



REPORT

Designing For Rehabilitation

EuroPris Real Estate Expert Group

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**PROMOTING
PROFESSIONAL
PRISON
PRACTICE**

About Europris

The European Organisation of Prison and Correctional Services (EuroPris) is a non-political, non-governmental organisation that was founded at the end of 2011 and is registered in the Netherlands.

Membership is open to public institutions or organisations in the Council of Europe region, which provide prison or correctional services on a legal or statutory basis.

EuroPris brings together prison practitioners with the specific intention of promoting ethical and rights-based imprisonment, exchanging information and providing expert assistance to support this agenda. The organisation exists to improve co-operation among European Prison and Correctional Services, with the aim of improving the lives of prisoners and their families, enhancing public safety and security; reducing reoffending and advancing professionalism in the corrections field.

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1.0 Introduction

This report has been compiled by the EuroPris Real Estate expert group to explore the nature of the wider design evidence that has been produced which could help influence both current and future prison design. It examines some of the ongoing work amongst European nations to improve the functioning of their prisons and explores how careful design can support the rehabilitation of individuals and contribute to reducing reoffending.

2.0 Background

In Western Europe the role and purpose of prisons is not to punish, people are already deprived of their freedom by being in prison, but rather to help reform those individuals committed to prison so that on release that they can be reintegrated back into society in a better condition than when they arrived.

This report seeks to explore opportunities to support rehabilitation and the well-being of individuals within the care of the prison system by examining the benefits of evidence-based design alongside factors that promote independence and self-determination.

We know that Prisons are all-encompassing environments and are over-represented with individuals with mental and physical health issues or other complications or pre-dispositions. Left untreated these illnesses can often be exasperated within a traditional austere prison environment. All this adds to the complexity and challenges placed on the prison system.

Research into how the design of buildings can influence the behaviour and well-being of their occupants has been long established in the Health and Education sectors. This information has been used by these sectors to create supportive therapeutic environments which have a positive impact on an individual's mental and physical well-being. The amount of research undertaken on design within prisons has to date been quite limited.

The long-standing design ethos within prisons has traditionally been focused on security and not necessarily on well-being. The impact of this approach on the occupants detained in these facilities is compounded by the much higher prevalence of mental health disorders amongst those entering the prison systems. There is therefore a need to look at how prisons can be designed to promote supportive therapeutic environments, places which can contribute to an individual's physical and mental well-being and ultimately aid their rehabilitation



3.0 Designing for Rehabilitation

To support the design of rehabilitative environments and provide better outcomes for people academic evidence points to the design of therapeutic spaces which feel safe, calm, and are low stress.

Design Considerations

There are a range of factors that could be considered. Some of the most effective beneficial factors that can positively impact on and improve an individual's mental and physical well-being are summarised below:

Natural Light Exposure to natural light plays an important role in setting and maintaining the body's biological clock (circadian rhythms). Disruption of circadian rhythms can affect hormone regulation and lead to short and long-term health consequences. Inadequate exposure to natural light can lead to vitamin D deficiency and depression.

Lighting design which mimics daylight changes helps the body to maintain circadian rhythms. Variations in indoor lighting levels and spectra can have a positive impact on cognitive performance and mood.

Lack of daylight and insufficient darkening at night can, like noise, affect the quality of inmates' sleep. Exposure to light during the night-time inhibits the production of melatonin, which affects sleeplessness. Chronic sleep problems have a negative impact on health, by increasing stress and social problems which can lead to unhealthy behaviour (increased smoking, poor diet and reduced exercise).

Green spaces/ landscaping Gardens The well-being benefits of green outdoor spaces are well documented. Research undertaken in healthcare settings has conclusively found that individuals who have a view of or access to nature/ gardens benefit from:

- Reduced stress;
- Reduced feelings of pain (hospital patients)
- Faster recovery from medical interventions
- Increase patience and task enthusiasm
- Lower levels of frustration



Landscaping offers the benefits of the visual connection with nature. Green recreation and garden spaces create potential for increased physical activity, skill building as well as self and collective efficacy.

The introduction of well-connected continuous wander paths/ gardens with attractive views are used much more frequently by people than gardens/ paths lacking these characteristics.

Indoor Planting	<p>The presence of plants in a workplace can reduce blood pressure and increase attentiveness and reaction times by 12% for people performing stressful tasks.</p> <p>Studies have found that pain levels and reported medication use were lower amongst patients assigned to rooms containing indoor plants.</p>
Colour	<p>Variety in colour is good both as a means of navigation/ way finding and also as a way of lightening mood, providing stimulation and visual interest both for prisoners and staff.</p> <p>Further research evidence is required to establish if colour has any significant influence on general psychological behaviour. Nonetheless, the choice of colour will affect the brightness of a room. The choice of certain colours can contribute to how homely or institutional a room is perceived.</p> <p>Generally, all age groups associate positive emotions with bright colours and negative emotions with dark colours.</p>
Nature	<p>There is emerging evidence that a view of nature or even pictures of nature help to reduce stress.</p> <p>The presence of windows with views of nature (e.g. trees and plants) has a strong restorative effect, particularly in institutional settings. Visual access to nature has been linked to lowered heart rates and lowered blood pressure as well as positively influencing mood, happiness and attitude.</p> <p>Views of nature and daylight can affect satisfaction, health, irritability, aggressiveness, mental function, problem solving, and stress. Views of nature can be restorative and can be especially useful when people seek to restore calm after experiencing threatening or emotionally difficult events. One study found that the positive effect of nature views was strongest where inmate turnover was the highest.</p> <p>Far reaching views have been shown to reduce boredom, fatigue and irritability as well as improve feelings of individual comfort and perceived safety</p>
Windows, Views	<p>Most people have strong preferences for windows in many kinds of settings. Windows provide visual variety and the potential for psychological escape and can therefore mitigate boredom and isolation, providing a connection to the outside. The ability to access views of nature can be particularly important in closed institutions where physical access is otherwise limited.</p>

Promotion of Social Interaction	<p>One of the key elements of a successful prison is the interaction an inmate has with staff. This relationship is a major determinant on the inmate's perception of the quality of prison life and outweighs material aspects of prison quality.</p> <p>The design of a prison can affect the levels of social interaction between staff and prisoners as well as the way in which staff interact with inmates. It is important that spaces are created which promote social interaction wherever possible. The introduction of technologies which reduce the requirement for direct supervision and dynamic security tend to create a greater amount of both physical and emotional distance between people which signal reduced levels of trust between inmates and staff.</p>
Acoustics	<p>Music has been found to decrease anxiety and pain intensity among surgery patients. As well as studies on music general acoustic quality is also an important factor. Patients admitted to an intensive care unit (ICU) which had poor acoustics had significantly higher re-hospitalisation rates than patients admitted to an ICU that benefitted from good acoustics.</p> <p>Excessive noise can be a stressor leading to an increased heart rate and blood pressure. Loud and sudden sounds have a negative effect on people, although a complete absence of sound can also be detrimental. Sounds needs to be appropriate to the space. For example sound may hinder tasks that require hearing and internal monologue but aid in tasks that do not require hearing. Sounds associated with a particular meaning (such as a baby crying) may be particularly distracting in task performance. Sounds that are perceived as pleasant (like calming music) can help in task performance and can be used to mask negative sounds.</p>
Air Quality	<p>Research on the effects of indoor climate suggests that motionless air and an unchanging environment have a negative impact and could lead to lethargy/ decreased vitality.</p> <p>Smell can also affect a person's mood, memory and behaviour. Positive smells and aromas can have a relaxing effect on muscles, and can improve concentration and enhance production of endorphins. Unpleasant smells may on the other hand be associated with unpleasant memories, anxiety and stress.</p>
Materials	<p>The texture of furniture and other interior design elements such as carpets can influence a person's perception of a room. Soft textures are associated with a welcoming environment. Natural materials (wood, textiles) are also used to reduce stress.</p>
Art	<p>Visual art can have a positive effect on mood. Natural images are viewed particularly favourably by hospital patients, whilst more abstract and stylized art should be avoided as they are generally unpopular/ difficult to understand.</p>

Patients consistently prefer texturally complex paintings of natural settings over simple poster images. This has been found to be the case regardless of patient characteristic.

