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Evidence Check

Designing mental health facilities that prevent the use of seclusion and restraint

An **Evidence Check** rapid review brokered by the Sax Institute for the NSW Ministry of Health. February 2020.

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This report was prepared by:

Lisa Brophy, Sanne Oostermeijer, Catherine Minshall, Carol Harvey, Bridget Hamilton, Cath Roper, Andrew Martel, Justine Fletcher.

February 2020.
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Executive summary

Background

NSW Health is committed to reducing and, where possible and safe, eliminating, the use of seclusion and restraint in mental health facilities. In NSW, between April and June 2019 an estimated 649 episodes of seclusion and 920 physical restraint events were reported in specialised acute mental health inpatient units.[3] Despite routine use, the effectiveness of seclusion and restraint has not been established.[4] It is widely recognised that the use of seclusion and restraint is traumatic, a high-risk intervention for consumers and staff and often unhelpful.[5-9] Recent literature has noted the important role of the physical environment in supporting better outcomes in mental health services.[1, 10-12]

In December 2017 the NSW Government released the independent review of seclusion, restraint and observation of consumers with a mental illness in NSW Health facilities.[5] This whole-of-system review was executed by the state's Chief Psychiatrist and a panel of five mental health experts. A key theme from the report included the built and therapeutic environment. Consumers and their families said many mental health units had a custodial feel, which was confirmed by the review team. Recommendations included implementation of minor capital works and equipment purchases to improve the therapeutic environment and that all future capital planning of mental health facilities should include consumer co-design and be informed by evidence regarding the prevention of seclusion and restraint. This report has already noted that there is evidence of an association between the physical characteristics of the therapeutic environment and a reduction in the use of seclusion and restraint.

The role of consumers in this Evidence Check

This Evidence Check included consumer researchers throughout its design, conduct and writing. In particular, a consumer academic (CM) conducted the critical assessment of the publications. The consumer voice is largely missing among the included publications. A consumer commentary has been included in this Evidence Check to offer insight into the consumer experience.

Evidence Check questions

This review aimed to address the following questions:

Question 1: What physical design features of mental health facilities reduce the use of seclusion and restraint in these facilities?

Question 2: Of the design features identified in Question 1, are any specific elements essential, or unsuitable, for particular patient subgroups?

Summary of methods

The review team searched peer-reviewed and grey literature for relevant publications on architectural design and the use of restraint and seclusion in mental health facilities. Literature published in English between January 2010 and August 2019 was included. We conducted a desktop search for relevant grey literature using google.com and scanning results from the first 10 pages. Other grey literature was identified from the expert knowledge of academics on the research team. In total, we included 38 publications: 35 peer-reviewed articles and three grey literature documents.

Evidence of critical assessment

We evaluated the included publications using the Joanna Briggs Institute's (JBI) critical appraisal tools.[13] The JBI critical appraisal tools address a wide range of study types including qualitative and quantitative studies (non-randomised) and expert opinion publications. Each publication is scored individually and is reported.

Key findings

This Evidence Check identified 38 publications relating to the research questions.[12, 14-50] Using the JBI critical assessment tools, we found most of the studies scored low or unclear on more than one item. Of the 38 included publications assessed using the JBI checklists, one case-controlled study[12] scored unclear for all 10 items. Of the 26 assessed using the quasi/non-randomised trials checklist, we found 22 were unclear or 'no' for two or more items.[14, 15, 18, 20, 21, 24, 26, 27, 30, 34-37, 41, 43-50] Of the 10 publications assessed using the qualitative studies checklist, we found seven were unclear or 'no' for two or more items.[16, 29, 40, 42, 45, 47, 51] Two[25, 33] of the four expert opinion publications were assessed as unclear or 'no' for two or more items. The trustworthiness of this body of evidence is, therefore, unclear and should be interpreted cautiously.

Question 1

The findings suggest physical design that aims to reduce the use of seclusion and restraint depends on a foundation of good design principles being in place. These include privacy, adequate space, no overcrowding, exposure to daylight and other appropriate lighting, use of colour, reduced levels of unpleasant noise, access to gardens, art that features nature, a homelike environment, and easy wayfinding and opportunities for consumer agency. These amenity features promote both consumer and staff safety, and reduce distress and environmental triggers for conflict[52], which are central to the prevention of seclusion and restraint.

Question 2

Few of the included studies discussed the physical environment in relation to specific subgroups of consumers. For young people, results indicated choice and control were important concepts to consider in designing facilities (e.g. coloured lights, light dimmers, music panels). For older people, noise reduction and attention to wayfinding was noted as particularly important. It was suggested noise reduction at night was valuable in forensic facilities because of its potential to improve sleep in what may be a sleep-deprived population.

Gaps in the evidence

This Evidence Check identified multiple gaps in the evidence, including about the optimal scale of wards, personal access to belongings, balancing open spaces with visibility, privacy, monitoring, designs to support physical exercise and activity, access to own food preparation and storage, access to technology, whole-of-ward sensory design, Alzheimer's disease/other dementia, inclusion and diverse needs, design support for safety/gender separation, older people's mental health, child and adolescent mental health, extra care units, and intensive care units.

For example, there is minimal understanding of the implications of changes in ward scale and the impact of increased privacy and consumers spending more time in their own rooms. Similarly, it is unclear what the role is of access, or lack of access, to personal property. There are aspects of the sensory environment that appear to be lacking in research—for example, temperature and air quality. The needs of women and subgroups such as people with dementia as well as Aboriginal people and members of the LGBTQI+ community appear to be under-investigated.

Discussion of key findings

Question 1

The findings suggest physical design that aims to reduce the use of seclusion and restraint depends on a foundation of good design principles being in place. These include privacy, adequate space, no overcrowding, exposure to daylight and other appropriate lighting, use of colour, reduced levels of unpleasant noise, access to gardens, art that features nature, a homelike environment and easy wayfinding.

Question 2

We found very few papers that focused on the elements essential, or unsuitable, for particular patient subgroups.

Conclusion

Overall, this rapid review Evidence Check found confirmation that the physical environment can have a role in supporting better outcomes for consumers of inpatient mental health services, including a reduction in the use of seclusion and restraint. The public health perspective has highlighted that seclusion and restraint are high-risk practices and that absolutely minimising seclusion and restraint affords safety benefits for consumers and staff alike. This is likely to be achieved through a multi-layered approach, founded on good design features and building towards specific design features that may reduce occurrences of seclusion and restraint. Good design features include adequate space and privacy, no overcrowding, exposure to daylight and other appropriate lighting, reduced levels of unpleasant noise, access to gardens and a homelike environment. In placing an emphasis on safety, inpatient spaces have often been designed to limit opportunities for physical injury to people, property damage and suicide attempts, but an unintended consequence has been that units are devoid of homelike comforts. The findings suggest design features can maximise access to resources, such as sensory rooms, to prevent seclusion and restraint.

The Evidence Check has also found that limited access to therapeutic spaces for staff and consumers together is an issue that needs design attention. Well-designed wards require accessible outside spaces, private spaces, therapeutic materials, homelike features and communication equipment. An overarching concept is that consumer choice and control and upholding the human rights of consumers in every instance is possible through design. This review suggests this should take precedence over efficiency and general security concerns. Furthermore, recent developments in inpatient practice highlight an urgent need for research to focus further 'upstream' in relation to good design principles, recovery-oriented and trauma-informed services and design features that prevent the emergence of aggression and conflict. Open staff bays are supported for improving consumer–staff access without reducing staff safety.[53]

Rather than designing spacious staff offices that separate consumers and staff, purposeful design of a sensory retreat space for staff, equivalent to a therapeutic sensory room, is a recent design idea that promotes positive staff–consumer interaction.[54] The design of mental health inpatient units has often happened without the input of consumers, their families, friends and supporters. Future designs should include consumers in a co-design process to maximise the potential for change and innovation that is genuinely guided by the insights of lived experience. There is also further potential to consider the needs of particular subgroups of consumers, including but not limited to Aboriginal people, the LGBTQI+ community, and people from refugee and non-English-speaking backgrounds, especially in the context of the limited evidence currently available to inform design that is inclusive and responsive to diverse needs.

Consumer critical commentary

The design of mental health inpatient units has a complex history. The asylum remains a powerful and archetypal representation of our collective struggle with power, shame and control. De-institutionalisation saw many of the original asylums torn down and hastily replaced with hospital-based inpatient units, co-located with health services. Consumers have criticised the design of these new facilities as clinical, alienating and distressing. It is likely that the poor design of these spaces contributes to distress and, therefore, increases the use of seclusion and restraint. It is noteworthy, that previous designs of inpatient wards have typically not involved consumers. *How can design features contribute to spaces that feel welcoming, homelike, allowing consumers maximum personal control over their own private space?*

Background

NSW Health is committed to reducing and, where possible and safe, eliminating the use of seclusion and restraint in mental health facilities. In NSW, between April and June 2019 an estimated 649 episodes of seclusion and 920 physical restraint events were reported in specialised acute mental health inpatient units.[3] Despite routine use, the effectiveness of seclusion and restraint has not been established and justifications for its use in mental health services are contested.[4] It is widely recognised that the use of seclusion and restraint is traumatic, risk-oriented and often unhelpful.[5-9]

In December 2017 the NSW Government released the independent review of seclusion, restraint and observation of consumers with mental illness in NSW health facilities.[5] This whole-of-system review was executed by the state's Chief Psychiatrist and a panel of five mental health experts. A key theme of the report included the built and therapeutic environment. Consumers and their families said many mental health units had a custodial feel, which was confirmed by the review team. Accordingly, the review team's recommendations included implementation of minor capital works and equipment purchases to improve the therapeutic environment and that all future capital planning of mental health facilities should include consumer co-design and be informed by evidence regarding the prevention of seclusion and restraint. This report has already noted that there is evidence of an association between the physical characteristics of the therapeutic environment and a reduction in the use of seclusion and restraint.

Consumer critical commentary

Importantly, if consumers receive messages (intentional or not) that they are not worthy of care, quality and freedoms (and are instead seen as risky or incompetent) these can follow an individual after discharge, making 'spirit breaking'[2] experiences more likely. For individuals who have been admitted without their consent, have experienced seclusion and/or restraint, or other trauma, simply approaching these spaces could be profoundly distressing. *How can design features contribute to consumers' sense of being valued and worthy of high-quality care, and capitalise on consumers' personal freedoms?*

When considering the physical design of inpatient mental health facilities, a fundamental consideration is whether it has been underpinned by good design principles. This refers to basic design principles that influence everyday wellbeing and mental health, such as access to daylight, noise reduction and air ventilation. These principles were codified in the 19th century in response to concerns about the health impact of the built environment on people, and form the basis of current building regulations.

Recently, the role of the physical environment in supporting better outcomes in mental health services has become more evident.[1, 10, 11] When considering a more proactive approach to preventing mental ill-health and supporting recovery, the link between taking a recovery-oriented approach and therapeutic design should be considered.

Placing an emphasis on personal recovery has been an important influence on policy and practice in Australia and internationally.[55] Personal recovery in mental health is often summarised by the CHIME framework—Connectedness, Hope, Identity, Meaning and Purpose, and Empowerment[20, 21, 56]; participants in Fletcher et al.'s study[57] identified a recovery orientation in inpatient units as supported through encouraging contact between consumers and their families and other informal support networks and encouraging their

presence on the ward; reducing boredom and having a choice of engaging activities; and including more peer support workers who have a fundamental role of spending time with consumers and their careers.

Consumer critical commentary

There is a tangible legacy between aspects of the design of the asylums and many of the subsequent inpatient units. We often call nurses' stations the 'fishbowl' or 'shark tanks'. This speaks to our experiences of being surveilled — sightlines to the nurses' station; use of cameras, which can be experienced as intrusions into privacy. We are known to joke: 'you're not paranoid, they really are watching you'. Co-located units (mainstreaming) can feel much more like hospitals than 'homelike environments'. *How can design features encourage relationships between staff and consumers?*

Wyder et al.[58] discuss the challenges of taking a recovery-oriented approach in inpatient units, especially when people have been admitted involuntarily. They similarly conclude that enabling choice, including choice of treatment, safety, connection with others and upholding human rights are important to ensuring that an admission does not disrupt recovery. Being recovery-oriented relates to efforts to be more trauma-informed; Muskett[59], in a review of the literature, recommended universal trauma-informed practices for all consumers as the experience of trauma was likely to be very high. Muskett identified tangible practices related to the physical environment that could contribute to being trauma-informed. These included being welcoming, having comfortable homelike furniture, using calming auditory stimulation, as well as providing adequate space and time-out options and sensory rooms that include soothing decor and items such as weighted blankets.

A comprehensive literature review by Connelan and colleagues[60], called 'Stressed Spaces', summarised evidence of key design features that contribute to broader positive mental health outcomes. They identified 13 major themes that affect outcomes and experiences of mental health consumers: security/privacy (including violence and crowding); natural and artificial lighting; therapeutic milieu (design and environment); gardens; the impact of architecture through enriching the environment with complexity, order and aesthetic considerations; interior design (furnishings, colour, wayfinding); psychogeriatric considerations (e.g. dementia); nursing stations; model of care considerations; art; designing for the adolescent; and the design of forensic psychiatric facilities. The authors also highlighted the lack of effective evaluations in health architecture generally and mental health architecture particularly.

Consumer critical commentary

There are different motivations underpinning ideas about the characteristics that inpatient spaces should have. For example, wanting to prioritise design features that will maximise a low-stimulus environment for 'safety' reasons is different from wanting to prioritise design features that are about creating aesthetically beautiful, warm, homelike spaces and maximising consumers' personal control over their own spaces, i.e. bedrooms.

