Environmental factors and outcomes in mental health and addiction clinical settings:

A review of the literature

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Citation: Nakarada-Kordic, I. and McKenna, B.G. (2011). *Environmental factors and outcomes in mental health clinical settings: A review of the literature.* Auckland. Te Pou o te Whakaaro Nui.

Published in June 2012 by Te Pou o Te Whakaaro Nui
The National Centre of Mental Health Research, Information and Workforce Development.
PO Box 108-244, Symonds Street, Auckland, New Zealand.

ISBN 978-1-877537-87-5

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Acknowledgements

The authors of this report are affiliated with the Centre for Mental Health Research (CMHR) at the Faculty of Medicine and Health Sciences, the University of Auckland. We acknowledge the support of the CMHR in completing this literature review. We also acknowledge reviews of the literature review undertaken by Anne Brebner, Carolyn Swanson and Jane Vanderpyl. These reviews assisted greatly in refining this report. The report was commissioned and funded by Te Pou, the National Centre of Mental Health Research, Information and Workforce Development, on behalf of the Ministry of Health.

Table of contents

Contents

List of tables

Executive summary

Historically, the environment has been considered a central factor in the treatment of people with acute mental health and addiction issues, and it has long been speculated that the physical environment in which treatment occurs has an impact on both the treatment process and its outcomes for service users. In New Zealand, as in other western countries, effective care for some people with acute and intensive care needs requires a highly specialised environment that should be designed to deliver optimal benefit for the service user. Acute inpatient units in New Zealand have never been formally evaluated and, in order for people to have confidence in acute services, these services should be based on the knowledge of what works (O'Hagan, 2006). Despite the provision of guidelines, it can be difficult for clinicians and designers to make specific decisions that incorporate the range of environmental features that assist within a clinical setting. The Ministry of Health (2002) has acknowledged that there is potential to learn from other countries and to carefully relate international developments to the reality of mental health services in New Zealand. Our systematic review contributes to this goal by appraising the available evidence-base, including that published in the decade following the development of the ministerial guidelines *Statement on the Criteria for the Design and Refurbishment of Psychiatric Acute and Intensive Care Facilities* (Ministry of Health, 2002).

This literature review examines the impact of environmental factors on a range of outcomes (service user and staff outcomes) in mental health and addiction clinical settings. The purpose of this document is: (1) to provide District Health Board (DHB) and NGO managers, funders, planners and designers, and clinicians with an easily accessible summation of the existing knowledge around physical features of the clinical treatment environment that may influence clinical outcomes, (2) to summarise the existent literature as a basis for advising on best practice for the physical design of mental health and addition clinical environments, and 3) to provide a critical appraisal of research evidence for the use of researchers wishing to empirically study the relationship between environmental factors and clinical outcomes. The overriding purpose of this document is to assist in improving the acute mental health and addiction inpatient environment in order to achieve better outcomes for people using these services.

A manual and electronic search of a total of 22 academic databases and indexes was undertaken. This encompassed health, medical, design, architectural and behavioural sciences databases, using predefined keywords and inclusion criteria. The searches resulted in the final sample of 73 relevant empirical papers and 13 literature reviews summarising empirical findings. The empirical studies were then critically appraised based on the approach described by Hawker et al. (2002), and their findings and recommendations summarised. Only original findings from empirical studies on the direct and indirect impacts of the physical environment on health and staff outcomes and clinical practice, conducted specifically in the mental health and addiction clinical setting, were considered for analysis. The literature reviews were used as a starting point to uncover empirical studies, which were then accessed and reviewed directly. Based on this appraisal, each source was then assigned one of three combined methodological scores indicative of the study's overall observed methodological rigour: low, medium, or high.

Our literature search revealed a rich and diverse body of evidence linking environmental factors to outcomes in the mental health and addiction clinical setting. The majority of studies scored satisfactorily on methodological rigour. Thirty-six studies (49.3%) obtained a 'high' methodological score; twenty-seven studies (37%) were rated as 'medium' on methodological rigour. Only 10 out of 73 studies (13.7%) obtained a low methodological score.

Various environmental features relevant to the design of mental health and addiction clinical settings and outcomes were uncovered. These include ambient features (such as lighting, noise, and air quality), architectural features (such as layout and size, windows, and access to outdoors), interior design features (i.e., wall art, colour and furnishings), and social features (i.e. furniture placement, dayroom, meeting room and visitation area design conducive to social interaction). This document also reviews research evidence on the design for specific populations, such as the older persons, children and adolescents, and mental health and addiction service users with special needs. Evidence on the impact of open versus locked wards, open versus closed nursing stations, mixed versus single sex wards, and seclusion rooms was also reviewed.

The following key points summarise the findings of this literature review:

- The physical environment of mental health and addiction clinical settings can be associated with both positive and negative service user and staff outcomes. Positive outcomes are related to improvements in environmental factors and may include shortened lengths of stay; a decrease in rates of medication refusal; reduced verbal and physical aggression; reduction in depression and self-harm; reduction in PRN medication use; as well as improvements in mood, social interaction, staff and service user satisfaction, and sense of safety. Poor environmental design of mental health and addiction clinical settings can be related to such variables as increased aggression, treatment refusal, lack of access to fresh air, privacy concerns, safety concerns, and poor social interaction. Thus, improving the physical environment of mental health and addiction clinical settings can be a worthwhile strategy in improving clinical outcomes.
- Mental health and addiction service users are frequently left out of the planning and design process and their views and needs regarding their clinical treatment environment are rarely taken into account. This lack of control by service users over their own treatment environment is in direct conflict with the principles of service user-centred care. Studies show the detrimental impact of leaving service users out of the design process on their service satisfaction and mental wellbeing. Thus, the planning and design of clinical settings should adopt a service user inclusive and participatory approach.
- Different stakeholders often have diverse opinions, needs, and expectations related to the physical environment of mental health and addiction clinical settings. In practical terms, this may mean having to achieve a balance in the design of the clinical environment in order to accommodate for such provisions as safety of both staff and service users, privacy and social interaction, and the needs of special populations (such as service users with dementia, adolescents, or service users with physical disabilities). It is therefore essential to involve all the relevant stakeholders in all the stages of the planning and design process.
- The planning and design of mental health and addiction clinical facilities should be evidence-based. Designers should not apply principles based on evidence found in general health care settings to the mental health setting where things are quite different (e.g., in mental health and addiction facilities, service users do not stay in their bedrooms or receive care in their bedrooms). Newly designed units need to be subjected to post occupancy evaluation to examine the strengths and weaknesses of their designs. It is likely that, for change to occur, environmental design needs to be part of a range of strategies that also include improvements in care practices, on-going staff training, and inclusion of service users in decisions regarding treatment.
- The literature suggests that simple, inexpensive changes to the design of clinical treatment environments can contribute to positive service user and staff outcomes. Some examples of the practical ways in which the change can be achieved are:
    - Through the use of ambient features – for example, providing enough natural daylight through installing large areas of glass in the walls and roof; fresh air and good ventilation; noise reduction through installing carpeted partitions to separate high density areas (see Table 2, p.19 for more design suggestions).
    - Enhancing architectural features – such as through the use of high quality materials; incorporating spatial flexibility into the design process; provision of privacy through the use of single rooms and bathrooms and personalised spaces; access to and view of the outdoors; provision of safety features, such as shatter proof windows; spaces for staff meetings and open nursing stations (see Table 3, p.26 for more suggestions).
    - Improved interior design features – display of wall art depicting naturalistic landscapes, improved furnishings to reduce the institutional feel, incorporate a homelike environment, and provide a familiar tone; allowing service users to personalise their own space; adjusting the colour schemes according to characteristics of service user (in general, avoiding either bland or overly stimulating colour schemes)(see Table 4, p.29 for more suggestions on interior design).
    - Designing physical spaces to enhance social features – such as small-group circular arrangement of furniture; creating flexible day rooms that encourage interaction with staff, but allow for personal autonomy; communal spaces for staff, visiting rooms, space for religious practices, and whānau space where traditional protocols can be undertaken (see Table 5, p.33 for more suggestions).

- Designing to accommodate specific populations – for example, providing safety features for older service users, furniture to facilitate balance and comfort, reducing glare and noise, using a neutral design and colour scheme, providing sufficient visual cues to promote orientation and reduce wandering in service users with dementia, allowing for access to outdoor areas and links with the community (see Table 6, p.36 for more suggestions on designing for older service users). Quiet rooms for adolescents and children should be attractive, non-punitive, and cosy, with warm colour tones, to allow for change in mood. Children should also be able to observe a pleasant scene (see Table 7, p.38 on designing facilities for children and adolescents). Female service users may prefer single sex wards or a separate female-only area and private bathroom facilities. Acute wards should have a single open exit, and unobtrusive but effective and consistent wraparound exit security (see Table 8, p.42 for more on the design of open units).

- There is a need for further research looking into causal relationships between environmental factors and various outcomes in the mental health and addiction clinical setting. In particular, a shift in focus from control of the physical setting and negative outcomes such as reactive responses, to studying environmental elements that support healing and resilience building is warranted. In addition, the impact of physical environment on outcomes should, whenever possible, be studied in isolation from other potential contributors, and in the presence of a control group.
- There is also a need for empirical research on the importance of design of mental health and addiction facilities for specific cultural groups. In the New Zealand context, evidence to guide design practices to improve Māori and Pacific service user outcomes is particularly warranted.

This review provides empirical support for the design recommendations outlined in the Ministry of Health's (2002) *Statement on the Criteria for the Design and Refurbishment of Psychiatric Acute and Intensive Care Facilities*. The Ministry of Health have argued for the need to pursue evidence from other countries and to link it to the New Zealand context. Despite the challenges of previous research and the diverse methodologies used, it is possible to draw useful conclusions and make suggestions from the vast body of research. Throughout this document, we have summarised the suggestions from the reviewed literature to assist in evidence-based, service user-centred design of the different aspects of mental health and addiction clinical environments. The findings of international studies summarised in this document provide specific examples of how the goals outlined in the Ministry of Health's recommendations for design can be achieved in practice. These suggestions can be useful in assisting stakeholders in their efforts to improve the physical environment of mental health and addiction clinical settings, in order to enhance recovery and resilience, and in this way contribute to improved outcomes for service users.

Introduction

The concept that the environment is integral to the healing process is seen as especially salient in mental health inpatient units (Gross et al., 1998). It has been argued that the evidence-based environmental design applicable to the medical/surgical setting does not transfer well to the mental health and addictions environment due to the differences in the treatment environments, such as spaces used to administer treatment, handling of infection control, and the nature of service user diagnoses and visitation (Sine & Hunt, 2009). Response to environmental design for a mental health and addiction service user may be quite different from that of other people, making it important to investigate their responses independently (Nanda et al., 2011).

This review includes articles and empirical studies identifying salient environmental features in mental health and addiction inpatient hospital design that are related to service user and staff outcomes, and clinical practice.

Search strategy

The search strategy involved electronic and manual searches using defined inclusion criteria, as well as critical appraisal of studies based on the approach described by Hawker et al. (2002). A keyword search was undertaken of the following 22 academic databases and indexes, encompassing health, medicine, design, architecture, and behavioural sciences: Academic Research Library, Australasian Medical Index, Health Source: Nursing/Academic Edition, ProQuest Health & Medical Complete, MEDLINE, CINAHL Plus, Psychology and Behavioral Sciences Collection, PsycINFO, PubMed, SCOPUS, Clinical evidence (BMJ), IngentaConnect, ScienceDirect, Health & Society, ErgonomicsnetBase, EMBASE, CivilEngineeringnetBase, Design & Applied Arts Index, JSTOR, ARCH Australian Architecture Database, Avery Index to Architectural Periodicals, and Google Scholar. Combinations of the following terms were used: "psychiatric", "physical environment", "design", "mental health" "hospital", "acute", "ward", "unit", "building", "sensory environment", "nursing station", "gender segregation", "light", "music", "noise", "locked door", "open door", "recreation space", "women only ward", "male ward", and "seclusion". The initial search returned a total of 647 sources that was narrowed down to 73 relevant empirical papers and 13 literature reviews summarising empirical findings.

The selection of relevant literature was an iterative process consisting of several stages. The first stage involved screening of abstracts for relevance. It was necessary to narrow our search to make it useful and relevant to the clinical context. Sources were considered relevant if they were published in English language only and if they specifically focused on the mental health facility environment (as opposed to hospital design in general). Only original findings from empirical studies on the direct and indirect impacts of the physical environment on health and staff outcomes and clinical practice, conducted in the clinical setting, were considered for analysis; this also included the non-intervention studies that examined characteristics and perceptions of service users and staff of mental health care physical environments.

Sources were excluded if they did not discuss empirical evidence on the relationship between mental health facility environment and service user outcomes, staff outcomes, and/or clinical practice. The influence of the physical environment in the clinical, rather than the community and residential settings, was the focus of the review. Non evidence-based expert opinion, anecdotal information, editorials, unpublished manuscripts, and newspaper articles were excluded. Published conceptual papers on evidence-based guidelines and best practices regarding mental health setting design, various literature reviews, books and book chapters were excluded from appraisal. These were, however, included in the descriptive overview sections, including the section on the historical context, and the sections on design suggestions and putting evidence into practice.

In the second stage, from the list of relevant sources, searches were then done on key authors as well as citation searches on significant papers. Thirteen literature reviews were used as a starting point to uncover empirical studies, which were then accessed and reviewed directly.

While there are a number of literature reviews focusing on the impact of arts, design and the physical environment on health, very few of these adopt a systematic review methodology. In the third stage, therefore, we have endeavoured to analyse in depth and critically assess all the relevant empirical sources on their methodological rigour, based on a framework proposed by Hawker et al. (2002). This model was chosen because it provides a method for critically appraising published studies using operational criteria that can easily be applied to varying literature. For each relevant study, the following variables were critically evaluated: abstract and title; introduction and aims; methods and data sampling; data analysis; ethics and bias; results; transferability or generalisability; and implications and usefulness. Each of these variables was scored according to their rigour as 'good', 'fair', 'poor', or 'very poor' – for example, if a source had no abstract, the source was rated as 'very poor' on the abstract variable. In contrast, if the abstract was structured, with full information on the study's aims, its method, data analyses, and sample size, then the abstract for that source was rated as 'good'. Similar analyses were performed for the other above variables within a source (for more detailed information on scoring for methodological rigour, see Hawker et al., (2002). Based on this appraisal, each source was then assigned one of three combined methodological scores indicative of the study's overall observed methodological rigour: low, medium, or high.

Historical Context

Historically, the environment has been considered a central factor in the treatment of people with acute mental health and addiction issues. In the early 19th century in Europe and the United States of America it was believed that in order to be cured, a "patient" needed to be separated from their home and community environment and installed in a suitable "therapeutic space" (Galt 1864, in Sine, 2008). This therapeutic space was believed to be the asylum. In the mid-1880s, writings by psychiatrist Dr Thomas Kirkbride suggested the design of psychiatric facilities should be cheerful, discarding "everything repulsive and prison-like" (in Huffcut, 2010, p. 33). "Moral architecture" developed from the notion that treatment of mental illness requires a humanistic rather than medicine-based approach to treatment (Edginton, 2003). Edginton (2003) traces the development of asylums back to the design of The York Retreat, built in 1796. The York Retreat was constructed on the premise that the asylum was a mode of treatment, and that the physical environment was a crucial part of the healing process. Nature was a central theme in the design of this asylum, which featured large windows in the galleries and unobstructed views of the surrounding countryside. The development of a cheerful environment was attempted through the creative application of carpets, paintings and wallpaper. This was revolutionary at the time.

Traditionally, however, psychiatric hospitals have been designed to convey the message that they are institutions (Edgerton, Ritchie, & McKechnie, 2010). This was reflected in the design of the physical environment of many hospitals from the 1880s to 1950s, where treatment was essentially limited to warehousing "patients" in order to isolate them from the community (McClure, 1980). It has been argued that the evolution of treatment of mental illness over the years has not been accompanied by refining the physical environment in which treatment occurs (Edgerton, Ritchie, & McKechnie, 2010). For example, the introduction of medication and psychosurgery treatments for mental illness in the 1950s meant that little emphasis was put on sensory and visual stimulation for "patients" in the environmental surroundings, as "patients" were deemed to be mainly unresponsive (McClure, 1980) .

However, between the 1930s to the 1950s there were some appeals internationally for reform and by the 1960s advocates were calling for core environmental and architectural changes to treatment facilities. Large institutions were broken up into smaller units that were dispersed throughout the community, with the goal of creating the least restrictive environment for "patients". The number of people in public asylums dropped considerably. Sine (2008) argues that the 'patient population remaining in institutions could be described as simultaneously acute and long-term and was increasingly viewed as containing "dangerous individuals" ' (p. 1061). He suggests that the role of the mental health hospital has then shifted, more than ever, to preventing elopement and self-harm, rather than having a key focus on treatment. As a result, "patients" had their 'freedom of movement limited by architectural design mostly out of concern for security rather than cure' (Sine 2008: 1061), and where prison, or prison-like design was utilised. Sine explains that since this time, 'spatial relations have been central to the function and management of persons treated in institutional settings' (Sine, 2008, p. 1060).

It is only in the past few decades that the importance of the physical environment has become recognised and that clinicians involved in the treatment of mental health and addiction issues have seriously considered the physical treatment environment as having a major impact on the efficacy of the treatment (Gabb, Speicher, & Lodl, 1992).

New Zealand has not escaped the international trends in the design of psychiatric treatment facilities and the associated implications for service user outcomes. The Porirua Hospital Museum website (Porirua Hospital Museum and Resource Centre Trust, 2011), as well as the chapter by Brunton (updated 6 April 2011) on the *Te Ara – The Encyclopedia of New Zealand* web site, offer a good description of the mental health care environment in New Zealand through time. The remainder of this section summarises the information mainly from these sources.

In New Zealand, in the mid-1800s, a network of provincial asylums was established throughout the country. Within these institutions, public demand was that people with mental health issues should be treated "properly". This included replacing mechanical restraints, such as straitjackets and shackles by the use of padded rooms and seclusion.

With time, the public had expected that, with medical control of the asylums, more "patients" would recover. However, there existed a conflict between asylums being used as terminal institutions for people with enduring mental health issues, as well as therapeutic places for the acutely ill. This resulted in overcrowding and institutionalization. Standards dropped and care became custodial. The overcrowding forced the establishment of a new generation of larger asylums, located in rural areas away from the areas of population they were meant to serve. These new asylums were much larger than early ones and were built in permanent materials rather than wood, which made them slow and costly to build or extend. The first of these new provincial asylums to provide for people with mental health issues, Karori Asylum, opened in 1854.

In September 1871, a parliamentary inquiry into the 'lunatic asylums' of the colony was launched, which concluded that a new site was required, "with enlarged buildings, more attendants, exercise for the women, baths, and a means of warming the isolation rooms" (Porirua Hospital Museum and Resource Centre Trust, 2011). The findings of the Committee of Inquiry laid the foundation for the future development of mental health services in New Zealand.

