Pockets of Peace

Multi-sensory environments for young adults on the autism spectrum.

By Rebecca Lockley

A 120 point thesis submitted to the Victoria University of Wellington in partial fulfilment of the requirements for the degree of Masters of Interior Architecture (MIA).

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“The world that people who are autistic inhabit isn’t just indescribable; in many ways it’s unknowable.”

- Tim Nudd
Acknowledgements

Thank you to my *mum*, *dad* and *brother* for your constant support, confidence and understanding throughout the years.

Thank you to my *friends* for the adventures, distractions and de-stressing sessions.

Thank you to my supervisor *Philippe* for your wisdom, expertise and calming influence.
Abstract

The transition between adolescence and adulthood can be an emotionally and physically challenging time for everyone. This period of time is especially challenging for those who are on the autism spectrum as the change from a structured and supportive system to full independence can be sudden and unfamiliar. Unfortunately, there is little to no support systems in place to help aid young adults on the spectrum with this transition. Pockets of Peace explores how interior architecture can be used to help aid the well-being of young adults on the autism spectrum by creating a controllable and interactive multi-sensory experience that aims to cater to the vast diversity within autism.

The questions surrounding the design process were how to design for the vast diversity within autism, as well as how to improve the well-being of the users by reducing anxiety and stress without introducing negative behaviours and reactions. The method of tackling these uncertainties was to test the design in three ways, through the urban environment, within a program and through mass production. Each stage of the design produced different questions and limitations surrounding the design's effectiveness, which were then carried through to the next stage of the design to help aid development and to try and solve the questions and reduce the limitations. The final outcome of this project will be a set of design guidelines aimed as a guide to help future designers. These design guidelines will provide an important framework for autism design as well as contribute to the interior architecture discipline. By continuing this process, there will be a greater public understanding of autism as well as how design can either positively or negatively affect the daily lives of those who are on the autism spectrum.
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“Not being able to speak was utter frustration. If adults spoke directly to me I could understand everything they said, but I could not get my words out. It was like a big stutter. If I was placed in a slight stress situation, words would sometimes overcome the barrier and come out.”

- Temple Grandin

Introduction

For people who are on the autism spectrum everyday sensory sensations can negatively affect their well-being. Sensory stimulations such as hot showers, the noise of someone eating, bright and or flashing lights, strong perfumes, unfamiliar environments and new clothing are just some examples of everyday activities and sensory sensations that for people who are on the autism spectrum can be uncomfortable, unpleasant and in some cases too extreme to handle. As Temple Gradian states, "Being autistic does not mean being inhuman. But it does mean being alien (Schopler, Mesibov, and SpringerLink (Online service) 1992, 145)."
People who are on the autism spectrum struggle with sensory integration, which means that they are unable to receive information from their senses collectively. This vulnerability causes social and sensory overstimulation, driving the behaviours we associate with autism. Often people on the spectrum struggle to form connections with others leaving them feeling isolated and lonely. A large majority of individuals on the spectrum experience some type of mental health problem, the most common being anxiety or depression. The transition from teenager to young adult can be a demanding time for most people when a range of physical, interpersonal, educational and other difficulties occur, which can create challenges. These challenges are often intensified for young people who are on the spectrum. There is currently little to no support to promote independence of young adults who are on the spectrum and it is often left to parents to fill in the supportive gaps, leaving them feeling rejected by society and lonely.

As Therese May explains, “I have been rejected because others view me as so peculiar. I still have a lot of autistic behaviours that are visible to other people. I am still viewed by many as mentally retarded. I want to help bring autism out of the closet. Many autistic people are in institutions for life. I think that they deserve better treatment (Schopler, Mesibov, and SpringerLink (Online service) 1992, 303).”

