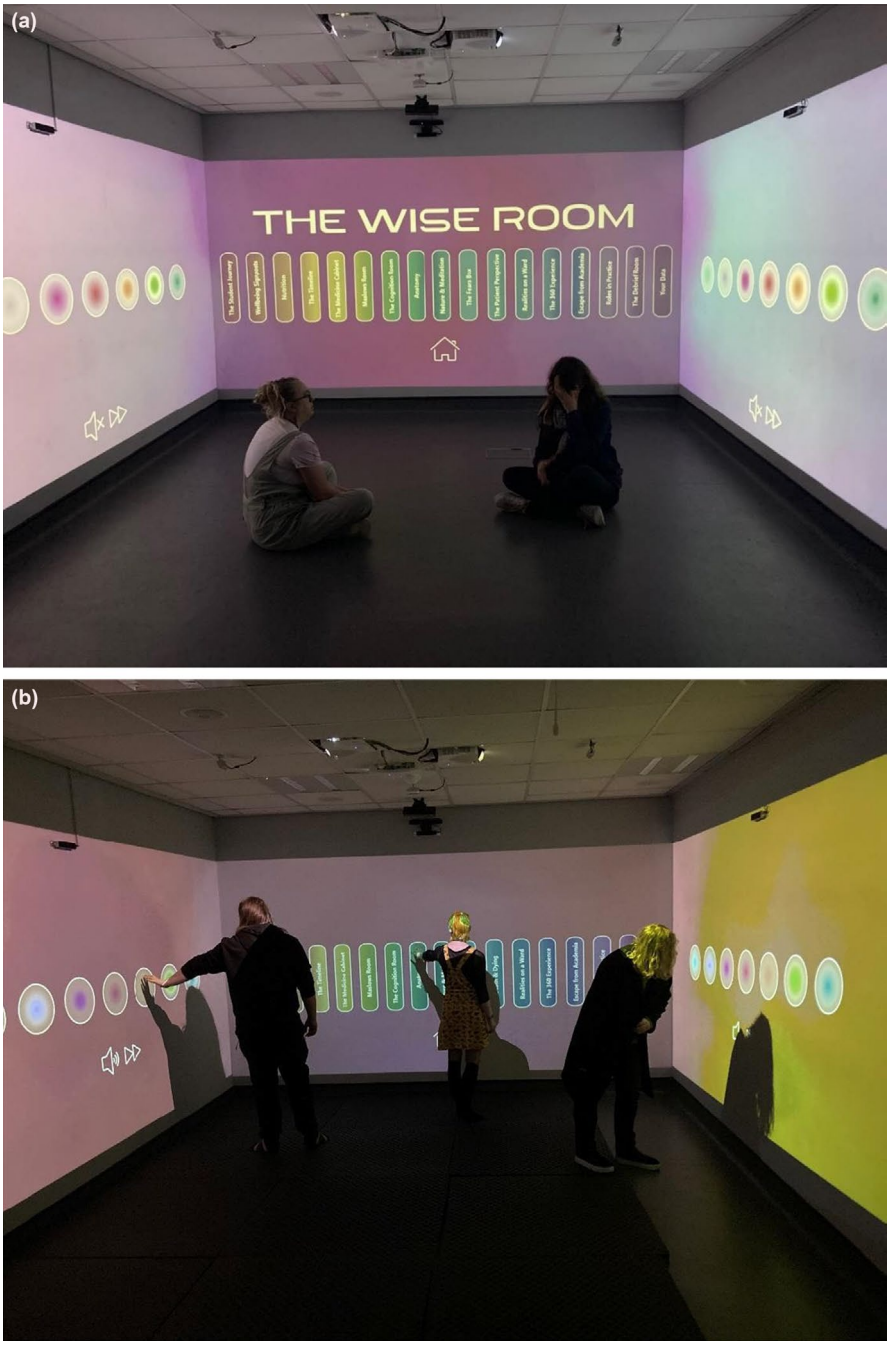

FIGURE 2 (a, b) The student accessibility team and students in The WISE Room.

experience and whether the university could work to improve its allocation of supportive practice, resources, improvements or additions to settings. Feedback included:

