"A calm space to reset": perceptions of sensory rooms in Australian public buildings

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Abstract

Purpose – Sensory rooms are designed to support users to regulate their sensory systems and have historically been used as a therapeutic modality by autistic people and others in educational and healthcare facilities. Sensory rooms (also commonly known as reset rooms or quiet rooms) are increasingly being incorporated into public buildings, such as sporting stadiums, yet there is a lack of evidence supporting their use, design and management as a public facility. The purpose of this study was to explore the use of sensory rooms in Australian public buildings, identify factors influencing use, design and management and describe outcomes gained.

Design/methodology/approach – A mixed-methods approach was employed, and data were collected via online survey ($n = 57$) and semi-structured interviews ($n = 4$). Participants identified as autistic, neurodivergent, people with disabilities, carers and/or supporters and industry personnel.

Findings – Users reported that sensory rooms were beneficial for sensory and emotional regulation, extended their stay in public buildings and enabled community participation. However, challenges were noted in relation to design, the impact of the social environment and the unpredictability of design and equipment available. Industry personnel also perceived strong value in sensory rooms and highlighted challenges relating to safety, promotion and meeting the needs of multiple users.

Originality/value – This study contributes new empirical evidence supporting the inclusion of sensory rooms in public buildings. Findings offer guidance on how these facilities can be designed and managed to enhance usability and effectiveness.

Keywords Sensory rooms, Autism, Neurodivergence, Public buildings, Sensory regulation, Accessibility

Paper type Research paper

Introduction

Universal design aims to create spaces, buildings, and infrastructure that are accessible, useable, and inclusive for everyone, regardless of age, ability, or other characteristic (Mace, 1985). As a widely recognised strategy for promoting social equity and participation,

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particularly for people with disability, universal design is explicitly referenced in the Convention on the Rights of Persons with Disabilities (United Nations, 2006). Yet, despite ongoing efforts to implement universal design and improve accessibility, many people continue to encounter barriers in the built environment that restrict their full and equitable participation in society.

Beyond physical elements of design, the sensory design of environments may impede access and participation, particularly for neurodivergent people. Neurodivergence refers to natural variations in brain function and cognitive processing that differ from what is considered neurotypical (Dwyer, 2022). It encompasses autism, attention-deficit hyperactivity disorder (ADHD), dyslexia, dyspraxia, and other neurological differences (Hughes, 2021; Anderson-Chavarria, 2022; Shah *et al.*, 2022). Many autistic people experience sensory processing differences, or difficulties (American Psychiatric Association, 2022), whereby a person is over- and/or under-responsive to sensory stimuli of various forms (Kirby *et al.*, 2015; Smith *et al.*, 2020). As a result, the design of indoor built environments can be challenging to autistic people (Mostafa, 2018; Suzuki *et al.*, 2019; Black *et al.*, 2022; Griffin *et al.*, 2022; McAllister *et al.*, 2022; Zaniboni and Toftum, 2023). More specifically, a recent literature review conducted by Black *et al.* (2022) identified the following aspects of architectural design as potential barriers for autistic people: (1) design and construction: layout; walls; building material; ceilings; entrances; orientation; (2) lighting: light intensity; light quality; light fixtures; (3) sound: sound intensity; sound quality; (4) aesthetics: patterns; windows; clutter; colour; texture; (5) indoor air quality; and (6) temperature. Such barriers can negatively impact autistic people's participation and engagement in meaningful community-based activities (Bagatell *et al.*, 2022).

Research also shows that, by association, sensory barriers within community environments can negatively impact carers and family members of autistic people (Suzuki *et al.*, 2019; Carers Australia, 2022; Griffin *et al.*, 2022). In past research, carers have described feelings of stress and fear when taking autistic children into inaccessible multisensory environments within the community (Hand *et al.*, 2018) and over time, such feelings may create caregiver strain and negatively impact mental health and wellbeing (Hand *et al.*, 2018; Griffin *et al.*, 2022).

Evidence is emerging on what constitutes sensory-friendly or neuro-inclusive design in public buildings. Low arousal environments, predictability of spaces, neutral lights and colour palettes, strong ventilation, and reduced noise, have been repeatedly identified as design features that increase accessibility and usability of public spaces for those with sensory processing difficulties, particularly autistic people (Mostafa, 2014; Tola *et al.*, 2021; Black *et al.*, 2022; Nair *et al.*, 2022; Patel *et al.*, 2022; Zwilling and Levy, 2022). The ASPECTSS Design Index (Mostafa, 2018) offers a set of seven principles to enhance environmental design for autistic users: acoustics; spatial sequencing; escape space; compartmentalisation; transition spaces; sensory zoning; and safety. Application of these principles in school environments have shown positive user outcomes and further research into their effectiveness in other settings is called for (Mostafa *et al.*, 2024). Importantly, to enhance the sensory design of public buildings, there is also a strong call for people with lived experience of sensory processing difficulties to participate in the design process (Black *et al.*, 2022; MacLennan *et al.*, 2022b).

As a specific strategy to promote social inclusion and community participation, sensory rooms are increasingly being incorporated into Australian public buildings, such as universities, libraries, sports stadiums, and shopping centres. Sensory rooms (also referred to as reset rooms, quiet rooms, sensory spaces, multi-sensory environments, and Snoezelen rooms) are adaptive spaces in which users interact with equipment, fixtures and fittings designed to offer and/or limit auditory, visual, tactile, olfactory, proprioceptive, vestibular, and gustatory input (Cameron *et al.*, 2019; Unwin *et al.*, 2022). Sensory rooms are designed to facilitate a person's sensory modulation (Barbic *et al.*, 2019) (i.e. the ability to regulate and organise the degree, intensity, and nature of responses to sensory input (Critz *et al.*, 2015), enhance emotional and behavioural regulation and increase participation in daily tasks, leisure activities, and community engagement (Cameron *et al.*, 2019). For many years, sensory rooms have been designed and used as a therapeutic modality for autistic people and others who experience sensory processing difficulties (e.g. people with mental illness, dementia, ADHD) in healthcare, educational, and residential facilities (Cameron *et al.*, 2019) and research suggests that their use in these settings may improve behaviour, mood, attention, and communication (Kaplan *et al.*, 2006; Fava and Strauss, 2010; Hill *et al.*, 2012; Unwin *et al.*, 2021). However, as past research has only explored the experiences of sensory room users in more controlled and supervised environments, such as schools and hospitals, little is not known how these facilities are perceived by users in public buildings and what outcomes are achieved (Cameron *et al.*, 2019; Mayerson *et al.*, 2019).