What co-design processes can be engaged in with consumers, where they have the opportunity to work through the different motivations and how they influence ideas about how inpatient spaces should be designed?

Ulrich and colleagues[48] argue efforts to provide calming environments through the design of psychiatric facilities have not been sufficient because the focus has mostly been on security features, and reliant on traditional architectural approaches. Their recent paper addresses this insufficiency and proposes key design principles for inpatient facilities. Their model is grounded in the premises that environmental and psychosocial stressors mediate and trigger aggression, and that the physical environment strongly influences consumer stress. The design principles are supported by evidence on understanding aggression, environmental stressors (e.g. noise), and stress-reducing elements (e.g. nature). According to this model the following physical features should be considered: single patient rooms with private bathrooms, ward layout for smaller consumer groups, moveable seating in spacious rooms, low noise/good acoustics, nature window views, having an accessible garden, being able to see nature art (not abstract), daylight exposure, staff stations close to activity areas, and other features including homelike environments and easy wayfinding.

Considered together, the principles and recommendations introduced above can be conceptualised as a layered response to the reduction and/or minimisation of harm to consumers in mental health facilities. All these concepts are interlinked and build on one another, representing a continuum of lesser (distal) to more direct (proximal) approaches to the reduction of restraint and seclusion (see Figure 1). This figure can also be considered to represent a public health approach to reducing the use of seclusion and restraint wherein the responses at the base of the pyramid are population or universal prevention approaches that are relevant to all consumers while responses at the top of the pyramid are targeted towards individuals at high risk of seclusion and restraint.

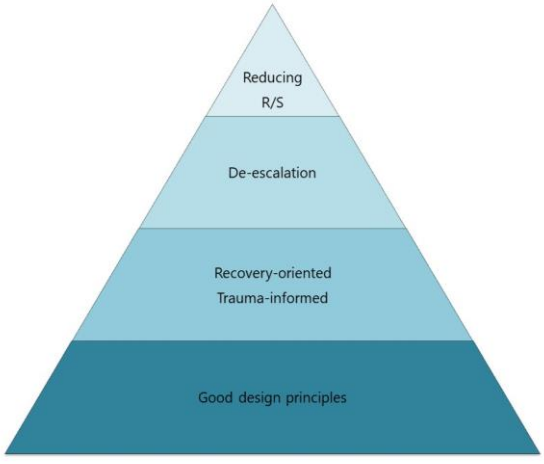

Figure 1: Design concepts in relation to the reduction of restraint and seclusion.

This Evidence Check will focus on design features directly related to reducing the use of restraint and seclusion in inpatient mental health facilities. However, we note that much of the relevant literature also addresses the value of good design, having recovery-oriented and trauma-informed environments and providing calming spaces and practices that enable prevention of aggression, de-escalation and stress reduction.

The results are intended to inform a co-design process with consumers to develop a set of principles based on best practice design of mental health facilities. They are to be used during future facility and infrastructure planning processes.

Methods

Peer-reviewed literature

We identified initial search terms from relevant publications of the aforementioned literature review, 'Stressed Spaces', and from the Evidence Check brief. We received substantial advice and assistance from a university librarian, who assisted in the development of the search strategy and the execution of the search. Additional input into the search strategy was obtained from research team members with lived experience, and clinical, architectural and academic expertise.

The search strategy included the following academic databases: Cochrane Library, MEDLINE, PsycINFO, Scopus and Avery. Searches were limited to literature published between January 2010 and August 2019 and written in English. Details of the search terms and limiters used are included in Appendix 1.

Results were uploaded and screened for duplication. One reviewer performed an initial screening of studies via titles (SO), with a second reviewer performing a more comprehensive screening of titles to further reduce the literature for abstract and full-text screening (CM). Two reviewers screened studies via abstract and subsequently via full text (SO, CM). They assessed them for inclusion independently at both stages. Disagreements were resolved through discussion or consultation with a third reviewer (LB).

Literature reviews were excluded, but their references were used to identify additional literature not covered in the search. Other literature was identified from the expert knowledge of academics on the research team. Studies of sensory modulation or other intervention approaches or programs to improve care or outcomes for consumers were only included if they specifically mentioned a physical feature, e.g. the introduction of a sensory or comfort room.

Grey literature

The review team used a broad definition of 'design' and 'design features' to include any element that had been actively considered. This interpretation included features such as furnishings—chairs heavy and fixed or light and moveable, or doors locked or unlocked—as well as more traditional features such as room layouts and sightlines from nursing stations.

We conducted a desktop search for relevant grey literature using google.com and including results from the first 10 pages. We used the basic search terms of our academic literature search: restraint, seclusion, mental health facility, architecture and design. We identified other literature from the expert knowledge of academics on the research team.

Grey literature documents were screened and assessed for inclusion by two team members (SO, LB) and inclusion was finalised via discussion with the team members. In total, we included three documents.

Method of critical assessment

We assessed the quality of the included publications using the Joanna Briggs Institute's (JBI) critical appraisal tools.[13] Reduction in seclusion and/or restraint was considered the key reporting outcome for each publication. The JBI critical appraisal tools address a wide range of study types (qualitative, case controlled, expert opinion) and provide a robust assessment of trustworthiness and relevance; therefore, we considered them the most suitable appraisal tools for this Evidence Check.[13] Each item was assessed as 'yes', 'no', 'unclear' or 'not applicable'. In this appraisal, studies that used a non-randomised design were assessed using the 'quasi-experimental checklist'.[13] Each publication is reported separately and should be considered on its merits; overall grades are not provided.

Findings

Included studies

In total, we included 38 publications in this Evidence Check[12, 14-50], which reported on seclusion[14, 20, 32, 34, 36, 38, 41, 45, 49], restraint[12, 15, 21, 48, 50] or both seclusion and restraint[16-19, 22-27, 30, 33, 35, 37, 39, 40, 42-44, 46, 47] within mental health inpatient units. Supplementary Table 1 presents a summary of the included studies and Supplementary Table 2 presents the influence of physical design features on seclusion and restraint; please note that not all the reductions reported are statistically significant. In these studies, significant reductions in the use of seclusion[14, 17, 19, 32] or restraint[12, 15, 19, 25, 50] were reported. One study reported a statistically significant reduction in 'full restraint' but a statistically significant increase in 'partial restraint', but did not define or describe these terms.[18] Most publications involved some changes to the physical environment that were part of a broader intervention to improve the quality of care, or due to renovations. The studies are detailed in Appendix 2.

The flow of publications through the screening process is reported in the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) chart[61] (Figure 2). Three relevant grey literature documents were identified that included a qualitative study or a case study that was directly relevant to the research question.

Findings from critical assessment

Findings from the JBI critical appraisal tools are presented in the Appendix (Supplementary Figures 1–4). Overall, most of the publications scored low or unclear on more than one item. Of the 38 included publications one was assessed using the JBI critical assessment tool for case-controlled studies[12] and scored unclear for all 10 items (Supplementary Figure 1). Of the 26 quasi/non-intervention trials , 22 were assessed as unclear or 'no' for two or more items[14, 15, 18, 20, 21, 24, 26, 27, 30, 34-37, 41, 43-50] (Supplementary Figure 2). Of the 10 qualitative studies seven were assessed as unclear or 'no' for two or more items[16, 29, 40, 42, 45, 47, 51] (Supplementary Figure 3). Two of the four expert opinion publications[25, 33] were assessed as unclear or 'no' for two or more items (Supplementary Figure 4).

The trustworthiness of this body of evidence is unclear and should be interpreted cautiously. First, the Evidence Check did not identify any randomised controlled trials. The case-controlled and non-randomised controlled trials were often not designed rigorously. It was often unclear if the comparison and intervention groups were comparable. Total participant numbers (intervention, comparison and total) were often unclear or not reported. Participant numbers were often not clearly differentiated for incidence numbers (i.e. incidence of seclusion). Demographics and group differences were often not reported. Further demographics, when presented, were often not presented as a table, making interpretation more difficult. A small number of studies did not report approval from an ethics committee. Overall, the quality of the reporting was often poor. As a result, it was difficult to tell whether the study had been designed and conducted rigorously.

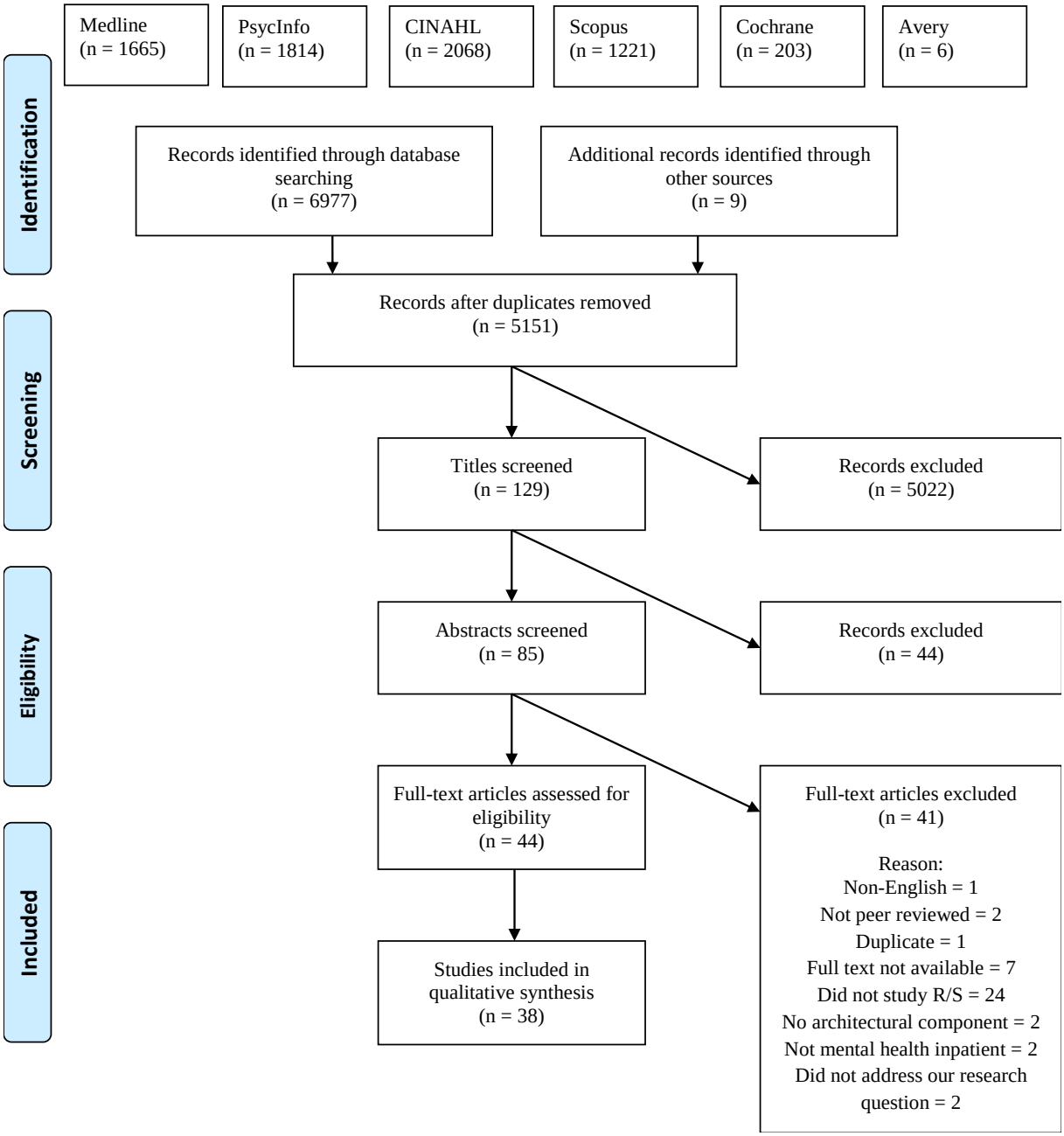

Figure 2: PRISMA chart

Consumer critical commentary

Entrances — crossing the threshold

What it means for us to enter the physical space of a mental health unit is often not spoken about, limiting opportunities for healing. To enter this environment as a consumer one must cross a threshold, both real and metaphorical. It is a space already deeply imbued with cultural and social ideas about having 'lost' minds, rationality, equilibrium. Once we cross the threshold, our testimony, personal capacity and competence may be doubted; this is likely to be experienced as deeply invalidating. Inpatient units often echo messages that reinforce that 'you are not capable' (e.g. locked doors, automatic lighting and shared rooms). A bell that can't be un-rung. For individuals who have been admitted without their consent, experienced seclusion and/or restraint or other trauma, simply approaching these spaces could be profoundly distressing. *How might design features work to support people's freedoms, capability and healing?*

Consumer critical commentary

In Scalzo's tour of architecture-designed mental health services[1], the description of one local urban inpatient unit was that it was more like a high-end apartment than a hospital. One consumer had apparently commented: "When the building is nice, then people act nice" (p.17).

In what ways can design features demonstrate respect for the people staying in mental health units (and the people working in them)?

Question 1: What physical design features of mental health facilities reduce the use of seclusion and restraint in these facilities?