The beginning of the twentieth century in New Zealand saw the renaming of lunatic asylums as 'mental hospitals' and a provision for voluntary admission (Joseph & Kearns, 1996). The aim was to replace the discredited asylum model by acquiring the therapeutic status and public acceptability of general hospitals. Mental hospitals had easier admission procedures, active early treatment and professional care by specialist psychiatrists and trained nurses; they also provided separate 'reception homes' or 'neuropathic hospitals' for early treatment (Brunton, updated 6 April 2011). Brunton describes 'the villa system' - a characteristic mental hospital design based on a group of small detached buildings rather than a single large and intimidating structure. This design became government policy from 1903, making it much easier to classify "patients" by age, gender, behaviour, likelihood of recovery and, to some extent, social class. A typical villa was self-contained and had several dormitories and single rooms, with 40–50 beds in total, a kitchen, dining room, lounge and offices. As these hospitals came to be seen as therapeutic communities, they were equipped with halls, libraries, canteens, chapels and swimming pools.

Following World War I, doctors in general hospitals grew more interested in the diagnosis and treatment of mental health and addiction issues. Some hospital boards began providing observation wards in general hospitals, to reduce the distress for service users caused by the stigma attached to their diagnosis. Brunton (updated 6 April 2011) describes how a gap emerged between short-term mental health service users and those who had lost outside links and established a home in their institution. The first group were cared for individually in 'front' wards, while the remaining service users were managed as efficiently as limited resources allowed. Acute mental health treatment was gradually being brought closer to the community, resulting in psychiatric outpatient clinics being established in General Hospitals in 1925, to treat less serious service users without admitting them.

The 1950s had seen larger numbers of mental health and addiction service users discharged into the community, largely due to the introduction of effective pharmacotherapy for mental health and addiction issues. Since the 1960s and 70s there has been a move from large institutional settings and progressive expansion of outpatient and community facilities. Despite this process of deinstitutionalisation, in 1969 for example, a quarter of all service users were still housed in traditional asylum-era buildings that were renovated very slowly through the early 20th century (Brunton, updated 6 April 2011). Brunton noted that the closure or rebuilding of traditional hospitals revealed that community care caused problems for some service users. Many did not have families or other people to support them, and some lived in boarding houses or other situations not suited to their needs. Some services and facilities were still needed to meet the needs for the acutely unwell service users; hence, psychiatric units of various sizes and purposes were established in general hospitals on an inpatient and outpatient basis. This model is now a mainstay of acute service delivery.

In addition to acutely unwell service users, there was another group of people who still required inpatient care: offenders with mental health and addiction issues. Prior to 1987, there were no designated forensic psychiatric services in New Zealand, except for one 'maximum security' inpatient institution, the National Security Unit, commissioned in 1965 and built originally to house the 54 most violent psychiatric patients nationally (Brinded, 2000). In 1987, a major investigation of the mental health system, known as the Mason Inquiry was launched due to suicides, homicides, and other deaths in prisons and in the community that were largely related to under-provision of services to service users interfacing with the criminal justice system (Simpson & Chaplow, 2001). The first Mason Report (Mason, Bennett, & Ryan, 1988)

recommended the establishment of Regional Forensic Psychiatry Services to provide treatment to prisoners, both within prison and on transfer to hospital if necessary. Today, these services provide inpatient psychiatric care, community follow-up, liaison and secondary consultation to general mental health and addiction services, prisons and court liaison services. Offenders are treated in the least restrictive environment in relation to the offending risk they present (Simpson & Chaplow, 2001) .

The second Mason report published in 1996 acknowledged for the first time the existence of mental health stigma and discrimination as interfering with progress in the mental health sector (Mental Health Commission, 2007). The report led to the establishment of the Mental Health Commission and recommended a public education campaign to reduce discrimination associated with mental illness (i.e., *Like Minds, Like Mine*). Social inclusion and a recovery approach based around the concept of resilience, service user participation and leadership in service provision became the mainstay characteristics of the national mental health strategy in New Zealand (Mental Health Commission, 1998, 2007).

Since the 1990s, special services have been designed to meet the needs of Māori and Pacific service users. Both groups are over-represented in mental health statistics compared to their populations (Ministry of Health, 2008b, 2012). For example, the Mason Clinic in Auckland, built on the site of the former Carrington Hospital, includes Te Papakainga o Tane Whakapiripiri. This unit, opened in 2006, is designed like a Māori village with a meeting house, dining hall, accommodation area and courtyard with traditional symbols of healing and cleansing (Brunton, updated 6 April 2011).

Over the last decade, acute inpatient units in New Zealand and some other western countries have gained a reputation of being increasingly overcrowded and more difficult to work and live in (O'Hagan, 2006). Those who work in contemporary acute clinical settings work with the legacy of the asylum, as well as current policy and treatment frameworks that aim to promote better outcomes for service users. This review aims to assist administrators, managers, practitioners and clinicians in this important and challenging work through providing empirical evidence that links positive service user, staff and service outcomes to physical features of the acute psychiatric treatment setting.

Current N.Z. Guidelines

The Ministry of Health maintains that mental health and addiction service delivery in New Zealand is still undergoing radical change (Ministry of Health, 2002). They argue that, while mental health and addiction services are now largely delivered in community settings, it is still imperative to be able to effectively treat some people with acute and intensive needs in a highly specialised environment. The Mental Health Commission's *Blueprint for Mental Health Services in New Zealand* also delineates the need for 'services for people with severe and acute symptoms who need 24 hour care in a safe environment' (Mental Health Commission, 1998, p.32). The Ministry of Health acknowledge that "well-designed facilities are a necessary element in delivering effective care" (Ministry of Health, 2002, p.2).

In 2002 the Ministry of Health published a statement on the *Criteria for the Design and Refurbishment of Psychiatric Acute and Intensive Care Facilities in New Zealand.* This statement sets out the criteria that the Ministry of Health uses to advise District Health Boards (DHBs) on the design or redesign of psychiatric acute facilities. The purpose of this statement is to assist DHBs 'to provide safe and effective facilities for psychiatric acute and intensive care'. Much of the content of the statement was based on lessons learned from examples of "inadequate design and planning" of New Zealand's mental health acute facilities in the past (2002, p.1).

The statement is consistent with the goals of the National Mental Health Strategy and the National Mental Health Sector Standards. Suggestions for the building design of acute facilities reflect an underlying philosophy of treatment that is enshrined in the Mental Health (Compulsory Assessment and Treatment) Act 1992 that is about achieving a balance between protecting the rights of service users and promoting recovery, and ensuring safety.

The Ministry of Health statement makes a number of recommendations for design that are consistent with many of the findings in this review. It also advocates consultation with stakeholders early on, echoing some of the authors in this review. Uniquely, it emphasises the provision of culturally safe spaces in recognition of the Treaty of Waitangi and the rights and needs of Māori.

However, despite the provision of guidelines, it can be difficult for those working in clinical settings to make specific decisions that incorporate the range of environmental features that exist within a clinical setting. It has been argued that New Zealand's acute mental health services lag behind policy and often fail to respond well to people in acute crises because many of these services are themselves in a state of crisis. This is also due to these services often not being based on best evidence for what works (O'Hagan, 2006). In her review of acute mental health services, O'Hagan (2006) states that, in New Zealand, the older acute inpatient units are often run down, do not have single rooms and lack private living spaces; there is communal dining and the nurses' office is often placed strategically where they can view different corridors. This view is echoed by the service users - a report published by the Mental Health Commission documenting the experiences of young adults of mental health services in New Zealand, has them describing acute mental health units as traumatising, particularly because of the fearful and distressing nature of the inpatient environment and seclusion experiences (Barnett & Lapsley, 2006).

As duly argued by O'Hagan, "people need to have confidence in acute services, and acute services need to be based on knowledge of what works" (O'Hagan, 2006, p.5). Acute inpatient units in New Zealand have never been formally evaluated (O'Hagan, 2006), and the Ministry of Health (2002) has acknowledged that there is potential to learn from other countries and to carefully relate international developments to the reality of mental health service in this country. Our systematic review contributes to this goal by appraising the available evidence-base, including that published in the decade following the publication of the Ministry of Health's 2002 *Criteria for Design* statement.

We will return to the Ministry of Health statement at the end of this document when we make our final recommendations.

Research evidence

Introduction

We present research evidence in this section for the impact of environment factors on people's outcomes in mental health clinical settings. Before we do so, we present a brief overview of the evidence and its scope. We also discuss the earlier literature reviews that have helped to inform our work and the way in which we have structured the presentation of research evidence. Finally, we make a comment on the methodological rigour of the reviewed empirical studies.

Overview of research evidence

Primary research

The literature we have included in this review emerges from both design and clinical disciplines. Many clinical studies in this review examine a range of factors that have an impact on good clinical outcomes, including the physical environment. Research into the specific effects of environmental factors in inpatient settings is still a developing area.

After surveying the literature it has become evident that there are specific challenges in conducting research into the impact of the environment in clinical settings. One of these challenges is that it is difficult to draw specific conclusions about whether environmental changes have made a significant impact, because these changes often occur at the same time as other changes such as improved communication and safety (Mistral, Hall, & McKee, 2002), implementation of training programmes, and in the research there is often an absence of control groups. Further, group comparisons can be challenging, as the groups are likely to differ in terms of the amount of time or attention received from the staff, or in gross aspects of the physical environment (Higgs, 1970) , as well as the complexity of needs.

On the other hand, environmental changes might not be as effective due to a lack of corresponding organisational change, to facilitate the best use of space (Tyson, Lambert, & Beattie, 2002). It is also difficult to engage in research evaluating before and after outcomes of environmental changes, given the transient nature of the inpatient client group, and the lack of long-term follow-up. Randomised controlled trials are a commonly accepted and respected method of analysis within scientific and clinical settings. This method is generally not possible for analysis of environmental outcomes because research needs to be conducted on specific wards, with unique layouts and needs.

In attempting to accommodate these research challenges, a range of methods have been used in the studies we have included in this review. These methods include scaling tools (such as the 'ward atmosphere scale', or 'violence and aggression scale') (e.g., Duxbury & Wittington, 2005; Mistral, Hall, & McKee, 2002), and surveys (Bensley et al., 1995; Duxbury & Wittington, 2005; Shoenfeld et al., 2008). However, most of the studies utilise descriptive or qualitative methods such as observation (e.g., Christenfeld et al., 1989; Higgs, 1970; Holahan & Saegert, 1973; Tyson, Lambert, & Beattie, 2002), participant observation (Gentle, 1996; Skorpen et al., 2008), focus groups (Lawson, Phiri, & Wells-Thorpe, 2004; Novotna, Urbanoski, & Rush, 2011; Walsh & Boyle, 2009), and interviews (e.g., Bensley, et al., 1995; Cleary & Edwards, 1999; Duxbury & Wittington, 2005; Mezey, Hassell, & Bartlett, 2005; Mistral, Hall, & McKee, 2002; Tyson, Lambert, & Beattie, 2002). Only two studies used a randomised controlled design (Borckardt et al., 2011; Holahan & Saegert, 1973).

The majority of studies used a combination of the above data collection methods. It was more common for the reviewed studies to rely on subjective than objective outcomes, such as service user and clinician perceptions, satisfaction, feelings, and expectations. We believe that such data provides information crucial to a client-centred design process and therapeutic approach. Many of the clinical articles examined studies that had 'mixed foci' and explored the impact of a range of factors including the physical environment.

Literature reviews

Thirteen literature reviews on environmental design and outcomes in healthcare settings were located. These formed a starting point in uncovering original empirical studies, as well as a useful guide in summarising the evidence-based design

recommendations. A summary of findings from a large literature review conducted to inform the design of a new inpatient psychiatry building in the U.S.A. by Karlin and Zeiss (2006) was particularly helpful in achieving the latter goal. Although written as a column, rather than an academic article, and therefore not fully and adequately referenced, this review had summarised important environmental issues and specific recommendations that could improve service user care and staff functioning.

All 13 literature reviews and the topics they cover are listed in Table 1 below.

Table 1.Literature reviews consulted in this document

Bibliography	Clinical setting and environmental features
(Andes & Shattell, 2006)	Acute inpatient care; mainly nursing station design
(Arya, 2011)	Acute inpatient care; physical environment in general
(Busch & Shore, 2000)	Mental healthcare; seclusion and restraint
(Chaudhury, Mahmood, & Valente, 2005)	Acute care; single versus multiple-occupancy rooms
(Day, Carreon, & Stump, 2000)	Physical environment for people with dementia
(Daykin et al., 2008)	Mental healthcare; art and interior design
(Devlin & Arneill, 2003)	Healthcare in general; physical environment in general
(Dix & Williams, 1996)	Inpatient Intensive Care Units (PICU); physical environment in general
(Dobrohotoff & Llewellyn-Jones, 2011)	Inpatient mental health care for older persons; physical environment in general
(Gross, et al., 1998)	Inpatient hospital design; physical environment in general
(Karlin & Zeiss, 2006)	Inpatient hospital design; physical environment in general
(Seeman, 2002)	Mental health services; female only units
(Van Der Merwe et al., 2009)	Acute inpatient care; locked doors

Assessment of methodological rigour

As mentioned earlier, very few of the literature reviews listed above adopt a systematic review methodology. If reviews are to be considered as evidence and seen as research in their own right, then the same rigor that is expected of primary research must also be applied to literature reviews (Hawker, et al., 2002). We have therefore conducted a critical assessment of all the located empirical sources on their methodological rigour, based on a framework proposed by Hawker et al. (2002). As described earlier, each relevant study was critically evaluated on the following features: abstract and title; introduction and aims; methods and data sampling; data analysis; ethics and bias; results; transferability or generalisability; and implications and usefulness. Each section of the source was rated as 'good', 'fair', 'poor', or 'very poor' according to the criteria described in Hawker et al.'s (2002) paper. Each source was then assigned one of three combined methodological scores (low, medium, or high), indicating the study's overall methodological rigour. A 'high' score was assigned if the majority of source's sections obtained a 'good' score; a 'medium' score was assigned to the source whose majority of sections obtained a 'fair' score; and a 'low' score was associated with most sections of the source being rated as 'poor' or 'very poor'.

Not including the general issues in study design outlined in the section above, the majority of studies scored satisfactorily on methodological rigour. Thirty-six studies (49.3%) obtained a 'high' methodological score; twenty-seven studies (37%) were rated as 'medium' on methodological rigour. Only 10 out of 73 studies (13.7%) obtained a low methodological score. These studies were mainly loosely based on observations, personal accounts, and/or narratives, and did not include a sufficient description of data analysis and data collection methods (i.e., providing details on interview and questionnaire schedules), or the clinical setting and participants. These shortfalls make it difficult to replicate and generalise the findings of these studies to different contexts.

Related to the issues of sampling and study design, it is worth mentioning that only 8 out of 73 empirical sources (11%) reported using a control group to study the impact of environmental design changes on outcomes. Another variable that studies scored poorly on is that of ethics and bias. We found several studies lacked the description of how potential participants were approached for the study and whether their ultimate consent followed an informed process. Several studies scored poorly on methodological bias. For example, in some studies, the researchers involved in data collection (through compiling incident reports, conducting observations, service user interviews and/or focus groups) were staff on the same units as the participants and could have therefore influenced the obtained responses. Another noted source of

potential bias was a data collection methodology that involved conducting joint focus groups and group interviews with both staff and service users, which could have made the two groups of respondents reluctant to express their opinions in front of each other.

An important point to note when interpreting the findings of this review is a strong focus in the literature on service user behaviours that may not be representative of the service user population as a whole. There is a strong theme throughout the literature of control, more than therapeutic healing, of service users in clinical settings in the context of aggression and violence. Although these are relevant issues, they relate to only a small percentage of service users who, not surprisingly given the context, may be volatile. The readers should therefore be aware that, although we simply report here on the research focusing on the issues of control in relation to environmental factors as in original reports, there is a risk that overemphasising these rare cases in the literature may encourage the myth of dangerousness and unpredictability of people using mental health and addiction services.

We hope that highlighting some of the methodological shortfalls of previous studies will serve to inform researchers interested in conducting similar, but more rigorous and comprehensive studies in the future.

We believe that despite the challenges of research and the diverse methodologies used, it is possible to draw some conclusions and make suggestions from the research. These suggestions might guide stakeholders in the refurbishment of old units and/or the building of new facilities.

Environmental factors and outcomes

We discuss the evidence for environmental factors and outcomes using five major categories that consistently appear in the literature on the impact of mental health hospital design on staff and service user outcomes: ambient features, architectural features, interior design features, social features and other specific issues. The table at the end of each section is a summary of suggestions made in evidence-based literature, including both primary studies and reviews of literature in the mental health and addictions clinical context.

Ambient features

Ambient features include lighting, air quality and noise (Karlin & Zeiss, 2006). In our literature search, we identified a number of studies examining links between client aggression, mood, and length of hospital stay, staff and service user needs, and ambient features. We discuss these below.

In one study (Soares, Lawoko, & Nolan, 2000) the researchers found that mental health nurses who worked in noisy conditions with poor lighting and ventilation were more likely to report being assaulted than those who worked in a more favourable environment.

In another study, staff from eight high assault wards in two U.S. state mental health hospitals were surveyed to identify hospital practices and aspects of the physical environment that they believed to be related to assaultive behaviour (Bensley, et al., 1995) . The top five aspects of the physical environment believed to influence assaults were crowding, noise, privacy, food, and temperature levels (Bensley, et al., 1995). It should, however, be noted that, in the same study, noise and overcrowding were identified as an issue by service users on only two out of eight wards interviewed. More service users believed smoking, access to outdoors, and excessive use of seclusion and restraint (i.e., being placed alone in a room, or in a chair with physical restraints on arms, legs, etc.) contributed to aggressiveness rather than the ambient features.

Olver et al's (2009) study sought to investigate the effect of changes in the physical ward environment on levels of arousal and aggression in long-stay service users in a secure extended rehabilitation facility. Fifteen male service users with a diagnosis of schizophrenia or schizoaffective disorder were present during the investigation period. Changes made to the ward environment were significant and included less density, more privacy and outdoor recreational facilities. There were also statistically significant increases in ambient light conditions in the new unit. During the time of investigation there was a significant reduction in the mean number of seclusion episodes and individual levels of psychopathology assessed using

the Brief Psychiatric Rating Scale. The authors concluded that the physical environment of long-stay rehabilitation wards may influence aggressive behaviour and arousal in service users with complex and long term needs. In another study, the incidence of physical assaults decreased markedly after the refurbishment of an inpatient intensive care unit where, as a result of numerous changes in the physical design, more natural light, fresh air, reduced noise levels and greater choice of spaces were available (Payne & May, 2009).

While not examining aggression, a small study by Beauchemin and Hays (1996) may give support to Olver's study linking mood to sunlight. Aware of the benefits of light-therapy with certain types of depressive illness, Beauchemin and Hays compared the length of stay of service users experiencing depression in the sunny rooms with those of service users in the dull rooms in a mental health inpatient unit. Those in sunny rooms had an average stay of 16.9 days compared to 19.5 days for those in dull rooms, a difference of 2.6 days. Similarly, Benedetti, et al (2001) found that service users experiencing bipolar depression in a mental health facility in Milan, Italy who were exposed to direct sunlight in the morning (Eastern windows) had a mean 3.67-day shorter hospital stay than service users in West-facing rooms, exposed to evening sunlight. No effect was found in unipolar service users.

Subjective accounts of both staff and service users point to the positive impact certain ambient features may have on satisfaction. In a study by Curtis et al. (2007), for example, the amount of light that floods into the hospital through large areas of glass in the walls and roof was a feature universally praised by staff and ex inpatients of a new mental health inpatient unit, some of which were involved in the design process. Natural lighting was also preferred by the service users who were moved to a new mental health hospital in the UK (Lawson, Phiri, & Wells-Thorpe, 2004). In a study conducted on two mental health wards of a general hospital in Nigeria, service users were significantly more likely to agree that there was enough provision for peace and quiet in the ward than staff, and this attitude was more pronounced in female than male service users (Olusina, Ohaeri, & Olatawura, 2002).