Barriers

(i) *Lecturers ignoring guidelines of SAPs; library is often full and loud even in quiet spaces—and the silent areas make me worried about getting into trouble for stimming. Finding a quiet spot that is private is difficult. Library study rooms are good but glass* (P001)

(ii) *Sometimes people's definition of quiet is different. So, you end up going somewhere highlighted as 'quiet' but it's set up by a neurotypical person so there may be background noises, a big group of people* etc. *They don't understand in the same way […] Staff don't follow through on adjustments* e.g. *putting slides on Blackboard in advance* (P002)

(iii) *I'm not sure if could be helped with [in] any way. I hate the normal classroom chairs. It is generally difficult for me to sit in the same position for too long* (P005)

(iv) *The rooms in the library—they have horrendous strip lights, which are very overwhelming […] There are*

TABLE 1 How students identify in their own words.

P	Identity in the context of ND
001	Autistic with traits of dyspraxia and auditory processing disorder
002	Autistic, AuDHD, ADHD, 'neurospicy', neurodivergent
003	Autism, dyslexia, dyspraxia
004	Autism, ADHD, dyslexia, neurodiverse
005	High-functioning autism spectrum disorder but likely also ADHD (mentioned by psychiatrist but undiagnosed)
006	Autism
007	I struggle to take in a lot of information at once. I struggle to keep track of multiple different tasks that I have to do. Loud and sudden noises can be quite upsetting for me.
008	Autism and ADHD
009	Autistic
010	Autistic but can mask enough to continue part-time work etc., so not as bad as others maybe
011	I have been diagnosed with autism spectrum disorder. I believe I have undiagnosed ADHD.
012	Dyspraxic, unneat /sic/ handwriting, slower to do anything, two sides to my body and brain
013	Person with autism
014	Moderate ADHD; trouble with concentration; restlessness; slight autism; trouble with loud noises; sensory issues with non-smooth objects
015	I identify as autistic. I consider it to be part of how I function as a person since it affects every aspect of my life, but it is not an illness/disorder because without autism I would be a different person genetically.
016	I would say that I am an individual with ASD (autism spectrum disorder) as well as dyspraxia.
017	I have autistic spectrum disorder. My sensitivity to sensory stimuli means that I struggle to retain concentration in the learning environment.
018	I have ASD and ADHD.

so many people around the university […] Some lecturers don't understand and can be loud or put jump scares on depending on the topic of the lecture (P009)

(v) *There is not a quiet room or sensory room* (P012)

(vi) *I have been assigned a presentation where they will mark you down for poor eye contact (this is written in a marking criteria). Some microphones used by lecturers have a lot of crackle/background noise to them and this can cause a sensory overload/distraction for many students* (P015)

(vii) *Windows must be open in self-ventilated rooms, allowing noise from the outside to stream in, creating distraction […] Certain seminar rooms don't have working/any speakers, so computer speakers are used. They aren't loud enough to mask background noises […] Harsh overhead lights, which don't seem necessary for daytime lectures* (P017)

TABLE 2 Themes and sub-themes from Workshop 1.

Themes	Sub-themes
First impression of The WISE Room	Uncertainty
	Potential to meet need
Features of the environment	Embracing interactivity
	Stimulation

(viii) *Loud environments where I can't understand what is being said to me, a lack of clear instructions, over-reliance on computer[s]* (P018)

Improvements

(i) *Would be nice to see [a] dedicated sensory room with diverse seating options and fidgets. Private bookable rooms out of sight to study in/calm down in that aren't glass* (P001)

(ii) *Spaces for timeout that are specifically for neurodiverse people that are easy to access—don't need to book, can use when needed* (P004)

(iii) *Frankly, the university already does a lot, but the classrooms could have better lights, maybe nicer chairs […] Mostly though, I'd focus on educating lecturers on potential barriers so they can be more understanding* (P005)

(iv) *Advance notice for when things change* (P006)

(v) *Sensory room that is always open for sensory regulation* (P008)

(vi) *Light dimmers in every room* (P009)

(vii) *Having more seating options at different levels*—e.g. *floor seating/bean bags* (P011)

(viii) *Measuring students' competence in more holistic ways*, e.g. *engagement* vs *eye contact. Provide information about sessions, such as workshops (content of the workshop and what to expect), prior to the session, so students know exactly what to expect when they attend* (P015)

Workshop 1

These initial insights offered perspectives that were unique to each student in relation to how they see the world. The ongoing workshop sessions resulted in two interrelated themes and four sub-themes, as shown in Table 2.