Peer-reviewed literature

A beneficial physical environment

Several studies involved changes to the physical environment that reduced the use of restraint and seclusion, ranging from simple improvements to the aesthetics to full relocation to a new building. Two uncontrolled pre–post studies from the US suggested that rather simple improvements to the physical environment could reduce the use of restraint and seclusion, including the introduction of warm colours, rugs, plants and new furniture.[16, 35] One uncontrolled pre–post study from Germany showed a reduction in restraint after more substantial renovation, which included increased ward space, changed room settings with more privacy, more natural lighting and modern home electronics and large balconies.[25] Another uncontrolled pre–post study from the UK showed a reduction in seclusion, seclusion duration and aggressive incidents after full relocation, with the new ward being rated by consumers as having increased privacy, greater access to therapeutic activity space and increased visibility.[32] Furthermore, a Dutch study showed relocation to a new ward with single rooms, free access to an enclosed garden, and recreational and simple sporting facilities was related to reduced seclusion.[30]

A study from the US[47] reported that the most commonly selected design elements and spaces that young consumers (aged 5–18 years) experienced as calming and healing were those with characteristics of choice and control over an attribute, such as light dimmers and music panels. Staff noted that the artwork and colours had a positive effect in supporting people to feel calm. Specifically, in relation to reduced use of restraint and seclusion, staff noted the benefits of having an indoor pool. One UK study reported that *"the*

overwhelming perception of consumers was that the ward was untherapeutic".[42] One of the main consumer observations for features that led to instances of restraint or forced medication was that they were cooped up in the ward and not allowed to go outside and get fresh air. Some even likened the environment to a prison or a cage for an animal. Likewise, consumers and their families, friends and other support persons in Australia have identified aspects of the physical environment as a barrier to the reduction of seclusion and restraint.[22] They commented on features such as poor lighting and rooms being bare and cold. There were many criticisms of the environment and the difficulty of being able to respond therapeutically in these environments. The study noted that beneficial changes such as non-fluorescent lighting, creating warmth by adding colour, pictures and quotes to walls and sensory modulation could be implemented within existing inpatient buildings. Consumers and carers also suggested unlocking the doors to the main ward.

Finally, it should be noted that simply the availability of a seclusion room was strongly related to the use of both seclusion and restraint.[20, 21]

Sensory and/or comfort rooms

A sensory or comfort room to provide a soothing, calming space, and the use of sensory modulation techniques to assist with emotion regulation have been identified as having a role in the reduction of seclusion and restraint.[62] One US study noted: *"Self-management empowers clients and promotes autonomy on their road to recovery. Comfort rooms should be considered an important tool in the goal toward the reduction of seclusion and restraint use."* [44]

A total of 17 peer-reviewed studies in this Evidence Check looked at a sensory or comfort room in relation to the reduction of restraint and/or seclusion (see Supplementary Table 2 in Appendix). For some studies the introduction of the room(s) was part of a broader intervention or approach to either improving care or reducing restraint and/or seclusion (e.g. a sensory modulation approach or a larger renovation project).[12, 14, 17, 27, 34, 36, 47] Most other studies involved at minimum staff training accompanying the introduction of the sensory approaches or comfort room(s).[16, 18, 29, 34, 41, 43] Therefore, any reduction in the use of restraint or seclusion cannot be ascribed solely to the introduction of these rooms. Overall, studies indicated that the introduction of sensory or comfort rooms can reduce the use of restraint and/or seclusion. Interestingly, Blair and colleagues[17] showed in their uncontrolled pre–post study (from the US) that even though the incidences of seclusion reduced after these renovations and changes in practice, the duration of seclusion and restraint increased. Another non-randomised pre–post study from New Zealand reported reduced seclusion.[18] This study also reported reductions in *"full restraint"* and an *"increase in the use of partial restraint"*[18] but did not define or describe these terms. This indicates the impact of sensory rooms may vary, and multiple seclusion and restraint measurements should be considered when evaluating the effects on consumer outcomes.

In a contradictory finding, one mixed method study from the UK reported an increase in the use of seclusion after the introduction of a sensory room.[45] This study reported an increase in seclusion incidences; however, when staff were asked about the impact of the sensory room, they reported having perceived a decrease in incidents.

Private, uncrowded and calm spaces

Several studies indicated the importance of private or quiet spaces, such as no crowding or low-stimulation environments, in reducing the use of restraint and seclusion. A requirement for privacy relates to the need for a private bedroom for each person, to safely relax and to sleep without the possibility of intrusion by other consumers. Furthermore, it involves the capacity to securely store valued belongings in one's room and additional space to be recreationally active in one's own room.

As has been noted, simply the availability of a seclusion room is strongly related to the use of both seclusion and restraint.[20, 21] Service systems in both the UK and US include multi-ward sites where only some wards have seclusion rooms. It is unclear whether these wards are viewed differently, for example, regarding the suitable level of symptom acuity.

One associative study from Denmark showed that no crowding was associated with a lower use of restraint.[15] Crowding is an environmental feature that has previously been studied in relation to aggression on psychiatric wards; however, a clear definition is often lacking. It can be understood as either the amount of space per person, the number of people in a physical environment or the perception of crowding.[15, 48] In the current study, 'no crowding units' were defined as those in which two of the following three conditions were present: only one bed in a consumer's room, more than 25 m^2 of all-day-accessible space per consumer, and the perception of no crowding.

Interestingly, a Dutch Delphi study indicated that in the absence of private spaces, mental health professionals were more likely to judge seclusion as very necessary.[37] In line with this, a large Dutch study involving a multi-level regression analysis with data from 16 psychiatric hospitals[49] showed the amount of 'privacy' influenced the use of seclusion. First, a larger number of consumers (varying from a mean of 37.4 consumers to a mean of 52.5 consumers) in the building increased the risk of being secluded. Furthermore, a larger total private space per consumer (varying from a mean of 12.7 m^2 per consumer to a mean of 14.7 m^2) was related to a reduction of seclusion risk. Other features that were related to reduced risk of seclusion were a higher level of comfort and greater visibility on the ward. However, these features did not influence the total number of seclusions for those secluded, or the duration of seclusion. The presence of an outdoor space (i.e. yes or no) and the availability of special safety measures (e.g. such as the presence of special communication and warning systems) were features that *increased* the risk of seclusion. The authors noted, however, that the effect of outdoor space might be biased in their study, due to very limited information (e.g. type, size and access unknown) and the fact that only 3.5% of the wards in their sample did not have an outdoor space.

One longitudinal observation study from the US[50] showed a reduction in restraint after efforts to reduce sensory stimulation levels which, among other things, included low and natural lighting and sound and noise reduction (specifically between 4:00 pm and 7:00 pm). In a qualitative study from Australia[40], nurses from old-age psychiatry inpatient units reported that noisy (e.g. from the TV, radio and dishwasher) and crowded environments, where consumers were unable to avoid noise and stimulation, contributed to the use of restraint and seclusion. One of the interviewees reported *"some patients requested seclusion in order to be left alone from the others"*[40] (page 112). Alternatively, having quiet spaces available, such as a garden, activity room or low stimulation area, were identified by nurses as effective alternatives to restraint and seclusion. Another Australian qualitative study involving consumers also reported the lack of quiet and private spaces as a contributing factor to poor practices that may impede efforts to reduce the use of seclusion and restraint.[22]

As discussed earlier, a recent study by Ulrich and colleagues from Sweden[48] introduces a conceptual model that promotes a de-stressing environment in psychiatric facilities by designing the physical environment with 10 evidence-grounded stress-reducing features. This model includes 10 design features, partly overlapping with some of the concepts described here, such as designing for low density (no crowding), noise reduction, and consumer control over private spaces—see Figure 3. To test this model, they conducted a pre–post study, which showed a 50% reduction in physical restraints for consumers who previously required restraint, after relocation to a hospital with most design features in place (9/10 versus 1/10).

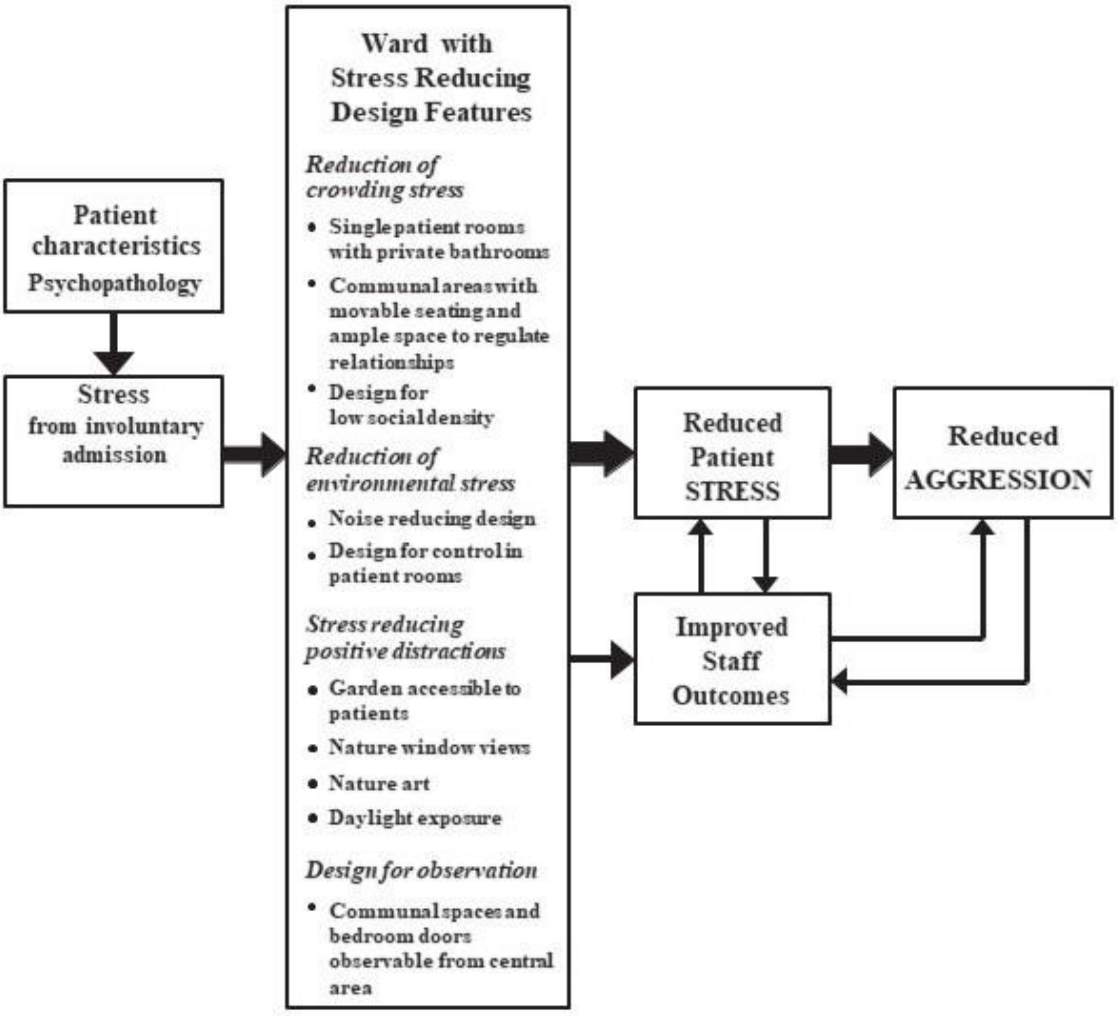

Figure 3: A conceptual model for designing a stress-reducing environment for inpatient psychiatric wards (Ulrich et al.[48] page 55)

Open nursing stations

One study from the US evaluated consumer and staff perspectives of the therapeutic milieu before and after moving from a closed to an open nursing station.[46] They reported no increase in aggression towards staff and a reduction in seclusion and restraint after moving to an open nursing station. However, the authors did not report any actual data on the latter finding so the effect on the use of seclusion and restraint is not known.

Grey literature

Most grey literature included in this Evidence Check on the design of mental health facilities did not comment specifically on reducing the use of restraint and/or seclusion. We identified three grey literature documents that spoke directly to the impact of design on the use of restraint and seclusion, one that included three case studies[33] and two that included qualitative studies[38, 39] (see Appendix 2). The following section discusses these three publications. Overall, they speak to the concept of having a beneficial physical environment. Other relevant grey literature identified by the review team is considered in the discussion section.

The Victorian Department of Health and Human Services (DHHS) has made efforts to assist mental health services to reduce restrictive practices.[38] Its recent published case studies noted the influence of the physical

environment in reducing restraint and seclusion. Changes to the inpatient environment included making the nurses station more visible, putting in more comfortable and colourful furniture, and introducing sensory spaces as part of a broader sensory modulation approach. Interviewed stakeholders stated they would like continued changes to the physical environment, including a larger indoor and outdoor space for the adult intensive care unit. Trend analysis indicated that the overall efforts to reduce restrictive practices were successful. Interestingly, they also reported an increase in the use of seclusion specifically for the youth mental health unit after introduction of a sensory room.

The Melbourne Social Equity Institute[39] reported on the use of restraint and seclusion for the National Mental Health Commission. As part of this report it conducted qualitative studies, which included online surveys and focus groups with key personnel in mental health care and individuals with lived experience, their carers, family members and support persons. The online survey asked participants about their views on strategies for reducing restraint and seclusion practices, and the focus groups involved three main topics: their understanding of seclusion and restraint, their observations about poor practice and what contributes to it; and ideas and recommendations regarding strategies to reduce and eliminate seclusion and restraint. The impact of design features was identified as a main theme by multiple participants, especially in the focus groups. The environment was identified as a barrier to the reduction of seclusion and restraint, including the 'bare' rooms and fluorescent lighting of inpatient facilities. Furthermore, more than half the focus groups linked strategies to improve the environment in the inpatient unit with strategies to reduce or eliminate seclusion and restraint. Participants suggested that physical changes should be considered in efforts to reduce the use of restraint and seclusion, such as non-fluorescent lighting; creating warmth by adding colour, pictures and quotes to walls; and sensory modulation. They also suggested unlocking the doors to the main ward and removing seclusion rooms altogether. A carer suggested that: *"You can do things with a room to make them cosy, relaxing, comfortable, music, different lights which don't intensify the experience."*[39] (page 147).