It is a well-known fact that how architects and designers create environments can make a considerable and significant change to a user’s well-being. Multi-sensory environments, which will be discussed later on in the text, are designed to stimulate as well as calm the senses for those who have multi-sensory difficulties, including people who are on the autism spectrum. These environments promote well-being by creating a relaxing and calm atmosphere and can also help to generate emotions, especially pleasure through interactive features. Pockets of Peace explores how interior architecture can be used to help aid the well-being of young adults on the autism spectrum by creating a controllable and interactive multi-sensory experience that aims to cater to the vast diversity within autism.
Two testing sessions were planned to test the design at different stages of the design phase but unfortunately never occurred. This was due to a lack of interest in participation from the autism community. The aim of the testing sessions was to observe the participants interacting with the different sensory aspects of the design. This was to help aid in development and to give an insight into how people on the autism spectrum would interact and react to unfamiliar environments and interactive sensory objects. Due to the lack of participation the sensory and well-being aspects of the designs have been derived from research and informal chats but these aspects have never been proven to work through testing. This creates a limitation in the effectiveness of the design to encourage positive well-being.

Young adults on the autism spectrum have a vast diversity of individual areas of strengths and weakness which can make it extremely hard to create a design that will accommodate everyone who is on the spectrum. Although there are interactive and changeable aspects within the design, these aspects are limited to a relatively small number of changes which may only suit a finite number of young adults on the spectrum. This reduces the number of young adults that the design would accommodate for.

Only three of the most common sensitivities were designed for, tactile, visual and auditory, the other sensitivities were documented but never part of the design brief. It is unknown whether this will limit the number of users who will benefit from interacting with the space.

The sites that have been chosen throughout the design process have limitations surrounding the range of users who will be able to use the space due to their locations. The sites are in public and semi-public locations in the Wellington Central Business District. The limitations due to the selection of sites means that the spaces will accommodate for people who tend to be more on the higher end of the autism spectrum rather than people who are on the lower end of the autism spectrum who require more assistance with their individual needs.
Scope

The design of a single use multi-sensory environment within the Wellington CBD that is created specifically for young adults who are on the autism spectrum.
How can we create a specific interior architectural space for a multi-sensory experience to improve the well-being of young adults on the autism spectrum and to accommodate to their individual diversity?

Research question
Research
The three-key area of research will be *Part A*, Context of Autism, *Part B*, Well-being and *Part C*, Interior Architecture.

The first design will be informed from the common factors, sensitivities research and potential spatial qualities discovered within these three areas of research.
Context of Autism
Part A, Context of Autism
“The world that people with autism inhabit isn’t just indescribable; in many ways its unknowable.”

- Tim Nudd
Autism is a complex lifelong neurodevelopmental disorder that can lead to various dysfunctions in emotional regulation, cognition, social interaction and communication skills as well as repetitive behaviours and interests (Kashefmehr, Kayihan, and Huri 2017; Grynszpan et al. 2014; Brown and Rankin 2017). These dysfunctions can lead to difficulties in improving and gaining the skills needed to develop, maintain and understand relationships with others, as well as difficulties managing and learning daily life skills (American Psychiatric Association and American Psychiatric Association. DSM-5 Task Force 2013; Duncan et al. 2017). Each person affected by autism will have different conditions and effects, this leads to a large diversity in the individual areas of strengths and areas of additional support needed for each individual on the autism spectrum (Noble 2019).