Theme 1: First impression of The WISE Room

During the initial workshop, participants were shown visual imagery and a video depicting The WISE Room, without any arranged in-situ visit. There was some initial apprehension among the group due to it being something very new, although the workshop also resulted in a high level of intrigue.

Sub-theme 1: Apprehension

- Potentially overwhelming: *May not be useful if you are in an already overwhelmed state as it could quickly in itself be overwhelming* (P004).
- Impractical useage: *Not very practical if one person wishes to use it at the same time for different purpose[s]* (P005).
- Visually unsettling: *Nothing eye-catching or bright and a little creepy* (P010).

Sub-theme 2: Potential to meet need

- Multisensory capabilities: *It hits three of five senses—see, hear, feel* (P003).
- Room dynamics: *It has a lot of potential for a sensory room […] From photos it looks like a good size—not too large to be overwhelming, not too small to be claustrophobic* (P008).
- Healing space: *I love it. I can see how such a room can facilitate reflection and emotional processing. This is important not only for healing trauma but [also] for processing day-to-day emotions that aren't always processed effectively. People with diverse identities could benefit from this room to explore how they feel about themselves and their story even in a world that hasn't accepted them* (P015).

Theme 2: Features of the environment

Each participant was asked what could be introduced to the room and the features it might contain. Shifting the focus from what The WISE Room appeared to contain to what it might be able to feature stimulated the participants' imaginations.

Sub-theme 1: Embracing interactivity

- Customised space: *Tactile elements*, e.g. *responsive when pressing walls […] Customisable music/noise such as white noise for relaxing […] Fully fleshed out environment with soundscapes and ambience* (P001).
- Hanging features: *A huge sensory swing* (P002).
- Personalised seating: *Have a chair that ergonomically suits different types of sitting, body sizes* etc. *and importantly not to obstruct [the] view of a display* (P016).

Sub-theme 2: Stimulation

- Meeting mobility needs: *I would like more stimuli for other senses such as stim toys, blankets, seating to make it more accessible to people with mobility disabilities, controllable volume level, control for the brightness, intensity and colour saturation of the screens* (P008).
- Olfactory senses: *Nice smells but not strong ones* (P010).
- Temperament of the setting: *Calming colours*, e.g. *blues, oranges, pinks […] temperature control—hot or cold […] stress relief, fidget toys* (P014).

These findings reveal initial apprehension among the participants when viewing visual depictions of The WISE Room, together with a sense of intrigue. Uncertainty emerged regarding potentially overwhelming aspects and privacy concerns, contrasted with recognition of the environment's multisensory capabilities and its potential as a healing space. When participants shifted their focus towards the features of the environment—envisioning interactive elements like tactile surfaces and customisable music, as well as stimuli to cater to diverse needs, such as mobility aids and olfactory stimuli—their responses highlighted the potential they imagined for the space. The environment's temperament was emphasised, with suggestions for calming colours, temperature control and stress-relief tools. Overall, the findings highlight the complexity of participants' perceptions and their diverse ideas for enhancing inclusivity and engagement within the environment.

Workshop 2

There were distinct differences in the participants' responses when physically in the room and engaging with it compared to viewing a visual depiction. Participants who had already mentioned The WISE Room's potential to meet needs and offer stimulation via a range of multisensory features were animated during Workshop 2 when they visited the space in situ. Here, they were requested to describe their experience of the room and voice any additional thoughts regarding the environment's inclusiveness and ability to meet the requirements of others. It became evident that the participants who trialled the room had excellent contributory ideas to share and had very much already considered the importance of environment as integral to their daily needs (Table 3).

Theme 1: A flexible setting

The participants' diverse needs were met by the setting's adjustable features and space in which to move around.

TABLE 3 Themes and sub-themes from Workshop 2.