Limited evidence is available to inform the design and management of sensory rooms in public buildings. One study by Sadia (2020) explored the preferences of neurodivergent people and industry professionals on quiet rooms across all settings. Participants in this study (survey, $n = 312$; interview, $n = 6$) highlighted education, workplaces, and healthcare as the most important locations in which quiet rooms should be located, and sound and lighting as the most important features to consider in the design of these facilities. Findings from this and other research with autistic children and staff in school environments suggest that user control of sensory equipment, accessibility to the room across a range of days and times, and varied equipment options help facilitate positive and effective use of sensory rooms (Grace, 2020; Sadia, 2020; Unwin *et al.*, 2022, 2023). Conversely, broken sensory equipment and inaccessible entry have been reported as barriers to sensory room use in school environments (Grace, 2020). Involvement of users in the design of sensory rooms has been called for (Mayersen *et al.*, 2019; Park *et al.*, 2020) but little is known about who is involved in designing sensory rooms in public buildings and what information is used to inform design.

To contribute toward these identified gaps in literature, this study aimed to explore stakeholder perceptions on how sensory rooms are designed, managed, and used in Australian public buildings. More specifically, the objectives of this study were: to understand who uses sensory rooms in public buildings and for what purpose; to identify facilitators and barriers to sensory room use, design, and management; and to explore outcomes gained from using public sensory rooms.

Method

The study employed a mixed methods design. This provided opportunity to triangulate data and expand upon early research findings with additional and more in-depth data collection techniques (Creswell and Creswell, 2018). As an exploratory study that aimed to understand participants' experiences and situated knowledge of existing buildings, a post-occupancy evaluative approach was employed. A descriptive approach was selected for quantitative data analysis (Punch, 2014) and a content analysis approach for qualitative data (Vears and Gilam, 2022).

Study context

This study was conducted across 2022 and 2023 and sought to explore perceptions of two key stakeholder groups: (1) people who have used or considered using sensory rooms; and (2) people with experience in the design and management of sensory rooms. Ethics approval was gained from Deakin University Ethics Committee (HEAG-H 42_2022 and 2023-076).

For this study, public buildings were defined according to the Australian National Construction Code classifications: Class 6 – “a shop or other building used for the sale of goods by retail, or the supply of services direct to the public”; and Class 9 – “a building of a public nature” (Australian Building Codes Board, 2022). Schools, healthcare and residential care buildings were excluded.

Data collection

Data were collected using two bespoke online surveys and in-depth interviews. Survey One was designed to collect data from people who had used or considered using sensory rooms and was administered across two time periods (July – September 2022 and July – September 2023). In the second round of data collection, the option for sensory room users to participate in an in-depth interview was offered. This aimed to enhance accessibility and inclusivity of data collection (Kenny *et al.*, 2023) and provided researchers opportunity to triangulate data and better interpret descriptive study findings obtained through surveys (Greene *et al.*, 1989; National Institutes of Health, 2018). Survey Two was designed to collect data from people with experience in the design or management of sensory rooms and was administered from July to September 2023.

Survey. Survey development was guided by expert knowledge within the research team, existing literature, and pilot-testing. Surveys were hosted on Qualtrics software (Qualtrics, 2022) and included open and closed (multiple-choice) questions, short answer questions, and Likert scales (0–10). Both surveys began with a plain language statement and sought informed consent prior to commencement and submission. Contact details, if provided, were removed prior to analysis.

Survey One included the following topics: participant demographics; experiences of using sensory rooms; wayfinding; purpose of using sensory rooms; how well user needs were met; and perceptions of equipment available. In both rounds of data collection, participants were asked to report their age, gender, and relevant social roles (e.g. parent/guardian/health professional) and, in round two, to describe their personal experience of neurodivergence and disability. Examples of questions included: "On a scale of 0–10, how would you rate your experience of using the sensory room?"; "On a scale of 0–10, how would you rate the experience of using the sensory room for the person you support?", and "What furniture/ equipment/design features in the room did you find helpful?". Question logic was employed to present questions relevant to participants who had used or had considered using a sensory room. Survey Two also employed question logic to present questions to participants with experience in sensory room design or management. Question topics in Survey Two included: participant demographics; purpose and type of sensory rooms; experience of designing/ managing sensory rooms; users of sensory rooms (management only); process of design (designers only); promotion of sensory rooms (management only); and perceived outcomes. Examples of questions included: "What furnishings did you include in the design of the sensory room?"; and "What term is used to promote and identify the sensory room that you manage?". Participants with experience designing or managing multiple sensory rooms were asked to complete the survey based on their most recent experience and could provide additional comments on previous experiences.

Interviews. Semi-structured interviews provided people who had used or considered using a sensory room the freedom to elaborate on topics of their choice and allowed researchers to gather more detailed information on user perceptions and experiences (Liamputtong, 2020). The interview schedule aligned with survey questions and provided opportunity for explanation through open ended questions and probes from the interviewer, e.g. "how did that make you feel?" and "can you elaborate?". Interview questions included "what design features could be improved?" and "what is your general opinion of sensory rooms?". Interviews were conducted online via Zoom by Authors IH and VW, recorded and transcribed verbatim. To ensure responses reflected participants' intended meaning, interviewees were invited to review their transcript and amend the document prior to its inclusion in analysis (Birt *et al.*, 2016).