Density Social density (number of people per room) has been found to be a more important factor than spatial density (the size of the room) in reducing stress. Low social density rooms alleviate stress and, by extension, aggressive behaviour.

There is strong support for the fact that private rooms with private bathrooms reduce stress within prison environments, whereas shared rooms or bathrooms increase aggressive behaviour.

Inmates and people with a history of aggressive behaviour need significantly more personal space than others and the experience of crowding and perceived violations of personal space are amplified in small spaces.

Size Unit, group and facility size is closely linked to the theme of density.

Research of youths in detention indicates that smaller group sizes have a more positive effect on individuals. Male juvenile offenders placed in smaller living units showed greater affection toward and identification with counsellors. Inmates housed in a smaller unit (38 compared to 47) had fewer time additions to their sentences. As a result, more spaces were kept open as juveniles left the facility rather than staying for longer periods.

There are some conflicting findings as to whether the overall size of a prison has an impact on an inmate's behaviour, but there is some evidence that the overall effectiveness decreases with increases in institutional size.

Schools should make you learn; hospitals should make you better and prisons should help prisoners reform. Prof Will Alsop OBE.

4.0 The English Case Study – Designing for Well being

In order to improve the design of future prisons a research project supported by the Royal Institute of British Architects Research Trust and Innovate UK has worked alongside the Ministry of Justice to gather research data which has been used to set out a series of design principles to improve the prison environment. The objective of the *'Wellbeing in Prison Design'* project has been to develop guidance aimed at improving the health and well-being of those people working in, visiting and residing in prison.

There is a need for prisons to become places of progress that promote citizenship and provide conditions that help people turn their lives around. In order to achieve this aim there is an argument that we need to engender some fresh thinking around the way we look at the contribution that design and buildings can bring.

There is also some evidence and substantial agreement that smaller prisons work better. For example, unpublished data analysed in a Prison Reform Trust 2008 report showed that larger institutions are consistently poorer at meeting prisoners' needs than smaller ones.

The output of the *'Well Being in Prison Design'* project is guidance intended to bring evidence from the field of environmental psychology to bear on prison design and to move beyond the basic provision towards environments that can support the rehabilitative activities envisaged in the UK prison reform agenda

HMP Berwyn

In order to 'ground' the academic research and theory with real-world circumstances a field study was undertaken during 2017 at the UK's most recently constructed prison at HMP Berwyn in North Wales. This is currently the UK's largest prison capable of accommodating up to 2,106 prisoners.



Large landscape image within a House-block at HMP Berwyn

HMP Berwyn is striking in that significant efforts have been made to turn a mostly conventional Category B (High Security) prison design into a more inspirational and uplifting environment suitable for Category C (Medium Security) inmates through relatively minor physical interventions. The management regime has publicised its desire to put in place a holistic approach to rehabilitation through supporting the men in custody to maintain a sense of dignity and identity. Walls have been painted brighter than usual and large-scale, high quality prints of landscapes have been fixed to the walls. Positive landscaping of the grass areas between the buildings have been planted with flower beds and trees.

'In room technology' consists of laptops issued to the men with a hardwired link to the internal network. These physical measures are matched with the operational philosophy and terminology. Those in custody are referred to simply as 'men' and the cells are 'rooms'. The guiding principle is that officers and staff are enablers of rehabilitation first and foremost.

It deserves re-iterating here the extreme difficulty of separating out individual measures in terms of their contribution to rehabilitation potential. The scale of HMP Berwyn (2,106 capacity) means it is an exceptionally large prison, a decision that was widely criticised at the time as detrimental to rehabilitation. The compactness of the site has advantages, but neither facilities nor outdoor space appear adequate for the future population. A large proportion of officers are new recruits and there are some basic functional shortcomings in the building design. The prison has opened during the early period of the changes to the probation system, with initial data indicating generally poor performance across the country; all prisons are part of a larger system from which outcomes are assessed.

Key findings

The visits centre at HMP Berwyn is designed quite differently from any other part of the prison - it is the only space with indirect lighting, to give one example - and was consistently commented on positively by both the men and staff in our survey work. Other key findings were:

Environmental design

The environmental performance of Berwyn was amongst the first issues raised by both staff and men. Normally, users of buildings are mostly oblivious to environmental performance and only mention it when it is failing, so this clearly indicates a significant issue. There are areas being used by staff that have no openable windows, no air-conditioning and only limited mechanical ventilation. There appear to be no background ventilators on the windows and some spaces had no external windows. Elsewhere, the form of the buildings and the windows are not adjusted to respond to their solar orientation. In many cases, these shortcomings appear to arise from the spaces being used differently to that originally planned, however this serves to highlight the need for flexibility and adaptability in the design of prisons. The house-blocks are not mechanically ventilated but neither do they provide clear, natural cross-ventilation routes and so are only ventilated by the movement of people in and out of the space, which may not be sufficient. Security constraints have clearly played a role in these decisions and the building apparently complies with relevant standards; however post-occupancy survey work is an important means of identifying such issues.

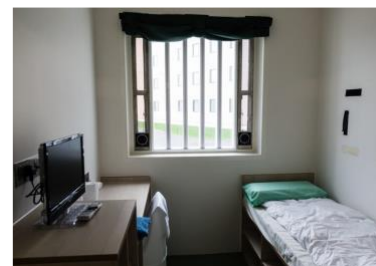


External spaces and a sense of open-ness

There were positive responses to the general sense of open-ness within the walled perimeter, in spite of the density of buildings. Taller buildings mean there are views from inside, out beyond the walls and the pathways between buildings are not covered. However, the team were concerned that this could change over time if more facilities have to be built within the perimeter. The layout of the buildings means the external spaces are 'fragmented' meaning many are unusable, or too small whilst being difficult and costly to maintain. The internal fences and gates were cited as a heavy burden on staff time and staff questioned their necessity in a category C prison. They severely limit the potential for the men to have a degree of autonomy, or free movement, which is currently regulated via a system of hand-written paper notes.

Lighting and materials

Daylighting in many spaces was poor and most spaces were artificially lit throughout the day. In some areas, roof lights were used to good effect and these spaces were notable as feeling different and more uplifting. Apart from the visits centre, artificial lighting throughout the prison is consistently high in colour-temperature, high in lux-level and direct only. Combined with the relatively low daylighting levels in most spaces this makes for a stress-inducing environment that does not meet best practice for residential, work or education facilities. In the house-blocks, the solid concrete construction is used throughout as a final, painted finish. This has various impacts on the environment, but the most quantifiable is the acoustic performance. Measurements taken in vacant house-blocks indicated reverberation times two to three times the limit for intelligible speech.



The house-block association spaces cannot be used for one-to-one discussions either between the men or between the men and officers. The difficulty of being understood tends to lead to a 'shouting' culture, which makes for a more stressful environment.

House-block configuration and rooms

Generally, the men interviewed liked their rooms and felt them to be adequate, though lacking storage space and ability to personalise. It should be noted that all these men had transferred from older establishments and they reported that their previous rooms had been much poorer. Within the rooms, windows have openable ventilation grilles on either side. These did allow a degree of ventilation, but due to their design were dependent on wind direction. HMP Berwyn incorporates a high proportion of twin, sharing rooms which both officers and staff stated as a negative. It should be noted that some shared room provision is advocated by officers, something that is supported by evidence, but that the majority of people in custody should have their own room. The three-dimensional configuration of the wings and the cores that serve them was reported as both positive and negative during the surveys. Overall, the configuration does not adequately support the different, more supportive type of relationship that the prison reform agenda envisages between officers and people in custody. This has been considered in more detail in the design guidance.