Themes	Sub-themes
A flexible setting	Adjusting to diverse requirements
	Spatial navigation
Incorporating new commands	Visual stimulus
	Generating immersion

Their responses showed that having control over what takes place in The WISE Room was required.

Sub-theme 1: Adjusting to diverse requirements

- Personalised control: *Immersive. Needs easy controls. Opportunity to meet different needs—seeking and avoiding. Can be so many different things* (P004).
- User autonomy: *I liked how interactive it is. The colour changing, volume control* etc. *is good. The dolphins in the meditation room are great. The anatomy room is good—I like the movement. Well-organised and easy to navigate* (P008).
- Therapeutic colours: *I also liked the option to change the colours of the room. Those who experience visual stress/photophobia can be more sensitive to certain colours/feel calmer with certain colours* (P015).

Sub-theme 2: Spatial navigation

- Supportive programming: *When I was told how The WISE Room worked, I found it easy to understand and navigate since the options were clearly displayed on the screen in the way that did not overwhelm me with lots of new information. The mats on the floor were very comfortable to both stand and sit on, which, like the low lighting, helped to create a calming atmosphere and make me feel at ease. Many of the programmes in The WISE Room looked like they could be very helpful for neurodivergent students, especially the meditation and the fears box programme* (P007).
- Moving through seasons: *The room was spacious and provided a calming and comforting experience—could include a remote control; console/headphones; calming environment, such as winter/summer locations; possibly slow changing colours. Possibilities are endless* (P014).
- Interactive mapping: *I think The WISE Room could be used to aid neurodiverse students by displaying different situations that could potentially happen and different ways to seek support. It could also be useful to have an interactive map of the university grounds to help new students navigate the environment and maybe some meditation programmes (nature scenes and the like) […] I think it would be a big hit with students who enjoy new technology, especially those who are sensory-seekers and enjoy such things as sensory room[s] and light shows* (P018).

Theme 2: Incorporating new commands

Immersion in a setting can offer a sense of calm, particularly in situations where a person with autism may find it challenging to adapt.

Sub-theme 1: Visual stimulus

- Video media: *Make the room more welcome [*sic*], like [add] fake plants. Ideas for videos: video of [a] walk-through of freshers' fair, open days, library, student union. Overall, the environment was well designed, and a lot of research/thought went into the making of this room* (P003).
- Pictural communication: *Programming ability to use pecs (picture communication) to start and continue conversations. Sometimes autistic people can't describe how they are feeling but pictures, sounds* etc. *may help to start begin that conversation* (P002).
- Adapting to new situations: *I enjoyed visiting The WISE Room. Being surrounded by light in that dark room is very calming. I particularly liked the fears box since this would be such a good tool for practising new situations before actually encountering them. As an autistic person, it can be harder for me to adapt to [a] new situation in the moment, so this would really help* (P015).

Sub-theme 2: Generating immersion

- Immersion through sound: *Optional Bluetooth headphones. More immersive soundscapes and per-person choice on the music/volume. Interactive whiteboard wall might be nice. More colours, more sounds, more nature! Vortexes and stock footage. Swirling colours and virtual landscapes!* (P001).
- Experiential 360°: *Wrap around visions* (P006).
- Vital environment: *"It's been quite positive. Seeing the potential the room has is very expansive. Where different sensory experiences can be isolated to see individual impacts. For [a] 360° experience, have something that is not static, like a live urban environment, to show people going around to feel more immersed. Having those with a neurodiversity allows so much, as individuals have to map themselves to how they operate around different experiences, so having a focus on this is vital and needed"* (P016).

Participant responses indicate that they valued the immersive interactive functionality of The WISE Room, with its potential to meet varying, diverse needs of a student population whose requirements can be otherwise under-represented. Findings included students wanting autonomy over what could realistically be programmed and uploaded as content into the space, as well as having ability to change the mood—particularly where this could have ability to alleviate visual stress. The students voiced that navigation was straightforward, due potentially to the scale of the space, where this could be adapted to be used as a tangible map in support of new recruits to university-based programs who are just getting started.The capabilities of the immersive system in total in offering both auditory, visual and kinaesthetic stimuli, added to the

participatory sense of being surrounded, with feedback suggesting this could be used to practice unfamiliar situations. Overall, meeting diverse needs, being supportive and permitting an ability to move through The WISE Room as an environment, were voiced as important, even vital affordances.