Recruitment

Participants were recruited from across Australia via purposive, convenience and snowball sampling. Public buildings where sensory rooms were located were identified via publicly available information. Building management personnel were contacted and invited to consent to promoting the study to room users via posters, websites, newsletters and/or social media. They were also invited to promote the study to staff who had experience in the design and/or management of sensory rooms. Additionally, Survey One was promoted online via peak autism consumer groups and Survey Two was promoted online and/or via email through peak architectural, access consultancy and occupational therapy bodies. For both surveys, participants were encouraged to share the survey with others who may be eligible to participate in the study.

Individuals expressing interest in an interview contacted the research team directly or indicated their interest via Survey One. A plain language statement and consent form was emailed to those interested. Informed consent was sought when arranging an interview time, formalised in writing, and confirmed prior to interview commencement.

To participate in this study, individuals were required to: have used a sensory room in an Australian public building within the last 12 months, or identify as an autistic person, or carer of an autistic person, who had considered using a sensory room in an Australian public building; or to have been involved in either the design or management of a sensory room in an Australian public building within the last five years.

Participation in the design of a sensory room referred to those who are/were involved in the creation of the space, whereas participation in the management of a sensory room referred to those who are/were involved in its day-to-day operation. All participants needed to be fluent in English, aged over 18 years, and able to provide informed consent. Participants were excluded if they had used, designed, or managed a sensory room in a residential facility, healthcare, or educational setting.

Participants

Sensory Room Users. Survey One was completed by 42 participants; 16 participants completed the survey in the first round of data collection; 26 in the second round. Three people who completed Survey One also completed an interview and one person completed an interview only. Most participants identified as female ($n = 34$; 79.07%), aged 30–44 years ($n = 19$; 44.19%). Almost three-quarters ($n = 30$; 69.77%) described themselves as supporters of people who are autistic, neurodivergent, and/or have disability, i.e. parents/guardians, family members, carers, friends, or health professionals. Eighteen participants (41.86%) identified as neurodivergent – 16 autistic (37.21%) and 11 ADHD/attention deficit disorder (25.58%). Twelve participants (27.91%) identified as a person with disability. Participants could select multiple descriptors, and seven (16.67%) reported that they held a supporting role (i.e. parent/guardian or health professional), were autistic/neurodivergent, and/or were a person with disability. One participant identified as having no lived experience of neurodivergence or disability. See Table 1 for further demographic details.

Industry Stakeholders. Fifteen participants completed Survey Two; eleven identified as designers of sensory rooms and four as managers of sensory rooms. Most were female ($n = 13$, 86.67%) and aged 30–44 ($n = 10$, 66.67%). One participant identified as a person with disability, indicating that their disability was both physical and sensory. Two participants identified as neurodivergent with one identifying autism and one identifying ADHD. See Table 2 for further details.

Data analysis

As a mixed methods study, quantitative and qualitative data were merged during data analysis (National Institute of Health, 2018). Descriptive quantitative methods were used to analyse numerical survey data. Qualitative data, gathered via survey and interview, were analysed using inductive content analysis, whereby categories were identified from the data set through iterative coding (Vears and Gillam, 2022). By reading and evaluating the data numerous times, the researchers independently developed codes from the textual data using an inductive

Table 1. Demographics of sensory room users ($N = 43$)

	n	%
Age		
18–29 years	8	18.60
30–44 years	19	44.19
45–59 years	15	34.88
60–74 years	1	2.33
Gender		
Male	1	2.33
Female	34	79.07
Non-binary	5	11.63
Transgender Female	0	0.00
Transgender Male	2	4.65
Prefer to self-describe (gender fluid)	1	2.33
Supporter Role[#]	30	69.77
Parent/guardian of autistic child/adult	25	58.14
Health professional	8	18.60
Paid carer	1	2.33
Friend/family member	4	9.30
Identifying as neurodivergent[#]	18	41.86
Autism	16	37.21
ADHD/ADD	11	25.58
Other[a]	4	9.30
Identifying as a person with disability[#]	12	27.91
Physical disability	3	6.98
Sensory disability	5	11.63
Psychosocial disability	1	2.33
Other[b]	4	9.30
Characteristics of sensory room users being supported by others (n = 24)		
Age		
0–5 years	2	8.33
6–12 years	15	62.50
13–17 years	4	16.67
18–39 years	3	12.50
Gender		
Male	18	75.00
Female	6	25.00

Note(s): [#]Total greater than 100% as participants could select more than one option
[a]Anxiety ($n = 2$), Chronic pain ($n = 2$), Complex Post-Traumatic Stress Disorder ($n = 2$), Depression ($n = 1$), Developmental Coordination Disorder ($n = 1$), Functional Neurologic Disorder ($n = 2$), Sensory Processing Disorder ($n = 1$)
[b]Neurological ($n = 2$), Chronic fatigue ($n = 1$); Chronic illness($n = 1$), Chronic pain ($n = 2$); Cognitive ($n = 1$) and Vision and energy limiting impairments ($n = 1$)
Source(s): Table created by authors

approach. After comparing codes to see if similar interpretations had been reached, researchers collaboratively identified and defined broader content subcategories and categories (Vears and Gilam, 2022). For example, text provided as "*Child was overstimulated and needed time to calm*" was coded as "decrease sensory input" and "*he needs and wants the sensory stimulation*" was coded as "increase sensory input". Along with others, these codes were grouped into a subcategory of "sensory regulation" which, when combined with another subcategory, formed a broader category of "Purpose of use was for sensory and emotional regulation". The final step of analysis was the integration of quantitative and qualitative data into a combined set of findings to address the research questions (National Institute of Health, 2018). Findings are reported here in an integrated form, drawing upon both data types.