Summary and relevance

Whilst the relevance of specific case-studies is limited, there are both positive and negative measures that stand out as being particularly pertinent and have informed the focus of the design guidance. In the case of HMP Berwyn, at least some of the shortcomings appear to have arisen as a result of either a change to the originally intended use and security requirements of the building, or from adjustments to the design and specification late in the delivery process. All of these issues point to a requirement for improvements in the approach to procurement, as well as in the design itself. A further note of caution is that this is a very recent building which will continue to be adapted over time and be subject to different regimes and demands.



[A copy of the 'Well Being in Prison Design Guide' can be viewed on the EuroPris website and is reproduced by kind permission of Matter Architecture UK.](#)



5.0 The Netherlands Case Study – The Same but Different

During 2018 the Dutch Custodial Agency (DCA) commenced a number of investigative projects on the theme of ‘Living Environments within our prisons’. DCA wants to undertake research into how a prisoners’ behaviour is influenced by colour, sound, light and equipment/ furniture. The central research question is:

In what way can colour, sound, light and more suitable equipment/furniture contribute to a better living environment for prisoners as well as a better working climate for prison staff?

Behavioural Analysis – Nieuwegein

In Nieuwegein, a scientific research study has recently been undertaken, in co-operation with the Tilburg University.

Two identical buildings were used to examine the effects that regime/ self-autonomy and the environment influence the outcomes for their inmate populations. One operated as a ‘control’ and was operated and furnished conventionally. In the other building the regime has been purposefully altered:

- Staff didn’t wear uniforms, but instead wore everyday clothing;
- Family visits occur in a friendlier less obtrusive and controlled environment. The conventional strict separation of inmates and their families has been relaxed to chairs and tables allowing a better element of person to person contact;
- Inmates have in-cell telephones to enable them to make calls from their cells;
- Inmates cook and prepare their own meals rather than having it prepared by the prison;
- Inmates are given their own passes to allow unescorted movement to attend work, education, sports and the like.

The main objective of the research study is to observe whether a changed environment through less restrictive treatment and increased self-autonomy has an influence on the behaviour of individual inmates both in the short and long term. At the time of this reports publication the scientific research project had only just concluded. The data will now be analysed.

At time of publication work continues on the scientific research project into a comparison of the groups within the two buildings and the nature of any behavioural differences evidenced by the individuals. Once produced the findings will be published on the EuroPris website.

Physical Environment – Design Toolkits

During 2018 another series of studies was undertaken by an environmental psychologist into the spatial needs of both inmates and staff at four other prisons (Krimpen ann den Ijssel; Middelburg; Heerhugowaard and Grave) in the Netherlands. The study covered four main themes examining visitation units, recreation rooms; exercise yards and staff rooms.

The research focused mainly on the adaptations to the physical buildings; not on elements of staff behaviour. In conjunction with an environmental psychologist research (through interviews and workshops) sought to determine the nature of the changes required. The alterations are focused on changes to the physical aspects of the buildings including:

- Light
- Sound
- Colour
- Design / furniture
- Air-quality
- Outside furniture
- Design/space

The aim of the studies has been to create design guidance which can be used in the future development of the prison estate in the Netherlands. The study covered four main themes and produced four design toolkits which are listed below:

1. [Design Toolkit – Exercise Yards in Penal Institutions](#)



During 2018 an Environmental psychologist undertook research into spatial users' needs for inmates and ward staff in the design of exercise yards of penal institutions at PI Middelburg and PI Heerhugowaard.

The study examined the spatial needs of inmates and staff alongside scientific knowledge on the influence of the environment on behaviour. A similar study had previously undertaken at Pi Krimpen aan den Ijssel.

The result is a 'Layout Toolkit' which offers broad design guidelines that should help to create a positive living and working environment within the exercise. The DJI plan to use the toolkit as a suitable reference point in the future delivery of exercise yards in penal institutions (PI's) in the Netherlands.

2. [Design Toolkit – Visitation Units of Penal Institutions](#)



During 2018 an Environmental psychologist undertook research into spatial users' needs for inmates and staff in the design of visitation units of penal institutions at PI Middelburg and PI Heerhogowaard.

The study examined the spatial needs of inmates and staff alongside scientific knowledge on the influence of the environment on behaviour.

The result is a 'Layout Toolkit' which offers broad design guidelines that should help to create a positive living and visitation environment within the prison. The DJI plan to use the toolkit as a suitable reference point in the future delivery of visitation units in penal institutions (PI's) in the Netherlands.

3. [Design Toolkit – Prison Officer Posts](#)



During 2018 an Environmental psychologist undertook research into spatial needs for two prison officer's posts at PI Grave and supplemented this with scientific knowledge on the influence of the environment on behaviour.

Based on the emerging research a study was conducted in order to recommend suitable materials that could be used in the design of the facilities for staff and inmates.

The result is a 'Layout Toolkit' which offers broad design guidelines on the aspects of the prison officer's posts which help to create a positive living and working environment. The DJI plan to use the toolkit as a suitable reference point in the future reorganisation of prison officer's posts in penal institutions (PI's) in the Netherlands.

4. [Design Toolkit – Recreation Rooms in additional care wards](#)



During 2018 an Environmental psychologist undertook research into spatial users' needs in recreation rooms in wards at PI Grave where additional care or attention is given.

The study examined the spatial needs alongside scientific knowledge on the influence of the environment on behaviour. Based on the emerging findings a study was conducted in order to recommend suitable materials that could be used in the design of the facilities.

The result is a 'Layout Toolkit' which offers broad design guidelines that should help to create a positive living and working environment for recreation rooms. The DJI plan to use the toolkit as a suitable reference point in the future delivery of recreation rooms at additional care or attention wards in penal institutions (PI's) in the Netherlands.

A copy of each of Toolkits can be obtained from the EuroPris website via the hyperlinks above.

6.0 The Swedish Case Study – Literature Search

The Swedish Prison and Probation Service (SPPS) are examining the expansion of their prison estate. Faced with a number of large-scale and long-term investment decisions, and as part of their membership of the EuroPris Real Estate expert group and contribution to the delivery of this report the Real-estate unit at SPPS commissioned a review of academic literature on how architecture and design matter for inmates within prison. The purpose of the review was to embed current academic knowledge in policy discussions and ensure that existing evidence relating to the physical environment inform the future SPPS estate strategy and be available to the wider prison community.

The rapid literature review was undertaken by SPPS's in-house Research and Evaluation Unit. In total the literature searches encompassed 18 journal articles, nine book chapters, 9 literature reviews and one monograph. The investigations examine the impact of the physical environment on the well-being of occupants. The study is presented in two thematic synthesizes:

- Studies on Prison Architecture, and forensic psychiatric care
- Literature associated with Broader Institutional Settings

The main findings are that normalised or homely environments and less crowding contribute to increased well-being, among both inmates and staff. Layouts benefit from allowing clear oversight and providing opportunities for natural meeting points between staff and inmates. Previous literature reviews also show that natural light (or lighting that simulates daylight) as well as access to nature can reduce stress and increase well-being. Moreover, prisoners may be more affected by poor physical environments, like crowding, noise and insufficient ventilation, than other groups. This is due to a combination of their previous experiences and habits, long-term exposure to their institutional environment and lack of control over their physical surroundings, which can result in insomnia or hostility.

The nature of the two thematic studies are summarised as follows:

Literature Review of Prison Architecture and Design

A total of twenty-nine articles and books were included in the review (see Table 1). The content was clustered into the following themes: physical characteristics and design functions (normalization, facility size, noise, light, windows and green spaces) and their impact on people in prisons; design as solutions to challenges associated with imprisonment (incl. prison staff well-being and work efficiency).

Normalisation

The widely accepted assumption is that a normalized interior design will mitigate institutionalization and aid the rehabilitation and reintegration of prisoners in closed security institutions. Normalization has been adopted as a key principle in Scandinavian prison policy,

including in its architectural and interior design. (see e.g. Fransson, 2018: 187; Hammerlin, 2018).