Workshop 3: Reflection

The final workshop took place one month after the in-situ trial of the technology, offering student participants time to consider their experience. The participants' views were constructive, and they welcomed the efforts made to develop an inclusive environment exclusive to their needs. For clarity, where 'city campus' is mentioned, this relates to the central buildings of the university, where there is nothing akin to The WISE Room at this location. The study took place at a campus a few miles from central

(i) *Really exciting and positive that the uni is continuing to improve the diversity and inclusion* (P002).

(ii) *If the room is supposed to be generally available, I think one useful door could be an 'information' door about autism, ADHD and neurodivergent brain[s]* (P005).

(iii) *I think there needs to be an autism-friendly space on campus and a WISE room environment in [*sic*] [the] city campus* (P006).

(iv) *I think a WISE room on [the] city campus would be an asset to neuroinclusivity at [host university]. This could be used by students either in both booked sessions or open access, depending on what individual students prefer since I think that this would be a great space for neurodivergent students to go to to de-stress* (P007).

(v) *I really enjoyed the experience of the immersive room. I could see it being adapted for a neurodiverse-inclusive environment. It would be great to have a safe space at uni that is there permanently to be able to regulate* (P008).

(vi) *It would be beneficial to have one of these rooms on campus which could be booked by students (priority to neurodivergent students). This would help with stress and anxiety and the room could be used when a student gets overwhelmed and needs a quiet space to relax* (P009).

(vii) *I think it should be used for guided sessions, rather than a sensory room that you can use to regulate or calm down. I think it would be really good for mindfulness sessions, guided meditation for groups or even one-to-one sessions. It could be good for promoting mental health in general, not just neurodiversity-coping methods* (P010).

(viii) *I want to see the room at [the] city campus where I can go to regulate myself in a neurodiverse-friendly place* (P011).

(ix) *Very positive idea—beneficial for individuals with neurodiversity. Calming environment with help with mitigating stress from hypersensitivity/uni work* etc. (P014).

(x) *I think The WISE Room is a great project. I'm interested to see what the addition of VR headsets could bring to the table. Social VR platforms can be a useful tool for neurodiverse individuals to cope with social anxiety/isolation. People of any neurotype could book the room for when they need a calm moment* e.g. *coping with the exam stress* (P015).

(xi) *Reflecting back, I do think that the isolating effects that The WISE Room could bring a lot of invaluable data by having stimuli being introduced one at the time to see the effects on an individual, neurodiverse or not. That way people can learn their tolerance to real-life simulations or purely artificial ones. And how other examples I've gave [*sic*], such as temperature, sound, light (general sight), can be added/changed/removed to see the effects it can give. Improved hardware to make the simulation/display look more seamless as you would normally see it and adding a way to have an overhead display can further help with immersion. Some people may prefer to sit in a chair, stand and walk around to interact with the displays, or even lay [*sic*] down on the ground* (P016).

(xii) *I like The WISE Room, and it already feels quite inclusive. However, to increase comfort, it needs comfortable seating, fidget toys, weighted blankets, a no-food policy (because of smell). It would be nice to have easily accessible meditations. This is certainly a space I would like to use during breaks on longer university days to regulate* (P017).

The neurodivergent students' reflections on the university's efforts towards inclusivity emphasised the importance of dedicated spaces, like The WISE Room. They expressed intrigue and excitement for ongoing improvements in diversity and inclusion while suggesting practical enhancements, such as an 'information door' (P005) providing education about neurodiversity. The participants advocated for the presence of autism-friendly spaces on campus and highlighted the benefits of a permanent WISE room for stress relief and regulation. Suggestions included prioritising neurodivergent students' access, offering guided sessions for mindfulness and mental health support and incorporating VR technology, such as head-mounted displays (HMDs), for immersive experiences. Reflecting on their in-situ visit, the students articulated a need for continuous improvement, including comfortable affordances and easily accessible resources, like meditations, for regulation. Overall, the reflections highlighted the positive impact inclusive spaces such as The WISE Room could have in promoting well-being and arguably consequent academic success for neurodiverse individuals.