Table 2. Demographics of industry stakeholders ($N = 15$)

	Designers ($n = 11$)		Managers ($n = 4$)	
	n	%	*n*	%
Gender				
Female	9	81.82	4	100.00
Male	1	9.09	0	0.00
Non-binary	1	9.09	0	0.00
Age Range				
18–29	1	9.09	0	0.00
30–44	6	54.55	4	100.00
45–59	4	36.36	0	0.00
Role in Sensory Room Design/Management[#]				
Building Manager	0	0.00	2	50.00
Building Owner	0	0.00	1	25.00
Foundation Manager	0	0.00	1	25.00
Information Personnel	0	0.00	1	25.00
Project Manager	2	18.18	1	25.00
Access Consultant	2	18.18	0	0.00
Architect	1	9.09	0	0.00
Assistive Technology Consultant	1	9.09	0	0.00
Developmental Educator	1	9.09	0	0.00
Interior Designer	1	9.09	0	0.00
Occupational Therapist	2	18.18	0	0.00
Person with Lived Experience of Autism/Other Health Condition	2	18.18	0	0.00
Lived Experience of Neurodivergence and/or Disability[#]				
Identifies as autistic/neurodivergent	2	18.18	0	0.00
Identifying as a person with disability	1	9.09	0	0.00
Family member/close friend with lived experience	4	36.36	1	25.00
Industry professional who supports people with lived experience	8	72.73	3	75.00

Note(s): [#]Total greater than 100% as participants could select more than one option
Source(s): Table created by authors

Trustworthiness of study design

Guided by the Rosalind Franklin Qualitative Research Appraisal Instrument (Henderson and Rheault, 2004), a range of strategies were employed to enhance trustworthiness of this study design. Firstly, the research team's professional and academic expertise enhanced the credibility of this study, as did the triangulation of qualitative and quantitative data. Secondly, member checking, independent coding of qualitative data, and provision of a detailed description of methodology and sample characteristics support study dependability. Finally, the research team communicated regularly throughout the study, and kept a comprehensive audit trial of qualitative data analysis. This enabled frequent reflection and critical appraisal and supports confirmability of findings (Korstjens and Moser, 2018).

Findings

Findings are presented here as they respond to the aims of the study: to explore who uses sensory rooms in public buildings and for what purpose; to identify facilitators and barriers to sensory room use, design, and management; and to describe outcomes gained from using sensory rooms in public buildings.

Sensory room users

Designers were asked to describe the intended users of sensory rooms. Responses included: people of all ages ($n = 6$; 54.55%); children and adolescents ($n = 4$; 36.36%); and adults over

18 years ($n = 1$; 9.09%). Most commonly, respondents reported designing the room for autistic people ($n = 6$; 54.55%) and people with sensory processing difficulties ($n = 5$; 45.45%). Other groups included: people with mental illness ($n = 3$; 27.27%); everyone ($n = 3$; 27.27%); neurodivergent people ($n = 2$; 18.18%); and people with ADHD ($n = 2$; 18.18%).

Of the broader user group, twenty-nine participants (67.44%) had used a sensory room. Of these, 17 (58.62%) reported that they were supporting one or more neurodivergent children and/or children with disability and three (10.34%) were supporting an autistic adult. Most of the 24 people being supported to use the sensory room were male ($n = 18$; 75.00%) and aged 6–12 years ($n = 15$; 62.50%). See Table 1 for more details.

Fourteen participants (32.56%) stated that they had not used a sensory room but had considered doing so.

All participants with experience using, designing, or managing sensory rooms ($n = 44$) were asked what type of building the sensory room was located in. Although a range of locations were identified, the most common were shopping centres ($n = 17$; 38.64%) and sporting stadiums ($n = 15$; 34.09%). See Table 3 for further details.

Purpose of use

When asked to outline the intended purpose of a sensory room, industry stakeholder responses indicated that it was implemented to "provide sensory respite and calm from an overwhelming public environment", e.g. *"To provide refuge for customers who find the sensory overload of a shopping centre difficult"* (Designer 6), *to* "support families", and "enhance participation". As stated by Manager 3, *"previously . . . visitors either didn't attend [the sports stadium] with their family or group at all, only attended part of the event before leaving, . . . or found the experience very negative"*.

A category generated from qualitative user data was that sensory rooms were used "for sensory and emotional regulation", i.e. to either increase or decrease sensory stimulation for themselves and/or the person they were supporting. Sensory overload was reported by many as a response to busy environments, crowds, and high noise levels in the public building. For instance, *"I felt that one of my children was getting agitated and needed some time out to decompress due to the busy environment and amount of people"* (User 5, parent of autistic children), and *"Child was overstimulated and needed time to calm"* (User 13, friend supporting autistic child). However, some people also reported using the sensory room to increase stimulation and receive more sensory input then the public building was providing.

Table 3. Sensory room details

Type of public building[#]	Designers ($n = 11$)		Management ($n = 4$)		Users ($n = 29$)	
	n	%	*n*	%	*n*	%
Church	1	9.09%	0	0.00%	0	0.00%
Community Centre	1	9.09%	0	0.00%	0	0.00%
Conference/Event	1	9.09%	0	0.00%	0	0.00%
Library	1	9.09%	0	0.00%	2	6.90%
Museum	0	0.00%	0	0.00%	2	6.90%
Recreation Centre	1	9.09%	0	0.00%	0	0.00%
Shopping Centre	4	36.36%	1	25.00%	12	41.38%
Sports Stadium	4	36.36%	3	75.00%	8	27.59%
University	1	9.09%	0	0.00%	3	10.34%
Other	0	0.00%	0	0.00%	3	10.34%
Not stated	0	0.00%	0	0.00%	4	13.79%

Note(s): [#]Total greater than 100% as participants could select more than one option
Source(s): Table created by authors

For instance, User 7 (parent of autistic children) explained that her son *"... likes to jump and crash and have deep pressure from a giant beanbag or something"* and User 4 (carer supporting autistic child) discussed how the child enjoyed exploring the sensory room as *"... he needs and wants the sensory stimulation"*. Other reasons for using the sensory room included to "engage the autistic person" in a safe and interesting environment and to "have a quiet break" and spend time in a "judgement-free space". As User 21 (autistic adult with disability) commented: *"[to] primarily unwind and unmask"* and *"to study where I am not expected to conform to typical behaviours"*.

Users were asked to rate their experience of using a sensory room on a Likert scale of 0–10 (0 = extremely negative, 10 = extremely positive). Of the 25 responses provided, the most frequent rating was 8 out of 10 (n = 6; 24.00%) with a mean of 5.92 (standard deviation (SD) = 3.00) and a range between 0 and 10. When asked to rate the experience for the person they were supporting, the experience was most frequently rated as 8 out of 10 (n = 6, Mean = 7.15, SD = 1.81, Range = 3–10).