In a review of mental health inpatient rehabilitation services commissioned by the Central Adelaide Local Health Network[33], staff identified that building design, and features that did not meet the needs of many of the consumers residing in the inpatient mental health facility, contributed to the use of restraint and seclusion. Nursing staff said observation was difficult to achieve within the layout, and this contributed to the difficulties they experienced in managing consumers with acute distress. They identified several difficulties with the current layout: medical and allied health staff offices located at opposite ends of the unit, removed from the clinical space; the location of the main external seating area directly outside the entrance of the open unit, promoting this as a smoking area; a very high reception counter, making it difficult for consumers and visitors to see if staff were present; a Perspex screen that acted as a barrier and created an 'us and them' environment; a small front nursing station, resulting in staff congregating in the second nurses station, out of sight of consumers; poor lines of sight; not enough space for confidential conversations; a design that encouraged clinical staff to retreat behind Perspex screens; the separation of the entrance from the nurses station, making it hard to monitor who was coming and going when the reception area was unattended.

Question 2: Of the design features identified in Question 1, are any specific elements essential, or unsuitable, for particular patient subgroups?

Most publications included in this Evidence Check focused on adult mental health units or did not distinguish clearly between different units or subgroups. Few publications offered information regarding subgroups of consumers that might be considered in the future design of mental health facilities.

Designing for young people

McKenna et al.[38] reported on three case studies involving physical changes to the environment as part of an effort to reduce restrictive practices. They mentioned age did not appear to be a significant factor in the use

of restrictive practices, although they also noted that restrictive practices were mostly experienced by males aged 20–30 years old. One interviewee noted that most of their young consumers came from diverse backgrounds and had experienced trauma, which required an emphasis on trauma-informed care. Interestingly, the authors reported an *increase* in the use of seclusion for the youth mental health unit in contrast with a decrease in use of seclusion for all other units. Unfortunately, the reasons for this were not explained or discussed.

Trzpuc et al.[47] researched the contribution of design features to the behaviours of staff, consumers and their families in a child and adolescent mental health inpatient unit (aged 5–18 years). Their results indicated that choice and control were important concepts to consider when designing for this cohort (e.g. coloured lights, light dimmers, music panels).

Seckman et al.[43] examined which sensory tools were preferred by young people (aged 12–17 years) when using the sensory room; the bubble tube was an absolute favourite (98.5%), followed by the image projector (75%), infinity tunnel (57%) and music (46%). Bobier et al.[18] found a massage chair (85%) was the item most commonly used by young people in the sensory room. A frequent suggestion for improvement by young people[43] was to have a better selection of sensory tools and, more specifically, a better variety of music. Generally, sensory work has been developed by the occupational therapy discipline.[43] There can be ownership of the sensory space and resources by group-program specialists, who are typically present on wards only during business hours. Sometimes sensory spaces are located away from the common areas in wards and are inaccessible to high-dependency areas, and sensory equipment can be locked away by specialist facilitating staff. Shift-working staff and consumers themselves may not have access to the sensory spaces and to sensory equipment, or access may be limited to certain times. However, as Seckman et al.[43] demonstrated, most sessions occurred during evening shifts (56%) or night shifts (9%) and were initiated by young people and facilitated by nurses. A Victorian study on sensory spaces refers to barriers of access to sensory resources, for example, through locking and storage, which would need to be factored into design.[63]

Designing for other subgroups

None of the included studies commented on any challenges or considerations that may exist for other subgroups of consumers. While two Australian qualitative studies commented on people with diverse backgrounds, these comments were not related to design features. One study[22] noted that isolation had a particularly negative impact on people from culturally and linguistically diverse (CALD) communities. Another study[40] noted that cultural differences and insensitivities might exist between staff and consumers that could lead to misinterpretation of consumers' behaviours as aggressive: *"We might have a nurse from another country, and we have an Italian patient that uses his hands in explaining something and the nurse can perceive [it] as being violent... Staff are not tuned into different cultures"* (interviewee, page 112). Two studies from the Netherlands highlighted the level of sleep disturbance experienced by consumers in forensic facilities and thus reducing night-time noise with the aim of lessening sleep disturbance might be a particularly valuable environmental modification in these units.[64]

Gaps in the evidence

Optimal scale of wards

There is evidence of the value of less crowding, which can be operationalised as square metres per person. But the fundamental issue of ward scale dictates the number of consumers and staff interacting in a space and it further determines how much familiarity can be established with people in a space. A larger scale may create many new encounters and opportunities for conflict to arise and it complicates communication, including making it more difficult to communicate rules. Conversely, people are more likely to relax, exercise choices and make use of resources in an environment where they develop familiarity with people, spaces,

resources and rules. Hence, more research is required regarding the implications of less crowding and determining the optimum ward scale.

Personal access to belongings

Though there is evidence for the conflict-preventing value of choice and personalising spaces, there is no guidance regarding optimal access to personal property in hospital. In healthcare generally, consumers are discouraged from bringing property into hospital and there are concerns about hazardous items, such as lighters. However, storage is relevant to both staff and consumers and access over extended or 24 hours to personal materials and spaces may need to be negotiated. This includes sensory equipment and sensory rooms, self-caring and self-soothing items such as weighted/multisensory objects, aromatherapy materials, headphones and music/visual devices such as iPods. Evidence supporting individual access to sensory items for self-care and objects for exercise, creativity and relaxation is needed.[63]

Balancing the values of open spaces and visibility vs privacy

People spending time in their own rooms and an emphasis on privacy is encouraged in design principles, but it is unclear what impact this may have on other considerations, such as the inpatient unit aiming to be a safe and therapeutic environment. For example, in order to protect belongings and privacy there may be a preference for bedrooms that an individual can lock themselves so that other consumers can't access their room, enabling only staff to override the lock.

Design and technology for monitoring

From a consumer perspective, surveillance can be a highly intrusive and frightening feature of inpatient units. It is a commonly reported experience that consumers feel they are being watched, so these technologies may have a particular resonance for people in terms of inducing further fear and anxiety.[65] Co-design processes can assist in negotiating paths through the tensions of personal freedoms and safety.

Design enabling physical exercise and activity

Physical exercise is important in preventing conflict and in preventing conflict related to demoralisation and frustration.

Design features supporting consumers' access to technology

Being able to access technology and engage in personal communication is a human right that does not cease when consumers are in mental health hospitals. Design features can enhance access and how best to achieve this right should be considered.[66]

Whole-of-ward sensory design

Positive management of aspects of the sensory environment apart from light—such as temperature, smells and airflow, optimal soundscapes, aesthetics in the visual field, touch-sensory features of floor and wall surfaces indoors and outdoors—needs to be investigated as these features may have a role in increasing opportunities for personalising private space, reducing distress and, potentially, seclusion and restraint.

Designing for people with Alzheimer's disease/other dementias

There was a lack of evidence about the design of mental health facilities to reduce restraint and seclusion for people with Alzheimer's disease or other dementias. However, environmental changes have been suggested in relation to the prevention and management of aggression and/or creating de-stressing environments for such consumers. For example, some environmental considerations described by the Alzheimer's Society in the UK[67] include lighting, room temperature, wayfinding (specifically to the toilet) and using signs and pictures. Furthermore, the Design in Mental Health Network[64] describes the effects of intrusive background noise for older adults on an mental health ward in relation to distress. They also noted

the value of rather simple and effective solutions, such as adding felt pads to the base of furniture legs to reduce noise.

Designing for inclusion and being responsive to diverse needs

No peer-reviewed or grey literature specifically addressed the design features that may be required to support the reduction of seclusion and restraint among consumers from diverse or marginalised communities. There is also the potential to consider the needs of particular subgroups of consumers, including but not limited to Aboriginal people, the LGBTQI+ community and people from refugee and non-English-speaking backgrounds, especially in the context of the limited evidence currently available to inform design that is inclusive and responsive to diverse needs.

Design features related to gender safety/gender separation

Gender safety is a common topic arising from complaints in inpatient units and is considered in management and policy arenas, but there is a lack of evidence to support mixed gender or single gender accommodation in acute psychiatry. Also, the implications with respect to seclusion and restraint reduction are unknown.[68] The complaints issue is strong in the recent Victorian Mental Health Complaints Commission's report.[69]

Specific design needs in aged care units and child and adolescent mental health units

There is very little specific and quality research and no detailed guidance.[70]

Extra care units/intensive care units

Extra care units are not addressed in this Evidence Check. Extended care units or Mental Health Intensive Care Units are smaller locked mental health acute units that usually contain a small number of bedrooms and ensuites. Recent UK policy regarding Psychiatric Intensive Care Units (PICU) [66] states (section 7.2.78):

"An effective PICU design should give the provision of therapeutic activity an equal status to safety and security and should include:

- *Activities room (containing board games, art and stereo equipment)*
- *Access to internet and social media (with appropriate safeguards in place)*
- *Day room (with a television and DVD player, or equivalent)*
- *A room with physical exercise equipment."*

Consumer critical commentary

Design features related to rights to freedom of movement for voluntary consumers

While aspects of care for voluntary consumers are regulated by mental health laws, their rights to liberty and freedom of movement should not be interfered with. *How might design features support voluntary consumers?*

Discussion

This Evidence Check found the physical environment can have a role in supporting better outcomes for consumers of inpatient mental health services, including a reduction in the use of seclusion and restraint. This is likely to be achieved through a multi-layered approach, founded on good general design features and building towards specific design features that may reduce occurrences of seclusion and restraint. The good foundation design principles include privacy, adequate space, no overcrowding, exposure to daylight and other appropriate lighting, use of colour, reduced levels of unpleasant noise, access to gardens, art that features nature, a homelike environment and easy wayfinding.[1, 48] These examples of good design features form the first layer in providing a welcoming, calming and healing environment for all. Use of colour has been noted by several studies but it remains unclear which colours are optimal or beneficial. Connelan et al.[60] reported that blue tones were calming and that bland colour schemes, trendy palettes and perceptual confusion (e.g. a woodgrain finish on a metal door) should be avoided.

Taking a recovery-oriented approach to mental health care is an established expectation for mental health services and the physical environment can contribute to this. Having access to engaging activities and ensuring ease of access for families and other supporters are features that can be facilitated through good ward design and are likely to contribute to recovery-oriented care.[57] Furthermore, many, perhaps most, of the people who come into an inpatient unit have experienced trauma at some stage in their lives and hence need trauma-informed care. Once again, the physical environment can contribute through the provision of, for example, sensory rooms and soothing decor.[59] The recovery-promoting and trauma-reducing intentions are also conceptually related to the intention to reduce seclusion and restraint, in so far as they prevent staff–consumer conflict and the likelihood of subsequent coercion.[52] More research is required to establish the strength of these relationships.

Consumer critical commentary

We notice how, in much of the literature, we are constructed as 'disturbed' or 'aggressive' or 'violent' in ways that do not pay attention to the role that environments play or to the contexts in which we find ourselves. *What is the role of design in mitigating the strangeness of unfamiliar people and spaces, in which we are perhaps frightened, perplexed, anxious, withdrawn, bored, or frustrated?*

Good design is also likely to support the prevention of distress, conflict or aggression. This forms another basis for the opportunity to work towards preventing the use of seclusion and restraint. Ulrich and colleagues[48] have provided a model that is optimistic that attention to physical features can reduce the environmental and psychosocial stressors that can result in distress and trigger aggressive behaviours. This includes most of what has already been described above and also includes preference for single bedrooms and staff stations being close to activity areas.

In relation to specific design features to support the reduction of restraint and seclusion, it is important first to acknowledge that this evidence, as already explained, has many limitations because of a general lack of robust, rigorous and gold standard research in this domain. However, the literature identified in this Evidence Check did indicate the potential for physical design features to play a positive role. It was found that a beneficial physical environment that can lead to reductions in seclusion and restraint can be achieved through relatively simple renovations and attention to decor—all the way through to a change of building

that enables a modernisation of facilities and ensures access to gardens, recreational spaces and sporting facilities (including a pool).[25, 30, 32, 35, 47, 71]

Based on the evidence identified in this Evidence Check, it is unclear whether sensory or comfort rooms reduce or increase the use of seclusion and/or restraint. Recent pilot studies reported that there are barriers to uptake, some of which can be addressed through design. For most studies the introduction of a sensory or comfort room was part of a broader intervention or approach to either improve care or reduce the use of restraint and seclusion. Any effects demonstrated by these studies cannot solely be attributed to the physical presence of a room; however they show the potential of broader sensory modulation interventions in reducing the use of restraint and seclusion.

The provision of private and calm spaces is strongly supported in the grey literature, especially literature focused on the future design of mental health services, and also in the peer-reviewed literature. The findings establish the importance of minimising crowding of inpatient units, of noise reduction and ensuring that people have access to quiet places and rooms over which they have some control. There is also some evidence for having an open nurse's station. Ulrich and colleagues'[47] model summarises 10 design features linked to reducing seclusion and restraint. This model is consistent with the recommendations from Scalzo[1] and is also demonstrated in architectural award-winning case studies.