The earlier dominant view of closed institutions, which was derived from psychological research, instead emphasized the necessity of sensory deprivation in institutional design. Mental health care facilities, for instance, were thought to benefit from ‘stripped’ or sparse environments that calmed the patients by avoiding external stimulations and stressors. However, few studies had ever tested this assumption. (Long et al., 2011: 209; Vaaler, Morken & Linaker, 2005: 19; Wener, 2012: 164-165). This approach dominated the design of, for example, seclusion areas in acute psychiatric wards. As a result, these facilities were sparsely furnished, lacked curtains, paintings, decoration as well as TV, radio, newspapers and flowers. However, more recent studies have challenged this traditional approach and found that a normalized or ‘more homely’ design features may be ‘associated with favorable perceptions of atmosphere’ at closed institutions and ‘have therapeutic value’. (Vaaler, Morken & Linaker, 2005: 19-20).

Tartaro et al. (2008) used bivariate analysis and logistic regression and found that US prisons with a less institutional, more comfortable, living environment, where inmates could control lighting and walk in and out of their rooms when they wanted, were less likely to report an inmate suicide. Their findings suggested that the use of design to transform prisons into less traditionally institutional and more ‘normalized’ environments could be beneficial in terms of suicide reduction. (Tartaro, Levy & Stockton, 2008: 33)

Vaaler et al. (2005) conducted a controlled, post-occupancy evaluation study of the refurbishment of Østmarka hospital’s acute psychiatric ward in Norway. In the experiment, one wing of the ward was redecorated like an ordinary Norwegian home (to the extent possible based on security requirements) while the other wing maintained a traditional stripped interior. During a period of four months, 31 patients in the Homely wing and 25 patients in the Stripped wing were monitored with regards to their symptoms, functioning and behaviour. The patients had various diagnoses and there were no significant differences in the group compositions. During the test period, the ward redesign had no significant effect on patients, yet, there was a slight decrease in vandalism in the Homely wing. Also, women were more positive to the new interior compared to men. Over the following two-year period, there was no cases of vandalism in the Homely wing (during this period it held 200 patients). This led the researchers to conclude that ‘Well-kept and familiar surroundings seem to lower vandalism in the seclusion area’, and to argue for a shift away from traditional stimulus-reducing interiors to a more homely interior design ethos. (Vaaler, Morken & Linaker, 2005: 22-24)

Long et al.’s small study (n=9) of female patients’ perceptions of the ward environment in a medium security unit following design change, similarly, found that a normalized interior design was associated with higher patient satisfaction, a reduction in overall symptomology, anxiety and guilt, and no change in misbehavior. (Long et al, 2011: 209). The new building, however, incorporated views and outdoor green spaces, changes to lighting, textiles and furniture, as well as changes to the layout and additional space for activities and more

personal space. (Long et al, 2011: 206). As many design changes occurred at the same time, it is not possible to determine which, if any, of the changes was the most effective.

Clancy and Maguire (2017) have conducted an outcome evaluation on a design intervention aimed at improving parent-children relations at Parc prison in Wales. The prison runs the largest family-focused support program in the UK, targeting prisoners, their partners and children. To facilitate the program, the main visit hall underwent extensive refurbishment, producing a more normalized environment, including a colourful children's play area. In addition, a 'Family Interventions Lounge' – a homely room allowing prisoners and their families to meet more privately during family visits – was created. A new visitor centre was built outside the prison gates for visitors to stay in. The centre was purpose-built as a child and family-friendly environment, by using, for example, plants, colour and art. (Clancy & Maguire, 2017: 215-216) The evaluation found the program to be successful in improving support to families, family relations and well-being. The program included more involvement from staff, more substantial interventions and new activities run by a children's charity. Hence, the importance of the physical environment in the successful outcome of the program is difficult to determine and may have played a limited role. Furthermore, the evaluation did not measure the role of the physical space and purpose-made design. Yet several references were made to these features in the interviews. Interviewees listed the physical experience of family visits as one necessary aspect that facilitated the program, and the perception that 'An establishment is much more likely to shift its culture if a family-focused wing is in place.' (Clancy & Maguire, 2017: 225)

Johnsen (2018: 81) similarly argues that a rehabilitation and care approach to prison design needs to take a more relational rather than a strictly technical approach, and be embedded in broader programs: 'It is easier to recognize the value of green places, gym facilities, music rooms and so on, and the value of allowing extended use of these facilities if they are incorporated into assemblages of normalization ... a music studio might be used to record music, like a lullaby, and sent to the prisoners' children so they can hear dad or mum singing before they go asleep.' Taking part in leisure activities, like family visits, is one part of normalization, with 'the idea that prisoners engage in leisure activities for the same reasons that people outside the prison do. Just as other people outside do, prisoners exercise, play music and so on for their own benefit or pleasure.' (Johnsen, 2018: 81) According to Trusiani and D'Onofrio, a further extension of normalization can be developed by building closer links between prisons and the local community on the outside. In Italy, the nursery section of Rebibbia Women's Prison houses mothers with children under the age of three. As one aspect of care and extended normalization, children regularly attend the city nursery schools outside the prison, despite their official temporary residence in the prison where their mothers are incarcerated. (Trusiani & D'Onofrio, 2018: 94-95)

Size of a Facility and Layout

The importance of facility size and layout has mainly been covered in the Ulrich literature review, and only a few newer studies from Europe are therefore included here. The findings from Ulrich (2017) concluded that prisons with layouts that support direct contact between staff and inmates showed more beneficial outcomes. Johansen et al. also argues that humane prison conditions, measured as positive perceptions of the quality of prison life for those who live and work in them, tend to be found in smaller prisons in Norway. (Johansen et al., 2011: 527).

A large survey study of prisoners in remand prisons in the Netherlands found, contrary to the researchers' hypothesis, that the largest facilities did not have the most negative outcomes with regards to staff-inmates' relations. Prisoners staying in a panopticon prison design (the second largest type) felt most negative about their relations to the staff, when controlling for other factors. This may be linked to the general large size of the facilities. Compared to the Dutch average and the average size of the Norwegian or Swedish remand prisons, those facilities with the lowest scores are still large facilities, on average hosting 322 prisoners. (Beijersbergen 2016: 861). The general layouts of the panopticon prisons in the Netherlands are consistent with the older prisons in the USA, in that they emphasize staff surveillance, control and discipline of prisoners. Panopticon prisons are circular with a domed roof and cells arranged in tiers around the circle. The centre of the building has an 'inspection house' from which staff are able to observe all the prisoners of the facility without prisoners knowing whether they are being watched. (Beijersbergen 2016: 847) Double bunking was also most common in the panopticon prisons. (Beijersbergen 2016: 862-863) The units with this design were also the oldest. All such units were built in the 19th century, which likely affects, for example, acoustics. (Beijersbergen 2016: 861) The study therefore supports the assumption that design choices can reduce feelings of privacy, increase social density among inmates and generate a distance between staff and inmates. (see Ulrich, 2017)

Madoc-Jones et al. (2016) measured outcomes for prisoners in various sized facilities in the UK to explore the effects of prison size on performance. They found that prison size was statistically associated with the assessment of a healthy prison (as defined by HMI Prisons Inspectors), with smaller prisons doing better. The authors concluded that larger prisons may have a negative impact on staff-prisoner relationships which can lead to negative outcomes in prisons. However, they also identified well-functioning larger prisons and poorly performing smaller prisons. (Madoc-Jones et al., 2016: 9-10) Like the Dutch study, the definition of small and large facilities may have affected the findings: in the case of Madoc-Jones et al. smaller prisons are those with less than 400 prisoners which, by Scandinavian standards, would be exceptionally large. These facilities, on average, performed well in regard to safety, respect and purposeful activity. The authors, like Beijersbergen, found that the age of the prison mattered with prisons built before 1938, on average, scoring below the median on all measures. (Madoc-Jones et al., 2016: 7-8)