DISCUSSION AND LIMITATIONS

This study's findings highlight the complexities of designing inclusive spaces for neurodivergent students in higher education. The development and in-situ trial of The WISE Room demonstrated that immersive, multisensory environments have the potential to support self-regulation, well-being and academic engagement. The results provide compelling evidence that such spaces can foster a sense of belonging and mitigate environmental barriers that are often overlooked in traditional university settings. However, they also raise important questions about how institutions conceptualise and implement neuroinclusive interventions, particularly given structural and financial constraints (Clouder et al., 2020; Dwyer et al., 2023).

The study aligns with broader research on the disconnect between institutional support structures and the lived experiences of neurodivergent students. Barriers, such as sensory overload, difficulties accessing quiet spaces and inconsistent adherence to reasonable adjustments, reflect well-documented challenges within higher education (Hamilton & Petty, 2023; O'Connor et al., 2024). Many participants reported struggling to find dedicated spaces that accommodate their sensory and cognitive needs, reinforcing previous research on the impact of sensory regulation on student success (Morgan, 2019). While mechanisms such as student support plans (SAPs) aim to formalise individualised support plans, participants expressed concern over the inconsistent implementation of these plans. Some reported that staff did not always appreciate SAP guidelines, particularly when it came to adjustments related to environmental and sensory needs. This suggests that meaningful inclusion requires more than just providing support plans; it necessitates a cultural shift in how academic staff and institutions perceive and implement neuroinclusive policies. Findings indicate that institutional support should be embedded at a structural level, rather than relying solely on individual adjustments, aligning with research advocating for universal design approaches in education (Clouder et al., 2020).

The study also contributes to growing discussions on the role of multisensory and extended reality (XR) environments in higher education. The participants valued the ability to control aspects of The WISE Room, such as lighting, soundscapes and interactive elements, which aligns with research on the benefits of sensory-friendly spaces (Kimura et al., 2023). The room provided opportunities for emotional regulation, offering a space where students could process emotions and find respite from overwhelming campus environments (Black et al., 2022). The capacity for personalisation and agency emerged as key factors in participants' positive experiences, reinforcing universal design principles that emphasise flexibility and adaptability (Hutson & Hutson, 2023). The study supports the idea that XR and immersive environments can create meaningful, engagement-driven experiences for neurodivergent students (Boyd et al., 2018), although findings also caution against the potential for sensory overload, highlighting the need for carefully calibrated, opt-in features that allow users to tailor their experience to their individual needs (Howe, 2023).

Despite the positive reception of The WISE Room, the findings underscore the persistence of structural barriers that impede effective neuroinclusion. Institutional responses to neurodivergent students remain inconsistent, with many participants reporting that their experiences were often dismissed or misunderstood. A recurring issue in higher education is the tendency to conflate neurodivergence with mental health challenges, leading to generic interventions that fail to address distinct cognitive and sensory needs (Sedgwick-Müller et al., 2022). Additionally, diagnosis-dependent support models create further exclusion, as many neurodivergent students face prolonged waiting times for formal diagnoses (O'Nions et al., 2023). A shift towards proactive, universal design-based policies would allow institutions to move beyond reactive accommodations and embed accessibility into all aspects of campus life (Botha et al., 2024).

Additionally, long waiting times for formal ADHD and autism diagnoses further complicate access to institutional support, leaving many students without the necessary documentation to secure accommodations (O'Nions et al., 2023). The findings raise ethical concerns about the reliance on diagnosis-dependent support models, which may exclude students who recognise their neurodivergence but are unable to obtain formal confirmation due to systemic healthcare delays (Botha et al., 2024). Addressing these barriers requires a fundamental rethinking of how higher education institutions approach neurodiversity, moving beyond reactive accommodations towards a proactive model that embeds accessibility into all aspects of campus life (Singer, 2023). Armstrong (2015) argues that the distinction between normal variation and pathology is often socially constructed, questioning where the threshold for conditions such as ADHD, autism and intellectual disabilities should be drawn. However, such framings risk reinforcing a binary view of either pathology or normality. The neurodiversity movement instead challenges this dichotomy by recognising that neurodivergent individuals can experience disability and barriers without necessarily being 'disordered' in a medicalised sense (Houting, 2018). This perspective aligns with the social model of disability, which posits that societal barriers, rather than inherent deficits, create disabling experiences for neurodivergent individuals (Clouder et al., 2020). By embedding neuroinclusive design into educational settings, as demonstrated in The WISE Room project, institutions can move beyond deficit-based approaches and towards proactive accessibility.