Analysis of qualitative data provided additional detail on user perceptions. Within the category of "negative experience", users reported concern about "taking away the room from others", e.g. *"I felt concerned, I may be taking it away from other people who needed it ... I would have stayed longer if I knew there were other spaces available"* (User 18, autistic adult). Some felt that the room was "unsuitable to their needs", e.g. User 30 (autistic parent of autistic/neurodivergent child) commented *"I think he would have calmed down more quickly had the room been better suited to his needs"*. Finally, some participants perceived that the room was "not designed for autistic people and people with disability". For instance: *"[the] room felt like it was designed by neurotypical people trying to understand the autistic mind ... this room [had a] gritty texture for the brain"* (User 8, parent of autistic child); and *"I think they need to be sort of created and run by disabled people, like by us for us"* (Interview User 1, autistic adult). Within the category of "positive experience", three codes were identified. Firstly, "sensory rooms are useful". As stated by User 20 (parent of autistic/neurodiverse child), *"A calm space to reset which means we can go to the footy as a family and it caters for everyone"* and User 21 (autistic/ADHD adult with disability), *"Sometimes the knowledge that the sensory room is there is enough to calm me down so that I don't require it as badly"*. Secondly, the sensory room "provides a break", e.g. *"It gives kids a break so they can re-join"* (User 38, parent of child with disability). Thirdly, the room was perceived by some as "autistic friendly" as it accommodated the needs of people who experience sensory overload.

Users were asked what activities they wanted and needed to do while using the sensory room and how well the room supported them to do these. Comments provided by both independent users and supporters emphasised "resting and calming oneself". Supporters also highlighted "support-related activities", such as managing behaviour and co-regulating emotions. For instance, *"Access a safe place where challenging behaviours could be managed without judgement/observation from random strangers"* (User 30, autistic parent of autistic/neurodivergent child). When asked to describe activities the supported person wanted and needed to do in the sensory room, supporters identified "sitting quietly", "interacting with sensory objects", and "walking around".

Survey One respondents were asked to rate how well the room had supported them to do their activities on a scale from 0 to 10 (0 = did not support at all, 10 = greatly supported). Respondents who used the room independently most frequently rated the room's ability to support their activities as 0 out of 10 (n = 3), with a range of 0–10 and a mean of 3.75 (SD 3.81). Supporters most frequently rated this as 8 out of 10 (n = 4), with a range of 0–10 and mean of 5.94 (SD 3.26). When considering performance for the person being supported, respondents most frequently rated the room as 9 out of 10 (n = 5), with a range of 1–10 and a mean of 7.26 (SD 2.49).

Factors influencing use

Participants who had considered but not used a sensory room were asked to outline their reasons for this. The most common was "difficulty locating a sensory room" (n = 8, 57.14%).

From the qualitative data provided, four codes were generated: “Judgement from others”, e.g. *“Most of the time when I am out in public, I try to mask my autistic traits, and going to a sensory room would force me to break that mask”* (User 17, autistic adult with disability); “not suitable to my needs”, e.g. *“I find them better suited to children”* (Participant 40, autistic/ADHD adult with disability); “difficult to find”, e.g. *“. . . they’re not well marked”* (Interview User 2, health professional and parent of autistic child); and a perceived “lack of sensory rooms” available, e.g. *“I have never known of one in any public spaces”* (User 37, health professional and parent of neurodivergent child with disability). Some participants shared alternate spaces that they had utilised when sensory rooms were unavailable. For instance, *“spiritual centres, . . . prayer rooms, and bathrooms”* (Interview User 3, autistic person with disability).

Survey One participants who had used sensory rooms were asked to rate how easy it was to locate the room on a 0–10 Likert scale (0 = extremely difficult, 10 = extremely easy). Participants reported a mean rating of 5.58 (SD = 2.33), mode of 5, and range of 0–10. Analysis of related comments revealed that participants’ experiences were influenced by the room’s “location within a building”, “quality of online information”, and “signage”. For instance, User 8 (parent of autistic child) expressed frustration that *“When you are at the other end of the shopping centre it takes ages to get here.”* User 10 (parent of autistic child) stated that *“There was no signage pointing me in the right direction, I had no idea where I was going and trying to keep an eye on my son in a busy stadium and look for a room was difficult”*. Sensory rooms were described as easy to find when there was clear signage, direction, and promotion of the facilities. As described by User 6 (parent of autistic child), the sensory room *“. . . was purpose built at a sporting facility and advertised prior to the opening day”* and by Interview User 1 (autistic adult), *“it’s quite easy to find . . . they’ve got signage . . . and directions in the actual building”*. In Survey Two, managers were asked how they promoted their sensory room to the public. Respondents described sharing information about the room on their “website”, “social media”, via “email”, and “within event information”, such as *“in all match day information”* (Manager 1). Managers were also asked to indicate the identifier used to promote the sensory room. Five different terms were reported: “sensory room”; “sensory space”; “quiet room”; “sensory zone”; and “multi-sensory room”.

Other users were reported to influence participants’ experience of using a sensory room. When asked if others were using the room at the same time, 12 (42.86%) of 28 respondents stated “yes”. Seven (25.00%) indicated that the presence of other users in the room influenced their experience. Coded text suggested that other users could provide valuable “peer support”, e.g. *“It was good to know that there were others around that required the time out space as well”* (User 6, parent of autistic child), and *“I feel comfortable being myself in front of those who come in”* (User 21, autistic adult with disability). Conversely, for some the presence of others within the room was reported to “increase stress”. For instance, *“I had to make sure my client doesn’t stay in a particular section and engage with particular sensory items for too long in case other children want to explore it too”* (User 4, carer supporting autistic child). Analysis of qualitative data provided by participants with experience in managing sensory rooms indicated that “managing capacity limits” was a challenge to sensory room management. For instance, Manager 1 stated that *“Demand has exceeded the capacity at times . . . we have an online booking system; however, a person cannot know when they will require the space”*. Other challenges included “hygiene management” and “balancing varying needs during simultaneous use of the space”.