Sound

Wener (2012) reviewed the literature on noise and its effect on prison environments in his book *The environmental psychology of prisons and jails: creating humane spaces in secure settings*. He argued that prisons are often loud due to large, open interior spaces with high ceilings and extensive use of hard materials and surfaces, such as concrete, glass and metal. This in combination with little use of textiles and other sound-absorbing materials, create high volumes and large reverberation times, generating uncomfortable echoing. Furthermore, constant mechanical sources of sound from, for example, heating, cooling and ventilation can add significant background hums. (Wener, 2012: 191, 193) Prisons typically house large numbers of people. A variety of activities need to be performed, including therapy and education. As a minimum, prisons are obliged to follow legislation relating to maximum noise levels for the various settings (school, residential homes, etc.). Noise may also influence the quality of such activities, including the ability to successfully engage in educational and rehabilitative programs. Noise can significantly impact on mood, motivation and behaviour. This could affect levels of tension, stress and well-being as well as affect task performance, learning and communication. (Wener, 2012: 196-198) Noise may also have negative physical effects, including hearing loss or a loss of sensitivity to sounds, nausea, headaches, hypertension, elevated blood pressure and increased release of stress hormones. (Wener, 2012: 194, 196) Importantly, noise levels in a prison environment are likely to be entangled with other stressful conditions, like crowding. Exposure to multiple stressors may increase their overall negative effect on the individual. (Wener, 2012: 196-197) Moreover, a lack of predictability and control over noise generate more stress than loudness. Unpredictability and lack of control have been found to reduce motivation for task completion and lead to greater aggression among people previously angered or provoked. (Wener, 2012: 195-166) In prison, both inmates and staff often perceive themselves as having little ability to control the level of, or exposure to, noise and there may be no place to withdraw. (Wener, 2012: 193)

Noise can lead to sleep deprivation and directly affect the quality of sleep. Repeated exposure to noise can also increase heart rate and blood pressure during sleep. (Wener, 2012: 194) A meta-analysis of 143 sleep deprivation studies by Pilcher and Huffcutt (1996) concluded that sleep deprivation has powerful negative effects on human functioning and especially on mood. This result was supported by Ireland and Culpin (2006) that found a negative relationship between quantity and quality of sleep and aggressive behaviour among incarcerated adolescent males. (Both ref. in Wener, 2012: 194) In a French study, poor sleep in prison was reported to be partly caused by the physical environment: with two thirds of 'bad sleepers' reported noise as the cause (the second most common cause), followed by temperature (40 %) and light (17 %). The most commonly reported cause, however, was thought rumination, a classic 'pains of imprisonment' (Sykes, 1958), not generated by the physical environment. Certain behaviors of the inmates, primarily smoking and late night TV-watching, also lead to poorer sleep. (Gourdard et al., 2017: 197)

According to Rice, the physical and visual restrictions in prison do not relate to acoustics, which often is porous, making sound travel through and into the building. (Rice, 2016: 12) Rice argues that prisoners have acoustical agency to a larger extent than is typically acknowledged in the literature: ‘Rather than simply being passively absorbent of unpleasant noise, then, prisoners are also active and resourceful listeners to and interpreters of sound.’ (Rice, 2016: 7) Through listening, prisoners may reduce uncertainty by, for example, gaining information about planned activities, or if a staff or prisoner is approaching, etc. (Rice, 2016: 12) Through ‘acoustical relationality’ inmates use their hearing to make sense of a place and a space. Listening to music with headphones can be a way for prisoners to influence their own soundscape, as a retreat from others and a strategy to deal with emotions. (Rice, 2016: 7)

Light and Lighting

Light and lighting are recurring themes in the literature reviews, however only one of the articles on prisons (Wener) discusses these themes specifically. As studies on light and lighting in prison environments appear to be lacking, Wener’s book chapter draws on literature from other settings, either other closed institutions or, more commonly, to general populations. (Wener, 2012: 204).

Several studies have found that exposure to natural light has a positive impact on physical and mental health, recovery and well-being among hospital patients. Significant features include windows and rooms on the bright side of a hospital. While these studies have emphasized the importance of natural light, there is increasing evidence that appropriate artificial lighting can have positive effects, comparable to those received from daylight. (Wener, 2012: 210) The long-term incarceration in prisons makes it especially important to consider artificial light both as a compliment to, and a substitute for, natural light. (Wener, 2012: 207)

Exposure to natural light plays an important role in setting and maintaining the body’s biological clock (so called circadian rhythms). Disruption of circadian rhythms may affect hormone regulation and can have short- and long-term health consequences. Inadequate exposure can also lead to vitamin D deficiency and depression. (Wener, 2012: 209) Lack of daylight and insufficient darkening at night can, like noise, affect the quality of inmate sleep. Exposure to light during night-time inhibits the production of melatonin, which affects sleepiness. (Wener, 2012: 229) Chronic sleep problems can have a negative impact on health, by increasing stress and social problems, and by leading to unhealthy behaviors (increased smoking, poor diet, and less exercise). Risks associated with insomnia also include reduced alertness and impaired performance, which may lead to a significant increase in the risk of accidents and injury. (Wener, 2012: 212) Lighting design that mimics daylight changes helps the body to maintain circadian rhythms. Avoiding static lighting can also help break the monotony experienced in many artificially-lit places, especially in closed institutional environments. Variations in indoor lighting levels and spectra can have a positive impact on cognitive performance and mood. (Wener, 2012: 209) Addressing circadian needs with blue lights of sufficient intensity would likely be seen as unpleasant and insufficient for task performance. (Wener, 2012: 211).

Views of Nature and daylight can affect satisfaction, health, irritability, aggressiveness, mental function, problem solving, stress responses and recovery, and even levels of violence. Poor access to daylight and inadequate artificial lighting may affect staff alertness and mood, especially given the increased stresses associated with shift work. (Wener, 2012: 229)

Colour has in the past been assumed to have significant impact on mood, and following the approach of ‘stripped’ institutional environments, design choices often included colour schemes of blue and green that was thought to calm patients. Wener however argues that changing the wall colour is unlikely to be a silver-bullet. First, there is little evidence that colours have general psychological and behavioral effects. (Wener, 2012: 225, 227) Context and individual differences appear to play important roles. So-called low-stimulus screeners (people who are more easily aroused and more easily distracted by environmental stimulation) may react differently to a colour compared to high-stimulus screeners, and the effects appear to be reactive and passing. Nonetheless, colour decisions may impact on the overall space. For example, the choice of colour will affect the brightness of a room. Certain colour and monochromatic surfaces can contribute to how institutional or homely a room is perceived. Colour can also be used in a design plan aiming to counteract the monotony and boredom of a place, or reflect natural elements that can have positive psychological effects. (Wener, 2012: 228)

Windows, Views and temperature

Most people have strong preferences for windows in many kinds of settings. (Wener, 2012: 216) Functions of windows include providing visual variety and the potential for psychological escape and can, therefore, mitigate negative aspects of prison life, including boredom and isolation. (Wener, 2012: 214) A study by Wener and Olsen (1980) found that windows in a prison were highly valued for activity and distraction (Wener & Olsen, 1980 ref. in Wener 2012: 217) Windows with a view provide a source of activity and distraction from monotony. Views, especially of nature scenes, may reduce boredom and stress as well as provide mental relief, restoration and recovery. (Wener, 2012: 214, 218) Windows can also break feelings of isolation by providing a connection to the outside world. (Wener, 2012: 204) Access to views of nature through windows may be particularly important in closed institutions where access to nature is limited. Moore (1985) showed that inmates with external views of nature had reduced blood pressure and used institutional health care facilities less, when compared to inmates who had only views of courtyards. (ref. in Wener, 2012: 223) Windows in intensive care settings have been found to significantly reduce depression, anxiety and post-treatment delirium. Nature scenes combined with nature sounds have successfully reduced pain in patients. (Wener, 2012: 218)