Four studies found ambient features conducive to privacy (Devlin, 1992; O'Reilly & Sales, 1987), and space and how it is used (Lawson, Phiri, & Wells-Thorpe, 2004; Payne & May, 2009) were of more importance to both service users and staff than lighting, noise, temperature and ventilation. In one study, however, natural light, fresh air, and reduced noise levels were rated as equally important by staff (Payne & May, 2009). A study by Devlin (1992) found no significant improvement in ratings of paint, wallpaper colour and lighting pre and post unit renovation.

The findings of the above studies indicate that insufficient lighting , poor ventilation and high sound levels may function as contextual stressors facilitating the occurrence of violence, and it has been argued that they may be as central as personal factors (Soares, Lawoko, & Nolan, 2000), such as diagnosis, social behaviour, or attitudes. Further, empirical evidence points to sunlight in service user rooms as having the potential to facilitate recovery of mental health service users with depression, as well as contribute to a reduction in violent episodes. The above studies also link lighting to shortened lengths of hospital stay.

Despite having good access to natural daylight being valued by both staff and service users, some of the above studies point to ambient features being lower on service user priority lists than some other aspects of the mental health units' physical environment, such as design for privacy and open spaces and its uses. This finding confirms the importance of including and incorporating service user views and preferences when designing mental health units.

Table 2 below provides a summary of suggestions on ambient features.

Table 2. A summary of positive ambient features in clinical settings

LIGHTING
(Beauchemin & Hays, 1996; Benedetti, et al., 2001; Curtis, et al., 2007; Karlin & Zeiss, 2006; Lawson, Phiri, & Wells-Thorpe, 2004; Melin & Götestam, 1981; Olver, et al., 2009; Payne & May, 2009)
Soft, indirect, and pervasive or full-spectrum lighting
Spotlight-type recessed lighting should be used sparingly and carefully placed, so as not to focus directly on individuals
Ample natural daylight is considered highly valued by service users and staff. This can be provided through installing large areas of glass in the walls and roof
Sunlight in service user rooms can prompt recovery of mental health service users with severe depression
AIR QUALITY
(Bensley, et al., 1995; Payne & May, 2009)
Fresh air and good ventilation and neutral odours can facilitate recovery
Comfortable air temperature
NOISE
(Bensley, et al., 1995; Olusina, Obaeri, & Olatawura, 2002; Payne & May, 2009; Soares, Lawoko, & Nolan, 2000)
Highly reverberant spaces should be avoided
Reduce noise levels so as not to trigger reactive responses. Noise reduction can also be achieved by installing carpeted partitions to separate high density areas

Architectural features

Architectural features are the relatively permanent aspects of the inpatient environment which include physical plan, layout, size, and shape of the units (Karlin & Zeiss, 2006), as well as rooms, dayrooms, corridors, and the placement of windows (Harris et al., 2002). These features are one of the most discussed in the literature. The two issues of safety and security, and density and privacy, as well as access to the outdoors were highlighted frequently in relation to architectural features. We discuss the related studies below.

Physical space - layout, size and shape

The majority of studies focused on the differences in service user variables before and after a move to a new or refurbished facility. The outcome variables commonly studied include behavioural changes and symptom reduction, rates of medication and discharge, staff and service user interactions, as well as staff and service user perceptions, attitudes, and satisfaction.

Higgs (1970), for example, found a decrease in psychiatric symptoms following a move of service users experiencing schizophrenia to a modernised unit, as compared to an 'unmoved' control group. Significant and long term improvements in 'appropriate' behaviours were also noted, although what constituted such behaviours was not specified. Another study found selective behaviour and attitude changes among both staff and service users after transition to a remodelled ward, as compared with matched control wards (Christenfeld et al., 1989). Notably, one of the changes in this study was a significant decrease in the rate of service user violence. Significant reductions in length of stay for some conditions and reductions in requests for pain killing medication were noted following a move to a newly designed facility (Lawson, Phiri, & Wells-Thorpe, 2004). Timko (1996) found that mental health facilities with more physical amenities (day room/activities room, decorated hallways, sheltered entrances, appropriate lighting for different activities), social-recreational aids (e.g., TV, CD and video player, exercise and sports equipment, etc.), and more space (including allowing for private bedrooms and bathrooms or shared among a few service users), had service users who were more active in the facility, who successfully completed treatment, and got discharged to independent living and to paid jobs.

Whitehead et al. (1984) measured behavioural changes in a clinically desirable atmosphere subsequent to the redesigning of a mental health unit. The original 30-bed unit was in the shape of a cross, with large open dormitories, long and uniform corridors, plain in colour and poorly lit; the day room afforded little privacy and was oriented to watching television. The new design involved the breaking up of long institutional corridors and subdivision of dormitories, and added flexibility of use to group and day room areas. The study showed that social behaviours tended to occur relatively more often in the hallways and the hall intersection before redesign, but were relatively more common in the visiting room, cafeteria, and day room in the redesigned unit. In particular, there was a significant increase in frequency of staff observed in the day room after redesign, and the authors attributed the 7% reduction in observed psychopathology in this area to the betterment of

staff-service user contact. Interestingly, service users' attitudes were significantly more positive than staff's after remodelling.

A study of a new, 'bright' purpose-built acute inpatient admission unit, designed according to 'best architectural practice' linked the move to the new physical environment to the reduction in the number of service users leaving the hospital against medical advice, reduction in the overall levels of aggression, and reduction in levels of benzodiazapine prescribing (Feeney et al., 2007). Trends towards reductions in involuntary admissions, admissions of intoxicated people, service users abusing intoxicants in hospital and in antipsychotic prescribing were also found. However, these findings should be interpreted with caution, as the move to the new unit was also accompanied by the review of protocols in relation to admissions and the management of aggressive behaviour, and it is therefore unknown whether the changes in physical environment alone would have still contributed to the described outcomes.

The conflicting perspectives of service users and staff were found by several studies (Brooker & Dinshaw, 1998; Olusina, Ohaeri, & Olatawura, 2002; Whitehead, et al., 1984). Generally service users seem to be more positive about the physical environment and standards of professional care than staff, but less positive about issues of privacy, social interaction, and empowerment (Brooker & Dinshaw, 1998). In a study of service user and staff satisfaction with the mental health ward environment in a general hospital in Nigeria, the only items of treatment that service users were not satisfied with were those related to curtailment of freedom, while the staff were dissatisfied with the physical facilities for care (Olusina, Ohaeri, & Olatawura, 2002). Gender differences were also noted, with female service users being significantly more likely than male service users to be satisfied with the ward environment.

Views often expressed by some staff, that service users are often too ill to be aware of the quality of the environment, was not supported by the data in one study (Lawson, Phiri, & Wells-Thorpe, 2004). Service users in the newer buildings expressed significantly more satisfaction with the appearance, layout and overall design of their wards than in the old facility, although there were no significant improvements reported in specific areas (such as satisfaction with lighting, noise, air quality and temperature). Staff also gave more positive ratings of service user progress in the new facilities. A key issue to emerge from the Lawson et al.'s study (2004), however, is that, although even the very ill service users demonstrated an awareness of the quality of the physical environment, they still lacked control over their environment, both in the old and the new setting.

Several studies found nurses often expressed concerns about the unsuitability of the ward layout for proper observation of service users (Cleary & Edwards, 1999; Novotna, Urbanoski, & Rush, 2011; Tyson, Lambert, & Beattie, 2002). For example, nurses felt that the large size of the unit meant that service users could 'get lost or go unnoticed' (Cleary & Edwards, 1999, p. 471). In the same study, searching for service users was seen as time-consuming; encouraging service users to stay around or making sure they were safe detracted staff from service user-centred activities.

Staff may have specific needs in relation to space that can also impact on staff burnout and satisfaction, despite the space being perceived as beneficial for service users. For instance, in a study by Tyson, Lambert, and Beattie (2002), two wards (long-stay and acute) were rebuilt to include privacy (such as self-contained sleeping areas with private bathrooms) and areas for structured activities for service users (e.g., a sitting/television room, activities room, and external veranda area with outdoor furniture). The new wards were associated with largely positive changes in staff behaviour (i.e., increased interaction with service users in the acute ward, with 98.8% of staff-service user interactions being rated as positive), but also with increased burnout, while there was no noted increase in job satisfaction. Staff described the new physical environment as being more aesthetic and pleasant, offering increased privacy and personal space for people, and separate accommodation for very acute unwell individuals. The new wards were also described as being good for the morale, more professional, and providing a better therapeutic atmosphere than the old ones.

However, the staff also noted some disadvantages of the new physical design: no rooms for smokers, facilities too cramped leading to overcrowding in the long-stay ward, and offices in the acute ward being too small. In particular, it was argued that the increased space and privacy made it difficult to find staff and service users, and made service user observations difficult. The larger space, together with the separate observation wing, also made staff feel isolated. The authors concluded that "without appropriate organizational change, the potential benefits of the new environment may be attenuated' (101).

The importance of achieving a balance between service user-centred space and the practicalities of day-to-day clinical work have also been highlighted in a study by Novotna, Urbanoski and Rush (2011). The lack of staff-designated spaces in a new facility was seen by staff to have potential negative consequences for service user treatment and for staff well-being. Reduced therapeutic space, lack of communal and storage space for staff, the lack of a nursing station on every floor, as well as direct sightlines to service users, the absence of call buttons in bedrooms and bathrooms, were all linked by staff to challenges in responding quickly to clinical and behavioural issues and emergency situations. This limited their ability to model pro-social behaviours. Lack of formal interview/counselling rooms, with ward alcove areas being used for planned therapeutic interactions was also a characteristic of the physical environment described by nurses in an acute mental health admission ward in Australia (Cleary & Edwards, 1999).

In a study by Musisi, Wasylenki and Rapp (1989) the introduction of the new psychiatric intensive care unit (PICU) led to a decrease in staff and service user accidents, a decrease in constant observation and seclusion hours, and a decrease in the number of nursing hours lost to injuries at work. The ICU was well liked by nursing staff who preferred to work in its more consistent and controlled environment. The unit centred on a large, easily observed open area with six dormitory style beds separated by rectangle privacy drapes. There were separate lounge and dining areas, a bathroom, meeting room and emergency buzzer system. In contrast to the findings of the above studies, positioning of the nursing station allowed observation of all people currently inpatient. The importance of the need for continuous observation was stressed with one-way mirrors and plexiglass in the nursing station. The survey of nurses' attitudes proposed a strengthening of windows for the observation station and improved sound-proofing of the quiet rooms. This study, however, did not explore the attitudes of service users in relation to the physical design of the unit.

In their service user-led study, Walsh and Boyle (2009) found that service users were particularly concerned with the image of the hospital, which they believed added to the stigma surrounding mental health. It was suggested that mental health wards should be linked to a general hospital and should be renamed by service users to invoke a positive reaction from the public. Related to the overall image of the hospital is the size of its physical spaces. Timko (1996) argued that the size of a hospital's physical space is frequently equated with perceptions of competency and level of professional care.

Our search identified only one study where service users considered issues concerning the physical environment of the ward as the least important aspect of the overall treatment environment (Hansson, Björkman, & Berglund, 1993). Although ward atmosphere was identified as one of the six characteristics of ideal mental health inpatient care in this study, interpersonal aspects of the treatment environment (such as staff taking their time and supporting service users, and service user involvement in their treatment decisions) were more important to service users than impersonal ones (i.e. the doors of the ward being locked or unlocked).

Safety and security

Safety and security were issues highlighted frequently in the literature. In a study by Cleary and Edwards (1999), safety was an important aspect of ward environment for both staff and service users. This required nurses to 'keep an eye out' for all service users at all times, and some service users did comment on safety as being in part attributable to the level of nursing observation. Inadequate security features were emphasised by nurses in a new mental health intensive care unit in England (Gentle, 1996). For example, they felt that the windows were unsuitable as they were easily broken and eventually had to be replaced with toughened glass; the perimeter fence was seen as useless, as it was low and service users were able to climb over it; there were problems with the locks on the doors as service users could barricade themselves and make their 'escape'. The main focus was on containment, and there was a great deal of concern by nurses about service users getting out. The locked doors were seen by some to be necessary to be able to concentrate on giving care - nurses felt they would be blamed for any 'escape' rather than this being attributed to any shortfall in the physical security.

Staff perspectives seem to be dominant in studies considering the safety and security aspects of architectural design. A study of staff ratings of mental health inpatient interview rooms (Lillywhite, Morgan, & Walter, 1995) found that, as the perceived dangerousness of the service user group increased, the desirability of having increased safety features was felt to be necessary by all the staff surveyed. In particular, it was felt that when agitated service users or those with a known history of violence were interviewed, an interview room should maximise safety with regard to space, access, layout, potential for concealing weapons, alarm and ease of exit. For interviewing other service users, staff were prepared to accept fewer safety features, and focused on those aspects of an interview room conducive to providing a warm, friendly environment. The

authors suggested all interview rooms should be located close to staff areas and incorporate safety features, such as alarm buttons and spy holes, and should be regularly checked for potential weapons.

Lack of safety features was also pointed out by staff in mental health intensive care and 'low secure units' (housing service users with serious mental health issues, detained under compulsory treatment or on legal grounds, and therefore requiring the provision of security) in a study by Pereira et al. (2005). An audit based on national minimum standards for the design of these units and consultations with various relevant agencies showed that only a third of the units had some form of Close Circuit Television (CCTV) and less than 20% had a recording system, suggesting that the majority used CCTV for door entry control. Only one-third had emergency call button facilities for staff and service users. Observation from the staff base was poor in 80% of the units and observation of the visiting area was poor in 30% of cases; more than half of the units had poor or limited observation into bedrooms. Sixty percent of the units had no specific areas for secure visits.

In contrast to the findings of staff's concerns for personal safety in mental health wards, service user-centred studies show that service users are often more concerned about the restrictive nature of the ward environment than safety. For example, respondents in a study by Curtis et al. (2007) described feeling locked in due to the high' metal fence around the mental health intensive care unit visible from the entrance. Service users also complained about the slippery and hard-to-turn door handles on their rooms designed to prevent ligature.

One report (The Sainsbury Centre for Mental Health (SCMH), 1998) discussed results of a study done with 215 service users on their satisfaction with acute admission wards in 9 hospitals in England and Wales. Although service users valued the respite quality of acute wards, they least liked the lack of freedom which accompanied them (e.g., doors locked at 9pm); nearly a quarter identified the restrictive regime as the aspect they would most like to change. In addition, the study found nearly one third of respondents, and especially women, felt unsafe on the wards. Seventy one percent had no secure locker for personal possessions. In the same study, vision panels were supported mainly by nursing staff with responsibility for making visual checks on service users throughout the day or night. The presence of vision panels on service users' room doors were criticised by service users in another study (Curtis et al., 2007). In a study by Chen and Sanoff (1988), staff and service users agreed that there was a need for visual surveillance between nurse and service users; however, service users felt that they needed less attention from nurses than the nurses believed. Thus, as with ambient features of the physical environment, the studies related to security and safety of architectural design point to discordant perspectives and needs of staff and users.

Finally there is also mention in the literature of "suicide proofing" as an important aspect to consider when designing a safe mental health unit. Benensohn and Resnik (1973) found that service users may actually test hospital environments to determine whether they can successfully attempt/complete suicide. They also found that some people were very knowledgeable about how to attempt suicide in hospital settings, possibly more so than hospital staff. Interestingly, service users felt reassured of their safety when hospitals took active measures to ensure their safety by restricting access to means of potential harm (e.g., the use of shatterproof glass, and locks on windows and doors to limit access to high places). Benensohn and Resnik provided further insight into these issues when they asked service users' opinions about how to decrease suicides in hospital settings. The researchers recommended that hospital administrators routinely, at least once each year, search for potential items that could present a risk. As Cardell, Bratcher and Quinnett (2009) point out, due to the relative infrequency of people completing suicide while in a unit, it remains difficult to study accurately how effective some policies and procedures are. Cardell, Bratcher and Quinnett also provide a description of an example of a bathroom door that is "almost impossible to hang from" (p.39), recommended by the Joint Commission on Accreditation of Healthcare Organizations. The door has a slanted top and a gap at the bottom that prevents wedging sheets or other objects to use to hang from. On the side there is a rubber edge for privacy that also makes it impossible to wedge objects between the edges. The door also has a continuous hinge on the side, making hanging from the hinge unlikely.

Density and privacy

Andes and Shoenfeld (2006) point out that spatial human experiences such as confinement and freedom are important in acute mental health treatment. They argue that mental health service users have little control over space, and the space they occupy is constantly being invaded by health care staff and other service users.

Overcrowding is a well-documented phenomenon in public mental health facilities and, together with the lack of privacy, has been related to incidents of aggression (Dobrohotoff & Llewellyn-Jones, 2011; Nijman et al., 1999) . Overcrowding is important to this discussion as it can impact on the way in which the physical space of a hospital is used, whether or not this was the purpose for which it was originally designed.

The report by The Sainsbury Centre for Mental Health (SCMH) (1998), based on service user experiences of acute wards in England and Wales, recommends that there needs to be an adequate environment that includes sufficient space, privacy, an atmosphere conducive to calmness, safety for service users, security of belongings and opportunities for relaxation.

Impact on length of stay and treatment, service user satisfaction with the treatment environment, and the importance of single service user rooms, unlocked room doors and issues of control were discussed in the literature in the context of privacy.

Chen and Sanoff (1988) conducted a study to elicit staff and service user views regarding the privacy and safety of different hospital wards, so as to incorporate their input in the redesign process of the wards. The results from the service user survey indicated the need for privacy, and control of the door and the corridor. The study confirmed that different service users have different privacy needs. The majority of mental health service users, for example, preferred a private room over a shared one; 66% preferred to 'always' have their door closed during the night. When comparing the actual amount of time that service users spend in their room, compared to the preferred amount of time, mental health service users stated that they would rather be elsewhere than in their room. The study also showed that staff consistently underestimated service users' need for their control of privacy.

A literature review on the advantages and disadvantages of single versus multiple-occupancy rooms in acute care environments in general showed that private patient rooms reduce the risk of hospital-acquired infections, allow for greater flexibility in operation and management, and have positive therapeutic impacts on people (Chaudhury, Mahmood, & Valente, 2005).

In a study by Lawson and Phiri (2000) conducted in England, service users were moved from conventional mental health and orthopaedic wards to refurbished wards that were mainly composed of single-occupancy rooms. Service users, and particularly those in the new single-occupancy rooms, rated their experience and treatment higher on the refurbished wards and were more satisfied with the appearance, layout, and overall design of the unit. Length of stay on the new mental health unit was lower than in the old unit.

Abbott (2004) identified undesirable architectural features in one hospital. These included shared rooms, lack of room visibility for ease of monitoring, traffic patterns requiring movement through one unit to reach the other, and visitors and service users sharing the same circulation routes (Abbott 2004). These concerns were confirmed in the study by Chen and Sanoff (1988) and addressed through ward design changes following consultations with service users and staff. The design changes addressed the need for service user privacy and for control of the door and the corridor. This was done by removing the doors opening onto corridors in the inpatients' area, thus permitting service users to walk along the corridor without invading the privacy of others, and to reach a destination of a lounge or sitting area.