For people who are on the autism spectrum, sensory information is perceived more intensely, meaning that the threshold for sensory overload is lower for people on the spectrum than it is for the general population (Noble 2019). For example, for someone who is on the autism spectrum a reaction could be easily caused by an everyday noise such as a large truck driving past or a large group of noisy people, this effect is similar to a fire alarm to most people who are not on the spectrum. For someone on the autism spectrum interacting with the environment can be a particularly demanding activity. The brain is tasked with both quickly and simultaneously processing very complex multi-sensory information and for people on the spectrum this processing can prove to be too much (Gomot and Wicker 2012). This often leads to people who are on the autism spectrum to become isolated as the world outside of their predictable and secure home environment becomes a place they do not want to venture into, simply because of the intensity of the stimulation they will face (Ulajrevic, n.d.).
Living with autism can be confusing, frightening and can lack life meaning. Being on the spectrum can also lead to unwanted feelings of isolation and of being an outcast (Kitson-Reynolds, Kitson, and Humphrys 2015). As well as feelings of isolation, stress and anxiety are constantly present for people on the autism spectrum (Uljarevic, n.d.). It is unknown why anxiety is so frequent with people who are on the autism spectrum and whether the anxiety they struggle with is actually a by-product of being on the spectrum, or if it is due to the constant intensity of the sensory information they are receiving on a daily basis (Uljarevic, n.d.). Anxiety can be a powerful factor for people who are on the autism spectrum and can often control and contribute to their behaviours. These behaviours are often increased when they are in environments that are unfamiliar, unpredictable and stressful (Uljarevic, n.d.).

In China, people on the autism spectrum are called “children of the stars because they are as lonely and isolated as the stars in the night sky.”

- Huang Lanlan
The diversity within the autism spectrum

No two people who are on the autism spectrum are the same, this is due to the vast spectrum within autism. Anyone who is on the autism spectrum can ‘sit’ anywhere along this spectrum. A person can also experience their own unique and diverse struggles in certain areas such as language skills, chosen approaches to communication, motor skills, perception, executive functioning (attention skills), organising, planning, emotional regulation, understanding different points of view, self-monitoring and the ability to perceive and process sensory information.
Figure 1. Re-created by author
Additional learning difficulties

Other additional learning difficulties can also become further burdens for people who are on the autism spectrum.
Third party content.
Please consult the print version for access.
Everyday discomforts

For people who are on the autism spectrum everyday sensory sensations can negatively affect their well-being. Everyday activities and sensory sensations can be uncomfortable, unpleasant and in some cases too extreme to handle.
Possible sensory trigger
Intense World Theory

“Would lead to an experience of the world as intense, fragmented, and overwhelming.”

- NewsRx
For decades, people who are on the autism spectrum have been viewed as having a form of mental retardation, a brain disease that destroys their ability to learn, feel and empathize, which leaves them disconnected from the complex and ever-changing social and sensory surroundings (NewsRx 2015). Thankfully perceptions and understandings have progressed and many theories and hypotheses have arisen since the 1990’s when there was a considerable change in awareness (Nuwer and Spectrum n.d.).

A relatively new theory, called The Intense World Theory proposed by neuroscientists Kamila Markram and Henry Markram in 2007, unifies multiple theories and hypotheses about the different disorders found within autism and it has received enthusiastic responses from the autism community (K. Markram and Markram 2010; NewsRx 2015). This theory is important because it offers a drastic shift in the clinical approach to autism. This shift moves away from the pre 1990’s idea that an autistic brain is damaged and requires extensive stimulation to ‘un-damage it’, which can cause discomfort and a sensory overload (NewsRx 2015). Intense World Theory proposes that autistic traits emerge when a molecular syndrome is activated which causes gene expression pathways to become sensitised and responds excessively to environmental stimulation (K. Markram and Markram 2010). This can cause the sensory aspects of the surrounding environment to become excessively intense, forcing the person to exhibit the behaviours and cognitive abilities we associate with autism as a coping mechanism to try and handle the intensity, rather than the behaviours being the symptoms of autism (K. Markram and Markram 2010; Gomot and Wicker 2012). The Intense World theory proposes that autistic brains are hyper-functional and require environments that have controlled stimulation that is structured, secure and tailored to suit the particular individual’s sensitivities in order not to overload the brain which causes the behaviours we associate with autism.
The lack of social interaction that is commonly associated with people who are on the autism spectrum may be due to the fact that there is a range and sequence of social cues during social interactions that can become too intense for someone on the spectrum to handle at one time, causing reactions like avoiding eye contact, withdrawing from social interactions and stopping communication as coping mechanisms for the uncomfortable intensity of the situation (H. Markram, Rinaldi, and Markram 2007). This sensitivity to stimulation would lead to an experience of the world for people who are on the autism spectrum that is intense, fragmented and overwhelming, forcing people on the spectrum to become trapped in an internal world where it is more secure with minimal sensory extremes and surprises (NewsRx 2015). The Intense World Theory goes on to state that people who are on the spectrum require environments that are secure, non-surprising, structured and tailored to the individual sensitivities, explaining why people who are on the autism spectrum prefer to stay in their secure and familiar home environments rather than venture out into the public environment where it is less secure and unpredictable (NewsRx 2015).