There are also negative aspects of windows that relate to temperature and exposure. (Wener, 2012: 215) A prisoner at Halden prison in Norway – a facility built with large glass windows – witnessed that the private rooms were uncomfortably hot in summer. (John K, 2018) A Danish study of the indoor climate at a remand center in Copenhagen measured air temperature, relative humidity and carbon dioxide concentration (CO₂) and recorded the inmates’

assessment of their indoor environment through a questionnaire. (Dogbeh et al., 2015: 21) The study found that 25 percent of all recorded temperatures in the cells were over 28°C, which is much higher than the Danish standard and above the max comfort temperature of 27 °C. The temperature was not even across the cells: in 19 of 35 cells the temperature exceeded 27°C more than half of the time. Ventilation in the cells was very poor. The CO² concentrations rose sharply at night time when the cell door closed. The researchers found a significant difference between the rooms where the inmates slept with an open window compared to rooms with closed windows, which reach a concentration of 4,000 parts per million (ppm) overnight (the recommendation is max 1,000 ppm). Thus, natural airflow in the rooms was very poor with doors and windows shut and the inmates' behavior of window opening was crucial for the air quality. Dogbeh et al. further found that prisoners in remand prisons likely have different needs compared to a general population with regards to indoor temperature, humidity and CO₂ concentrations. First, the prisoners spend a lot of time in their rooms; the average time spent in the cell was 19 hours per day (range 12-23 h). Secondly, the group smokes extensively. Of the 31 inmates in the sample, 74 percent were smokers. In the smokers group, 30 percent always smoked in their cell and 39 percent smoked more often in their cell than outside the cell. (Dogbeh, 2015: 23) Thirdly, prisoners have a different level of control over their environment, and the standard comfort range was established based on people who have more control over their environment. 'Therefore, it is possible that the upper limit of the comfort range for the inmates in the prison was lower than the recommended 27 °C'. (Dogbeh, 2015: 25) The study also found that inmates frequently attempted to take control over their environment: 'Many inmates, especially those occupying cells oriented towards southeast and southwest, tried to block the incoming sunlight during hot days. No external shading was installed and the curtains, which were too short for the new windows, were sometimes missing. As a result, many inmates used towels, cloths and bed sheets as internal shading.' (Dogbeh, 2015: 24)

Windows without blinds or curtains also have the disadvantage to allow views into the room from the outside. Being visually exposed through windows is considered unpleasant. Adjustable window blinds help inmates regulate both temperature and exposure from the outside. (Wener, 2012: 215) Lighting, windows, views, and color are closely interconnected in ways that make it easy to confuse, confound, and conflate key findings. It is not easy to control or account for which element is most important. (Wener, 2012: 206)

Green Spaces, Gardens

Experiences of nature, even via photographs, have been found to improve cognitive performance and attentional capacity as well as helping to reduce anxiety and stress. Nature scenes have also helped patients dealing with pain, aided in recovery from health issues, and reduced blood pressure and heart rate. (Wener, 2012: 225).

Views of nature tend to improve life satisfaction and may reduce aggressive behavior. (Wener, 2012: 219) Having access to green spaces- physically or visually- provides distraction, and may help reduce mental fatigue, which is a risk in environments that are monotonous or unpleasant. Mental fatigue can lead to anger, irritability, aggressive behavior, poorer thought processes, and reduced impulse control. Access to small green spaces have, for example, been

associated with improved attention span and lower rates of aggressiveness. (Wener, 2012: 220, 222) Nature views can be restorative and may be especially useful when people seek to restore calm after experiencing threatening or, in other ways, emotionally difficult events. One study showed that the positive effect of nature views was strongest where inmate turnover was the highest. Population turnover in closed institutions can add stress to the unit and may lead to increased aggression. (Wener, 2012: 223)

The use of green spaces is sometimes referred to as ‘biophilic design’. Originally seeking to bring nature into city residents’ daily life to enable positive physiological and psychological outcomes, biophilic design can be extended to people in closed institutional environments. (Söderlund & Newman, 2017: 750). Biophilic design includes the use of fractal patterns (self-replicating patterns that occur at increasingly smaller magnification), refuge (a place where one feels safe), prospect (view or window out of the place of refuge) and greenery. (Söderlund & Newman, 2017: 761-766).

The biophilia hypothesis assumes that exposure to nature reduces stress and contributes to rapid stress recovery. The incorporation of biophilic initiatives within prison design is an emerging field. Söderlund and Newland found that images of nature, including wall posters and the screening of nature movies, have been incorporated in some prison facilities in United States. Other examples from Australia include using green walls, plants, and green houses for the production of the food for the inmates. (Söderlund & Newman, 2017: 766)

Horticultural therapy has been defined as the experience of plants between the therapist and the patient. (Richards & Kafami, 1999: 184) Horticultural therapy may take the forms of imagining nature, viewing nature, visiting a healing garden, and gardening. It is expected to facilitate healing, alleviate stress, increase well-being, and promote participation in social life and re-employment for people with mental or physical illness. It has been used in, for example, Danderyd hospital rehabilitation clinic in Sweden with patients in rehabilitation following brain damage. (Söderback, Söderström & Schäländer, 2004: 245) Richards and Kafami (1999) measured the influence of a horticultural therapy program on San Francisco county jail inmates’ psychological and social functioning during treatment and on return to the community. They found that horticultural therapy reduced vulnerability to addiction (incl. psychological symptoms, tension and distress) which led to reduce drug use among participants; however the program had no significant impact on building resistance to addiction among the participants (measured as increased sense of self-efficacy, positive expectations, and confidence in one’s coping skills). (Richards & Kafami, 1999: 175)

Staff Well-being

For staff, improved satisfaction with the physical work environment may improve workplace efficiency, increase job commitment and reduce staff turnover. (Bierie, 2012b: 93) Bierie has studied the effect of intrusive noise, clutter and dilapidation in prisons on staff well-being. He found that harsher conditions were associated with reduced well-being, measured in sick leave use; change in alcohol and tobacco use; somatic symptomology; psychological symptomology; and personal worries. (Bierie, 2012b: 89) Staff members who perceived harsher prison conditions consumed more alcohol and smoked more often in the prior six

months. They were significantly more worried about aspects of their life outside of prison (e.g., money) and reported significantly higher psychological problems (e.g., concentration problems, depression). They also exhibited more physical problems, such as headaches, stomach aches and back pain. Prisons with better than average conditions recorded much fewer problems amongst staff, even if an individual staff member perceived poor conditions. (Bierie, 2012b: 92)

The physical environment may have an important influence on job satisfaction and commitment. A survey of office workers showed that there was a direct and positive effect of natural sunlight on job satisfaction, intent to quit, and well-being, although there was no effect for overall lighting. (Wener, 2012: 210).

Noise can also have significant effects on task performance, increase the likelihood of accidents on the job, as well as impair the level of cognitive functioning, including memory, reading, and vigilance. (Wener, 2012: 195). Prison staff in the USA have previously rated the noise levels as a concern and indicated that noise contributed to tension. (Wener, 2012: 198). Noise may also increase work stress, reduce job satisfaction, reduce attachment to the organization, and, in turn, increase turnover of officers. (Wener, 2012: 195) The added pressure of accomplishing tasks that are hindered by these conditions may generate additional strain and duress for staff. For example, intrusive noise, clutter and shabbiness is unpleasant for staff, and makes it more difficult for them to communicate and monitor inmates or their own safety. (Bierie, 2012b: 83) This may be particularly true if conditions also affect inmates, leading to additional workload pressure for staff members who must then control a stressed prison population. (Bierie, 2012b: 93)



Table 1

Literature Review of Prison Architecture and Design				
Study	Publication form	Study design and/or method	Sample	Country
Beijersbergen, K. et al. (2016) A Social Building? Prison Architecture and Staff–Prisoner Relationships.	Journal article	Observational cross-sectional, survey	1715 prisoners in 32 remand prisons	The Netherlands
Bierie, D. (2012) Is Tougher Better? The Impact of Physical Prison Conditions on Inmate Violence.	Journal article	Observational cross-sectional, survey	1738 staff in all (114) federal prisons	United States
Bierie, D. (2012) The Impact of Prison Conditions on Staff Well-Being.	Journal article	Observational cross-sectional, survey	1738 staff in all (114) federal prisons	United States
Brottveit, G. (2018) The Becoming of Punishment as an Unpredictable and Moveable Torment.	Book chapter	Qualitative, user-involved research cooperation	1 prisoner’s diary and letters over 4 years	Norway
Clancy, A. and Maguire, M. (2017) Prisoners and their children: An innovative model of ‘whole family’ support.	Journal article	Longitudinal pre-post quasi-experimental	83 benefitting prisoners with families + control group of 76 prisoners	United Kingdom
Dogbeh, A. et al. (2015) Field study of the indoor environment in a Danish prison.	Journal article	Observational, field study and survey	Measurements of indoor climate in 36 cells, survey of 31 prisoner	Denmark
Fransson, E. (2018) The Lunch Table. Prison Architecture, Action-forces and the Young Imprisoned Body.	Book chapter	Qualitative, participant observations, conversations with staff and youths	30 staff and six youth inmates	Norway