While this Evidence Check identified few papers that reported elements essential, or unsuitable, for particular consumer subgroups, Trzpuc et al.[47] found the design elements and spaces that young consumers (aged 5–18 years) most commonly noted as calming and healing were elements with characteristics of choice and control over an attribute, such as light dimmers and music panels. Two other studies indicated favourite sensory tools for young people included a bubble tube, an image projector, an infinity tunnel, music and a massage chair.[18, 43] Additionally, one study demonstrated that most sessions took place during evening shifts (56%).[43]

Notably, the work on the Orygen and OYH Parkville building in Melbourne demonstrated the success of working in collaboration with young people (both with and without lived experience).[74] The design team said a major theme for young people was inclusivity and showed efforts to address this in the design of the building (e.g. gender-neutral amenities). Tapak[72] has identified specific considerations for the design of mental health facilities for young people:

1. Involving children and adolescents in the design development process
2. Enhancing the residential quality of the space
3. Ensuring safety
4. Maintaining privacy and dignity
5. Sensitive treatment of consumers' bedrooms
6. Choice of decoration
7. Providing exercise areas.

The Orygen and OYH Parkville building is 'championing inclusive and universal design'. One of the most prominent issues discussed with young people and clinicians was inclusivity, with gender and sexual orientation discrimination being a real issue for young people. One way they addressed this in the design was to make all amenities in the new facility gender-neutral.[73]

As noted earlier, there is a lack of evidence about the design of mental health facilities for reducing restraint and seclusion specifically for people with Alzheimer's disease or other dementias. The review report produced by Design with People in Mind pointed out that there is evidence that background noise may particularly affect older adults and may also lead to sleep disturbances in mental health settings.[64]

Specific challenges or considerations may exist when designing for consumers with diverse backgrounds. Hunt and Sine[74] reported that consumers from different backgrounds may have entirely different views of

what constitutes a homelike or 'normal' setting. They pose that a more realistic goal is to create a non-threatening environment in which consumers can feel relaxed and comfortable and can also be actively engaged and occupied.

Aspects of home likeness can be extrapolated by contrast with clinical spaces that are primarily designed with attention to the workplace needs of clinicians, not the everyday living experiences of consumers. These comparisons might suggest: domestic scale of spaces and consumer clusters (e.g. less than 10), much higher ratio of living spaces versus sleeping spaces, diverse indoor and outdoor recreational and creative spaces and equipment. These enriching features should extend into the locked intensive care spaces.[66]

The literature related to prevention of seclusion and restraint is mainly about opportunities to *manage* differently actual or imminent events of aggression. Recent developments in inpatient practice highlight an urgent need for research to focus further 'upstream' in terms of preventing the emergence of aggression and conflict. The Safewards model[52] identifies the ward environment as a key domain for the generation of potential trigger points that lead to conflict and coercive responses. It highlights in principle many more opportunities to prevent seclusion and restraint, using good environmental design as a starting point. There is considerable scope to prevent seclusion and restraint by considering design features that:

- Relate to gender safety/gender separation
- Enable physical exercise and activity for health and wellbeing
- Support (the consumer's right of) access to technology
- Enable (the consumer's right to) freedom of movement, including in every instance for voluntary consumers
- Enable inclusion of family/supporters
- Facilitate the full integration of peer support.

Modern design principles

Many of the grey literature publications that the Evidence Check team came across did not specifically focus on the impact of design on restraint and seclusion, but mostly on recovery-oriented care and providing calm and soothing environments for consumers. Modern design principles discussed in architectural literature in the design of mental health facilities include: green space and access to nature (including in artworks), family spaces, noise reduction, attention to fabrics, floor covering, lighting and access to natural light. Some of the key documents speaking to these principles are summed up below. The overarching concept is that choice and control (for the consumer)—single bedrooms, openable windows, moveable furniture—should take precedence over efficiency and security concerns.

The Facility Guidelines Institute has published a document that comments on common mistakes in the design of psychiatric hospitals.[74] Several points are made that may be relevant when designing to reduce the use of restraint and seclusion, although they do not speak to this directly. The document authors point out that many design elements and items typically provided in general hospitals are carried over into psychiatric hospitals. Many of these features are unnecessary and reinforce the institutional character of such facilities. For example, they mention that fluorescent lighting, commonly used in general hospitals, does not provide a homelike feel and replacing such fixtures can simultaneously improve safety and make a big difference to the character of a facility. Also, paddle-style door hardware, which is intended to help staff open doors with their hands full, is generally not necessary in psychiatric hospitals. Other general hospital elements, such as medical gas outlets, bedpan washers, nurse-call systems, light fixtures located directly over the bed, and wrist handles on tap valves, are simply not needed in a psychiatric unit.

Award-winning modern designs of mental health units have focused on providing spaces that enable choice and control in relation to a variety of environments and have extended the access-to-nature theme by having units that reflect the local environment, for example in Vermont[64], where *"coloured linoleum laid in a*

pattern that mimics a creek edge flows down the inpatient unit corridors, meeting 'docks' at each bedroom door and stopping at wood window benches along the way".

In the Wagga Wagga mental health unit[75] *"a familiar 'home' environment is created by modulating courtyard facades with feature garden spaces signifying growth and regeneration. The internal aesthetic takes on a calm colour palette of eucalyptus-inspired greens and greys evocative of the Australian bush and the hills of the Riverina district."*

And at Midpark in Scotland[76] they used *"daylight to create different interior atmospheres throughout the building's functional spaces. Different levels of daylight are used to create reassuring patients' rooms, bright and positive common rooms, and calm, peaceful therapy rooms. Daylight is further used throughout the circulation corridors to create smaller, more intimately scaled spaces."* This case study also highlighted that staff were seeing real differences in consumers' wellbeing and attributed this to the design of the new building. They also observed a reduction in aggression and reported the environment as calming and conducive to the healing process.

The new Royal Adelaide Hospital[77], completed in 2017, included a new mental health unit with a focus on providing a healing environment. Access to the natural environment is described as a key design feature, maximising the use of natural light and incorporating open spaces and access to garden courtyards. It includes 40 single rooms with ensuite bathrooms, and every room has a window with views of nearby gardens or across the river. Five courtyards provide each unit with private outdoor spaces. The focus on the natural environment continues in the artwork, which includes landscape photographs.

Recently, the Orygen and Orygen Youth Health (OYH) Parkville building has won the Best Mental Health Design prize at the 2019 European Healthcare Design Awards ceremony.[73] In designing the building, the architecture firm consulted with staff members, young people with a lived experience and their families, and young people without a lived experience. The facility uses warm materials (e.g. wood), homelike spaces and furniture, and ample daylight.

A large architectural firm, Hassell[78], released its principles of design for a successful mental health facility, based on its project experience and research into 'evidence-based design' (EBD). The firm describes EBD as a tool to overcome some of the challenges that exist in mental health architecture and to help understand the causal links between environment and treatment. It notes that the Centre for Health Design in the US has collated more than 2000 papers on EBD but only very few specifically address mental health. Hassell has described the critical attributes of a successful mental health building as including: light; elimination of environmental stressors; safety; security; observation; avoidance of visual disturbance; colour; group interaction; and access to nature. These key design features appear to have a fundamental role in good design and, potentially, play a part in working towards the reduction or elimination of the use of restraint and seclusion in inpatient mental health facilities. Hassell notes efforts to minimise restraint and uphold consumer dignity are a part of contemporary mental health service design.

Architect Stefano Scalzo, the Director of Planning and Development at the Victorian Health and Human Services Building Authority (VHHSBA), explored the design of high-amenity mental health units and subsequently developed lessons learned and recommendations for the Australian context (see Table 1).[1] Overall, these recommendations are in line with the previously mentioned design elements, including access to outdoor areas, maximising daylight and good acoustics. Scalzo also recommends promoting *"consumer perceptions of freedom"*. Table 1 presents one of the most innovative examples of modern design identified by Scalzo, as described below:

"Unlike other examples seen throughout Scandinavia and Europe, the new Psychiatric Unit at Södra Älvsborg Hospital does not include courtyards, roof gardens or other similar features. Rather, it relies on the amenity provided by bedroom balconies, the careful interior design of recreation spaces and the reprising of a pinwheel plan typology synonymous with institutions of the nineteenth century" (page 24).

Table 1. The 10 recommendations from Scalzo[1] for the design of Australian mental health units

1.	Mental health units are ideally developed over multiple levels so as to minimise building footprint and site coverage of hospital campuses.
2.	Mental health units are ideally located on hospital campuses or on urban sites where linkages between the unit, the broader hospital campus and community can be developed to mitigate against stigmatisation.
3.	Mental health units are ideally designed to achieve built environments of high amenity featuring: direct access from clinical spaces to outdoor areas, high levels of daylight penetration, good acoustic attenuation and ease of wayfinding.
4.	Wherever mental health units are developed as standalone buildings they are ideally designed as either a stepped courtyard or radial plan type (e.g. Figure 4).
5.	Wherever mental health units are designed with courtyards, these are ideally surrounded by residential accommodation in a 'single' loaded corridor arrangement to maximise daylight penetration.
6.	Mental health units are ideally designed to facilitate direct access from indoor spaces to landscaped areas without the need for 'managed' solutions, which impact upon staff efficiency and consumer perceptions of freedom.
7.	Mental health units are ideally designed with disaggregated outdoor areas preferably linked to consumer bedrooms or recreation areas that promote individualised amenity.
8.	Mental health units are ideally designed to incorporate sound attenuation features through the use of sound absorbing materials and finishes resolved to a high standard architecturally.
9.	Mental health units are ideally designed to include local materials and building traditions to assist in the creation of a 'normal' place.
10.	Mental health units are designed to incorporate anti-ligature fixtures and fittings to a standard commensurate with an agreed safety management plan balancing amenity with risk.

Figure 4: Floorplan of the Psychiatric Unit at Södra Älvsborg Hospital (Norway).

Note. This figure was taken from Scalzo[8] and illustrates inpatient accommodation arranged in six spokes of a pinwheel plan each comprising six single bedrooms (page 24).

Staff safety

Staff safety is an important consideration in service planning and the design of mental health facilities. First, it is important to note that good design principles benefit every person in the space, staff as well as consumers. Access to aesthetically appealing spaces with natural light and air, minimal noise, a natural outlook and good wayfinding promotes staff wellbeing and communicates similarly to staff that their work is valued.

The early work on reducing and eliminating seclusion and restraint was based in a public health perspective that highlighted seclusion and restraint as high-risk practices. Reducing and eliminating seclusion and restraint afforded safety benefits for staff.[79] Massed event data from the 2000s in Pennsylvania, US, showed staff injury was directly associated with seclusion and restraint, so that reduced rates were associated with reduced rates of staff injury.[80]

Since the early 2000s all Australian public mental health services have undertaken projects to reduce restrictive practices. However, as staff injury events are relatively infrequent and not systematically reported at a state or national level, the expected safety gain for staff in Australian inpatient settings has been poorly evidenced. Nor is there evidence that staff in acute units are less safe or more frequently harmed.

Inpatient unit design has focused strongly on reducing opportunity for self-harm, in particular eliminating ligature points and sharp objects, and nursing override of privacy features, such as bathroom door locks. Similarly, nurses have emphasised reducing the opportunity for consumer to consumer and consumer to staff injury. Nurses have emphasised the safety-promoting value of living spaces and ample corridors with good lines of sight and ready access, in the event of an emergency. Nurses value sufficient private spaces to encourage spatial separation of people in conflict. Inpatient spaces have been designed to avoid dark corners and to limit consumers' access to other consumers' bedrooms. An unintended consequence of the safety emphases in design has been that units are devoid of homelike comforts. A significant exception has been the women-only corridor/bedroom sections in mixed-gender units, often designed with homelike furnishings. This Evidence Check highlights the need to reintroduce homelike features, and for design briefs to rebalance safety and aesthetic considerations for the benefit of consumers and staff.

Staff also require private space to meet and plan for team work. This is a reasonable requirement for focused conversations and consumer privacy considerations. However, this need can compete with the also reasonable consumer need for easy access to staff, for example with a preference for an open reception and staff area rather than a glassed-in office. Case example evidence[46] suggests an open staff bay does not undermine staff safety.

There are examples of specific design interventions for lessening staff distress that reduce the use of seclusion and restraint. A recent study identifies the value of a calming and sensory supportive retreat space for staff, equivalent to a therapeutic sensory room.[29] This space is intended for individuals to access if distressed, for example post-conflict, in order that staff members regroup and re-engage with consumers optimally. An example of this is the 'cortex corner' staff space at the Adolescent CAMH Unit, Austin Health, Melbourne.[53] Crowding is relevant to nurses' experience of ward hotspots and heightened perception of risk: consumers gather near ward offices where staff can be accessed, in dining areas at mealtimes, in corridors or rooms where medication is dispensed. One study[47] noted that staff experience of the new and more spacious ward was beneficial to their wellbeing and improved staff–consumer interactions.

Applicability

This Evidence Check was conducted to inform the development of more therapeutic environments to support the prevention of seclusion and restraint in mental health inpatient units in NSW.

The built and therapeutic environment was one of the identified themes in the *Review of seclusion, restraint and observation of consumers with a mental illness in NSW Health facilities*.[5] The report of the review was publicly released in December 2017. The NSW Government accepted all recommendations in the review report. In response to recommendation 18 in the review, the NSW Government committed $20 million in 2018-19 for minor capital works, furnishings or equipment to improve the therapeutic environment in acute mental health inpatient units. NSW Health partnered with representatives from the peak mental health consumer and carer organisations (Being and Mental Health Carers NSW), the Mental Health Commission of NSW and the Official Visitors Program to co-design the selection criteria and assess proposals from local health districts and specialty health networks. The partnership panel's selection criteria were:

1. Evidence of co-design with consumers and carers
2. Detailed project description, budget and timeline
3. Aligns with published evidence for the prevention of seclusion and restraint
4. Provides a welcoming environment that fosters hope and self-determination
5. Provides a safe, secure and trauma-informed environment.