“The autistic is proposed to become trapped in a limited, but highly secure internal world with minimal extremes and surprises.”

- Kamila and Henry Markram
Design aim

To create a controllable space. This will allow the user to tailor the environment to their individual needs, creating a predictable and calm environment that will make the user feel safe.
Expressions of the text

Each model is an expression of the research in this chapter. They represent the emotive thoughts experienced in the writing of part A, Context of Autism.
The world through their eyes

Expressive paintings were created using bold and contrasting colours as an interpretation of how people on the autism spectrum may experience the world and its intense incoming sensory information.
Well-being
Quality of Life

“My autism has held me back from some things in this life, including close relationships and job advancements.”

- E. Schopler, G.B. Mesibov and SpringerLink
Individuals who are on the autism spectrum have coexisting conditions that may negatively affect the individual's quality of life (Ayres et al. 2017). Many people on the autism spectrum can have difficulty completing and managing daily living skills such as cooking, cleaning, buying groceries and personal hygiene (Tavernor et al. 2013; Duncan et al. 2017). According to a study done by Duncan et al, Preliminary Efficacy of a Daily Living Skills Intervention for Adolescents with High-functioning Autism Spectrum Disorder, 56% of high functioning autistic individuals lived with their parents while only 12% were living independently. Only 54% of these adults who were high-functioning had a paid full-time or part-time job, the remainder were either unemployed or volunteers. Poor daily living skills are associated with poor quality of life for adults on the autism spectrum and can lead to difficulties regarding social interactions, challenges around employment and feelings of isolation and loneliness which can lead to mental health issues (Ayres et al. 2017; Schopler, Mesibov, and SpringerLink (Online service) 1992; Duncan et al. 2017). There is currently little to no support to promote independence of young adults and adults who are on the autism spectrum and it is often left to parents to fill in the gaps in the daily living skills (Duncan et al. 2017). Therese Marie Ronan shares her experiences as a person on the autism spectrum and how it has affected her as an adult, “my autism has held me back from some things in this life, including close relationships and job advancements. I have never learned how to drive, and some say that I never will. These are unfair limitations that drive me bananas (Schopler, Mesibov, and SpringerLink (Online service) 1992, 303).”

There is no universally accepted definition or model of quality of life when assessing people who are on the autism spectrum, typically the quality of life of people on the autism spectrum has been measured against the quality of life for people of the same age who are not autistic, which is an unfair comparison (Tavernor et al. 2013). People who are on the spectrum have different interests and enthusiasm from people who are not autistic, this means that the testing/subject criteria should be different for people who are on the spectrum and for people who are not, currently it is the same (Biggs and Carter 2016). For example, interpersonal relationships and recreational activities may not be perceived as important by people who are on the autism spectrum, who prefer specific activities and time alone over recreational activities which may cause stress and social anxiety (Tavernor et al. 2013; Ayres et al. 2017).
Sensory responses

“Smells like deodorant and aftercare lotion, they smell so strong to me I can’t stand it, and perfume drives me nuts.”