This study has several limitations that should be considered. The research was conducted within a single

university and was initially funded as a six-month research project via NHS England. Because of its success, additional funds were made available for the current study with a major limitation being both the availability of funds as well as timescales. This limited the generalisability of the findings to other institutions with different policies and infrastructures. The sample size, while providing rich qualitative insights, remains relatively small, meaning that findings may not fully capture the diversity of neurodivergent experiences (Braun & Clarke, 2006). Additionally, recruitment through disability support networks may have introduced sampling bias, as participants were likely to have greater awareness of neurodiversity-related issues (Howe, 2023). Another limitation is the short follow-up period. While students reflected on their experiences one month after using The WISE Room, further research is needed to assess the long-term impact of such spaces on well-being, academic performance and student retention (Gerbuz et al., 2018). Future research should consider multi-institutional studies with larger participant groups to explore the broader applicability of neuroinclusive design strategies.

The study reinforces the critical role of environmental design in supporting neurodivergent students and demonstrates the potential of immersive, multisensory spaces in higher education. The WISE Room provides a tangible model for integrating neuroinclusive principles into campus environments, aligning with calls for universal design and proactive accessibility measures (Armstrong, 2015). However, meaningful inclusion requires systemic institutional change, moving beyond individual accommodations towards a comprehensive reimagining of educational spaces (Smith & Kirby, 2021). By foregrounding neurodivergent perspectives and prioritising co-designed interventions, universities can create environments that not only accommodate difference but actively recognise and celebrate cognitive diversity as a fundamental strength.

CONCLUSION

The WISE Room project demonstrates how an immersive, multisensory environment can foster a more inclusive learning experience for neurodivergent students. By centring student perspectives, the study highlights the need for dedicated spaces that allow personal control over stimuli, reducing anxiety and improving engagement. The findings emphasise that neuroinclusion must extend beyond individual adjustments, requiring a broader institutional commitment to universal design principles.

The project underscores the importance of expanding neuroinclusive spaces, embedding staff training on neurodivergent experiences and integrating universal design into teaching and assessment. Longitudinal research is needed to assess the long-term impact of such interventions on academic success and student retention. Institutional policies should shift from diagnosis-dependent accommodations towards proactive, embedded neuroinclusive infrastructure, ensuring equity across higher education. By implementing these measures, universities can move beyond reactive support to create environments where neurodivergent students are not only accommodated but empowered to thrive.

ACKNOWLEDGEMENTS

The authors acknowledge the research participants; without their involvement, the research would not have been possible.

FUNDING INFORMATION

Our study was funded via the Vice Chancellor's Diversity Fund at Northumbria University on 16 August 2023.

CONFLICT OF INTEREST STATEMENT

The authors report no conflicts of interest.

DATA AVAILABILITY STATEMENT

To respect the participants' confidentiality, consent was not sought to make the original transcripts available. Therefore, the data cannot be made open access.

ETHICS STATEMENT

Ethics approval was sought via application 4935 and granted by Northumbria University's Faculty of Health and Life Sciences on October 30, 2023.

ORCID

Tor Alexander Bruce https://orcid.org/0000-0002-9997-9786
Tom Nicholson https://orcid.org/0000-0003-3833-3284

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How to cite this article: Bruce, T.A., Champney-Smith, E., Eleftheropoulou, S., Nicholson, T., Lambert, M. & Hill, B. (2025) The WISE Room: An innovative multisensory space for self-regulation and immersive support for neurodivergent students. *British Journal of Special Education*, 00, 1–12. Available from: https://doi.org/10.1111/1467-8578.70020