Design of sensory rooms

Designers were asked who had been involved in designing a sensory room and what resources were used to inform the design process. The most common responses were “people with lived experience of autism or other health condition(s)” (n = 8; 72.73%) and “project managers” (n = 8; 72.73%). Qualitatively, participants’ comments were coded as “prior experience”, e.g.

"from setting up classrooms, early intervention settings and sensory rooms" (Designer 1), "self-developed resources", and "suggestions from other professionals". For example, Designer 10 stated that they had *"contacted OTs [occupational therapists] from several organisations and schools for advice"*.

Designers were asked if there were elements of the sensory room that differed from the rest of the building. Ten participants (90.91%) selected "yes". Qualitative data analysis revealed five codes: "enhancing noise reduction", e.g. *"Sound proofing"* (Designer 2), "signs and symbols to indicate location"; "dimmed lighting"; "soft colour palettes"; and "omission of furniture", such as *"built-ins/cabinetry"* (Designer 4).

Sensory room users were asked about their perceptions of design elements in these facilities. Design features perceived as "positive" were: a "low stimulation environment"; "dimmable or controlled lighting"; "privacy"; "separation from outside"; and "spatial design". As explained by User 5 (parent of autistic children), *"I liked the space and the lighting, and the fact that it was quiet"*. Spatial design encompassed data relating to the room's layout and size. For instance, User 13 (friend supporting autistic child) identified *"clear unobstructed vision"* as helpful while several participants commented positively when the room was an appropriate size to accommodate all users, including people who use wheelchairs. When asked what features were challenging or unhelpful, users identified "bright/uncontrollable lighting", "overstimulation", "inappropriate position within larger building", "not having clearly defined spaces for different activities" and "insufficient space". As noted by User 31 (autistic/ADHD health professional with disability) "A *quiet room and sensory room are vastly different and often confused which impacts the use. Many use it as a social space which is annoying"*. Some participants noted that the room's position within a larger building negatively influenced their experience, particularly when located in high traffic areas. For instance, User 30 (autistic parent of autistic/neurodivergent child) noted that being *"located next to toilets [there was] constant banging of doors and noise from other people"*. Room size influenced user experience, particularly when there were multiple users. For instance, User 4 (carer supporting autistic child) stated that *"When there are a lot of kids, I find the noise level a bit uncomfortable"*.

Both managers and designers were asked to identify equipment included in sensory rooms. A variety of over 30 different items were identified, with the most common being beanbags (86.67%, $n = 13$) and fidget tools (73.33%, $n = 11$). Designers were also asked to identify equipment purposefully excluded from sensory rooms. The most frequently identified were diffusers (45.45%, $n = 5$), music players (45.45%, $n = 5$), swings ($n = 4$; 36.36%), projectors ($n = 4$; 36.36%), and weighted lap pads ($n = 4$; 36.36%).

The category of "items, equipment or furnishings perceived as helpful" by users included three codes: "comfortable seating and furniture"; "lava/water walls"; and "sensory tools". Contrastingly, "items, equipment or furnishings perceived as unhelpful" included: "safety of users and equipment"; "insufficient seating"; and "a lack of sensory tools". Several participants raised concerns about the safety of equipment and room users. For instance, reflecting on an incident where her son had attempted to throw a bin and damage an iPad, User 30 (autistic parent of autistic/neurodiverse child) stated that *"Expensive equipment should be in protective cases. Consider what could be used as a weapon"*. Similarly, User 8 (parent of autistic child) reported that *"There is a big red emergency button located at child height. He is demand avoidant so when I tell him not to touch it, he just wants to touch it"*.

Impact on participation

Sensory room users were asked if using the facility extended the time that they stayed in the public building. Of the 26 responses, the majority were affirmative ($n = 20$; 76.92%). Five participants (19.23%) stated that using the sensory room did not extend their stay, with one adding *"But it meant that we could leave calmly and safely"* (User 30, autistic parent of autistic/neurodivergent child). When asked by how much time the room extended their stay, responses ranged between 30 and 90 min, with the most frequent being 30 min (n = 9; 34.62%). Overall, the mean response was 51.67 min (SD = 24.79). Qualitative data indicated that "being able to extend time in public building is beneficial". For instance: Interview User 1 (autistic adult) commented *"Definitely during study time . . . get some work done, and then stay, . . . rather than just going home";* and User 6 (parent of autistic child) stated *"I felt for my son it [attending event] had been a positive experience even if he didn't last for the whole match"*. When asked if they would use a sensory room again, almost all users (n = 26, 96.55%) responded affirmatively.

Discussion

Sensory rooms are increasingly being incorporated into the design of public buildings, yet little is known about how these facilities are used, designed and managed. This study suggests that sensory rooms are perceived positively by users, designers and managers. Findings also suggest ways in which these facilities can be improved.

Predictability and wayfinding in the sensory environment

In the absence of standards on the design and management of sensory rooms in public buildings, facilities can vary significantly. In this study, inadequate promotion and signage were noted as potential barriers to using sensory rooms. Wayfinding refers to how people orient and navigate themselves within a physical environment and can include the use of signage, maps, or technology as navigational tools (Wayfound Victoria, 2020). The ability to way-find in a public building is pertinent to effectively carrying out one's meaningful activities within that space (Jamshidi *et al.*, 2020). However, in large, busy buildings, such as shopping centres or sporting stadiums, the cognitive load required to way-find can be high, particularly for new users (Jamshidi *et al.*, 2020). Research by MacLennan *et al.* (2022b) describes how unfamiliar public buildings, particularly those that regularly change layout, can reduce accessibility for autistic people. Additionally, busy environments can increase feelings of anxiety and overwhelm due to the high variation in uncontrolled sensory stimuli (MacLennan *et al.*, 2022b). Such experiences were reflected in findings from this study whereby users indicated that sensory rooms were easier to locate when there was clear signage and that, when this was unavailable, people experienced further dysregulation. For instance, "User 10 (parent of autistic child) stated that *"There was no signage pointing me in the right direction, I had no idea where I was going and trying to keep an eye on my son in a busy stadium and look for a room was difficult."* Importantly, some participants in this study who had not yet utilised a sensory room explained that this was largely due to difficulty locating the sensory room. Previous research by Schaaff *et al.* (2011) also suggests that it can be beneficial for autistic people to be prepared for the sensory aspects of a public environment prior to visiting. Similarly, MacLennan *et al.* (2022b) detailed that for many autistic adults, public buildings were associated with uncertainty, inconsistency, and unfamiliarity, and that having information available in advance was helpful as it increased the predictability of an environment (MacLennan *et al.*, 2022b). As such, provision of online preparatory information about the availability, location, and design of sensory rooms is likely to be beneficial. Clear and informative information and signage about sensory rooms in public buildings is essential and, as outlined by Balaa (2020), to accommodate variations in user preference, multiple methods of communication should be used.