Funding was approved for projects in all local health districts and specialty health networks under this Therapeutic Environments Minor Capital Works Program (TEMCWP).

The TEMCWP was the first initiative in the new $700 million Statewide Mental Health Infrastructure Program (SWMHIP). The SWMHIP will embody recommendation 17 of the review report, *"All future capital planning of mental health facilities should include consumer co-design and be informed by evidence on preventing seclusion and restraint"*.

The findings from this Evidence Check will support a more robust approach to planning in the SWMHIP and other mental health unit capital works or refurbishment.

Conclusion

Overall, this Evidence Check rapid review found the physical environment can play a role in supporting better outcomes for consumers of inpatient mental health services, including reducing the use of seclusion and restraint. The public health perspective has highlighted that seclusion and restraint are high-risk practices and that absolutely minimising seclusion and restraint affords safety benefits for consumers and staff alike. This is likely to be achieved through a multi-layered approach, founded on good general design features and building towards specific design features that may reduce occurrences of seclusion and restraint. Good design features include adequate space and privacy; no overcrowding; exposure to daylight and other appropriate lighting; reduced levels of unpleasant noise; access to gardens; and a homelike environment. In placing an emphasis on safety, inpatient spaces have often been designed to limit opportunities for physical injury to people, property damage and suicide attempts, but an unintended consequence has been that units are devoid of homelike comforts.

The findings suggest design features can maximise access to resources, such as sensory rooms, to prevent seclusion and restraint. However, the Evidence Check has also found that limited access to therapeutic spaces for staff and consumers together is an issue that needs design attention. Well-designed wards require accessible outside spaces, private spaces, therapeutic materials, homelike features and communication equipment. An overarching concept is that consumer choice and control and upholding the human rights of consumers in every instance is possible through design. This Evidence Check suggests this should take precedence over efficiency and general security concerns.

Furthermore, recent developments in inpatient practice highlight an urgent need for research to focus further 'upstream' in relation to good design principles, recovery-oriented and trauma-informed services and design features that prevent the emergence of aggression and conflict. Open staff bays are supported for improving consumer–staff access, without reducing staff safety.[52] Rather than designing spacious staff offices that separate consumers and staff, purposeful design of a sensory retreat space for staff, equivalent to a therapeutic sensory room, is a recent design idea that promotes positive staff–consumer interaction.[53] The design of mental health inpatient units has often happened without the input of consumers, their families, friends and supporters. Future designs should include consumers in a co-design process to maximise the potential for change and innovation that is genuinely guided by the insights of lived experience. There is also further potential to consider the needs of particular subgroups of consumers, including but not limited to Aboriginal people, the LGBTQI+ community, and people from refugee and non-English-speaking backgrounds, especially in the context of the limited evidence currently available to inform design that is inclusive and responsive to diverse needs.

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Appendix

	Andersen et al., 2017
1. Were the groups comparable other than the presence of disease in cases or the absence of	UC
2. Were cases and controls matched appropriately?	UC
3. Were the same criteria used for identification of cases and controls?	UC
4. Was exposure measured in a standard, valid and reliable way?	UC
5. Was exposure measured in the same way for cases and controls?	UC
6. Were confounding factors identified?	UC
7. Were strategies to deal with confounding factors stated?	UC
8. Were outcomes assessed in a standard, valid and reliable way for cases and controls?	UC
9. Was the exposure period of interest long enough to be meaningful?	UC
10. Was appropriate statistical analysis used?	UC

N/A = Not Applicable	N = No	UC = Unclear	Y = Yes

Supplementary Figure 1: JBI critical assessment for case-controlled trials

	Ash et al., 2015	Bak et al., 2014	Blair et al., 2017	Bobier et al., 2015	Borckardt et al., 2011	Bowers et al., 2010	Bowers et al., 2012	Cummings et al., 2010	Eggert et al., 2014	Espinosa et al., 2015	Fletcher et al., 2019	Georgieva et al., 2010	Jenkins et al., 2014	Lloyd et al., 2014	Madan et al., 2014	Maguire et al., 2012	Mann-Poll et al., 2011	Novak et al., 2012	Seckman et al., 2017	Sivak , 2012	Smith & Jones., 2014	Southard et al., 2012	Trzpuc et al., 2016	Ulrich et al., 2018	van der Schaaf et al., 2013	Yakov et al., 2018
1. Is it clear in the study what is the 'cause' and what is the 'effect'?	Y	UC	Y	Y	Y	Y	Y	UC	N	N	Y	Y	Y	Y	UC	UC	Y	Y	UC	UC	Y	UC	UC	Y	UC	Y
2. Were the participants included in any comparisons similar?	UC	UC	Y	Y	Y	UC	UC	UC	UC	UC	N/A	N/A	Y	UC	UC	UC	N/A	Y	Y	UC	Y	UC	UC	Y	UC	UC
3. Were the participants included in any comparisons receiving care?	Y	UC	Y	Y	Y	UC	UC	UC	UC	UC	N/A	UC	Y	Y	UC	UC	N/A	Y	Y	UC	Y	UC	UC	UC	UC	UC
4. Was there a control/comparison group?	UC	UC	Y	Y	Y	UC	UC	UC	UC	UC	N/A	N	Y	Y	Y	Y	N/A	Y	Y	UC	Y	N	N	Y	Y	Y
5. Were there multiple measurements of the outcome both pre and post? intervention?	Y	UC	Y	Y	Y	UC	UC	UC	UC	UC	N/A	UC	Y	UC	UC	UC	N/A	Y	Y	UC	UC	UC	Y	Y	UC	UC
6. Was follow-up complete and if not, were the differences described? analysed?	UC	UC	Y	UC	Y	UC	UC	UC	UC	UC	Y	UC	UC	UC	UC	UC	N/A	UC	NC	UC	UC	UC	U N	UC	UC	UC
7. Were the outcomes of participants' comparisons measured the same way?	UC	UC	Y	Y	Y	UC	UC	UC	Y	UC	Y	UC	Y	Y	Y	Y	Y	Y	Y	UC	UC	Y	Y	UC	Y	Y
8. Were outcomes measured in a reliable way?	UC	UC	Y	UC	Y	UC	UC	N	UC	UC	Y	N	Y	UC	UC	UC	UC	UC	UC	N	UC	UC	UC	UC	Y	UC
9. Was appropriate statistical analysis used?	UC	UC	Y	UC	Y	UC	UC	N	UC	UC	Y	N	Y	UC	UC	UC	Y	Y	UC	N	UC	UC	UC	UC	Y	UC

N/A = Not Applicable	N = No	UC = Unclear	Y = Yes

Supplementary Figure 2: JBI critical assessment for quasi/non-interventions trials

	Björkdahl et al., 2016	Brophy (A) et al., 2016	Brophy (B) et al., 2016	Fletcher et al., 2019	Forsyth et al., 2018	Lindberg et al., 2019	Muir-Cochrane et al., 2015	Rose et al., 2015	Smith & Jones al., 2014	Trzpuc et al., 2016
1. Is there congruity between the philosophical perspective and the research?	Y	Y	Y	Y	Y	Y	Y	Y	UC	Y
2. Is there congruity between the research methodology and the research question?	Y	Y	Y	Y	Y	Y	UC	UC	UC	Y
3. Is there congruity between the research methodology and data collection?	UC	Y	Y	Y	Y	Y	UC	Y	Y	UC
4. Is there congruity between the research methodology and the data analysis?	UC	Y	Y	Y	Y	Y	Y	Y	UC	Y
5. Is there congruity between the research methodology and the interpretation of results?	Y	Y	Y	Y	Y	Y	Y	Y	UC	Y
6. Is there a statement locating the researcher culturally or theoretically?	UC	y	y	UC	UC	UC	UC	Y	UC	Y
7. Is the influence of the researcher on the research, and vice- versa, addressed?	UC	Y	Y	Y	UC	UC	UC	UC	UC	Y
8. Are participants, and their voices, adequately represented?	Y	Y	Y	Y	Y	Y	Y	Y	UC	Y
9. Is the research ethical according to current criteria or, evidence of ethical approval?	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
10. Do the conclusions drawn in the research report flow from the analysis, or interpretation?	UC	Y	Y	Y	Y	Y	Y	Y	UC	Y

N/A = Not Applicable	N = No	UC = Unclear	Y = Yes

Supplementary Figure 3: JBI critical assessment of qualitative studies

	Dresler et al., 2015	Keppich-Arnold et al., 2019	McKenna et al., 2018	Melbourne Social Equity Institute, 2014
1. Is the source of the opinion clearly identified?	Y	Y	Y	Y
2. Does the source of opinion have standing in the field of expertise?	Y	Y	Y	Y
3. Are the interests of the relevant population the central focus of the opinion?	UC	Y	Y	Y
4. Is the stated position the result of an analytical process, and is there logic in the opinion expressed?	UC	UC	Y	Y
5. Is there reference to the extant literature?	Y	N	Y	Y
6. Is any incongruence with the literature/sources logically defended?	UC	UC	Y	Y
7. Is the source of the opinion clearly identified?	UC	UC	Y	Y
8. Does the source of opinion have standing in the field of expertise?	Y	Y	Y	Y
9. Are the interests of the relevant population the central focus of the opinion?	Y	Y	Y	Y
10. Is the stated position the result of an analytical process, and is there logic in the opinion expressed?	UC	UC	Y	Y

N/A = Not Applicable	N = No	UC = Unclear	Y = Yes

Supplementary Figure 4: JBI critical assessment of expert opinion publications

Appendix 2

Table 1. Summary of included studies

Source (author, year)	Country	Study type	Population/setting	Number of studies/participants	Intervention/comparator	Measures
Andersen et al., 2017	Denmark	Case control study	Inpatient psychiatric facility	Inpatient units (n = 2; 1 control unit)	Implementation of a sensory modulation approach	The number of belt restraints and forced medication
Ash et al., 2015	Australia	Prospective study	Inpatient psychiatric facility	One 10-bed mental health inpatient unit, consumers (*n* = 63) completed an exit interview	Implementation of recovery-based practices	Number of consumers secluded and total number of seclusions, one and two years after introduction of the recovery-based practices. Exit interviews with consumers
Bak et al., 2014	Denmark	Associative study	Psychiatric hospital	Mental health inpatients (n = 90); Denmark (n = 43) and Norway (*n* = 47)	N/A	A questionnaire covering several preventive factors that might decrease the use of restraint, which included no crowding. The number of (mechanical) restraint episodes per unit over 1 year
Björkdahl et al., 2016	Sweden	Pre–post study	Inpatient psychiatric facility	Mental health inpatient staff members (*n = 126)*	Introduction of sensory rooms, including staff training	Self-reported 12-item questionnaire with both open- and closed-ended questions
Blair et al., 2017	US	Pre–post study	Inpatient psychiatric facility	A total of 8029 admissions post-intervention and 3884 admissions pre-intervention	A quality and safety initiative designed to decrease seclusion and restraint	Seclusion and restraint incidences and duration
Bobier et al., 2015	New Zealand	Pre–post study	Child and adolescent inpatient psychiatric unit	One unit, 16 beds. Total admission (*n* = 145) of inpatients (n = 108)	Introduction of a sensory room, including staff training and an assessment tool	Arousal measures pre- and post-room use, incidents of seclusion and full and partial restraint
Borckardt et al., 2011	US	Pre–post study	Inpatient psychiatric facilities	Five mental health inpatient units in one hospital (including a geriatric, general adult, substance abuse and a child and adolescent unit)	Implementation of an engagement model	Rate of seclusion and restraint (number of incidents per patient per day for each unit and each period). Measure of the quality of care, including the perceptions of the physical environment

Source (author, year)	Country	Study type	Population/setting	Number of studies/participants	Intervention/comparator	Measures
Bowers et al., 2010	UK	Associative study	Acute psychiatric wards	Hospitals (*n* = 67); 136 wards (n = 136)	N/A	The frequency of conflict and containment events (including seclusion and time out), information on the physical environment (quality and complexity ratings) and policies, and availability of a seclusion room and/or a PICU. Other measures also included consumer and staff variables
Bowers et al., 2012	UK	Associative study	Acute psychiatric wards	Hospitals (*n* = 67); 136 wards (n = 136)	N/A	The frequency of conflict and containment events (restraint and use of force), information on the physical environment (quality and complexity ratings) and policies, and availability of a seclusion room and/or a PICU. Other measures also included consumer and staff variables
Brophy et al., 2016 (a)	Australia	Qualitative study	Consumers who had either experienced seclusion or restraint directly, witnessed these practices or were consumer advocates who directly supported people who had experienced seclusion	Consumers (*n = 30)* and supporters (*n* = 36)	N/A	Ten focus groups in four Australian state capitals and a rural location
Brophy et al., 2016 (b)	Australia	Qualitative study	Consumers who had either experienced seclusion or restraint directly, witnessed these practices or were consumer advocates who directly supported people who had experienced seclusion	Consumers (*n = 30)* and supporters (*n* = 36)	N/A	Ten focus groups in four Australian state capitals and a rural location
Cummings et al., 2010	US	Pre–post study	Acute adult inpatient unit	Mental health inpatients (*n* = 105)	Introduction of comfort room	Quantitative survey before and after using comfort room, as well as frequency and duration of seclusion and restraint before and after addition of the comfort room