Studies also point to the importance of private washing facilities for service users. For example, in one study female service users were significantly less satisfied with privacy of washing facilities than male service users (The Sainsbury Centre for Mental Health (SCMH), 1998). Bathroom and dormitory privacy were the most poorly rated environmental features of an old mental health facility in one study and the authors argued these to be central to service users' psychological health (Devlin, 1992). It is difficult to assess the individual contribution of design for bathroom privacy on service user outcomes as this architectural feature is rarely redesigned and has not been studied in isolation from other basic architectural changes.

Bedroom and bathroom privacy was rated the poorest in terms of quality in a list of physical design features by service users of an acute public long-term facility in the United States. (O'Reilly & Sales, 1987). Service users reported that problems in the bedrooms were due to too many people, too little space, and being able to be seen; there was not enough privacy because some of the toilet doors did not work, and although the showers were private enough, the waiting areas were not - everyone

had to undress together and wait for a shower to become available. Service users also complained that people of the opposite sex would occasionally try to enter during showers, and that showers could be taken only at specific times in groups. Among the design changes suggested by the service users in this study were: dividers or curtains around (rather than just between) beds, fewer inpatients, individual rooms, having a lock on the door, limiting room use to one person at a time, and providing a curtain by the doorway in addition to having curtains by the beds to block the view into the room. Specifically in the bathrooms, service users suggested more or larger areas, providing private showers (including a private dressing area), installing full partitions around toilets, and providing lockable individual toilet doors and partitioned sinks.

While the physical environment can facilitate a more therapeutic relationship between staff and service users, staff might need guidance as to how changes should take place. While service users may now have private rooms in many hospitals, staff will often still govern the use of these spaces. For instance, in one hospital in Israel it was common to lock service users experiencing schizophrenia out of their bedrooms during the day in order for them to develop independent living skills i.e. getting up and dressed, making beds, eating and attending day programs (Shoenfeld, et al., 2008). Shoenfeld et al. conducted a study where room doors were kept open for one week. After the doors were left unlocked for the week, a majority of service users reported that they enjoyed the "open-door" week and supported a policy of unlocking rooms. All reported not having spent all their time in their rooms; instead they attended therapy groups at least some of the time. Ninety percent of respondents also reported that they appreciated having full access to rooms and belongings at all times, something one service user reported as "true freedom and privacy." In contrast, nursing and allied health staff responded more negatively than service users to the week-long open door policy. They believed that some service users slept more than necessary in the afternoon, which led to their having difficulties in falling asleep and spending the nights wandering uncharacteristically. Moreover some service users did not leave their rooms, and their communication was significantly diminished. However, Shoenfeld et al. concluded that the decision to lock or not lock a service user's room should be seen as an important part of an individual's treatment plan. They argued that enforcing locked doors, especially as an active way of asserting staff control, limits decision making over an important aspect of one's life (such as when one can stay in one's own room), and this may be contrary to the basic goal of mental health treatment of encouraging autonomy and good decision making. Thus, Shoenfeld et al. argue that, if at all necessary, the locked door policy should be limited to times when ward activities oriented toward direct service user benefit and the rehabilitation process are taking place, to ensure service user participation (Shoenfeld, et al., 2008). The authors further stress that this arrangement should be made clear at the time of admission, within the context of informed consent for voluntary institutional treatment.

In contrast, staff surveyed on their attitudes towards new design of treatment units in Canada were well tuned into people's needs - opportunities for people to choose between the privacy of their bedrooms and socialising with other people or visitors in the communal spaces also factored into staff perceptions of greater service user control over their environment (Novotna, Urbanoski, & Rush, 2011). Participants commented on the physical design, describing it as respectful of people's privacy and independence, and these were linked with improved quality of life and empowerment (Novotna, Urbanoski, & Rush, 2011).

Despite the lack of privacy and personal space, safety or the opportunity to get away from everyday problems, the physical environment provides the most commonly valued quality of the acute wards mentioned by one third of service user respondents in a study conducted in England and Wales (The Sainsbury Centre for Mental Health (SCMH), 1998). The issues of territoriality and symbolic or private space also feature in the literature. Curtis et al. (2007) point to the importance of places of refuge - for staff and service users interviewed in their study. The individual bedrooms helped to enhance a sense of private space. Personalised spaces that people can decorate (Gutkowski, Ginath, & Guttmann, 1992) may prepare clients for independent living after treatment (Timko, 1996).

Some service users see the hospital in general as a haven from the pressures of the outside world. In a service user-led study in acute psychiatric hospitals across Northern Ireland, the hospital was a place that provided time and space for reflection, personal safety, and helped to reduce feelings of isolation by providing fellowship with other service users (Walsh & Boyle, 2009).

Windows and Access to the Outdoors

The importance of windows and natural daylight, and views they provide on service user satisfaction, has been shown in several studies (Curtis, et al., 2007; Lawson, Phiri, & Wells-Thorpe, 2004; Musisi, Wasylenki, & Rapp, 1989; Shattell, Andes, & Thomas, 2008). Service users preferred natural lighting and a view from a window (Lawson, Phiri, & Wells-Thorpe, 2004), and described the benefit of the windows on the unit, through which they looked at the sunshine, trees and other features of the outside world (Shattell, Andes, & Thomas, 2008; Thomas, Shattell, & Martin, 2002). The amount of light that floods into the hospital through large areas of glass in the walls and roof was also universally praised in another study (Curtis, et al., 2007), as was being able to open windows and let in fresh air (Payne & May, 2009). Devlin and Arneill (2003) concluded that windows may have a therapeutic value because they provide "a soothing, peaceful distraction" (p. 681).

Karlin and Zeiss (2006) summarise several positive features in relation to window design and positioning that are listed in the table below. They also suggest that outdoor gardens and other elements of nature create positive distractions as well as reduce stress and facilitate recovery (Karlin & Zeiss, 2006).

In their study of six mental health wards in the UK, service users felt there were not enough grounds for exercise and getting outside for fresh air (Burns et al., 2004). Service users and staff had various specific suggestions regarding the use of the outdoors - a large garden with trees, grass and places to sit in the fresh air to read a paper or enjoy a cigarette[1]; a greenhouse where service users could watch their own plants growing; a theme garden, or having a roof top garden (Curtis, et al., 2007; Payne & May, 2009). In a study of outdoor setting preferences in relation to certain types of behaviour (i.e., active, passive and mixed-active), Barnhart, Perkins and Fitzsimonds (1998) found that both staff and service users in a large mental health hospital in Ontario, Canada, selected natural open settings for passive behaviours such as sitting and viewing scenery, and natural enclosed settings for active behaviours such as walking and talking with others. In one study, 69 service users from eight wards with high rates of assault in two state mental health hospitals discussed concerns about access to outdoors in relation to smoking (Bensley et al., 1995). They reported enjoying going outdoors for fresh air, exercise, and a change of pace, as well as for smoking. Service users additionally reported that after an outing with staff members, they would see each other more positively, and tensions would ease. Staff interviewed identified smoking policy as the most important hospital practice of concern. For service users who required an escort, access to outdoors ranged widely from ward to ward, from every 2 hours to as little as once a week. Considerable friction was created during waits for outdoor access or as a result of illegal smoking activity. The researchers suggested that floor designs be developed that would allow service users free access to an outdoor area (Bensley, et al., 1995).

Not having access to an outdoor garden was associated with aggression in an acute mental health admission unit for older persons in New South Wales, Australia (McMinn & Hinton, 2000). In this study, service users experiencing dementia and associated psychiatric and behavioural disturbances released from a 32-day period of mandatory indoor confinement displayed a decrease in both verbal and physical aggression following release from confinement, as well as the nurse-initiated psychotropic medication use. This effect was more pronounced in service users admitted because of aggression. The unit housing the participants in this study was situated in a 19th century colonial building originally built as a military barracks, but had relatively peaceful surroundings looking over grassed playing fields and is distant from other acute units. The authors suggested their findings supported the argument for purpose built units for service users with higher levels of behavioural disturbance. They also concluded that along with other factors (care practices, social/ recreational provision, orientation cues and other aspects of the physical environment), "the freedom and ability to go outdoors should be a necessary component of the environmental design and care philosophy for the acute admission of people who experience dementia and highly disturbed behaviour" (McMinn & Hinton, 2000, p. 41).

The location of the facility itself in relation to the community in which it resides was also important to service users, staff and visitors. For example, in one study, locating the facility near an old sewage outfall and a busy motorway (with no barrier to shield the centre from heavy traffic noise) was considered as showing a lack of respect for service users and staff, as was a rural location of the hospital which disconnected the service users from the physical and social urban landscape (Curtis, et al., 2007).

[1] Smokefree policies do not allow such practices in New Zealand

According to Grosenick and Hatmaker (2000), the physical location of a health-care facility is an important element of facility arrangement. However, changing the location of a facility may require major structural changes and, therefore, may be harder to implement than the rearrangement of the interior space. Community access is believed to benefit service user functioning during treatment by normalising the environment and therefore, it is important to locate a facility so residents and visitors can access a nearby community, whenever possible (Timko, 1996).

Below is a summary of suggestions regarding desirable architectural design features.

Table 3.A summary of positive architectural features in clinical settings

- Move to a new or refurbished facility can be associated with: a decrease in symptoms of service users experiencing schizophrenia; selective behaviour and attitude changes among both staff and service users; significant reductions in length of stay; reductions in requests for pain killing medication; reduction in the number of service users leaving the hospital against medical advice; reduction in the overall levels of reactive responses; reduction in levels of benzodiazapine prescribing; and more satisfaction with the appearance, layout and overall design of the wards by staff and service users (Christenfeld, et al., 1989; Feeney, et al., 2007; Higgs, 1970; Lawson, Phiri, & Wells-Thorpe, 2004)

Space and positioning

(Abbott, 2004; Barnhart, Perkins, & Fitzsimonds, 1998; Curtis, et al., 2007; Grosenick & Hatmaker, 2000; Karlin & Zeiss, 2006; Shattell, Andes, & Thomas, 2008; Thomas, Shattell, & Martin, 2002; Timko, 1996; Walsh & Boyle, 2009; Whitehead, et al., 1984; Wilson, 1992)

- Consider locating the facility away from a busy road, but with easy access to a nearby community
- Long, echoic corridors are discouraged by environmental psychologists because of perceptual distortions experienced by some service users
- Incorporating spatial flexibility into the design process (for example, installing flexible dividers for larger areas) allows for maximal use of available space
- Materials in mental health units should preferably be of high quality, to counter service users' potential poor self-image and to help build feelings of status and coping
- A staff office near the entrance of the unit allows ingress and egress from the unit to be monitored
- Design open rather than closed nursing stations, provided there is a functional 'offstage' area inaccessible to non-staff where staff could complete administrative tasks, keep confidential records and conduct confidential meetings
- Locate seclusion rooms near and within sight of nursing stations, but outside of main patient corridors and activity areas

Privacy and density - rooms, dayrooms, meeting rooms, and bathrooms

(Brunt & Rask, 2007; Chaudhury, Mahmood, & Valente, 2005; Chen & Sanoff, 1988; Curtis, et al., 2007; Devlin, 1992; Dobrohotoff & Llewellyn-Jones, 2011; Gutkowski, Ginath, & Guttmann, 1992; Lawson & Phiri, 2000; Nijman, et al., 1999; Novotna, Urbanoski, & Rush, 2011; O'Reilly & Sales, 1987; Olver, et al., 2009; The Sainsbury Centre for Mental Health (SCMH), 1998; Timko, 1996; Tyerman & Spencer, 1980)

- Single or non-dormitory style rooms enhance privacy and autonomy and in some cases promote participation in treatment activities
- Allow for private washing and toileting facilities, especially for women, or shared among a few service users
- Female service users may benefit from being on single sex wards, or at least having a separate female-only day room
- Privacy can be enhanced by dividing large spaces into smaller, purpose-specific areas
- Provide interview and treatment rooms. These should be positioned away from dormitories and closer to a nursing station/office

Windows and views

(Curtis, et al., 2007; Devlin & Arneill, 2003; Karlin & Zeiss, 2006; Lawson, Phiri, & Wells-Thorpe, 2004; Musisi, Wasylenki, & Rapp, 1989; Payne & May, 2009; Shattell, Andes, & Thomas, 2008; Thomas, Shattell, & Martin, 2002)

- Views of nature can reduce psychological distress and recovery time, and enhance staff functioning and job satisfaction
- Large low windows may improve sensory abilities and reduce delirium and paranoia
- Laminated safety glass in group rooms can open up the interior and provide a visual connection to the outside

Outdoor gardens and access to the outdoors

(Bensley, et al., 1995; Karlin & Zeiss, 2006; McMinn & Hinton, 2000; Olver, et al., 2009; Payne & May, 2009; Timko, 1996)

- Outdoor gardens and other elements of nature can serve as positive distractions. Exposure to nature reduces stress and fatigue, has been associated with reduced aggression and seclusion, and may facilitate recovery
- Access to nature has been identified by service users as a priority design factor in general health care environments
- Provide enough grounds for outdoor exercise

Staff needs

(Cleary & Edwards, 1999; Musisi, Wasylenki, & Rapp, 1989; Novotna, Urbanoski, & Rush, 2011; Timko, 1996; Tyson, Lambert, & Beattie, 2002)

- Space for incorporating new technology as it develops should be included in the architectural design
- Provide a nursing station on every floor; their location needs to be functional and facilitate observation
- There should be appropriate facilities for staff training, staff showers and toilets

Safety and security

(Benensohn & Resnik, 1973; Cardell, Bratcher, & Quinnett, 2009; Chen & Sanoff, 1988; Cleary & Edwards, 1999; Curtis, et al., 2007; Gentle, 1996; The Sainsbury Centre for Mental Health (SCMH), 1998; Walsh & Boyle, 2009); Lill ywhite, Morgan, & Walter, 1995; Mezey, Hassell, & Bartlett, 2005; Pereira, et al., 2005;

- Routinely check breakaway hardware (plumbing rails, rods, closet bars) and replace non-breakable hardware
- Lock doors that may provide access to sharp objects, cleaning solvents, and other chemicals
- Limit access to roofs or high places, open stairwells, screen porches, or elevator shafts, provide unlockable private bathroom doors, non-protruding wing doorknobs; and remove sheets from the units, to decrease the risk of suicide and absconding
- To promote safety, use shatterproof windows, window locks, breakaway curtain rods, tamperproof electrical outlets, stainless-steel mirrors and lockable water taps
- Provide emergency call button facilities for staff and service users
- Ensure that women's bedrooms are adjacent and in sight of the nursing station
- Install a handrail in the toilets to prevent the risk of falls by older service users or those with special physical needs

Interior design features

Interior design features are the less permanent aspects of the hospital environment including colour, arrangement of furniture, art work and aesthetics, and plants (Karlin & Zeiss, 2006; Mazuch & Stephen, 2005).

Dalke et al. (2006) argue that, although there is still no definitive evidence on the power of colour, in the healthcare setting, colour can have a practical and functional use in patients' accommodation as it can control bright reflected light and make the most of available daylight, as well as help to reduce glare. These authors emphasise that, regardless of the lack of evidence on the impact of colour and design on health, monotony and poor conditions in premises that have not been refurbished with any care, have certainly had a detrimental effect on recovery rates and staff morale.

Literature links interior design changes to changes in service user and staff behaviour, mood and attitudes towards the therapeutic milieu.

As early as the 1970s, Holahan and Saegert (1973) discussed changes to a mental health admissions ward that aimed to improve the ward atmosphere and 'encourage successful social interaction and discourage withdrawal' (p. 455). The changes involved: painting the walls bright off-white and blue and all doors in bright solid colours, attractive and comfortable modern furniture in dayrooms and bedrooms, brightly coloured bedspreads in the bedrooms, and areas with a range of social options. In contrast, no changes were made in an identical control ward, consisting of old, worn and rather uncomfortable furniture, walls in dull tan brown, marble, and dark brown doors. As a result of the changes, increased socialising and decreased passivity were observed. Service users also said that they found the changes more stimulating and less depressing than the control ward setting. A notable finding of this study is that even very disturbed service users were perceptive of their physical surroundings.

Corey et al. (1986) used the Ward Atmosphere Scale to evaluate the milieu in a 101-bed general adult mental health hospital. Staff and service users identified several problems in relation to interior design features including metal hospital-style furniture which emphasised the sick role, furniture arrangements which inhibited socialisation, crowding in dining areas, vinyl tile flooring which contributed to noise, coldness and an institutional feeling, a pale monotonous colour scheme felt to be unstimulating, sparse ornamentation, and a lack of private areas and space for personal belongings. Changes in furniture style and arrangement, floor covering, and colour scheme in the same study were associated with improved staff and service users' perceptions of the psychosocial milieu.

Devlin (1992) showed how even modest aesthetics and functional interior design changes guided by staff suggestions can improve staff perceptions of their physical environment. The changes involved new day hall furniture (loveseats and couches, wood corner tables, fabric covered high back chairs, low fabric covered dividers to create a sense of separate seating areas), plants, wallpaper, paint, curtains (in complementary colours and cut shorter to provide more light), bathtubs, carpet and brighter lighting (higher voltage light bulbs in corridors). Behavioural data from this study showed a significant decrease in service user "stereotypy" (described by the author as head banging, rocking, and tantrum) and a preference for more private seating areas in the day hall following renovations. Although there was no significant improvement in ratings of paint, wallpaper colour and lighting pre and post renovation, plants were found to be the most effective and least costly improvement.

A study by Mistral, Hall and McKee (2002) evaluated interventions in a higher care mental health ward based upon the principles of therapeutic community. One of the interventions was an improved physical environment. This included an upgrade of the ward kitchens and bathrooms, installing new carpet, and painting of all the bedrooms and communal areas. Other interventions included improved communication between staff and personal alarms for staff. Two scaling tools (the ward atmosphere scale and attitude scale) and interviews with staff indicated a significant improvement in ward atmosphere and staff attitudes. Ward records also showed a substantial reduction in the use of seclusion for aggressive behaviour and a 62% reduction over 2 years in short-term staff illness. The researchers conclude that the upgrade and sprucing up of the physical environment may contribute to more positive ward atmosphere and attitudes to work as perceived by staff, as well as improved inpatient care.

Redecorating mental health wards in a homely manner was also linked to reductions in reactive responses and staff absenteeism due to illness. In a study by Christenfeld et al. (1989), within eight months of ward remodelling, there were selective behaviour and attitude changes in both staff and service users as compared to four matched control wards: staff mood level was raised significantly, staff unscheduled absence rates were cut in half; service users themselves reported improvement in their self-image, and significantly more satisfaction with the ward dayroom. Most importantly, the rate of service user aggression decreased by almost 50 per cent. Design changes to the ward in this study included lowered ceilings, light-coloured tiles on the floor, separate seating areas, regrouped furniture, relocation of the nursing station, recessed lighting, vinyl walls, full carpeting in bedrooms and wall hangings. Similarly, following ward refurbishment initiated by the National Health Service (NHS) mental health services trusts refurbishment scheme "Enhancing the Healing Environment", service users cited a high quality, comfortable and homely environment as important (Payne & May, 2009). This included, for example, having a selection of different, good quality furniture; bean bags to lie on; pleasant laminate flooring and carpets; nice curtains; a large, high quality television; music (via a stereo system) and a large selection of DVDs; having a female-only lounge with a separate television; having a roof top garden; and being able to look outside. The new environment also saw a marked reduction in the incidence of physical assaults.