Sensory room design

Findings from this study indicate that sensory rooms in public buildings may be used by people of all ages independently and/or with people in a caring or supporting role. Although autistic people were commonly considered intended users of sensory rooms by designers in this study, other groups of people also reported using these facilities. Diversity in users is important to acknowledge as different groups of people may have different needs and preferences on room design and equipment. To enhance the user experience, it is essential that industry stakeholders carefully consider who will use the facility and what activities users will need and want to do in the room. Understanding the roles and occupations of users is integral to designing a room that meets user needs and enhances social participation (Watchorn *et al.*, 2019). To garner a genuine understanding of user needs and preferences and enhance design outcomes, it is essential that people with lived experience of neurodivergence and disability are provided opportunity to contribute expertise to the design of sensory rooms in public buildings.

Aligned with previous research on how autistic people experience built environments (Toronyi, 2019; Sadia, 2020; Sheykhmaleki *et al.*, 2021; Black *et al.*, 2022; Caniato *et al.*, 2022; MacLennan *et al.*, 2022a), findings from this study present lighting and acoustics as key factors influencing the usability of sensory rooms. Users emphasised that bright, non-adjustable, or motion-sensor lighting negatively impacted their experience, and that dimmable or controlled lighting was helpful. This supports earlier research on autistic people's experiences of using sensory rooms in school settings (Grace, 2020, Unwin *et al.*, 2022; Unwin *et al.*, 2023) and Sadia's (2020) research on quiet rooms more broadly. In the current study, industry professionals highlighted a need to implement adequate noise control measures in the structural design of sensory rooms, including soundproofing and carpeting. Such efforts are supported by emerging evidence on the importance of reducing acoustic input as a way of designing built environments that better support autistic people (Mostafa, 2014; Tola *et al.*, 2021; Black *et al.*, 2022).

There is vast diversity in what equipment and furnishings are included in sensory rooms. Industry stakeholders showed consideration of safety and user preference in discerning what equipment to include and exclude, acknowledging that sensory equipment may be perceived as helpful by some and as triggers or safety risks by others. As User 30 (autistic parent of autistic/neurodiverse child) stated, *"Expensive equipment should be in protective cases. Consider what could be used as a weapon"*. Items perceived to create auditory/visual/olfactory stimuli that could not be restricted to a single user were excluded by designers and managers along with weighted equipment. Whilst deep pressure has been shown to promote a reduction of physiological arousal in autistic people (Afif *et al.*, 2022), safe use of weighted items is dependent on individual factors, such as weight and physical strength.

Impact on community participation

Findings from the current study suggest that, by using sensory rooms, autistic people and others, including carers, may be able to stay longer in public buildings, such as sporting stadiums, universities, and shopping centres. Acknowledging earlier research that shows autistic people frequently experience sensory barriers in public buildings (Suzuki *et al.*, 2019; Black *et al.*, 2022; Griffin *et al.*, 2022) and find new and unfamiliar environments particularly challenging (Fetta *et al.*, 2021), sensory rooms may offer a useful strategy to enhance social participation. However, further research investigating the efficacy of sensory rooms in public buildings is called for.

Importantly, the social participation of autistic people and others experiencing sensory barriers in public built environments is not only influenced by the physical environment but also by the social environment. Several participants in the current study who had not used a sensory room expressed concerns regarding potential judgement associated with usage of such facilities, particularly as adults, e.g. Participant 40 (autistic/ADHD adult with disability) stated: *"I find them better suited to children"*. Similarly, some carers reported increased stress when others were present in the room as they perceived potential judgement by others, e.g. *"I had to make sure my client doesn't stay in a particular section and engage with particular sensory items for too long in case other children want to explore it too"* (User 4, carer supporting autistic child). The experience of stigmatisation in public settings has been highlighted by MacLennan *et al.* (2022b) who investigated the sensory experiences of autistic adults in public spaces. Participants in MacLennan *et al.'s* (2022b) study recounted experiences of feeling scrutinised by others in public spaces based on their responses to sensory environments and access requirements. Similarly, Broady *et al.* (2017) and Devenish *et al.* (2020) emphasised that stigma was a significant barrier to participation in public spaces. Findings from the current study illuminate the tendency of autistic individuals to conceal and mask their autistic traits when engaging in public life, e.g. *"Most of the time when I am out in public, I try to mask my autistic traits, and going to a sensory room would force me to break that mask"* (User 17, autistic adult with disability). While this coping mechanism may reduce judgement by others, it may simultaneously diminish the likelihood of autistic individuals utilising sensory rooms in public built environments (Miller *et al.*, 2021). Businesses and public organisations must acknowledge that social environments may influence people's willingness to access and use sensory room in public environments and instigate strategies to support potential users. Although further research is needed to identify what sensory room users perceive would be helpful, wide promotion of sensory rooms as a common public facility may serve to increase public awareness of these facilities and normalise their use within the broader population (Broady *et al.*, 2017).