Source (author, year)	Country	Study type	Population/setting	Number of studies/participants	Intervention/comparator	Measures
Dresler et al., 2015	Germany	Pre–post study	University psychiatric clinic	97–175 occupied beds	Physical relocation of mental health service	Number and duration of mechanical restraints and coercive medication
Eggert et al., 2014	US	Correlational study	High security forensic institute	Staff (*n* = 353) and mental health inpatients (*n* = 526)	Physical relocation	Participants were interviewed 6 months prior to moving to the new HSFI as well as 6- and 12-months post-move. Involved a control group that did not move buildings. Used EssenCES to evaluate ward environments and Copenhagen Burnout Inventory (CBI). Also observed consumer-to-consumer assaults, consumer-to-staff assaults, seclusion and restraint episodes, consumer grievances, and unscheduled staff absences, consumer progressions and consumer discharges
Espinosa et al., 2015	US	Pre–post study	Psychiatric intensive care unit (PICU)	15 units, almost 350 mental health consumers including children, adolescents and adults	Milieu improvement intervention	Satisfaction scores, episodes of violence, rates of seclusion and restraint (number and total time), length of stay, number of admissions and discharges, number of psychiatric emergencies, percentage of staff up-to-date in training
Fletcher et al., 2019	Australia	Cross-sectional post-intervention study	Inpatient mental health wards	Staff (*n* = 103) from 14 wards	Implementation of 10 Safewards interventions	The purpose-designed survey included demographic characteristics and both quantitative and qualitative questions regarding the acceptability, applicability and impact of the Safewards model and 10 interventions
Forsyth et al., 2018	UK	Qualitative study	Male adult acute inpatient mental health ward in a large mental health trust	Staff members (*n* = 6) in one facility	Implementation of a sensory 'chill out' room for use by consumers and staff, including staff training	Thematic analysis was used on semi-structured staff interviews
Georgieva et al., 2010	The Netherlands	Pre–post study	Psychiatric intensive care unit	4-bed mental health inpatient unit; consumers (*n = 8)*	Physical relocation of mental health service	Number of days in seclusion pre and post transfer for a period of 28 months
Hedlund Lindberg et al., 2019	Sweden	Qualitative study	Psychiatric inpatient care (including seven wards: three general psychiatric wards, one psychiatric	Mental health consumers (*n* = 28)	N/A	After use of sensory room: short questionnaire of items use and free text on experience. One month after discharge: an individual interview (20–70 minutes)

Source (author, year)	Country	Study type	Population/setting	Number of studies/participants	Intervention/comparator	Measures
			intensive care unit, one child and adolescent ward, one forensic long-stay ward and one ward for psychotic disorders)			
Jenkins et al., 2014	UK	Pre–post study	Psychiatric intensive care unit	Mental health consumers (*n* = 18); both pre and post measurements	Physical relocation of mental health service	Episodes of seclusion, duration of seclusion, aggressive incidents and the Environment Assessment Inventory (EAI)
Keppich-Arnold et al., 2019	Australia	Qualitative study	Inpatient mental health services	One inpatient unit (*n* = 40) with both 'closed' (*n* = 14) and 'open' beds *(n* = 26)	N/A	Interviews were held with nursing staff, clinical leadership, administrative staff, allied health staff, consumers, the peer workforce and medical staff
Lloyd et al., 2014	Australia	Repeated measures study	Acute inpatient units	Acute inpatient units (*n* = 2) with one control unit	One unit offered a sensory room and the other did not	Seclusion rates
Madan et al., 2014	US	Pre–post study (total of 10 years)	Inpatient psychiatric facility	1 mental health facility, 95 beds across 5 units (adult high acuity, general adult, geriatric, child and adolescent, and substance abuse)	Implementation of seclusion reduction intervention	The number of seclusion or restraint incidents per 1000 patient-days across all inpatient units
Maguire et al., 2012	Australia	Pre–post study	Forensic hospital	One hospital with 116 beds	Implementation of seclusion reduction strategies	Monthly seclusion events, number of consumers secluded and total hours of seclusion
Mann-Poll et al., 2011	The Netherlands	Delphi study	Inpatient wards	Mental health professionals (*n = 82)* from 4 institutions, with 17 different wards. N = 54 (66%) worked on a closed inpatient admission ward	A total of 64 vignettes that assessed the relationship between consumer and environmental variables	Ratings of the vignettes on a 9-point Likert scale anchored at the extremes, ranging from 1, seclusion is absolutely not necessary, to 9, seclusion is absolutely necessary
McKenna et al., 2018	Australia	Case study	Acute inpatient units	Three case studies involving representatives (*n* = 16). Case study 1 involved two acute inpatient units. Case study 2 involved two acute inpatient units and a mental health unit for older people. Case study 3 involved an adult mental health unit, a secure extended care	N/A	Interviews with representatives. Seclusion episodes per 1000 occupied bed days and average duration in hours per seclusion episode

Source (author, year)	Country	Study type	Population/setting	Number of studies/participants	Intervention/comparator	Measures
				mental health unit, a youth mental health unit and a child mental health unit for children under 13		
Melbourne Social Equity Institute, 2014	Australia	Qualitative study	Key personnel in primary healthcare and individuals with lived experience, their carers, family members and support persons	Online survey: n = 1240 people 48% identified as a carer; 40% reported personal experience of receiving treatment for a mental health issue and almost one in three identified as a nurse (30%) and/or mental health practitioner (28%). Focus groups: n = 30 people All of whom had lived experience of mental health service provision and all of whom had either experienced seclusion or restraint directly or had witnessed or advocated for those who had	N/A	Online surveys and focus groups
Muir-Cochrane et al., 2015	Australia	Qualitative study	Short-stay acute old age psychiatry inpatient units	Nurses *(n = 39)* from 3 geriatric mental health inpatient units (20-, 19- and 15-bed)	N/A	Interviews
Novak et al., 2012	Australia	Pre–post study	Acute inpatient psychiatric unit	75 occasions of sensory room use	Introduction of a sensory room, including staff training	Consumer distress, episodes of seclusion and aggression incidents
Rose et al., 2015	UK	Qualitative study	Acute psychiatric ward	Four focus groups, each meeting twice, including service users (who have been an inpatient in the previous 2 years, *n* = 37) and nurses (*n* = 50)	N/A	Focus groups
Seckman et al., 2017	US	Pre–post study	Adolescent psychiatric inpatient unit	One 20-bed inpatient adolescent mental health unit	Introduction of a sensory room, including staff training	Month-by-month freq. and durations of restraint/seclusion and number of aggressive behaviours
Sivak, 2012	US	Pre–post study	Inpatient units of rural mental health hospital (one female, one male)	2 mental health inpatient units	A 'hospital-wide' recovery-focused initiative	Number of restraints and seclusion, as well as client-to-client assaults and client-to-staff assaults

Source (author, year)	Country	Study type	Population/setting	Number of studies/participants	Intervention/comparator	Measures
Smith & Jones, 2014	UK	Mixed-method study	Psychiatric intensive care unit	15 beds (male only), staff members (*n* = 10) and consumers (*n* = 7)	Introduction of a sensory room	Seclusion rates were collected 3 months prior to the introduction of the sensory room and 3 months after the introduction. This was followed by semi-structured interviews with staff and consumers
Southard et al., 2012	US	Pre–post study	Adult acute care psychiatric unit	Consumers (*n* = 81) and nursing staff (*n* = 25), which included 41 consumers and 12 staff at T1 and 40 consumers and 13 staff at T2.	Renovation-based intervention	Therapeutic milieu: The Ward Atmosphere Scale (WAS)
Trzpuc et al., 2016	US	Mixed-method study	Child–adolescent mental health inpatient unit	Mental health consumers (*n* = 188); staff surveys (*n* = 48); and face-to-face staff interviews (*n* = 25)	A renovation project involving a relocation of the child and adolescent unit	Staff participated in both qualitative and quantitative aspects of the project, consisting of online survey and interviews. Consumers participated through surveys
Ulrich et al., 2018	Sweden	Comparative study	Inpatient psychiatric wards	One intervention and one control hospital	Renovations to environment	Compulsory injections and physical restraint, number of consumers and number of incidents
van der Schaaf et al., 2013	The Netherlands	Cross-sectional study	Inpatient psychiatric and forensic wards	16 psychiatric hospitals (from two major data sources) with 199 wards with 2446 beds, 23,868 admissions of 14,834 mental health consumers	N/A	115 design features on a ward level, reduced to six main concepts with 14 design features. Three outcome measures concerning seclusion: Whether or not an individual was secluded during their admission (risk), the number of seclusion incidents during their admission, the proportion of time they were secluded
Yakov et al., 2018	US	Longitudinal observation study	Psychiatric intensive care unit (PICU)	One locked 20-bed PICU unit	Sensory reduction/integration improvements	Percentage of hours in restraints and assault rates between 4:00pm and 7:00pm and the count or rate of number of assaults per 1000 patient hours

Table 2: Physical design features and impact on restraint and seclusion

Source (author, year)	Physical design feature	Impact on R/S	Outcomes	Magnitude of effect
Andersen et al., 2017	Sensory room	↓ R for belt & chemical only	Reduced mechanical restraints, only significant in combination with chemical restraint	The rate of belt restraints was 38% lower on the sensory modulation unit compared with the control unit; however this was not significant. Altogether, the use of physical restraint and forced medication were significantly reduced with 42% ($p<.05$)
Ash et al., 2015	Comfort room	↓ S	A significant reduction in the number of consumers secluded. Consumers highlighted the importance of the environment, including personal space and a range of exercise and recreational facilities	A significant reduction in number of consumers secluded, from 28% to 15% of consumers ($\chi2$ (1) =17.78, $p<0.001$)
Bak et al., 2014	No crowding	↓ R	No crowding was associated with low rates of restraint use	No crowding was associated with low rates of restraint use (exp[B] = .54, $p < .01$). Units in which two of the following three conditions were present experienced an average of .54 times (or 46% fewer) restraint episodes than those in units where only one or none of the conditions was present: only one bed in a consumer's room, more than 25 m^2 of all-day-accessible space per consumer, and the perception of no crowding
Björkdahl et al., 2016	Sensory room	↓ R/S (q)	Staff expressed hopes that the room could be used for prevention and de-escalation and that this would result in a decreased use of coercive measures. Authors describe how these hopes were confirmed for most staff. Staff also described the room as de-stressing for consumers and a quiet place to get away from the stressful ward environment	N/A
Blair et al., 2017	Comfort room	↓ S ↑ duration of R/S	Reduced rate of seclusion, increased duration of seclusion and restraint	Rate of seclusion reduced by 52% ($p<0.001$), changes in the rate of restraints were not significant. Mean seclusion duration increased from 337.7 to 516.2 min ($p<0.01$). Likewise, from baseline to post-intervention the mean duration of restraints increased from 286.0 to 445.0 min ($p<0.01$)
Bobier et al., 2015	Sensory room	↓ S and ↑ R (partial)	A total of 22% used the sensory room. Results showed a reduction in seclusion incidents during and after implementation, but an increase of partial restraint	Compared with 6 months earlier, the episodes of seclusion significantly decreased during the study period and during the subsequent 6 months ($X2=17.14$, $p<0.001$). The episodes of full restraint decreased slightly but the episodes of partial restraint significantly increased ($X2=19.14$, $p<0.001$). The rates of seclusion declined from 3.2 per 100 treatment days to 1.8 per 100 treatment

				days during the study period and 1.4 per 100 treatment days in the 6 months following the investigation
Borckardt et al., 2011	Changes to the physical characteristics of the therapeutic environment. Two events: one involving repainting walls with warm colours, placement of decorative rugs and plants, and rearranging furniture; and a second one included replacing old furniture and continuing with environmental changes initiated during the first intervention	↓ R/S	A significant increase in consumers' average rating of the physical environment was observed from pre to post intervention for the first therapeutic environment intervention across the five inpatient units. No changes in staff perceptions were observed. The changes to the physical environment was the only intervention within the model that was associated with a significant reduction in use of restraint and seclusion. Furthermore, only the second intervention stage was associated with a reduction	Mean rating of the environment was 3.72±.16 before the intervention and 3.94±.18 after the intervention (t=2.07, df=8, p=.04). The entire engagement model initiative was associated with an 82.3% reduction in use of seclusion and restraint when the mean monthly rate during the baseline phase (January 2005 to February 2006) was compared with the mean monthly rate during the follow-up, post-intervention phase (April 2008 to June 2008) (Wilcoxon=6.00, z=−2.65, p=.008). The physical changes were associated with a significant reduction in use of restraint and seclusion (F= 7.94, df=1 and 119, p=.006). Only the second environmental change was associated with a significant change in the rate of seclusion and restraint (F= 4.99, df=1 and 125, p=.03)
Bowers et al., 2010	Seclusion room available Access to PICU Main door locked Quality / complexity ratings of physical environment	↑S ↑S ↑S NS	Use of seclusion was strongly associated with the availability of a seclusion room Many wards had no specific seclusion room (*n* = 67, 49%), and the next largest number only had access to a seclusion room on another ward *(n* = 48, 35%), with only a few having a seclusion room on the ward (*n* = 21, 15%) Higher rates of seclusion were associated with the availability of a specialist unit (PICU) and having ward door locked for up to 3 hours Use of seclusion was not related to any quality or complexity ratings of the physical environment Seclusion was related to more use of restraint	There was a significant relationship between seclusion and access to a seclusion room (univariate analysis, r=0.317, p<.001), and access to a PICU (IRR = 1.478, p<.05) and having the main ward door locked for up 3 hours in the multivariate analysis (<1 hour, IRR=1.674, p<.05 and 1-3 hours, IRR=1.570, p<.05)
Bowers et al., 2012	Seclusion room Main door locked, Quality / complexity ratings of physical environment	↑R ↑R NS	Manual restraint was associated with the availability of a seclusion room but was not related to any quality or complexity ratings of the physical environment Higher rates of manual restraint were also related to having the main ward door locked for up to 3 hours	There was a significant relationship between restraint and access to a seclusion room (r=0.174, p<.043) and having the main ward door locked for up 3 hours in the multivariate analysis (<1 hour, IRR=2.173, p<.05 and 1–3 hours, IRR=1.712, p<.01)