- M. O’Neill and R. S. P. Jones
People who are on the autism spectrum have abnormal responses to incoming sensory information from the surrounding environment. People who are on the spectrum have difficulties with sensory integration meaning that they are unable to receive information from their senses collectively, this causes social and sensory over stimulation which drives the behaviours we associate with autism (Gaines, Bourne, and Pearson 2016; NewsRx 2015). Interacting with the environment can be a particularly demanding activity because the brain has to quickly and simultaneously process complex multi-sensory information, processing the most relevant information for adaptation with the surrounding environment and conditions. For people who are on the autism spectrum it becomes extremely difficult for them to adapt with a changing environment due to the abnormal responses to sensory information (Gomot and Wicker 2012). Sudden changes in their surrounding environment can cause the change in scenario to become intensely invading causing a sensory overload. This leads to physical symptoms such as headaches, anxiety, panic attacks, aggression, social withdrawal and repetitive behaviors such as rocking or hand flapping, or it does the opposite and the changes go unnoticed (Pellicano and Burr 2012; Brincker and Torres 2013). As explained by K. Markram and Markram's, a predictable environment is perceived as safer and calmer due to the lack of surprising stimuli, a non-predictable environment can lead to a wider range of negative symptoms. How sensory information is perceived can be categorized as either hypo-sensitivity, numb to stimulation or hyper-sensitivity, over sensitive to stimuli. Often people on the autism spectrum can fluctuate between the two unpredictably. This can lead to sensory ‘tune outs’, where vision or sound can disappear and then returns again, multichannel perceptions, where sounds can also provoke a smell or a sensation of colour, sensory overloads and difficulties processing and identifying the sensory information that is coming through the different senses (O’Neill and Jones 1997).
The three most common sensory sensitivities are visual, auditory and tactile, each sense can be either hypo or hyper-sensitively received. There are also fewer common instances of hyper or hypo sensitivities in vestibular movement (movement and balance), proprioception (awareness and movement of the body) and the ability to sense the position of their body in space (Gaines, Bourne, and Pearson 2016). Sensitivity to change in the surrounding environment is a fundamental condition of autism that will be a consistent treatment-resistant symptom which can stop an individual from adapting. New stimuli such as new clothing, sounds or environments should be introduced to someone who is on the autism spectrum slowly so that they are able to become familiar with it, surrounding someone who is on the spectrum with multiple new stimuli can become overwhelming and can cause negative reactions (Gomot and Wicker 2012).

“Fabrics dangled in front of me in my dark cupboard, the security of my chosen darkness. Here the bombardment of bright light and harsh colours, of movement and blah-blah-blah, of unpredictable noise and the uncontrollable touch of others were all gone.”

- M. O’Neill and R. S. P. Jones
Sensitivities

“My eyes are very sensitive to light, and I squint as a result. This has been one of my major stumbling blocks.”

- Anne Carpenter
<table>
<thead>
<tr>
<th>Auditory sensitivity</th>
<th>Tactile sensitivity</th>
<th>Visual sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditory sensitivity is the most common sensory trigger for people on the spectrum and can create sensitivity to loud noise or obliviousness to surrounding noises. Sensitivity to loudness and reverberation can affect people who are auditory sensitive and should be considered when designing for people who are on the autism spectrum (Gaines, Bourne, and Pearson 2016).</td>
<td>Tactile sensitivity is the second most common sensitivity after auditory. People who have tactile sensitivity often seek deep pressure sensations as a form of comfort but are resistant to being touched. Soft textures and weighted blankets are often used to calm and comfort people who are affected by tactile sensitivity (Gaines, Bourne, and Pearson 2016).</td>
<td>Visual sensitivity for people who are on the spectrum can be thought of as having a visual impairment because it can cause them to be disturbed by bright lights, distracted by movement or fixated on certain objects. It is less common than tactile and auditory sensitivities. Colour, light and space organization are three visual factors that can impact the behaviour of people who have visual sensitivity (Gaines, Bourne, and Pearson 2016).</td>
</tr>
</tbody>
</table>
Sensitivities table