Nanda et al. (2011) argue that there is a significant body of research on the impact of art and its healing potential in acute-stress settings using clinical outcomes such as heart rate, blood pressure and pain perception, as well as indications that art can be used beyond physiological healing, towards spiritual healing. Although anecdotal evidence points to people with mental health issues being receptive to art, research in mental health has been lacking in terms of determining the impact of artwork, and different types of art, on mental health service users. (Nanda, et al., 2011). Daykin et al. (2008) argue that one of the main issues to consider when designing healthcare environments is that of what constitutes "appropriate" art. There is evidence suggesting naturalistic environments support recovery, while abstract images, along with noisy, institutional or urban environments may contribute to increased stress (see Daykin, et al., 2008).

The only published study on the impact of wall art on mental health service user outcomes we found is that by Nanda et al. (2011), in which visual art was displayed on a rotation basis on the walls of a small multi-purpose lounge for mental health service users in an Alabama hospital. The findings showed that pro re nata (PRN) medication dispensed by nurses for anxiety and agitation was significantly lower on days when a realistic nature image of a landscape was displayed as compared to days when abstract art or no art was displayed. The authors suggested that simple environmental interventions like visual art can save the hospital costs of medication, and staff and pharmacy time, by providing a visual distraction that can alleviate anxiety and agitation in service users. This view is mirrored in the evaluation of the impact of grants awarded to 32 UK National Health Service (NHS) hospital trusts described by Daykin et al. (2008) as a part of a scheme aimed at improving physical environments on inpatient wards. This study found that, although these arts projects were initially considered as "the icing on the cake", the achievements and outcomes were surprisingly positive (i.e., improved therapeutic outcomes, improved service user experience, improved privacy and dignity, improved sense of identity, improved staff morale and motivation), which persuaded NHS trusts that "a high impact could be made for relatively small sums" (see Daykin, et al., 2008p. 91).

Below is a summary of suggestions made in Karlin and Zeiss (2006), with several additional suggestions from the surveyed literature relating to interior design.

Table 4.Interior design features

Ensure design reinforces treatment goals
(Daykin, et al., 2008; Georgieva et al., 2010; Karlin & Zeiss, 2006; Nanda, et al., 2011; Payne & May, 2009)
• A clearly identifiable reception area and method of greeting service users and visitors reflects customer service values and service user centredness • Different functional areas may be differentiated through colour, lighting, carpeting, wall graphics, and furnishings • Make use of wall art displays - realistic nature images of a landscape can support recovery, while abstract images, along with institutional or urban environments may contribute to increased stress • Amenities that enable service users to increase the convenience and comfort of the setting, such as telephones, lamps, and individual heating and air conditioning controls, can enhance service users' image of themselves as independent and self-directed, and lessen their distress
Furnishings
(Christenfeld, et al., 1989; Corey, et al., 1986; Georgieva, et al., 2010; Holahan & Saegert, 1973; Mistral, Hall, & McKee, 2002; Payne & May, 2009; Vaaler, Morken, & Linaker, 2005)
• Reduce institutional feel and incorporate a homelike environment wherever possible • Make furnishings appropriate to the age group • Interior and furnishing like an ordinary home in the seclusion areas can lead to comparable treatment outcomes to the traditional bare interior, and can have positive effects on service users' well-being
Familiarity
(Christenfeld, et al., 1989; Karlin & Zeiss, 2006; Payne & May, 2009)
• Service user rooms should have a familiar tone, as research reveals people prefer familiar rooms over decorative or stylish rooms • Allow for service users to personalise their space by placing pictures on the walls and putting flowers and personal items on display. This may help normalise the treatment environment
Colour
(Corey, et al., 1986; Dalke, et al., 2006; Day, Carreon, & Stump, 2000; Devlin, 1992; Glod et al., 1994; Holahan & Saegert, 1973; Huffcut, 2010; Vaaler, Morken, & Linaker, 2005)
• Monochromatic, bland colour schemes and fashionable or trendy palettes should be avoided • Brighter colours may be preferred for service users with depression and some older adults, but they could be over-stimulating for highly agitated people • Warm blue tones often have a soothing or sedating effect and may appeal to adolescents • Blue-green colours can have a negative effect on mood for service users with depression or less energy • Seclusion rooms should be a calm and definitive colour, not white or grey
Other design considerations
(Day, Carreon, & Stump, 2000; Devlin, 1992; Karlin & Zeiss, 2006)
• Ensure design accommodates competing goals of stimulating depressed or withdrawn service users while not over-stimulating service users who are manic or agitated • Include natural plants if possible • Natural wood veneer can be used to soften the look of doors • Avoid highly polished floors and other reflecting surfaces because of glare.

Social features

Skorpen et al. (2008) point out that all social interactions and processes are contextualised in time and place; therefore, spatial areas and locality, as well as experience and impressions will always constitute elements that influence social interactions.

Several studies identified the importance and need for social features in the acute setting. These included social spaces for service user interaction, group work areas, therapeutic spaces for clinical staff and service users to meet, and places where service users could meet comfortably with family and friends. We discuss the relevant studies below.

The lack of space for service users and staff to meet was often mentioned in the literature. For instance, Cleary and Edwards' (1999) study involved 10 nurses and 10 service users being interviewed to explore factors influencing nurse-service user interactions in an acute inpatient setting. The lack of quiet spaces to sit and talk (as no formal interview or counselling rooms were available on the ward) was considered as non-therapeutic. In their assessment of 25 patient interview rooms, Lillywhite, Morgan and Walter (1995) found that mental health assessments in the accident and emergency wards were often conducted in cubicles which were cramped, had inadequate seating and provided little privacy. The study identified as problematic the location and design of interview rooms on the acute admission wards, as they were mainly located on the first floor adjacent to the dormitories and isolated from the nursing areas.

Improvements in staff and service users' interactions were observed after a redesign of one of the primary corridors in a mental health hospital in Scotland catering for service users with dementia (Edgerton, Ritchie, & McKechnie, 2010). The redesign included introducing two ceiling-to-floor structures that reduced the width of the corridor in two consecutive areas, thereby altering the rigid perspective of the space; introducing ergonomically designed timber beams to act as informal seating; changing the colour of the ceiling, removing the protective, institutional-style panels from the walls; wall, and floor coverings to give a sense of nature (primarily blue and green) and to break up the vast, uniform expanse of this space; replacing some transparent glass windows with opaque glass to accentuate the daylight whilst blocking out unsatisfactory views; ; planting trees outside the corridor adjacent to the opaque glass; and installing two site-specific artworks (paintings) into the architecture. Following redesign, there was a significant increase in the number of service users observed talking to other people in the corridor. Service users were also more likely to be accompanied in the corridor by either a staff member or a visitor. Service users and staff, however, perceived the change to the environment differentially - service users were more likely to rate the redesigned corridor as being cleaner, quieter, and more likely to make them feel good compared with the corridor before it was redesigned. Staff were more likely to rate the redesigned corridor as less bright and airy compared with the old design. The authors contributed the limited impact of the redesign to the fact that it was not radical enough and that it may have been greater if a more accessible and visible area had been selected.

Studies on the design of spaces for mental health and addiction service user interaction point to the special significance these spaces have for the service users themselves. It is often the smoking room that provides the perfect meeting place, regardless of whether the service users smoke or not. Thomas, Shattell, and Martin (2002) found that a smoking room unofficially reserved for service users in a mental health unit, although drab and small, was described vividly by service users as "the best place on this floor" and "very therapeutic" (p. 102). The service users' smoking room, with its 'huge' window with an outside view, which was also enjoyed by service users who did not smoke, was an "inner sanctuary" where service users could speak freely, without any strictly prescribed rules of interaction, and away from the "watchful eyes" of nurses (p.104). This perception of the ward's smoking-room as a 'sanctuary' for service users, serving as peer-administrated 'therapy' was later echoed in the findings of the study by Skorpen et al. (2008). Three themes regarding the significance of the smoking room emerged from this study: the smoking-room as the service users' panopticon, the smoking-room as the service users' sanctuary, and the smoking-room as the arena for service user-led treatment. Thus, the architectural placement of the smoking-room gave the service users a surveillance point, or served as their panopticon to observe those who observe them and monitor the ward's events and activities. In addition, the smoking room served as a main arena for service user interaction, and many service users reported that the company of other service users in the smoking room had the effect of lightening their mood, and giving them comfort and strength in the daily events on the ward. It was an area where the service users could stay and practise certain activities (such as conversations around personal subjects) free from the ward staff's observational presence – for example the service users often discussed how difficult it was for them to keep

in touch with friends and relatives outside the hospital. Finally, the smoking room offered a space for service user 'consultations', involving corrective advice, comfort and support. The service users in the smoking room asserted that they were the ones responsible for their treatment. When a staff member entered the smoking-room, the conversation stopped or altered. Those of the staff who were aware of the existence and function of the smoking-room kept away from the room, or used authority with reservation when they entered. Skorpen et al. (2008) concluded that the smoking-room in these wards contributed to a safer and more dignified existence for the service users through its position, activities and atmosphere, in an otherwise powerless situation.

Although smoking rooms are no longer relevant in the context of acute mental health and addiction units in New Zealand, in Skorpen et al.'s study (2008), both nurses and service users recognised the need for places to call their own, perhaps in order to relieve the pressures of role performance when in the presence of the other. Thomas, Shattell and Martin (2002) concluded that, if service users must gather in smoking rooms to achieve the valued peer intimacy described by participants in their study, then nurses should strive to find alternative ways to facilitate this intimacy.

The impact of rearranging and remodelling dayrooms and other meeting places in order to increase interaction on the ward features prominently in the literature. The simplest, and most common design changes to facilitate service user interactions described in the literature were furniture rearrangements. Baldwin (1985) found modest reductions in the number of incidents of injury to staff and residents, and minor improvements in relationships as rated by staff and service users, due to the impact of furniture rearrangements in the dayroom from non-social to group arrangements (3 or more chairs facing a table within a radius of 3 feet from that table). Grouping chairs around small tables instead of along corridor walls was found to increase the frequency of communication for the experimental group of service users in a facility for older persons, as compared to both baseline and the control group (Melin & Götestam, 1981). This study also involved changing the mealtime routines, such that, instead of the residents being served coffee individually while being seated in chairs along the walls of the corridor, coffee trays were placed on a table in a special coffee room where no staff were present and the residents could help themselves to coffee. Brighter lighting was also provided in the coffee room.

Furniture rearrangement, especially when determined by service users themselves, was associated with increases in talking behaviour in a mental health setting for older persons (Peterson et al., 1977). Early studies by Holahan (1972, 1976; Holahan & Saegert, 1973) showed that rearrangement of newly acquired furniture together with other interior design changes (i.e. repainting walls in bright colours), done in collaboration with staff and service users in order to facilitate privacy and social interaction, can lead to more social behaviour and service users being less passive and withdrawn than service users on the unchanged control ward. In the 1976 study (Holahan, 1976), the most pronounced differences in socialising between the two wards occurred in the dining room and the corridors. In the study of dayroom furniture rearrangement, Holahan (1972) found seating patterns exerted a powerful influence over the amount and quality of social interaction among service users in the dayroom. Sociopetal furniture arrangement (i.e., chairs arranged around two small tables in the middle of the room) and mixed arrangement (chairs arranged both along the walls and around a small table in the middle of the room) demonstrated a greater amount of social interaction and more personal interaction than did sociofugal furniture arrangement (chairs arranged shoulder to shoulder along the walls of the room), and unstructured arrangements. In contrast, seating arrangements had no effect on non-social activity. An unexpected finding of this study was that service users preferred sociopetal seating arrangements to sociofugal ones.

Holahan (1976) describes a shift from resistance to personalisation that occurred post-refurbishment: for ward staff, the shift from lethargy and resistance to change occurred when they were able to increase their feeling of control over the remodeling by "personalising" the changes in their surroundings. This included hosting an open-house party on the newly completed ward initiated and organised by ward staff themselves; staff extending the planned changes by adding touches of their own (for example, the nursing assistants made curtains for the dayroom and dining room with money they raised on the ward). Similarly, for service users, there was a shift in behavior on the postchange ward from no personalisation of space by service users at all, to personal articles, such as books, magazines, towels, and flowers, observed on the window ledges of the newly partitioned bedrooms. In addition, during the 6 months following environmental change, marked changes in the role behaviours of ward staff were observed – there was relaxing of the previously tight hierarchical structure characterising role relationships and the use of authority on the ward. Direct and open communication between different level staff groups was enhanced.

In another study manipulating the arrangement of furniture in the dayroom in a mental health facility for older persons, Bakos (1980) found that interaction was directly related to the physical distances between people; most of the positive interactions took place when people were physically closer to one another. He also observed that organising the dayroom as a single space (with no defined smaller territories) focused around the television lead to the discouragement of other activities and complete lack of social interaction. The design changes in this study were based on both staff and service user input. These included: moving the television set to one side of the room and behind a freestanding carpeted partition (which helped direct the sound and made it less disruptive to others); a built-in circular seating area and round table raised so that the eye level of someone seated there was similar to that of someone standing nearby, making eye contact and conversation easier; and arranging the remainder of the dayroom in small conversation groupings, one of which had a table for cards and games. Bakos reported positive outcomes for both service users and staff post-redesign. For example, there were significant gains in more functional, adaptive behaviours for the residents (e.g., choosing to go to the new dayroom spaces rather than to remain isolated in their bedrooms). Similarly, staff spent more time in the dayroom, engaging residents in more conversation, and spent much less of their day alone in the nursing station, so that they were visible and available to the residents (Bakos, et al., 1980). These changes persisted at follow-up, 18 months post-intervention.

Another study demonstrated that breaking up vast, open spaces can increase social interaction on mental health wards. Whitehead et al. (1984) studied the impact of ward redesign based on a psycho-environmental approach. The original design (the shape of a cross, with large open dormitories, long corridors, dull colour and poor lighting, and a day room oriented to watching television) was replaced by breaking up of the long institutional corridors, adding flexibility of use to group and day room areas, accentuating functional uses and humanistic values through colour and graphics, and subdividing dormitories (Whitehead et al., 1984). The authors reported service users spent significantly less time after redesign in the hallways and visiting room and gathered more frequently around the cafeteria on the modified unit, supporting its function as a social organiser. A 7% reduction in observed psycho-pathology post redesign was also noted. There was also a significant increase in frequency of staff observed in the day room after redesign.

The need for improved visitation spaces was also noted in the literature. For example, in the above study by Whitehead et al. (1984), visitors used the visiting area significantly more often after redesign, reflecting a shift from hallway visits to visits in a more appropriate area. In a service user-led research project (Walsh & Boyle, 2009), the lack of family-friendly rooms was a common complaint, particularly for those who needed personal time with their children. Participants suggested that the hospital should provide private visiting rooms, to protect children from potentially distressing scenes. Interestingly, in another study, after a visitors' room was made available (on suggestions from staff and service users), only 41% of service users said they actually used it to see their visitors; others preferred to see their visitors off the ward or in their bedroom area, saying that it was too official to see visitors in the visitors' room (Brooker & Dinshaw, 1998).

The need to accommodate staff social needs in relation to design of physical spaces was also noted in the literature. For example, in the study by Novotna, Urbanoski and Rush (2011), the lack of staff-designated spaces was seen to have negative repercussions for service user treatment and for staff well-being. For instance, participants in one focus group discussed how the lack of communal space for staff, limited their ability to model prosocial behaviours for service users, such as gathering together for a meal rather than sitting alone in an office. In this study, staff evaluated the newly designed facility, where workspace for clinical staff on the units was purposely limited, with two small staff centres that served as nursing stations located on alternating floors. Having a larger space in a newly designed unit, together with the separate observation wing, made staff feel isolated in a study by Tyson, Lambert and Beattie (2002). In her study of physical amenities in mental health inpatient and community facilities and their attractiveness, Timko (1996) concluded that having adequate office space for clinical and administrative staff made facilities more pleasant, perhaps by contributing to a quieter and less cluttered environment.

Achieving a balance between service user-centred space and the practicalities of day-to-day clinical work requires careful planning and ongoing negotiation of the needs of all participating user groups during all phases of redevelopment (Novotna, Urbanoski, & Rush, 2011). A physical redesign that reconciles the spatial, architectural, therapeutic, and logistical needs of all users can provide an effective means to enhance the quality of provided care. The environment should protect individual dignity and be designed to allow people to observe their own religious and other practices (Curtis et al.,

2007; The Sainsbury Centre for Mental Health (SCMH), 1998). In the New Zealand context, the Ministry of Health *Statement on the Criteria for the Design and Refurbishment of Psychiatric Acute and Intensive Care Facilities* (Ministry of Health, 2002) mentions the requirement that whānau space be made available where Māori protocols can be observed. Unfortunately, our literature review failed to uncover any empirical evidence related to the design of mental health and addiction facilities for Māori or Pacific Island service users and their family and whānau populations, in relation to clinical outcomes.

Below is a summary of recommendations assembled from the literature on social features of mental health and addiction physical environment.

Table 5.Social features

(Bakos, et al., 1980; Brooker & Dinshaw, 1998; Cleary & Edwards, 1999; Curtis, et al., 2007; Edgerton, Ritchie, & McKechnie, 2010; Holahan, 1972, 1976; Holahan & Saegert, 1973; Lillywhite, Morgan, & Walter, 1995; Melin & Götestam, 1981; Ministry of Health, 2002; Novotna, Urbanoski, & Rush, 2011; Peterson, et al., 1977; Skorpen, et al., 2008; The Sainsbury Centre for Mental Health (SCMH), 1998; Thomas, Shattell, & Martin, 2002; Tyson, Lambert, & Beattie, 2002; Walsh & Boyle, 2009; Whitehead, et al., 1984)

- Design spaces where service users can retreat, including spaces where they can form social relationships.
- Avoid areas prone to overcrowding
- Create flexible day rooms that encourage interaction with staff, but allow for personal autonomy. For example, this can be achieved through the use of movable partitions to create small private areas, or raised platforms so that the eye level of someone seated there is similar to that of someone standing nearby, making eye contact and conversation easier.
- Carpeting the partitions can reduce noise and therefore increase privacy
- Provide spaces for staff and service users to talk in private
- Small-group circular arrangement of furniture may promote socialisation, as can moving the television to a separate area away from the group activities
- Provide communal spaces for staff. The presence of a staff lounge, garden, or similar congregate space can improve morale and job satisfaction and encourage professional communication
- Private visiting areas increase privacy and intimacy and support maintaining a life outside of the unit
- Provide space for religious practices
- Provide whānau space where Māori protocols can be undertaken

Specific issues

Special considerations with older service users.

Since the service users in mental health and addiction environments are not one homogenous group, the type of environmental intervention should be based on the needs and characteristics of the particular population in question (Edgerton, Ritchie, & McKechnie, 2010). Thus, environment aspects that may be appropriate for older service users in a mental health and addiction ward may be very different from those for adolescents in a mental health and addiction hospital. Several literature reviews highlight the unique issues to consider when designing mental health and addiction facilities for older persons (Day, Carreon, & Stump, 2000; Dobrohotoff & Llewellyn-Jones, 2011; Karlin & Zeiss, 2006). However, Dobrohotoff and Llewellyn-Jones (2011) found that there was sparse research on the design of health facilities for older persons and that much of the existing literature is based on opinion and anecdote or at best, based on observational studies.