Brophy et al., 2016 (a)	Several design features	N/A	Participants identified the physical environment as a barrier to the reduction of seclusion and restraint. They commented on features such as poor lighting, uncomfortable waiting areas and rooms being bare and cold. There were many criticisms of the environments people in mental distress or crisis were finding themselves in, and the difficulty of being able to respond therapeutically in these environments. Changes such as non-fluorescent lighting, creating warmth by adding colour, pictures and quotes to walls and sensory modulation were suggestions that could be implemented within existing in-patient buildings. Unlocking the doors to the main ward and constructing a separate therapeutic environment connected to the emergency department were other suggestions by participants	In more than half the focus groups, strategies to improve the environment in the inpatient unit were encouraged
Brophy et al., 2016 (b)	Ward design, private space	N/A	The physical environment was identified by participants as being a main factor contributing to poor practice. This included the 'fishbowl' ward design in inpatient units operating as a barrier, separating staff from consumers physically and on an interpersonal level. Others mentioned a lack of a quiet, private space	N/A
Cummings et al., 2010	Comfort room	NS	89% of consumers reported reduction in distress after using the comfort room, and no consumer reported increased distress. Aside from 'high-utiliser consumers', overall trends in seclusion and restraint decreased post-comfort room	Reduction in R/S was not statistically significant
Dresler et al., 2015	Substantially increased ward space (from about 200 m^2 for 16–18 consumers to 400 m^2 for 17 consumers) Changed room settings (from mainly 2–4 beds per room to only 1–2 beds per room) Improved sanitary arrangements (from 2 toilets/showers per ward to one for each room)	↓R	The number and duration of mechanical restraints as well as coercive medication significantly dropped by 50%–85% in the 3.5 years following the relocation. The mean number of restrained consumers per bed, the mean number of days with restraints, the mean duration of restraint, and the mean number of coercive medications all decreased	All measures showed a statistically significant decrease measured via t-test

	More natural lighting (from small windows to almost picture windows) Modern home electronics and large balconies			
Eggert et al., 2014	Moving to a new High Security Forensic Institute (HSFI) constructed according to the design proposed by Dvoskin et al. (2002). This included improved facilities such more space and different unit layout, proximity to ancillary facilities and improved aesthetics, such as natural light and efforts to normalise the environment	NS	Contrary to expectations, the measured benefit of the new environmental design was less than anticipated. For example, actual safety, as measured by seclusion and restraint episodes and consumer-to-consumer and consumer-to-staff assaults, neither increased nor decreased	No significant correlations on seclusion events
Espinosa et al., 2015	Comfort room	↓ R/S	After introduction of the comfort room, the unit experienced no restraint or seclusion episodes for a full year, and the incidence remained low thereafter. Overall, both seclusion and restraint incidents reduced over time after the various implementations of milieu improvements. They also report that initially 50% of seclusion and restraint incidents were judged as preventable, which reduced to 5% (after 6 years into the project)	Not reported
Fletcher et al., 2019	One of 6 domains of the Safewards model is the physical environment	↓R/S (q) not directly linked to physical environment	Qualitative data highlight four key themes regarding the model and interventions: structured and relevant; conflict prevention and reducing restrictive practices; ward culture change; and promotes recovery principles. Under the theme conflict prevention and reducing restrictive practices staff highlight that the model assists in reducing restrictive practices; however, environmental factors are	N/A

			not mentioned and they mainly focus on the relational aspects	
Forsyth et al., 2018	Sensory room	N/A	Three main themes were identified in the study. These related to de-escalation, use of the chillout room and impact on staff. The chillout room improved de-escalation andhelped manage emotional distress, and staff reacted positively to their own personal use	N/A
Georgieva et al., 2010	Transfer to a newly developed unit focused on non-coercive management. The new ward was small (4-bed) and included single rooms, free access to an enclosed garden, recreational and simple sport facilities	↓S	Use of seclusion almost eliminated	pre: 40% of days spent in seclusion and post: 0.1% of days. On average consumers had spent 156 (SD = 215) days in seclusion during a mean stay of 386 (SD=221) days. After transfer this was reduced to 0.5 (SD=1) days per consumer over a mean time of 349 (SD=167) days
Hedlund Lindberg et al., 2019	Sensory room	N/A	Four thematic categories: emotional calm, bodily calm, empowerment, and unexpected effects. The vast majority of participants reported positive experiences	N/A
Jenkins et al., 2014	Transfer to a new purpose-built ward as recommended by the Psychiatric Intensive Care Advisory Service	↓S, both incidents + duration	The new ward scored significantly higher on the EAI, including increased privacy, greater access to therapeutic activity space and increased visibility. A reduction in episodes of seclusion, total seclusion hours and aggressive incidents, as well as a reduction in levels of agitation. Plus, qualitative improvements on the new ward	Reduction in total duration and number of seclusion episodes ($X^2=11.70$ (N=17, df 1) $p<0.001$). No significant reduction in mean duration. A significant reduction in the number of aggressive incidents ($X^2=16.47$ (N=52, df 1) $p<0.001$)
Keppich-Arnold et al., 2019	N/A	N/A	Coercive behaviours were evident and it was noted that the sense of isolation felt by staff, the serious and behaviourally problematic nature and acuity of the consumers' illnesses, and a lack of mentoring and training for staff have all been contributors, in addition to a building design and features that do not meet the needs of many of the consumers who are in actuality residing in inpatient mental health services	N/A

Lloyd et al., 2014	Sensory room	↓S	The frequency of seclusion dropped dramatically in the unit that introduced SM but rose slightly in the unit that did not have access to SM	The change in seclusion rate was highly significant ($\chi 2 = 49.1$, df = 1, $p < 0.001$)
Madan et al., 2014	Changes to the therapeutic environment, such as repainting to warm colours, decorative plants and rugs, replacing/restructuring furniture	↓ R/S	During the pre-intervention period the data showed a linear trend upwards of seclusion and restraint incidents, while in the post-intervention phase a stabilisation effect was observed	A stable reduction of seclusion and restraint post-intervention
Maguire et al., 2012	Sensory room + reduction of seclusion rooms	↓ S	A reduction in seclusion events and hours of seclusion, and a lesser reduction of the number of consumers secluded	No statistical tests included
Mann-Poll et al., 2011	Private space	↓ S	The described approachability of the consumer in the vignette was variable and had the most impact. In relation to the physical environment, the availability of space was also an influence. When there was only one living room and consumers had to share a bedroom, professionals were more likely to rate the need for seclusion as high	A model that used all data on rater characteristics and vignette variables was constructed that explained 46% of the judgements of these mental health professionals about the need for seclusion; 28% could be explained by the variables used in the vignettes, and almost 32% could be explained by the characteristics of the raters. Approachability was the vignette variable with the most impact (7.6%). In relation to the physical environment, the availability of space explained 2.7% of the judgement
McKenna et al., 2018	Case study 1 involved no physical design changes. Case study 2 involved a sensory room and other refurbishment: more spacious, changing the layout of the nurses' station to make it more visible, putting in more comfortable and colourful furniture and creating a sensory room. Case study 3: introduced a sensory room and a time-out space, male-only and female-only corridors and a larger indoor and outdoor spaces	↓S ↑S for youth Missing for children	A reduction in the number of seclusion events experienced by the secluded person during the time of their admission and the average number of seclusion episodes per secluded consumer was observed for all three case studies involving adults. Case study 3 showed an increase of seclusion events experienced by youth. Case study 1, 2 also showed a reduction in the average duration of seclusion episodes	N/A
Melbourne Social Equity Institute, 2014	N/A	N/A	Survey participants indicated the need for more funding to upgrade the physical environment of mental health settings so they were conducive to the care of consumers. Focus group participants commented that the physical environment was a barrier to the reduction	N/A

			of seclusion and restraint. In more than half the focus groups, strategies to improve the environment in the inpatient unit were linked to strategies to reduce or eliminate seclusion and restraint	
Muir-Cochrane et al., 2015	No crowding Quiet spaces	↓ R/S	An unfavourable physical environment contributes to aggression and restraint and seclusion use. In particular, noisy and crowded environments where consumers are unable to avoid noise and stimulation. Having a quiet space available, such as a garden, activity room or a low stimulation area, were identified as effective alternatives to restraint and seclusion	N/A
Novak et al., 2012	Sensory room	NS	Significant reduction in distress. No changes were noted in rates of seclusion or aggression	No significant effect
Rose et al., 2015	Therapeutic environment	N/A	The overwhelming perception of service users was that the ward was 'untherapeutic'. The groups have differing perspectives on their mutual powerlessness: users feel coerced whereas staff feel they are delivering a legitimate response to violence. One of the main reasons given by consumer participants for behaviour that might elicit restraint or forced medication was that users were cooped up in the ward and not allowed to go outside and get fresh air. Some likened the environment to a prison or a cage for an animal	N/A
Seckman et al., 2017	Sensory room	↓ R/S	Reduced seclusion, restraint and aggression. Also included reduced distress of consumers, and improved sense of safety but no effect on consumer–staff relationships	Comparison of 6-month pre and 6 months post sensory room showed a 26.5% reduction in restraint and 32.8% reduction in seclusion incidents. Reduction in aggression incidents was 16.4% (however, subtype of destruction of property increased)
Sivak, 2012	Comfort room	NS	No use of restraint or seclusion in 4 months post comfort room (5 incidences 4 months pre comfort room). Decreased rate of CTCA (-23.4%) and CTSA (48.1%). However, self-injuries increased (+12.1%)	No statistical tests included

Smith & Jones, 2014	Sensory room	↑S and ↓ S (q)	The number of seclusion incidents was higher after the sensory room was introduced, with 27 incidents of seclusion in the 3 months prior to the sensory room introduction and 37 incidents in the following 3 months. The interviews revealed that staff perceived the rates of seclusion had decreased since the introduction of the sensory room. With outliers removed, the average length of time in seclusion had actually increased, not decreased, following the introduction of the sensory room	N/A
Southard et al., 2012	Enclosed versus open nursing station after renovations	↓ R/S (q)	No statistically significant differences in consumer/staff perceptions of the therapeutic milieu and no increase in aggression towards staff. Authors describe a drop in seclusion and restraint in the discussion section, no data reported	Unknown
Trzpuc et al., 2016	Among other design elements, renovations included a sensory room, quiet room, group room, therapeutic indoor pool in an adjacent (and connected) building and the creation of a nearby, secure outdoor play area	↓ R/S (q)	Consumers: The most commonly selected design elements and spaces that were calming/healing according to consumers, were elements with characteristics of choice and control over an attribute: music panels (*n* = 107), coloured lights (*n* = 96), the consumer's room (*n* = 92), pool (*n* = 91), and light dimmers (*n* = 82). Staff: The environment was highly rated (86%) as having positive influences on staff interactions with consumers. Overall, safety in the new environment was rated positive, with 75% of the responses in direct relation to the security features such as the alarm system, security cameras and room sensors. 87% of staff described the overall environment as having a positive impact on consumer behaviours and 79% of staff noted specifically that the artwork and colours had a positive impact on calming consumers. The highest ranked features by staff included the sensory room and pool. The lowest ranked features were the seclusion room, TVs and hallway desks. Analysis of the interviews	N/A

			revealed three themes: (1) units' design features are of clinical utility; (2) needs-adaptable rooms enhance positive behavioural outcomes; and (3) increased physical activity is associated with decreased behavioural issues. Specifically, in relation to restraint and seclusion, staff noted the benefits of having the indoor pool as being related to reduced use of seclusion and restraint	
Ulrich et al., 2018	The new environment has nine of 10 design features of the Ulrich model and one control hospital with only one design feature	NS + ↓R	The number of consumers receiving restraints did not change, but a 50% reduction in the average number of physical restraints was observed for those consumers who required restraint in the new hospital versus the old	Reduced number of restraints for those who needed restrictive measures
van der Schaaf et al., 2013	Several design features	↓S risk only	Overall, the 14 selected design features had a significant effect on the risk of being secluded during admission, but not the number of seclusions or the duration of seclusions	Features that increased the risk of seclusion: presence of an outdoor space or garden (OR = 9.09), availability of special safety measures (e.g. such as presence of special communication and warning systems) (OR = 1.60), a large number of consumers in the building (1.01). Features that decreased the risk of seclusion: more total private space per consumer (OR = 0.88), a higher level of comfort (OR = 0.77) and greater visibility on the ward (OR=0.69)
Yakov et al., 2018	Reducing general sensory stimulation levels between 4:00pm and 7:00pm, which included low lighting and natural light and sound reduction	↓ R	Restraint rates dropped immediately following light and sound reduction interventions and by 72% at 11 months post-implementation (from 1.55% to .51%) Mann-Whitney statistics for unpaired 6-month comparisons, one year pre- and post-intervention showed significant reductions: assault rates (median pre = 1.37, post = 0.18, U = 4, p = .02); restraint rates (median pre = 0.50, post = 0.06, U = 0, p = .002)	