This table shows the three sensitivities that the design will be focused around, auditory, tactile and visual. Also documented are the contrasting hypo-sensitive and hyper-sensitive behaviours and how they can be displayed in a number of different ways. Each sensitivity has a potential spatial quality that can be used to accommodate either for the hyper or hypo-sensitive behaviours.
<table>
<thead>
<tr>
<th>Sensitivities</th>
<th>Hyper-sensitivity behaviours</th>
<th>Hypo-sensitivity behaviours</th>
<th>Potential spatial qualities/conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Auditory sensitivity</strong></td>
<td>- Can be easily distracted by background noises.</td>
<td>- Does not respond if their name is being spoken.</td>
<td>- Creating a quiet space.</td>
</tr>
<tr>
<td></td>
<td>- Overreacts to sounds.</td>
<td>- Seems to be oblivious to sounds in the surrounding environment.</td>
<td>- Do not have multiple sounds.</td>
</tr>
<tr>
<td></td>
<td>- Has unpredictable reactions to noises.</td>
<td>- Creates constant sounds to stimulate themselves.</td>
<td>- Sound is able to be controlled and changed, melodies, different sounds or instruments, through an interactive sound system.</td>
</tr>
<tr>
<td></td>
<td>- Puts hands over ears to block out certain sounds.</td>
<td>- Does not react to sounds that indicate potential danger.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Screams or cries at certain sounds in the surrounding environment.</td>
<td>- Does not respond to any type of sound.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Responds physically if the sound is perceived as a threat.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Tactile sensitivity</strong></td>
<td>- Does not like to be touched.</td>
<td>- Does not understand the concept of personal space.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Avoids doing tasks that have strong tactile elements e.g. clay, food preparation, water.</td>
<td>- Does not notice the touch of others.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Finds clothing uncomfortable and will not wear certain types of clothing that creates too strong of a sensation.</td>
<td>- Frequently puts things in their mouth for texture and taste.</td>
<td>- Soft furnishings.</td>
</tr>
<tr>
<td></td>
<td>- Responds negatively to textures in food, toys and furniture.</td>
<td>- High pain threshold which can make them unaware to danger due to a low response to pain.</td>
<td>- Has a dedicated space where there are a range of different textures that can be interacted with but can also be avoided.</td>
</tr>
<tr>
<td><strong>Visual sensitivity</strong></td>
<td>- Disturbed by bright lights.</td>
<td>- Unaware of the presence of other people around them.</td>
<td>- No bright lights.</td>
</tr>
<tr>
<td></td>
<td>- Avoids sunlight.</td>
<td>- Unable to locate desired objects or people.</td>
<td>- Lighting colour and intensity is able to be controlled.</td>
</tr>
<tr>
<td></td>
<td>- Follows any movement that enters their field of vision.</td>
<td>- Loses sight of people or objects when they move.</td>
<td>- Interactive display system that can display a range of moving scenes, colours or static images.</td>
</tr>
<tr>
<td></td>
<td>- Covers parts of their field of vision, e.g. with hands.</td>
<td>- Cannot distinguish figure-ground relationships, identifying a figure from the background.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Blocks field of vision.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Responds physically to the appearance of certain objects or colours.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This table has been reworked by the author from Gaines, Bourne, and Pearson, 2016, *Designing for Autism Spectrum Disorders*. 
Mental Health

“Many young autistic people felt that their mental health problems resulted from the pressure to act ‘normal’ in a neurotypical world.”