In our literature search, we have uncovered only a handful of studies related to the outcomes with the older persons population that were not specifically focused on people with dementia. These studies largely focused on the impact of interior design changes, such as furniture rearrangement, on behaviour. For example, one study showed that having greater control over physical space helped older residents in a state mental health facility gain a sense of competency and worth if they could do more for themselves (Bakos, et al., 1980). Thus, older service users demonstrated more positive outcomes when kitchenettes, and opportunities for personalisation, interaction and stimulation were provided. In terms of the physical design, this included partitioning a large open space in the dayroom into smaller ones divided by carpeted partitions, in order to create multiple, more intimate conversation groupings. Circular seating areas were introduced and round tables were raised so that the eye level of someone seated there is similar to that of someone standing nearby, facilitating eye contact and conversation. A cards and games table was also introduced. Stahler, Franzer and Rappaport (1984) found an increase in service user-staff interaction and a decrease in pathological behaviour (described as talking or gesturing to self, pacing, rocking), together with improved morale among both service users and staff compared to a control ward, after a remodelling of a mental health facility for older persons. The intervention in this study involved furniture rearrangement and environmental enrichment through repainting, activity material (such as a writing desk and materials, books and magazines, and a large blackboard), and introduction of orientation signs. Various furniture rearrangements were shown to increase talking behaviour in another study (Peterson, et al., 1977).

One particular condition relevant to the physical design of mental health facilities for older persons is dementia. One small short-term randomised controlled trial found that rearranging seats (previously placed along the walls) around small tables, allowing for more choice regarding meals (e.g., coffee, sugar, milk placed on a table in a special coffee room for service users to help themselves to, rather than being served to them individually while seated), and improving lighting improved communication and behaviour of long stay service users with dementia in facilities for older persons (Melin & Götestam, 1981).

In their review of the literature on the design of environments for people with dementia, Day, Carreon and Stump (2000) point to the problems unique to this population that have implications for the design of their physical environments. For example, people with dementia face difficulties with sensory overstimulation, which may increase the distraction, agitation, and confusion associated with dementia. Design guides call for appropriate levels of sensory stimulation, striking a careful balance between environmental overstimulation and deprivation. High stimulation, as measured by agitation levels, was found to occur in elevators, corridors, nursing stations, bath rooms, and other residents' rooms, whereas low stimulation has been observed in activity and dining rooms (see Day, Carreon, & Stump, 2000, for the review of studies on the impact of physical environment in general on people with dementia).

Another issue emphasised by Day, Carreon and Stump (2000) is that of safety. They note that residents' attempts to leave facilities present a major safety concern for staff, and that design solutions to prevent unwanted exiting often do so by exploiting residents' cognitive deficits. For example, in a study involving nine residents, a full length mirror placed in front of the exit door reduced residents' exit attempts by half (Mayer & Darby, 1991). In another study, capitalising on the observation that many individuals experiencing dementia perceive two-dimensional patterns as barriers, Hussian and Brown (1987) observed the impact of masking tape laid in different grid patterns on the floor in front of exit doors on the

exit attempts of eight residents with dementia in a public mental health hospital. They found that the method was often completely effective in preventing wandering at the first experimental trial; although the baseline condition (no tape) yielded a 98% exit-door contact, the addition of horizontal grids reduced exit-door contact to 42%.

Design guides for people with dementia suggest numerous strategies to enhance orientation, including improvements for way finding (e.g., landmarks, signage) and provision of information from the environment (e.g., allowing views to accessible outdoor areas to increase residents' orientation to time of day and season) (Day, Carreon, & Stump, 2000). In studies with eight female residents with mild to severe dementia, large 3-D ward signs and pictorial signs improved resident orientation, but only when incorporated with orientation training (Hanley, 1981). Signs alone had minimal effect on residents' orientation (Hanley, 1981).

Although there is no empirical evidence to support this, improving hospital facility design is thought to have the potential to decrease fall rates and fall-related injuries, the most common of which occur when getting in or out of bed (see Dobrohotoff & Llewellyn-Jones, 2011). Dobrohotoff and Llewellyn-Jones (2011) cite studies that link improved visibility from the nurses' station with fewer falls in bed areas, and the design-regulation height and staff-working height for service user beds used in acute care units, with service user falls and the severity of fall-related injuries. These authors concluded that research on the environmental features that contribute to, or reduce falls offers contradictory design recommendations. Carpeting, for example, may be appropriate to soften falls in common areas, while vinyl is recommended in service users' bedrooms to facilitate cleaning.

Below is a summary of suggestions made in the literature reviews and empirical studies on older service users, including specifically those with dementia.

Table 6. Designing for older service users

(Bakos, et al., 1980; Day, Carreon, & Stump, 2000; Dobrohotoff & Llewellyn-Jones, 2011; Hanley, 1981; Hussian & Brown, 1987; Karlin & Zeiss, 2006; Mayer & Darby, 1991; Melin & Götestam, 1981; Peterson, et al., 1977; Stahler, Frazer, & Rappaport, 1984)

- Provide moderate environmental stimulation and note that glare and noise are particularly aggravating factors
- Provide pleasant sounds, aromas and artwork
- Increase overall light levels and exposure to bright light. Higher levels of illumination are particularly needed for service users with dementia
- Use a neutral design and colour scheme
- Provide limited stimulation activity areas – this can be achieved by hanging cloth partitions to eliminate views to ongoing activity - thus eliminating some visual and especially auditory distractions (e.g. noise, talking)
- Remove unnecessary clutter and provide tactile stimulation in surfaces and wall hangings
- Pictures of familiar images and eras and a familiar dining experience can stimulate memory and enhance meaning and adjustment among older service users.
- Provide opportunities for exercise or other physical activity as this may enhance personal well-being and provide energy outlets to reduce negative behaviours associated with dementia
- Provide access to outdoor areas and separate areas for specific activities
- Provide opportunities for privacy and links to the community
- Sufficient visual cues can promote orientation and reduce wandering. For example, room doors and handrails of bright colours to facilitate their identification
- Locks on exit doors and removal of obstacles for wandering inpatients
- Suicide-proof (enclosed bottom) handrails and grab bars throughout the facility are particularly needed with older service users to promote balance and mobility
- Chairs (and commodes) should have sufficient height and arm length as well as adequate back support in order to facilitate balance when rising
- Bathrooms should be large enough to accommodate wheelchairs and care attendants
- Easily visible and non-institutional bathroom facilities. Increasing the visibility of toilets may reduce incontinence among older service users with cognitive impairment
- Carpeting some parts of a mental health facility for older persons may be appropriate depending on the service users admitted, especially in units where service users are generally continent. Use industrial grade carpet to soften falls in hallways and/or common areas but with vinyl to facilitate cleaning in service users' bedrooms.

Special considerations with children and adolescents

Children and young people have different developmental, physical, social, emotional, and mental health needs than adults, which is why they require specially designed services delivered in an environment that recognises these differences (Mental Health Commission, 1998; Ministry of Health, 1998). In New Zealand, there are few specialist psychiatric wards for children and young people, with most children needing mental health admissions managed in paediatric wards, and adolescents managed either in paediatric or adult wards. The Ministry of Health's document *New Futures. A strategic framework for specialist mental health services for children and young people in New Zealand* (Ministry of Health, 1998) outlines that, although services should be matched to need regardless of age, it is important to acknowledge the variation in access need across the various age groups. Therefore, for example, it is inappropriate to treat adolescents in adult or child inpatient units, or to allocate underutilised areas of an adult psychiatric ward to accommodate children, adolescents, and families when a young person is experiencing mental health difficulties. Both clinicians and adolescent service users consulted during the development of the Ministry of Health's report highlighted the need for separate inpatient services for adolescents, tailored to their needs:

"*Young people who had experienced inpatient admissions in paediatric wards spoke about the awkwardness of being the biggest with lots of little children and having to sit in little chairs. Others spoke about the fear and loneliness they felt after acute admission to an adult ward with people running around screaming and talking about killing themselves. One young woman expressed the issues succinctly when she explained that it was difficult enough dealing with her own illness without being forced to be aware of everyone else's*" (Ministry of Health, 1998, p.36)

One suggestion made during consultation for the above document was that there be specialist adolescent inpatient wards in the major centres, with elsewhere a choice of going to an inpatient unit or a local ward with 1:1 staffing and private rooms and individualised programmes.

Several empirical studies also highlight the unique needs of children and young people. Glod et al. (1994) conducted a study of the impact of a redesigned quiet room on agitated or aggressive children. One of five quiet rooms was modified by painting the walls tea rose, carpeting the vinyl floor and painting a picturesque mural on one of walls. The researchers found that total aggression ratings were 45% lower in the modified quiet room than in the standard room. The overt aggression ratings initially fell by 50% during the first five minutes of placement in the modified quiet room (but only after 20 minutes in the standard quiet room). It was found that motor excitement and verbal aggression were two component factors most strongly influenced by the quiet room design. The authors concluded that their findings challenge an institutional tradition that quiet rooms should have bare white walls, with little colour or comfort, at least when designed for child and adolescent mental health populations.

Another study also linked physical ward design features with adolescent aggression. By redesigning a large dormitory area originally housing 40 adolescent service users into four adjoining units, Wilson (1992) observed a significant reduction in anti-social acts (such as vandalism, stealing, and acting out), and violent interaction between staff and service users. The redesign involved dividing the long halls on each floor into two separate units, forming four units with space for nine service users each; room for a large lounge with a television; snack kitchen and laundry equipment; and noise reduction by carpeting and structural separation. Connecting the opening and closing of the doors between the units to the fire safety and alarm systems, led to a prevention of incidents spilling over from one unit to another, and the majority of service users interviewed said they were no longer fearful under the new system. The containment also reduced the stimulus level, and decreased in the number of AWOLs. Unit meetings became much more effective and had better attendance with the structural separation. A good routine of sleeping and waking was established and there was a greater feeling of belonging and security among service users. Greater involvement, competence, and satisfaction on the part of direct care staff were reported. Whitehead et al. (1984) found that reduced psychopathology among younger service users was facilitated by design solutions that encouraged social interactions, such as the introduction of a ward kitchen, an open nursing station, and a dayroom module for crafts and other occupational therapy activities.

Huffcut (2010) described the interviews conducted with service users at a behavioural health facility in the suburban US that treats adolescents, ages 12 to 18, suffering from behavioural and emotional disorders, as a part of an evidence-based design process. All of the service users requested individual 'calm down' spaces with detailed, realistic imagery. They preferred cool colours of blue and purple. The residents disliked strong primary colours, children's toys and small-scale furnishings. A desire for daylight was also apparent and males favoured seating focused around the television.

Table 7 below summarises the suggestions regarding the design of mental health clinical spaces for children and adolescents.

Table 7.Designing for children and adolescents

(Barnett & Lapsley, 2006; Glod, et al., 1994; Huffcut, 2010; Mental Health Commission, 1998; Ministry of Health, 1998; Whitehead, et al., 1984; Wilson, 1992)

- Acknowledge that children and young people have different developmental, physical, social, emotional, and mental health needs than adults, which is why they require specially designed services delivered in an environment that recognises these differences
- It is inappropriate to treat adolescents in adult or child inpatient units, or to allocate underutilised areas of an adult psychiatric ward to accommodate children, adolescents, and families, when a young person is experiencing mental health difficulties
- Provide enough daylight when designing for spaces for adolescents and children
- Smaller, self-contained units, housing up to 10 service users (with a separate lounge with a television, snack kitchen and laundry equipment) are better than large dormitories as they can reduce aggression, anti-social behaviour, and increase the sense of belonging and security among service users, and staff satisfaction
- Design to encourage social interactions - e.g., through adding a ward kitchen, having an open nursing station, and a dayroom module for crafts and other occupational therapy activities
- Reduce noise by carpeting and structural separation
- Young males may prefer seating arranged around the T.V.
- Design individual 'calm down' spaces with detailed, realistic imagery for adolescent mental health service users
- Cool colours of blue and purple, instead of strong primary colours are preferred by adolescents with behavioural and emotional disorders
- Adolescents disliked children's toys and small-scale furnishings
- Quiet rooms for adolescents and children should be attractive, non-punitive, and cosy. Use warm colour tones for quiet rooms, to allow for change in mood; and carpeting instead of tile and vinyl. Children should also be able to observe a pleasant scene

Other special populations

Several studies mention designing for service users with physical and developmental disabilities, and forensic mental health populations. For example, in one study, some participants with a physical disability claimed that their physical circumstances were neglected when designing an acute mental health hospital; being scared of falling and suggestions for adding a hand rail in the toilets were some of the issues raised (Walsh & Boyle, 2009). Timko (1996) showed that facilities that were equipped with more prosthetic aids had more service users with physical disability successfully completing treatment. Tyerman and Spencer (1980) studied the impact of 'normalised' physical environment for the developmentally disabled on service user behaviour. The new physical environment ensured greater privacy in the residents' daily living and toilet facilities. The authors found that, the more 'normalised' environment was significantly related to non-participatory (e.g. television watching) behaviour and participatory activity, although it was also associated with fewer self-help skills and more aided skills than the more traditional, formal environment. The authors contributed the finding that residents were more reliant on staff help to the introduction of sophisticated equipment, which allowed staff more time to spend with service users, offering assistance even when not needed.

In the forensic mental health setting, Brunt and Rask (2007) assessed the ward atmosphere in terms of the physical environment. They found that the forensic mental health service users were not significant contributors to the ward atmosphere, as there seemed to be no distinguishing characteristics of the ward atmosphere that can solely be attributed to the service users. Rather, they appeared to be "a peripheral almost invisible figure on forensic psychiatric wards" (p.648). Both service users and staff in this study complained about the different aspects of physical environment on the ward, such as 'corridors being too narrow' 'a lack of space', and 'hospital buildings not being purpose-built'. Negative characteristics such as 'too many patients', 'noisy', 'chaotic', 'stressful', and 'a great mental strain working on the wards' were also mentioned. Paradoxically, what is essentially a secure environment was seen by some as a refuge - some respondents expressed that the atmosphere provided 'security', and characterised the ward as having 'a calm atmosphere' and 'a home environment' (Brunt & Rask, 2007, p.646). In another study conducted in a high secure forensic unit in Australia, intrusion and lack of personal space, overcrowding, and the restriction of having to live in a confined area for long periods of time with other potentially volatile service users left the interviewed service users with a feeling that aggressive behaviour was inevitable (Meehan, McIntosh, & Bergen, 2006). Separation of acutely reactive service users was thus one of the strategies for coping with aggression proposed by the participants in this study.

Our search uncovered several other sources discussing the physical design of forensic mental health units (for example, Dvoskin et al., 2002; Macculloch & Bailey, 1993; Watson, 1998) Although this literature offers insight into the design principles, it is mostly based on anecdotal evidence as opposed to empirical evidence on the impact of physical environment characteristic of secure units on service user and staff outcomes.

Open versus closed nursing stations

The issue of whether to build an open or closed nursing station is a contentious one. Staff safety is often behind the logic of a closed nursing station. However, it is also recognised that an open nursing station might facilitate a more therapeutic and collaborative relationship between all parties in an acute ward. Despite this being controversial, there is very little recent published research on the issue.

Karlin and Zeiss (2006) also surveyed the literature on nursing stations and found that open nursing stations have been recommended by several sources; other sources recognise that old fashioned closed nursing stations (more typical before the development of psychoactive medications), often convey an image of staff inaccessibility and are not welcoming to service users and visitors.

A recent case study examined the relationship between the physical design of nursing stations and inter-professional communication and collaboration (Gum et al., 2012). Three types of nursing stations located in three rural hospitals in South Australia were examined: 1) consisting of a high counter with a desk behind it, which was not enclosed (H1); 2) enclosed and with glass windows but an open doorway and an adjoining area for note writing (H2); and 3) fully enclosed with a door with glass windows along the front (H3). Gum et al. (2012) found that communication barriers were related to poor design, lack of space, frequent interruptions and a lack of privacy. In the first type of nursing station, there was no privacy for conversations due to the openness of the station; there was a lack of space in H1 and H3 nurses' stations, and many conversations were held in the doorways or corridors or in front of the nurses' desk. In H1, when the nurses and doctors wanted a slightly less conspicuous area to discuss a service user, they used the adjoining medication room, however there was no door to close; in H1 and H3, case notes were often in full view to the public. Although the H3 station had the ability to be fully enclosed, the glass windows were sometimes open. Conversations in all three stations were often interrupted by people waiting at the window/doorway/desk, telephones ringing or people entering and leaving the room or area. It was observed that areas where the healthcare team sat down to write notes equated with the place where discourse took place, both social and professional. The authors suggested future design to focus on providing ample desk space and a functional "offstage" area, where the staff are not "on show" to the public (Gum, et al., 2012, p.26). Thus, a closed, secure space that is off limits to non-staff should exist in order to maintain confidentiality of service user records.

Both Gum et al. (2012) and Andes and Shattell (2006) argue that the name 'nurses' station' denotes the space as the primary domain of nurses rather than a workspace for the healthcare team, or a point of contact with service users. Andes and Shattell (2006) argue that 'it is possible that on acute psychiatric units the nursing station is a metaphor for nurses' existential dilemma to distance themselves yet relate to service users. The space and place of the nursing station may"alienate psychiatric nurses from patients, as it may patients from nurses" (p. 705). This was described by nurses having to work in a large, enclosed nursing station (Shattell, Andes, & Thomas, 2008):

" *If you're separated to such a degree that you're not even ... able to visualize each other, know what's going on, then out of sight, out of mind. Your reality becomes what you see in front of you ... staff starts interacting with each other more than they interact with patients. Because that's who you're seeing. That's who's in your world. " (p. 247)*

Musisi, Wasylenki and Rapp (1989) described a new mental health intensive care unit centred on a large, open area, from which the closed nursing station allowed observation of all service users. The importance of the need for continuous observation was stressed with one-way mirrors and plexiglass in the nursing station. Nurses surveyed in this study reported a decrease in constant observation and seclusion hours in the newly designed unit; however, they also proposed a strengthening of windows for the observation station.

Contrary to this view, some authors maintain that barriers to interaction with service users, such as closed doors or windows of the nurses' station, should be minimised (Shattell, Andes, & Thomas, 2008; Thomas, Shattell, & Martin, 2002). In one study, the locked and glassed-in nurses' station made it difficult for nurses to see and speak directly with service users. Nurses felt stuck doing tasks in the station and said the unit included "too much nursing station space and not enough patient interaction space" (Shattell, Andes, & Thomas, 2008, p.247).

Karlin & Zeiss (2006) noted that available reports of experiences with open nursing stations did not support concerns of service users overusing the increased access to nurses, although additional empirical research on this issue is needed.

In summary, existing research evidence favours open over closed nursing stations, provided there is a functional 'offstage' area inaccessible to non-staff where staff could complete administrative tasks, keep confidential records and conduct confidential meetings.

Single versus mixed sex wards

Research has drawn attention to safety issues in mixed gender wards, particularly for female service users. Davenport (2002) explains that the dynamics of inpatient units can involve power and over-sexualised relationships, with women often being dominated. The situation is not helped by the statistics that show that around two thirds of female mental health service users have a history of childhood physical and/or sexual abuse (Gallop et al., 1999). These factors can work against the goal of providing a therapeutic environment on an inpatient ward.

A study done in nine hospitals, with 215 inpatients on acute wards in England and Wales, revealed that women were generally seriously concerned for their safety, prompting the authors to recommend that more women-only areas be provided in mixed-sex units (The Sainsbury Centre for Mental Health (SCMH), 1998). This finding was confirmed in a study of young adult service users' experiences of acute mental health wards in New Zealand, in which the women reported having little privacy or sense of safety from male service users (Barnett & Lapsley, 2006). Similarly, in a study of mixed-sex wards in Canada, 17 out of 20 women with a history of abuse, that accessed acute care mental health inpatient units, reported feeling unsafe in mixed-gender units and said they would prefer an all-female unit, or at least segregated areas for sleeping, programming and meals (Gallop, et al., 1999). All the female interviewees in this study said they wanted to be included in the decision-making regarding potential changes to unit design.