Literature Review of Prison Architecture and Design				
Study	Publication form	Study design and/or method	Sample	Country
Giofrè, F. (2018) Prisons and Architecture. The Italian Framework.	Book chapter	Descriptive, historical narrative analysis	N.A.	Italy
Goudard, A. et al. (2017) Sleep Disorders and Therapeutic Management: A Survey in a French Population of Prisoners.	Journal article	Observational cross-sectional, survey	358 prisoner in one prison	France
Grant and Jewkes (2015) Finally Fit for Purpose: The Evolution of Australian Prison Architecture.	Journal article	Descriptive, historical narrative analysis	N.A.	Australia
Hammerlin, Y. (2018) Materiality, topography, prison and ‘human turn’.	Book chapter	Interpretative, critical	N.A.	Norway

		theoretical analysis		
Hancock, P. and Jewkes, Y. (2011) Architectures of incarceration: The spatial pains of imprisonment.	Journal article	Interpretative, critical theoretical analysis	N.A.	Mainly United Kingdom
James, F. (2018) 'It's Important to Not Lose Myself' – Beds, Carceral Design and Women's Everyday Life Within Prison Cells.	Book chapter	Qualitative, participatory observation with interviews	3 prisoner	Norway
John K., (2018) Humanity Rather than Materialism – A Short Essay About the Prison Environment.	Essay, book chapter	Descriptive, narrative account	1 prisoner	Norway
Johnsen, B. (2018) Movement in the Prison Landscape: Leisure Activities – Inside, Outside and In-between.	Book chapter	Qualitative, observations, interview	Multiply observations, interview with 1 prisoner	Norway
Johnsen, B., Granheim, P. K and Helgesen, J. (2011) Exceptional prison conditions and the quality of prison life: Prison size and prison culture in Norwegian closed prisons.	Journal article	Observational, cross-sectional	1132 prisoners + 1078 staff in 32 closed prisons	Norway
Long, C., et al. (2011) Architectural change and the effects on the perceptions of the ward environment in a medium secure unit for women.	Journal article	Longitudinal pre-post non-experimental	9 patients and 16 staff in one unit	United Kingdom
Madoc-Jones, et al. (2016) Prison Building Does Size matter? A Re-Assessment.	Journal article	Observational, cross-sectional	124 HMI Prison reports on the conditions and treatment of prisoners	United Kingdom
Shammas, V.L. (2014), The pains of freedom: Assessing the ambiguity of Scandinavian penal exceptionalism on Norway's Prison Island.	Journal article	Qualitative, observations and semi-structured interviews	15 prisoner and unknown number of staff	Norway

Literature Review of Prison Architecture and Design

Study	Publication form	Study design and/or method	Sample	Country
Rice, J. and Lremy, L. (1998) Impact of Horticultural Therapy on Psychosocial Functioning Among Urban Jail Inmates.	Journal article	Longitudinal time series pre-post experimental	57 prisoners	United States
Rice, T. (2016) Sounds inside: prison, prisoners and acoustical agency.	Journal article	Descriptive, textual analysis	4 prisoners' personal text collections	United Kingdom
Richards, H. and Kafami, D. (1999) Impact of Horticultural Therapy on Vulnerability and Resistance to Substance Abuse Among Incarcerated Offenders.	Journal article	Longitudinal pre-post non-experimental	33 prisoners with substance abuse	United States

Söderlund, J. and Newman, P. (2017) Improving Mental Health in Prisons Through Biophilic Design.	Journal article	Descriptive, summarizing literature and practices	N.A.	N.A.
Tartaro, C. and Levy, M. (2008), Predictors of Suicide in New Generation Jails.	Journal article	Observational, cross-sectional	150 prisons	United States
Trusiani, E. and D'Onofrio, R. (2018) Prisons, cities, and urban planning: the Rebibbia prison in Rome.	Book chapter	Descriptive, description of prison site	1 prison	Italy
Vaaler AE and Morken G (2005), Effects of different interior decorations in the seclusion area of a psychiatric acute ward.	Journal article	Cross-sectional post-test only quasi-experimental	31 patients + 25 in control group. Follow-up evaluation on 200 patients	Norway
Wener, R. (2012). The environmental psychology of prisons and jails: creating humane spaces in secure settings.	Monograph	Descriptive, literature summary	N.A.	Mainly United States



Literature Review of Broader Institutional Settings

As a complement to the thematic analysis of literature in the field of prison services and forensic psychiatric care, research also included literature reviews from other institutional settings. Nine literature reviews were included in the study. All reviews were ranked based on their comprehensiveness, transparency and appraisal, and analyzed thematically.

Table 2 offers an overview of the reviews, detailing the rank of the evidence presented and the themes identified in each review. The evidence ranking is based on the methodological rigor of the review – in particular the quality assessment of included studies – and the transparency of the research process.

Four literature reviews received the highest evidence grade (+++). These papers have followed established systematic review guidelines and include a detailed methodology section. They include rigorous exclusion and inclusion criteria along with established quality assessment methods in the selection of articles for review, ensuring that only high-quality studies were reviewed. Two of these reviews focus on the effects of physical environment design in a healthcare setting. Dijkstra, Pieterse and Pruyn (2006) restricted their review to include controlled clinical trials focusing on physical environmental stimuli in a healthcare environment. Laursen and Rosenberg (2014) similarly included randomized control trials (RCTs) in their review, as these are understood to provide best evidence according to established review methodology in health care science. (Laursen & Rosenberg, 2014:109). The result of this screening strategy is that fewer studies are included (30 and 14 studies respectively). The third systematic literature review conducted by Ulrich (2017) focuses on rehabilitative environments within special residential homes for young people (*särskilda ungdomshem*). The author conducted a rigorous quality control of inclusion criteria to identify articles that could improve evidence-based policy for the Swedish National Board of Institutional Care (*Statens institutionsstyrelse, SiS*). Although lower quality studies are included, the author clearly acknowledges methodological limitations making it possible to determine the evidence level for each finding. Although the review by Joseph, Choi and Quan (2016) on the effects of environmental design in residential care homes for the elderly included some studies with lower study design quality, the review has been assessed as meeting the highest evidence grade as the authors indicate findings that are presented in these articles and have conducted a quality assessment on the 66 studies reviewed.

Two articles received the medium evidence grade (++) . While these articles are described as systematic literature reviews and include comprehensive search strategies, the level of transparency in the quality assessment process is lower, making it difficult for readers to understand the level of evidence in the findings. Gharaveis, Hamilton and Pati's review (2018) lacks transparency and, according to the authors, no established quality assessment tools were used. (Gharaveis, Hamilton & Pati, 2018:122). The authors claim that they rated the quality of the studies included using Pati's ranking, which places meta-analysis at top and consensus opinion of respected authorities at the bottom of the evidence scale (Pati, 2011: 61); however it is not possible to link the sources of specific findings in their analysis.

The conclusions state that no randomized studies were included, which lowers the level of evidence according to their own standard. (Gharaveis, Hamilton & Pati, 2018: 132) Connellan et al. (2013) similarly do not account for which method of quality control was used in selecting articles. Their synthesis is a thematic narrative which does not account for the strength of their findings.