Universal design of public buildings

Despite the diverse preferences reported by sensory room users, findings from this study suggest that there is support among neurodivergent individuals, people with disability, and carers for the inclusion of sensory/reset rooms in public environments. However, the provision and use of these facilities can be viewed as a compensatory strategy for users to escape from public buildings that are perceived as inaccessible and unsafe (Clément *et al.*, 2022). In addition to implementing compensatory strategies, the sensory design of all aspects of public buildings should be enhanced to better meet the needs of all users, particularly those who experience sensory barriers (Heylighen *et al.*, 2017). This aligns with a universal design approach, whereby designers are encouraged to create environments and facilities that are useable by all individuals, to the greatest extent possible, without necessitating modifications or specialised design (Mace, 1985). Here, it is important to acknowledge that people's embodied experiences of the built environment are unique, complex and dynamic and reflect not only a sensory or physical response, but also an emotional (Abusaada, 2020) and cultural response. Further interdisciplinary and transdisciplinary research is called for to better understand the experiences of people, particularly those who are neurodivergent, in public built environments (Salama, 2019). Such insights have potential to not only inform the design of urban environments that are accessible but that can also enhance user wellbeing (Elsayed *et al.*, 2024).

Limitations and future research

This study explored experiences of sensory rooms in public buildings from the perspectives of users and industry stakeholders, thus providing emerging insight into some of the current gaps in literature. However, this study has limitations that should be considered during interpretation of findings. Firstly, reported findings are subjective and there is potential for participants' recall of detail to be flawed. Secondly, this study did not directly investigate the perceptions of children and adolescents who may utilise sensory rooms nor those for whom a survey or interview was inaccessible, e.g. people with significant communication or intellectual impairment. Although supporters were asked to describe how they perceived the person in their care had experienced a sensory room this may not have been an accurate representation of another person's experience. Thirdly, data on participants' lived experience of neurodivergence or disability was not collected from participants in round one of data collection. Overall, there is a need for further research investigating the user experience of sensory rooms to expand upon these early insights and draw more conclusive evidence on the efficacy of design elements. Finally, the sample of people with industry experience designing and managing sensory rooms was small. Potential reasons for this were recruitment barriers associated with the employment structure of large businesses and a small population of designers with relevant experience in Australia. To gain additional perspectives, further research is called for, in Australia and internationally. Despite limitations, this study provides valuable insights into sensory room use, design, and management and maintains rigour in its methodology and reporting.

Conclusion

This research provides insight into how sensory rooms in public buildings are perceived by neurodivergent users, people with disability, supporters, and industry personnel. Findings suggest that sensory rooms are perceived as a valuable facility in public built environments but that a range of factors relating to location, design, and management influence usability. For those involved in the design and management of these facilities, key design considerations and their alignment with the Principles of Universal Design (Connell *et al.*, 1997) are presented in Table 4.

In this study, sensory room users included children, adolescents and adults, who identified in diverse ways including autistic, neurodivergent, people with disability, and as supporters/carers of other people. This highlights the broad range of potential users of sensory rooms in public buildings. To maximise the usability and effectiveness of a sensory room, designers and building managers should carefully consider who will use the facility and what their sensory

Table 4. Key considerations for the design of sensory rooms in public buildings

Design consideration	Alignment with the Principles of universal design (Connell *et al.*, 1997)
Location	
Details about location, design, and access methods should be available online Sensory rooms should be in an easily accessible and visible location within a building Clear signage with supporting symbols and images should be provided	Principle 3: Simple and intuitive use Principle 4: Perceptible information
Design	
Consider who will use the facility and their sensory and activity needs and preferences Co-design the room with people who have lived experience of neurodivergence and disability Provide sufficient space for users to move freely and to accommodate mobility aids and prams. Ensure accessibility standards are adhered to Sensory rooms should be quiet. Sound-absorbing materials can help reduce external noise Avoid bright light. User-controlled lighting is beneficial A variety of equipment and furnishings may be included. Safety, comfort, and equipment protection should be considered Provide sufficient comfortable seating for all users	Principle 1: Equitable use Principle 2: Flexibility in use Principle 5: Tolerance for error Principle 6: Low physical effort Principle 7: Size and space for approach and use
Management	
Carefully consider who will use the facility and their sensory and activity needs and preferences Consider how entry and use of room will be managed Consider maintenance and safety requirements of equipment and furnishings	Principle 1: Equitable use Principle 5: Tolerance for error Principle 6: Low physical effort

Source(s): Table created by authors

and activity needs and preferences will be. As a means by which this information can be gathered and utilised, engagement of people with lived experience of neurodivergence and disability in a co-design process is recommended.

Beyond the design and implementation of sensory rooms, it is also imperative that effort is made to examine and eliminate design features that act as sensory barriers to many people in public buildings. Creating truly inclusive spaces requires not only adding supportive features but also addressing barriers that prevent equitable access for all.

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Cathryn Grant is an Occupational Therapist and Senior Access Consultant at Architecture & Access. Cathryn leads a large team of Access Consultants to deliver access advice across a broad range of built environment projects. Cathryn recognises the critical influence of our built environment on the participation and inclusion of people with a disability. Cathryn strongly believes in the collaboration between industry, academia and people with a lived experience to build evidence to support the development of built environment solutions for all.

Anna Walker is a registered Occupational Therapist, currently working at the Royal Melbourne Hospital. She completed her Honours in 2022 at Deakin University under the guidance of Cathryn Grant and Valerie Watchorn, focusing on how sensory rooms are used by autistic people and their supporters. Anna has always had a passion for accessibility within the built environment and she hopes to explore this further as her career progresses.

Isaac Hale is a Paediatric Occupational Therapist dedicated to helping autistic children and those with other conditions engage in meaningful activities and achieve their personal goals. With a deep commitment to enhancing the lives of neurodivergent individuals and those with disabilities, Isaac's research during his final year as a Bachelor of Occupational Therapy (Honours) student introduced him to the impact and importance of sensory rooms on occupational performance. Isaac values the benefits of working inter-professionally and with individuals who have lived experiences of disability and neurodivergence, believing that such collaboration is crucial for generating evidence, designing inclusive environments and fostering broader participation.