An exploratory study by Brunt (2008) lends support to single-sex wards for females in the maximum-security forensic mental health setting. In this study, the creation of single-sex wards for the protection of women service users in forensic mental health settings appeared to generate a ward atmosphere that was positive and presumably more suited to the particular needs of women. The atmosphere on the wards for female service users, although not attaining optimal levels, appeared to be more homogeneous and positive, and had a high level of service user-programme congruence. The ward atmosphere of the wards for male service users appeared to be less favourable; these wards had a more mixed diagnostic profile than those for female service users and did not seem to follow any specific treatment programme. Instead, they contained elements of different programme profiles.

However, single sex wards may not be an answer in and of themselves. Mezey, Hassell and Bartlett (2005) conducted a study involving individual interviews with 58 male and female staff and 31 women service users in single-sex and mixed sex medium secure units throughout England and Wales. The study showed that women service users in both types of units reported high levels of actual and threatened physical and sexual violence. However, women in single-sex units also reported intimidation, threats and abuse by other women service users, although they were less vulnerable to sexual abuse and exploitation and serious physical assault. The researchers conclude that women in single sex units were still at risk, although less vulnerable to sexual and physical assault than in mixed units. Interestingly, most of the women on the mixed-sex wards said they would prefer to be with male service users, rather than in a female-only ward, despite the widespread reports of experienced and witnessed abuse and violence. In addition, some men in the mixed sex units were physically intimidated by some of the women and vulnerable to sexual advances. In the same study, the physical layout of the ward and the organisation of space were identified by staff as key issues contributing to the service users' perception of, as well as their actual, safety. Many staff on the mixed-sex units felt that women's sense of safety could be enhanced through a more

imaginative and flexible use of the available space, such as by ensuring that women's bedrooms were adjacent and in sight of the nursing station (Mezey, Hassell, & Bartlett, 2005).

A study by Gebhardt and Steinert (1999) lends partial support for mixing of the sexes on psychiatric units. A significant improvement of the ward atmosphere and a reduction of aggressive behaviour were seen in this study following partial ward opening, internal sectorisation and mixing of the sexes; the impact on sexually inappropriate behaviour remained unclear. The bad ward atmosphere (characterised by heightened aggression, and reduced sense of freedom, peacefulness, support, involvement, autonomy, order and organisation, and programme clarity) in the former locked ward for 'uneasy' male service users improved after the equal distribution of the severely disturbed male and female service users. The positive ward atmosphere (perceived as providing greater support, autonomy, freedom, involvement, programme clarity, order and organisation) in the former open ward for 'easy' inpatient service users remained almost as good as it was before. However, due to multiple simultaneous interventions, it is hard to isolate the impact of mixing the sexes alone from the other contributing factors in this study.

In summary, there is inconclusive empirical evidence on the benefits of single over mixed sex wards. Service user history, diagnoses, and treatment programmes seem to form an important part of the picture. In general, evidence points to female service users benefiting more from being on single sex wards, or at least having female-only areas. Evidence on whether male service users benefit more from being on mixed or single sex wards is more inconclusive. A literature review by Seeman (2002) further explores the issues related to the design of single versus mixed sex wards.

Locked wards versus open wards

The literature on locked wards versus open wards has been included in this review in the context of the ward environment, rather than as a practice issue.

Bowers et al. (2008) cite a study by Ashmore conducted in 2008, where nurses were unable to clearly recall any guidelines or policies available to aid their decision regarding locking the ward door. They argue that, in the UK, mental health service managers are, at present, being forced into taking decisions on door locking policy, without a specific legislative framework or government guidelines.

Although locking the ward door is becoming common practice on acute mental health wards in the UK, a study of 136 acute mental health wards in 67 hospitals within 26 NHS Trusts in England found a positive link between service user containment practices and service users choosing to not take medication (Baker, Bowers, & Owiti, 2009). When the ward doors were locked for 'full shifts' there was significantly more people choosing not to take regular and PRN medication. In the same study, there were also associations between people choosing not to take medication and with other restrictions on service users (i.e., the presence of locked bathrooms, kitchens, cupboards, the provision of plastic cutlery and dining ware, etc.).

As is frequently the case in literature on the impact of physical design, it is difficult to isolate the impact of door locking alone on service user outcomes, as this variable is frequently studied in conjunction with other environmental and treatment variables. Although not high in methodological rigour, a study by Zigmond (1995) offers a vivid description of a secure ward environment - damaged furniture; ward devoid of homely items, such as pictures or flowers; items that 'may be used as weapons'; and a lack of fresh air. The author concluded that being exposed to such deterioration in the living environment slowly becomes acceptable for this group of service users who cannot go for a walk, visit off-ward areas, take fresh air, or watch television without permission. Zigmond's own observations of the ward also showed that it was not uncommon to see a notice on the door requesting that the bell be rung even by those with a key.

In the most comprehensive study so far of locked versus open wards, spanning several years and 136 acute NHS psychiatric wards geographically situated proximate to three major centres in England, Bowers et al. (2008) found strong support for keeping the mental health ward doors open. Based on qualitative service user, staff and visitors' data, as well as quantitative measures of service user outcomes, the findings of this study showed that, although locking the ward door significantly reduced absconding, it was also found to increase feelings of social exclusion, stigmatisation and depression, as well as being

associated with increased rates of self-harm. The feeling of being caged-in by the locked doors of the unit was expressed by participants in another study (Shattell, Andes, & Thomas, 2008). In the study by Bowers et al. (2008), locking the ward door had no effect on the rate of use of alcohol or illicit drugs by inpatients. However, locking the ward door was associated with increased service user aggression and treatment refusal produced by feelings of being trapped and confined, feeling like a prisoner rather than a service user, being mistrusted by staff, as well as perceptions of not having access to fresh air. The findings further showed that open doors were not associated with increased overall use of manual restraint to forcibly detain service users, nor was locking doors associated with releasing more staff time for direct service user engagement.

Bowers et al. (2008) noted that the emotional burdens of the locked door were on service users (who experience anger and depression), whereas those of the open door fall on staff (who experience anxiety). However, an emotional burden on staff, who are paid and trained for the job, should be considered more acceptable than on service users who are ill and for whom treatment is being provided. Consistent with the theme common throughout the literature, Bowers et al. also found that staff were more positive about the benefits of locking the door than service users. Staff were also found to be more biased towards the type of unit they work in than service user residents, whose preference for open or locked doors was more likely to be based on individual value systems (Sacks, Nininger, & La Torre, 1982). In this study by Sacks, Nininger and La Torre (1982), both service users and staff preferring locked units, emphasising the safety of locked units. They generally believed it is easier for a service user experiencing a suicidal state to complete suicide in an unlocked unit, and staff generally believed it is easier to manage service users in a locked unit. In contrast, service users and staff who preferred open units viewed locked units as a discouraging experience, and were concerned about becoming demoralised with being locked in a unit. Similarly, in another study, service users in the locked units perceived significantly higher degrees of expressions of anger and aggression in their units, than the service users in open units (Middelboe et al., 2001).

Based on an extensive literature review and their own research, Bowers and colleagues outlined several recommendations for the physical design of safe, but service user-friendly open acute mental health wards. These are listed in the table below. A literature review by Van Der Merwe et al. (2009) also discusses the issues associated with locked doors in psychiatry.

Table 8.Open ward design

(Baker, Bowers, & Owiti, 2009; Bowers, et al., 2008; Bowers et al., 2009; Middelboe, et al., 2001; Shattell, Andes, & Thomas, 2008; Van Der Merwe, et al., 2009; Zigmond, 1995)

- Acute admission wards should have a single main exit that is unlocked to those leaving during the day.
- Exits should have maximum visibility to the staff on duty, via the positioning of the nursing office or station, the use of mirrors, or closed circuit television overlooking the exit and piped through to the nursing office and/or main areas of the ward where staff spend most time, and/or other similar strategies.
- All acute mental health wards should have ready access to a responsive intensive care service or locked extra care area.
- Although acute wards should have a single open exit, they should also have unobtrusive but effective and consistent wraparound exit security. In other words garden areas should be secure, there should be no additional patient releasable or accessible exits from the ward (windows or fire doors), and if feasible, a staffed main reception to the unit or hospital as a whole should be provided (coupled with effective communication systems to the wards and joint procedures regarding potentially absconding inpatient people).
- All wards should provide secure and safe service user access to fresh air via a garden area or covered and enclosed (to ensure people's safety) internal or external balcony.
- Experimentation and innovation on alternative solutions to exit security, utilising new technologies, should continue to take place and be evaluated for its costs and benefits.

Seclusion rooms

Seclusion involves "containment and isolation in a controlled, restrictive setting under close observation and monitoring by appropriately qualified and experienced staff", for the purposes of treatment or risk containment (Mental Health Commission, 2004, p.3). A person in seclusion in a mental health setting is contained alone within a relatively bare room, except a bed and sometimes a toilet, where freedom to exit is decided by clinical staff.

Happell and Koehn (2011) noted that, regardless of whether seclusion is regarded as a therapeutic intervention or a last-resort behaviour management strategy, there has been surprisingly little focus on the seclusion room itself, either from the perspective of the impact of the seclusion room or from changes that might be made to it to reduce or minimise the negative impact of seclusion. These authors found that nurses employed in mental health services in Australia opposed simple changes to seclusion rooms (such as music, furniture, and reading material, and leaving the seclusion room unlocked), although most (90.2%) supported painting seclusion rooms to enhance a calming effect on the service user. Nurse participants in this study also acknowledged the negative impact seclusion can have on service users; however, 97.6% believed that the seclusion room sometimes or always has a calming effect. The authors concluded that resistance by the nurses to simple design changes to the seclusion room appears to suggest at least some degree of punativeness associated with the use of seclusion. Lower levels of nurse burnout in this study were related to an increased desire to create positive changes to the seclusion room, presumably to reduce the detrimental impact.

Vaaler, Morken and Linaker's (2005) study looked at whether there were any changes in behaviour as a result of a seclusion area being changed from sparse furnishings (i.e. no curtains on windows, naked walls without paintings or decoration, and no sources of stimuli such as TV, radio, newspapers and flowers) to a home-like atmosphere (i.e., the walls received wainscoting, colourful wallpaper and paintings; the ceilings were lowered and contained multiple lighting spots; windows with tasteful curtains; wardrobes, chairs, flowers and personal items in the service users' rooms; Italian ceramic tile covering the entire bathroom). It was concluded that interior and furnishing like an ordinary home in the seclusion areas created an environment with comparable treatment outcomes to the traditional dismal interior, and had positive effects on many service users' well-being, as it was clearly preferred by female participants. The authors argued that the traditional beliefs that a sparsely decorated interior is a method to reduce symptoms of psychopathology and dangerous behaviours have no empirical basis and therefore, this practice should be abandoned.

Georgieva et al (2010) described a new psychiatric intensive care unit (PICU) in the Netherlands where seclusion was completely eliminated. Service users at most risk were no longer placed on the general ward, but in a newly designed 4 bed intensive care PICU. In the new unit each service user had their own bathroom with open access to a garden and some exercise equipment (as boredom has been correlated with aggression). All had been involuntarily admitted, although this status changed for six of the service users during the stay. After service users' admission to the PICU, the use of seclusion was almost completely eliminated, falling from 40% of admission days spent in seclusion before transfer to the PICU, to 0.1% during their stay at the PICU. These results highlight the way that the changed physical environment provided the opportunity for staff to work closely with service users using a recovery approach. Similarly, simple interior design improvements (i.e., repainting walls with warm colours, placement of decorative throw rugs and plants, and rearrangement of furniture to facilitate increased service user and service user-staff interaction), were associated with a significant reduction in the rate of seclusion and restraint in the study by Borckardt et al. (2011).

Karlin and Zeiss (2006) argue that the proximity of seclusion rooms to nursing stations should be carefully considered. They point out that close proximity may promote safety but may raise concerns over disruption, whereas greater distance may reduce environmental disruption but decrease staff responsiveness and available staffing resources. The authors describe a design process where a balance was achieved by locating seclusion rooms near and within sight of nursing stations, but outside of main service user corridors and activity areas (Karlin & Zeiss, 2006, p.1377).

In summary, empirical evidence so far does not support seclusion in the traditional, plain sensory-free environment. In New Zealand, the Mental Health Commission have also argued for elimination of seclusion (Mental Health Commission, 2004). A literature review by Busch and Shore (2000) further discusses the issues related to seclusion and restraint. Also, Te Pou's publication '*Best practice in the reduction and elimination of seclusion and restraint; Seclusion: time for change*' (O'Hagan, Divis, & Long, 2008), offers further information to guide best practice in the use of seclusion. '*Survey of seclusion*

and restraint reduction initiatives in New Zealand acute mental health services' (Te Pou, 2008) is another publication that may be of potential interest to some readers.

Comfort or sensory modulation rooms

This review does not include the literature on the use of sensory modulation rooms in mental health. The evidence on this topic is discussed in the recent publication *"Sensory modulation in mental health clinical settings: A review of the literature."* (Te Pou o te Whakaaro Nui, 2011).

Putting Evidence into Practice

Our review of the literature suggests a growing clinical and research interest in the ways in which the environment might impact on service user outcomes in clinical settings. Many of the studies in this review have linked more positive outcomes for service users to particular environmental features. However, on the whole, this literature provides a good deal of disparate information, rather than providing a coherent way to approach design in acute settings.

In this section, we discuss the context for interpreting some of these research findings and putting evidence into practice. In particular, we discuss how research might be interpreted as part of a recovery approach that enhances service-users outcomes. Consequently, we consider the findings of this literature review in the New Zealand context, through discussing the implications of the research evidence in relation to the *Let's get real* framework. We also comment on how, as a part of the person-centred approach, the evidence base we identified could be used to aid in the design of mental health clinical settings.

Environmental factors and the service user-centred approach

Since the 1970s and 1980s there has been a growing focus in clinical work on the ways in which changes to the environment can be used to support healing and positive change for service users. In the 1970s, Holahan and Saegert (1973) published a study that highlighted the ways that the 'controlled manipulation of the environment' (p. 455) could successfully influence people's behaviour and attitudes. The simple interior design changes made in this study were based on the preferences and dissatisfactions expressed by service users and staff in interviews, as well as on the authors' observations of behaviour on the ward. Holahan and Saegert found that changes to the environment largely resulted in increased socialising and decreased passivity by service users, which were therapeutic goals articulated by hospital staff. Service users also said that they found the changes more stimulating and less depressing than the controlled ward setting. This, and other studies (for example, Borckardt, et al., 2011; Holahan, 1972, 1976; Taj & Sheehan, 1994; Whitehead, et al., 1984) clearly demonstrate how service user and staff input regarding their environment can lead to the environment positively impacting on people. In some instances, however, literature demonstrates how a slightly paternalistic approach can be adopted when considering the impact of environment on service users, where staff are presumed to know what is best for service users. For instance, in one study, Whitehead et al. (1984) highlight the ways that 'pathology' in the individual might be manipulated to positive effect by the environment, to achieve goals identified by staff as positive for service users.

It should be noted that it has been argued by some that providing humane clinical settings will hamper staff efforts to discharge service users because of resistance to leaving the ward (Vaaler, Morken, & Linaker, 2005). Empiricial evidence refutes such claims. For example, despite 'a significant reduction in the disabling psychopathology' (p. 644) as a result of changes to ward design, Whitehead et al. (1984) found that length of service user stay was not substantially affected by the ward redesign. In fact, a move from conventional to refurbished wards was actually related to reduced length of stay, and service users rating their experience and treatment significantly higher than those on old wards (Lawson & Phiri, 2000). Other studies confirm the link between shortened length of service user stay and improvements in the ward environment (Beauchemin & Hays, 1996; Benedetti, et al., 2001; Lawson, Phiri, & Wells-Thorpe, 2004; Vaaler, Morken, & Linaker, 2005).

To some extent, studies we have located from the 1980s, 1990s and 2000s reflect less direct paternalism. The focus has tended to shift from behavioural interventions to the therapeutic role of the environment. Several studies address the differing views of staff and service users (e.g., Brooker & Dinshaw, 1998; Olusina, Ohaeri, & Olatawura, 2002; Whitehead, et al., 1984), and highlight the benefits of consulting with service users and staff (e.g, Curtis, et al., 2007; Duxbury, 2002; Gallop, et al., 1999; Holahan & Saegert, 1973; Taj & Sheehan, 1994). However, on the whole, despite the encouraging findings on the positive impact of the physical environment on clinical outcomes, mention of service user involvement in environmental change is seldom made and we have only found a handful of studies or accounts where change has resulted from significant service user consultation. Some of these studies have shown that service users' involvement in environmental changes can also increase participation by staff and raise staff awareness of the physical environment as an important treatment element (e.g., Bakos, et al., 1980; Timko, 1996).

Understanding service user needs, and involving them in planning and design of mental health facilities has been outlined as important by the Ministry of Health (2002) in ensuring the facility design acts as a tool to recovery. From our review of research evidence showing that environmental factors can have a positive impact on outcomes in mental health clinical settings, it can be concluded that, enhancing the physical design features of the clinical environment should be part of a range of strategies in a service user-centred approach, for those service users for whom treatment in the clinical setting is required.

Environmental factors and *Let's get real*

Let's get real is a framework that identifies the essential values, attitudes and skills required for working in mental health and addiction in New Zealand. It takes a service user-centred approach in order to promote best outcomes for service users. There is a clear expectation from the Ministry of Health (Ministry of Health, 2008a) that this framework will be used by services.

At first glance, the physical environment might not seem essential to the mandate of *Let's get real*. However, *Let's get real* promotes evidence-based practice as a means to improve engagement. It is therefore necessary to ascertain whether the physical environment does play a role for individuals and for clinician-service user relationships in clinical contexts.

The *Let's get real* framework has a strong focus on building therapeutic relationships and their role in promoting recovery and well-being. Evidence suggests that the physical environment can impact on the service user-clinician relationship. For example, the lack of space for service users and staff to meet was often mentioned by service users and staff evaluating their clinical environment (Cleary & Edwards, 1999; Lillywhite, Morgan, & Walter, 1995). The literature therefore recommends that quiet and private spaces, with adequate seating, be available on mental health wards to facilitate staff-service user interaction. Architectural and interior design changes were also found to contribute to staff-service user interaction. For example, designing a new psychiatric unit to emphasise client-centred care and provide a more home-like setting positively facilitated communication and therapeutic relationships among clinicians and clients, and increased team cohesion in one study (Novotna, Urbanoski, & Rush, 2011). Following redesign of one of the primary corridors in a psychiatric hospital in Scotland catering for service users experiencing dementia, service users used the corridor and visited other areas of the hospital more frequently, and more importantly, they were more likely to do so accompanied by a staff member (Edgerton, Ritchie, & McKechnie, 2010). In another study, breaking up of long institutional corridors, adding flexibility of use to group and day room areas, accentuating functional uses and humanistic values through colour and graphics, and subdividing dormitories was associated with significant increase in the frequency of staff observed in the day room after redesign (Whitehead, et al., 1984).