The remaining three studies have not followed a systematic methodology and the findings from these are therefore categorized as being of lower evidence (+). Common to these reviews is the absence of a clear methods section, making it difficult to determine which articles were selected for review and why. Roush (2002) conducted a review of both published and unpublished material, whilst the review by Pressly and Heesacker (2001) includes both research studies as well as theoretical papers. (Pressly & Heesacker, 2001: 158-160) The review by Wener (2006) is somewhat unclear in terms of the screening procedure in selecting articles for review. Wener states that more than 30 research reports exist on the subject of direct supervision facilities – including case studies and cross-sectional and longitudinal comparative studies – although it is not clear if all of these studies are included in the review, and it is difficult to determine the level of quality of the studies referenced.

Table 2

Review of literature within broader Institutional Settings		
Study	Evidence value	Themes
Dijkstra, K., Pieterse, M. and Pruyn, A. (2006). Physical environmental stimuli that turn healthcare facilities into healing environments through psychologically mediated effects: systematic review. <i>Journal of Advanced Nursing</i> , 56(2), pp.166-181.	+++	Lighting, Nature, Temperature and smell, Sound, Floor plans
Joseph, A., Choi, Y. and Quan, X. (2016). Impact of the Physical Environment of Residential Health, Care, and Support Facilities (RHCSF) on Staff and Residents: A Systematic Review of the Literature. <i>Environment and Behavior</i> , 48(10), pp.1203-1241.	+++	Size, Nature, Density, Lighting, Floor plans, Interior design
Laursen, J., Danielsen, A., & Rosenberg J. (2014). Effects of environmental design on patient outcome: A systematic review. <i>Health Environments Research & Design Journal</i> , 7(4), pp. 108–119.	+++	Sound, Nature, Lighting, Interior design
Ulrich, R. (2017). Litteraturöversikt -evidensbaserade designrekommendationer för SiS ungdomshem. <i>SiS Vårdmiljö: En Guide För Lokalutveckling 2017</i> , 9, institutional care in focus, 120-161.	+++	Density, Floor plans, Interior design, Nature, Lighting, Sound
Connellan, K., Gaardboe, M., Riggs, D., Due, C., Reinschmidt, A., and Mustillo L. (2013). Stressed spaces: Mental health and architecture. <i>HERD: Health Environments Research & Design Journal</i> , 6(4), pp. 127-168.	++	Lighting, Nature, Temperature and smell, Interior design

Review of literature within broader Institutional Settings		
Study	Evidence value	Themes
Gharaveis, A., Hamilton, D. and Pati, D. (2018). The Impact of Environmental Design on Teamwork and Communication in Healthcare Facilities: A Systematic Literature Review. <i>HERD: Health Environments Research & Design Journal</i> , 11(1), pp.119-137.	++	Floor plans, Lighting

Review of literature within broader Institutional Settings		
Pressly, P. and Heesacker, M. (2001). The Physical Environment and Counseling: A Review of Theory and Research. <i>Journal of Counseling & Development</i> , 79(2), pp.148-160.	+	Lighting, Interior design, Temperature and smell, Sound
Roush, D. (2002). The Relationship Between Group Size and Outcomes in Juvenile Corrections: A Partial Review of the Literature. <i>Journal for Juvenile Justice and Detention Services</i> , 17(1), pp.1-18.	+	Size, Density
Wener, R. (2006). Effectiveness of the Direct Supervision System of Correctional Design and Management. <i>Criminal Justice and Behavior</i> , 33(3), pp. 392-410.	+	Floor plans

[A copy of the original research paper can be viewed on the EuroPris website.](#)



7.0 Conclusion

Prisons function 24 hours a day, 365 days a year, are places of work for staff and prisoners; and are charged with providing opportunities, education and skills development, healthcare, behavioural interventions, accommodation, food, contact with family together with a range of other needs. By their nature, prisons are generally configured to be closed, restricted communities. The way they look, feel are designed and built has an enormous impact on those inside. The nature of this impact will depend upon a range of factors that include whether the spaces allow for strategies of choice to be facilitated. Can they offer people appropriate choice with regard to levels of autonomy; can they create the right conditions to care for an increasing population of older people and those with multiple needs; and are they able to signal to those who live and work in prison that they are valued and to those inside that they have a role to play in the wider community upon release.

Our understanding of how buildings affect behaviour, health and well-being is still poorly understood. A growing body of evidence, as demonstrated within this report, indicates that design and architectural choices made to the physical environment do have a significant impact on the health and well-being of individuals. What we do know is that the design decisions that we make at the outset have a long-lasting influence on life within prisons, both good and bad. It is therefore important – for all those who work, visit and are detained in prison - that we invest our energies into achieving the best possible design outcomes.

Unfortunately, evidence-based research on how architecture and design influence well-being and recidivism amongst prisoners is very limited. The bulk of available data is drawn from the health and education sectors. On average prisons routinely retain individuals within their buildings for much longer periods of time than in either a healthcare or education setting. It is therefore all the more important for society and the wider prison community to have a much clearer understanding of the design choices which can improve an individual's mental and physical well-being.

The body of existing research points to the creation of normalized living conditions as offering the single most effective factor to improve the well-being of prisoners and forensic care patients. Fundamentally, this is about empowering individuals to make their own choices in a less institutional and more normalized living environment. Typically, this includes examples where prisoners can control their own lighting, walk-in and out of their rooms when they want, and live in environments which allow greater levels of personal independence and self-determination. It can also extend to other areas like being able to allow individuals to make their own meal selection, booking their own visits or an appointment with the healthcare unit. These are all small tasks that – accumulated together - can help better prepare individuals for a life outside prison and smooth a prisoner's transition to a life back in mainstream society, moving away from a reliance on the institution doing everything for you.

Some of the design considerations within this report can be easily and readily implemented without significant cost – like the introduction of greening - it is important for individual prison authorities to consider how best to implement the measures identified.

Applying the Principles in Practice

In sharing knowledge and best practice across national boundaries the expert group outline a number of practical considerations that should be considered whenever the prison community is implementing ideas outlined from this report:

One Size does not fit All By and large the challenges and issues faced by the prison community are common to all. However, the differing nature of each country's political, cultural and financial situation means that a single uniform silver bullet approach is never going to be the answer.

Whenever implementing on guidance material it needs to be considered and implemented by each country in the context of their own political, cultural and/or financial situation.

Balancing Regime and Design It is true that good regimes can exist in poorly designed buildings (i.e. the regime can still function well despite a poorly configured layout). It is also true to say that the regime would perform even better if the building was more supportive.

It is also equally true that the most efficiently designed and supportive designs cannot achieve all they were expected to deliver in the absence of an effective regime. In other words, the building alone cannot provide all the answers it has to be complimented with an effective regime.

Counting the Cost / Benefit The adage 'Prevention-is-better-than-cure' is particularly important whenever trying to justify the value of investing in rehabilitative measures.

Whilst a lot of the information contained within this report can be implemented without compromising funding streams there will inevitably be occasions where designing for rehabilitation may require an initial financial outlay above that of the traditional approaches adopted by the prison community.

The importance of the longer-term benefits of 'rehabilitation' on society and returning individuals to a life which doesn't place the level of demands/costs on society if they were not rehabilitated needs to be captured/ explained/ justified to a wider financial/political audience.

8.0 Recommendations

Based on a growing body of evidence it is clear that the design of the physical environment does impact on the health and well-being of individuals. As a result, there is a need to look at how prisons can be designed to promote supportive therapeutic environments which contribute to an individual's physical and mental well-being and ultimately aid their rehabilitation

Given the extended periods of time, relative to any other sector, that individuals remain within the prison system and the high levels of mental health disorders amongst those entering prison there is a societal and moral obligation on the prison community to focus on tackling these issues and work towards the creation of effective rehabilitative environments.

For the long-term well-being of those in the care of the prison community the Europris Real Estate expert group recommends the following measures:

1. Firstly, the design considerations identified within this report should be adopted and implemented within prison policies and deployed whenever opportunity arises in the extension, refurbishment or expansion of each countries prison estate, and
2. Secondly, there should be a commitment to a coordinated research effort to build evidential data, within a prison environment, to further strengthen knowledge and ultimately improve the outcomes for all those who work or are looked after within our prisons.



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