Studies also show that the simplest, and most common design changes, such as furniture rearrangements (from non-social to group arrangements, such as three or more chairs facing a table within a radius of 3 feet from that table), can facilitate social interactions on the ward (Baldwin, 1985; Holahan, 1972). Early studies by Holahan (1972, 1976; Holahan & Saegert, 1973) showed that rearrangement of newly acquired furniture together with other interior design changes (i.e., repainting walls in bright colours), in collaboration with staff and service users to facilitate privacy and social interaction, can lead to more social behavior and the relaxing of previously tight hierarchical roles and the use of authority on the ward.

Studies also show that an open nursing station might facilitate a more therapeutic and collaborative relationship between all parties in an acute ward. Inadequately designed and positioned nursing stations can alienate mental health nurses from service users and vice-versa (Andes & Shattell, 2006). Barriers to interaction with service users, such as a closed doors or window of the nurses' station, should be minimised (Shattell, Andes, & Thomas, 2008; Thomas, Shattell, & Martin, 2002). In one study, the locked and glassed-in nurses' station made it difficult for nurses to see and speak directly with service users. Nurses felt stuck doing tasks in the station and said the unit included 'too much nursing station space and not enough patient interaction space'(Shattell, Andes, & Thomas, 2008, p.247).

The *Let's get real* framework emphasises the importance of consultation with stakeholders and especially service user input, in ensuring the best outcomes for service users. This is echoed in the literature, which consistently points to the service users' need to be heard and the importance of involving them in the decisions regarding the physical design of the clinical

setting (Curtis, et al., 2007; Duxbury, 2002; Gallop, et al., 1999). Studies repeatedly show that poorly designed physical treatment environments are associated with negative service user and staff outcomes, such as aggressive behaviour (e.g., Bensley, et al., 1995; Duxbury, 2002; Soares, Lawoko, & Nolan, 2000); lack of privacy and safety (e.g., Curtis, et al., 2007; Devlin, 1992; Gallop, et al., 1999; O'Reilly & Sales, 1987; Soares, Lawoko, & Nolan, 2000); choosing to refuse treatment (Baker, Bowers, & Owiti, 2009; Bowers, et al., 2008); lethargy (e.g., Zigmond, 1995); and poor inter-professional communication and collaboration, and service user-staff alienation (Andes & Shattell, 2006). However, there is empirical evidence that points to the benefits of service user and clinician involvement in the design process of clinical environments for service user and staff outcomes, which is in accordance with the principles of the *Let's get real* framework (e.g., Bakos, et al., 1980; Borckardt, et al., 2011; Curtis, et al., 2007).

Literature on the importance of environmental design for clinical outcomes further provides evidence that supports the core values of the *Let's get real* programme – those of fostering relationships between wider communities, service users and their families/whānau, as well as maintaining the right of service users to receive care and support that responds to their physical, spiritual, intellectual and cultural needs. The importance of the geographical location of the clinical facility and its connection with the rest of the physical and social urban landscape, in order to maintain links with local communities (Curtis, et al., 2007; Olusina, Ohaeri, & Olatawura, 2002; Timko, 1996) and provision of spaces for visitation (Brooker & Dinshaw, 1998; Walsh & Boyle, 2009; Whitehead, et al., 1984), were shown to be an important part of normalisation of the service users' environment in the clinical setting. Studies also point to the importance of designing physical environments to accommodate the service users with special needs, such as those with dementia (Day, Carreon, & Stump, 2000; Hanley, 1981; Hussian & Brown, 1987), physical disabilities (Timko, 1996; Walsh & Boyle, 2009), and developmental disabilities (Tyerman & Spencer, 1980). Finally, literature on environmental factors maintains that the environment should protect individual dignity and be designed to allow people to observe their own religious and other practices (Curtis, et al., 2007; The Sainsbury Centre for Mental Health (SCMH), 1998).

As demonstrated above, the literature on the environmental factors and outcomes in mental health clinical settings supports the basic values of the *Let's get real* framework. Therefore, this review might usefully support clinicians and institutions in the goal of recovery and healing for service users.

Evidence based design and the service user-centred approach

Devlin and Arneill (2003) argue that designers and planners of today's health care facilities are faced with a difficult task of having to accommodate sophisticated clinical interventions and complex medical technology while providing a humane, therapeutic environment. In their statement on the *Criteria for the Design and Refurbishment of Psychiatric Acute and Intensive Care Facilities in New Zealand*, the Ministry of Health (2002) maintain that "a truly functional environment is achieved by integrating the overlapping functions of clinical, service user, operational and environmental aspects of service delivery, based on an understanding of best practice and recovery' (p.3).

Some designers promote evidence-based design (EBD) as part of "a process for applying research findings about the physical environment to improving the design" (Huffcut, 2010, p.33). This approach makes sense and fits broadly within an evidence based practice paradigm such as promoted in *Let's get real*. However, there is also a need to be cautious in the use of EBD, as there are a myriad of design, therapeutic and organisational factors to take into account when making environmental changes in clinical settings. Sine and Hunt (2009) contend that evidence based design principles need to take into account factors relevant to the particular facility and use good methods and procedures for gathering evidence. Thus, designers should not apply principles based on evidence found in general health care settings to the mental health setting where things are quite different (e.g., in mental health and addiction facilities patients do not stay in their bedrooms or receive care in their bedrooms).

There are other potential difficulties with the use of the EBD approach. For example, some authors whose studies we reviewed in this document, remind designers of the need to remember to address staff and service user safety issues, as poor physical design can contribute to sentinel events (e.g., Bowers, et al., 2008; Lillywhite, Morgan, & Walter, 1995; Mezey, Hassell, & Bartlett, 2005). This explains suggestions such as using shatterproof windows; covering internal or external balconies; and installing safety features such as alarm buttons, viewing holes and windows on bedrooms in secure wards.

The need for safety, however, needs to be carefully balanced against the needs expressed by service users, who can often be dissatisfied with such design implementations (e.g. Curtis, et al., 2007).

Literature also provides examples of how failing to implement EBD can lead to significant problems later on. A study by Taj & Sheehan (1994) highlights the importance of consulting with health care staff stakeholders. A unit was built as a satellite extension of the general hospital for service users who tended to be very ill, often psychotic and with high risk of suicide. The position of the nursing station meant that nurses did not have a view of the entrance or the emergency exits. There was a very attractive roof garden built on the first floor that was a risk for attempts to suicide; fashionable exposed beams and supports were also a risk for those who were suicidal. A man-made lake available in the grounds was mentioned by most service users with suicidal thoughts and caused constant stress and anxiety for staff. Taj and Sheehan argued that their study offered 'a warning to clinicians on the importance of being involved at an early stage in the brief to architects on the design of any building in which they are likely to be working' (p. 281).

Sine and Hunt (2009) make a point that there is "no perfect design" and that "the design of mental health units continues to be a struggle between opposing considerations: service user's safety, staff safety, therapeutic environment, infection control, building and fire codes" (p. 46). Striking a balance between protecting the rights and needs of service users and ensuring safety has been outlined as crucial for the design of acute mental health facilities by the Ministry of Health (2002), and reflects an underlying philosophy of care that is outlined in the Mental Health (Compulsory Assessment and Treatment) Act 1992.

In their review of the literature, Dobrohotoff and Llewellyn-Jones (2011) found that authors often emphasise the importance of good communication between administrators, architects and clinicians, although this is rare in the design of mental health facilities, where service users must also be involved in the planning and delivery of proposed services. In their *Criteria for the Design* statement, the Ministry of Health (2002) recommend a service 'user group' as a way to involve people with service user experience in planning and design from the onset, in order to ensure that all those involved understand the end users of the facility. The Ministry of Health also propose that a consultative group "comprising consumer, family, Iwi, clinical, managerial and administrative staff and other stakeholders should be delegated the authority to agree on these principles and priorities" (p. 4). Dobrohotoff and Llewellyn-Jones (2011) argue for a team approach, where the service user group brings together those with different and often contradictory needs and ensures structural errors are not the result of allowing only the leaders to make design decisions. These authors also emphasise the importance of subjecting newly designed units to a post occupancy evaluation to examine the strengths and weaknesses of their designs.

As mentioned earlier, our literature search failed to uncover any empirical evidence specifically focused on the impact of design of physical environments on Māori and Pacific service user outcomes. In their *Blueprint for Mental Health Services in New Zealand*, the Mental Health Commission (1998) maintains that "Māori must be able to access mental health services which are aligned to Māori cultural expectations" (p. 66). They call for both Māori and Pacific people involvement in the planning of mental health services in order to meet the specific needs of their populations. The expectations for adequately supporting Māori and Pacific service users are also clearly outlined in *Let's Get Real* and the Seitapu frameworks (Ministry of Health, 2008a; Pou, 2009; Pulotu-Endemann et al., 2007). Thus, in the New Zealand context, there is a need to consider the use of culturally specific design features and the impact these have on recovery. Design features lie on a continuum from individual pieces of art as part of the interior design, through to complete units developed on a cultural basis. An example of a mental health facility designed to cater for cultural needs of Māori service users, with an input from Māori cultural advisers, is a kaupapa Māori medium secure rehabilitation unit, Tane Whakapiripiri, developed in 2006 as part of Auckland Regional Forensic Psychiatry Services. Located at Auckland's Mason Clinic on the site of the former psychiatric hospital, the 10-bed unit was described as a 'secure village' where Māori culture, beliefs and practices sit alongside western clinical and rehabilitative practices (Collins, 2006, 17 March). The designers of Tane Whakapiripiri describe how the planning of this facility required a sensitive and collaborative approach to ensure a positive environment "where patients (tangata whai ora) could draw strength and progress their rehabilitation" (AECOM, 2012). According to the designers, the aim of the design was to achieve a strong sense of Māori values while maintaining the highest level of security on a small, restricted site. The unit was built around a central courtyard, to resemble the close gathering of structures or 'whare'. This connects to a double height corridor facing into the courtyard, which is extensively glazed to bring natural light into the interior clinical spaces, and allow views from across the courtyard to communal spaces. The centre of the courtyard has a large basalt rock

water feature which symbolises the spreading of wellbeing and health through the unit and into the wider community. According to the designers of Tane Whakapiripiri:

Safety, security and strong detailing and finishes were also paramount to the successful operation of the unit. These aspects are downplayed where possible through the use of light, colour, texture, and materiality with the use of natural low energy and renewable materials adding to the comfort of the facility'.

(AECOM, 2012, http://www.aecom.com/Where+We+Are/Australia+-+New+Zealand/Architecture/_projectsList/Tane+Whakapiripiri,+Mason+Clinic)

As stated earlier, Māori and Pacific peoples are over-represented in mental health facilities. Although none of the international literature guides the evaluation of such services, this remains an important research need within the New Zealand context.

Lastly, we discuss the cost implications of implementing the evidence-based design principles in the design of mental health clinical settings. Our review of empirical evidence strongly suggests that even simple and inexpensive environmental interventions - such as placing visual art on walls, furniture rearrangement, increased lighting, use of movable partitions to provide areas for privacy and socialisation, providing access to outdoors, etc. - can save the hospital costs in medication, and staff and pharmacy time, by providing a pleasant setting that can help alleviate anxiety and agitation in service users, reduce length of stay, increase service user and staff satisfaction and interaction, and lead to other positive clinical outcomes (Baldwin, 1985; Beauchemin & Hays, 1996; Devlin, 1992; Lawson, Phiri, & Wells-Thorpe, 2004; Nanda, et al., 2011). A further benefit of investing in basic physical redesign is that it may provide a useful starting point in increasing our understanding about the effects of environmental factors on human interaction, as well as providing new therapeutic treatments (Peterson, et al., 1977). Thus, the evidence on the potential benefits of environmental improvements clearly supersedes the cost argument, and could therefore be used to drive environmental design changes at an organisational level. The Ministry of Health also acknowledge that building site and cost restraints "should not override the basic design philosophy, which is aimed at assisting staff to provide quality psychiatric acute and intensive care services" (Ministry of Health, 2002, p.4).

This review offers empirical support for the design recommendations outlined in the Ministry of Health's (2002) *Statement on the Criteria for the Design and Refurbishment of Psychiatric Acute and Intensive Care Facilities.* The Ministry of Health have argued for the need to pursue evidence from other countries and to link it to the New Zealand context. Apart from providing an evidence base, the findings of international studies summarised in this document provide specific examples of how the goals outlined in the Ministry of Health's recommendations for design can be achieved in practice.

Summary of key points

This document outlines the accessible research evidence for the impact of physical environment on service user and staff outcomes, and clinical practice in mental health clinical settings. The purpose of this document is: (1) to provide DHB and NGO managers, funders, planners and designers, and clinicians an easily accessible summation of the existing knowledge around physical features of the clinical treatment environment that may influence service user and staff outcomes, (2) to summarise the existent literature as a basis for advising on best practice for the environmental design of mental health clinical treatment environments, and (3) to provide a critical appraisal of research evidence for the use of researchers wishing to empirically study the topic of environmental factors and clinical outcomes. The overriding purpose of this document is to assist in improving the acute mental health and addiction inpatient environment in order to achieve better outcomes for people using these services.

Our literature review has revealed various environmental features relevant to the design of mental health and addiction clinical settings. These include ambient features (such as lighting, noise, and air quality), architectural features (such as layout and size, windows, and access to outdoors), interior design features (i.e. wall art, colour and furnishings), and social features (i.e. furniture placement, dayroom, meeting room and visitation area design conducive to social interaction). This document also reviews research evidence on the design for specific populations, such as the older persons, children and adolescents, and mental health service users with special needs. Evidence of the impact of open versus locked wards, open versus closed nursing stations, mixed versus single sex wards, and seclusion rooms was also reviewed.

Based on this literature review, the following key points can be highlighted:

- **The physical environment of mental health clinical settings can be associated with both positive and negative service user and staff outcomes.** Examples of positive outcomes include shortened lengths of stay; reduced rates of choosing to refuse medication; reduced verbal and physical aggression, self-harm and absconding; fewer seclusion episodes; reductions in the use of illicit drug and alcohol; reductions in the presence of symptoms of depression and improvements in mood; increased social interaction; improvements in patterns of eating; staff and service user satisfaction with their environment and its safety and privacy; service user satisfaction with services and feelings of self-worth; staff job satisfaction and morale; and improved use of space and physical activity levels. In contrast, evidence also links poor environmental design of clinical settings to increased service user aggression; increased refusals to accept treatment; increased feelings of being trapped and confined; the lack of access to fresh air, privacy and safety; increases in the feelings of being mistrusted by staff; poor inter-professional communication and collaboration, service user-to-service user communication and service user-staff interaction; and staff and service user lethargy. Thus, enhancing the physical environment of mental health clinical settings is a worthwhile strategy in improving clinical and service user outcomes. Some of the practical ways in which these can be achieved are:
    - Through the use of ambient features – for example, providing enough natural daylight through installing large areas of glass in the walls and roof; fresh air and good ventilation; noise reduction through installing carpeted partitions to separate high density areas
    - Enhancing architectural features – such as through the use of high quality materials; incorporating spatial flexibility into the design process; provision of privacy through the use of single rooms and bathrooms and personalised spaces; access to and view of the outdoors; provision on safety features, such as shatterproof windows; spaces for staff meetings and open nursing stations
    - Improved interior design features – display of wall art depicting naturalistic landscapes, improved furnishings to reduce institutional feel, incorporate a homelike environment, and provide a familiar tone; allowing service users to personalise their own space; adjusting the colour schemes according to characteristics of service user (in general, avoiding either bland or overly stimulating colour schemes)
    - Designing physical spaces to enhance social features – such as small-group circular arrangement of furniture; creating flexible day rooms that encourage interaction with staff, but allowing for personal

autonomy; communal spaces for staff, visiting rooms, space for religious practices, and whānau space where traditional protocols can be undertaken
    - Designing to accommodate specific populations – for example, providing safety features for older service users, furniture to facilitate balance and comfort, reducing glare and noise, using a neutral design and colour scheme, providing sufficient visual cues to promote orientation and reduce wandering in service users with dementia, allowing for access to outdoor areas and links with the community. Quiet rooms for adolescents and children should be attractive, non-punitive, and cosy, with warm colour tones, to allow for change in mood. Children should also be able to observe a pleasant scene. Female service users may prefer single sex wards or a separate female-only area and private bathroom facilities. Acute wards should have a single open exit, and unobtrusive but effective and consistent wraparound exit security.

- **Involve service users in all stages of the design process.** Despite expressing a strong desire to be heard, mental health service users are frequently left out of the clinical facility planning and design process and their views rarely taken into account. This lack of control by service users over the treatment environment is in direct conflict with the principles of service user-centred care. Studies show the detrimental impact of leaving the service users out of the design process on their satisfaction and mental wellbeing. Thus, the planning and design of clinical settings should always adopt a service user-centred approach.

- **Different stakeholders often have diverse opinions, needs, and expectations related to the physical environment of mental health clinical settings.** More often than not, there are discrepancies in the views of staff and service users regarding the needs of service users in relation to their physical environment and its potential impact. Staff often underestimate service users' needs and the impact physical environment may have on them. It is therefore essential to involve all the relevant stakeholders in all the stages of the planning and design process.

- **The implementation of an all-inclusive, person-centred approach in the physical design of mental health clinical settings is vital for successful clinical and service user outcomes.** The literature suggests that even simple, inexpensive changes to the design of clinical treatment environment can contribute to positive service user and staff outcomes. The planning and design of mental health clinical facilities should therefore be evidence-based. It is likely that, for change to occur, environmental design needs to be part of a range of strategies.

- **There is a need for further research looking into causal relationships between environmental factors and various outcomes in the mental health clinical setting.** It is also often difficult to draw specific conclusions about whether environmental changes have made a significant impact, because these changes often occur at the same time as other changes, such as those in the treatment plan, or implementation of training programmes, and in the absence of control groups. Therefore, the impact of physical environment on outcomes should, whenever possible, be studied in isolation from other potential influences. A shift in focus from studying environment in the context of control and reactive behaviour, to its potential to contribute to therapeutic recovery is also warranted.

- **There is a great need for research in this domain to guide future culturally appropriate design practices.** There is at present no empirical evidence on the significance of physical design of mental health facilities for clinical outcomes for Māori and Pacific service users.

This review offers empirical support for the design recommendations outlined in the Ministry of Health's (2002) *Statement on the Criteria for the Design and Refurbishment of Psychiatric Acute and Intensive Care Facilities*. Apart from providing an evidence base, the findings of international studies summarised in this document provide specific examples of how the goals outlined in the Ministry of Health's recommendations for design can be achieved in practice.

Conclusion

Our review contributes to the evidence base for best practice in service user-centred approaches towards recovery for people who experience mental illness/distress and addiction issues. We have demonstrated how, in the New Zealand context, the research evidence presented in this document can be used to support the values and practices promoted by *Let's get real*. Empirical evidence summarised in this document also supports the recommendations outlined in the Ministry of Health's (2002) statement on the *Criteria for the Design and Refurbishment of Psychiatric Acute and Intensive Care Facilities in New Zealand*. This literature review further adds to the Ministry of Health's statement by providing detailed and specific, evidence-based suggestions for the improvement of the clinical environment, while supporting the person-based approach to treatment.

This document is a resource for both clinicians and designers alike. The outline of the studies and comments on the gaps in their methodological rigour presented in this document will aid researchers interested in undertaking future high-quality research on the topic of environmental factors and service user outcomes.

Despite the challenges of research and the diverse methodologies used, it is possible to draw useful conclusions and make suggestions from the vast body of research. These suggestions may be useful in assisting stakeholders in their efforts to improve the physical environment of mental health clinical settings in order to enhance clinical and service user outcomes.

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