- L. Crane, F. Adams, G. Harper, J. Welch and E. Pellicano
Mental health problems are common for people who are on the autism spectrum (Crane et al. 2019). Approximately 70% to 80% of individuals who are on the autism spectrum experience some type of mental health problem, the most common being depression or anxiety (Crane et al. 2019). People on the spectrum who have a greater self-awareness of their social struggles and isolation from society are more likely to experience more negative emotions surrounding the overwhelming pressure they feel to be ‘normal’, which can lead to a higher level of anxiety and depression (Strang et al. 2012). Characteristics that are associated with autism can also be associated with symptoms of depression, such as social withdrawal, sudden loss in interests and sleep problems. It is also unknown if depression presents itself differently in people who are on the spectrum, these factors make depression hard to diagnose in people who are on the autism spectrum (Crane et al. 2019). Many people who are on the spectrum do not acquire the language skills to verbalise negative changes in their mood that are related to depression and if they do, then they have difficulty detecting or talking about these complicated emotions. This means that it is often up to the carers and clinicians to detect potential cases of depression, which can be problematic (Stewart et al. 2006). The transitions from teenager to young adult can be a challenging time for most, a range of physical, interpersonal, educational and other changes occur that can create challenges, these are often elevated for young adults who are on the spectrum (Biggs and Carter 2016). Many young adults who are on the autism spectrum are unsure whether the difficulties they are facing during this transition period are due to their autism or due to a mental illness, such as depression or anxiety. Many young adults can tell that they are experiencing mental health problems due to an aggravated change in their autistic traits, but for others this worsening of their traits could be due to other circumstances (Crane et al. 2019).
An Inside View

“Screaming was the only way I could communicate. Often I would logically think to myself, “I am going to scream now because I want to tell somebody I don’t want to do something.”

- Temple Grandin
Professor Temple Grandin, expert of animal science at Colorado State University, is one of the first individuals on the autism spectrum to publicly share her personal insights into her life as someone who is on the spectrum. Professor Grandin is hypersensitive to loud noises and touch, “Mother reported that sometimes I acted like I was deaf. Hearing tests indicated that my hearing was normal. I can’t modulate incoming auditory stimulation (Schopler, Mesibov, and SpringerLink (Online service) 1992, 107).” Like many people who are tactile sensitive, Grandin craves deep pressure sensations. At the age of 18 she built herself a squeezing machine to satisfy her desire for a deep pressure sensation without being touched by someone else (Figures 3 & 4). The machine allowed her to control the length and strength of the pressure sensation and helped her to relax by relieving some of her anxiety.

As a teenager she suffered from constant anxiety that began once puberty started, “the “nerves” were almost like hypersensitivity rather than anxiety. It was like my brain was running at 200 miles an hour, instead of 60 miles an hour (Schopler, Mesibov, and SpringerLink (Online service) 1992, 111).” Her tactile sensitivity means that she is unable to adapt to different types of clothing as quickly as other people. It usually takes her three to four days to fully adapt to the new fabrics.

“As a child in church, skirts and stockings drove me crazy. My legs hurt during the cold winter when I wore a skirt. The problem was the change from pants all week to a skirt on Sunday. If I had worn skirts all the time, I would not have been able to tolerate pants (Schopler, Mesibov, and SpringerLink (Online service) 1992, 108).”

Temple’s insights into her personal life have helped people who were not on the spectrum understand what life can be like for people who are on the spectrum as well as helping to raise awareness of autism.
“My hearing is like having a hearing aid with the volume control stuck on “super loud.” It is like an open microphone that picks up everything. I have two choices: turn the mike on and get deluged with sound, or shut it off.”

-Temple Grandin
Design aim

To create a space where young adults on the autism spectrum can remove themselves from an environment that is overstimulating and demanding of their senses, creating constant anxiety and negative reactions.
Expressions of the text

Each model is an expression of the research in this chapter. They represent the emotive thoughts experienced in the writing of part B, Well-being.
Interior Architecture
Part C, Interior Architecture
Multi-sensory environments

“A Snoezelen room is not treatment, therapy, or a place specifically for learning. It is simply a spa for the senses.”

- Lisa Tran
A multi-sensory environment is designed to stimulate as well as calm the senses for those who have multi-sensory difficulties, including people who are on the autism spectrum (Tran 2009). The environment is usually used by one or multiple people at a time with the stimulation being controlled by the user to suit their individual needs, this also helps to create novel sensations as well as a feeling of safety (Fava and Strauss 2010). These environments help to soothe those who are overly excited while stimulating those who are unengaged, this is achieved by calming or invigorating the tactile, visual and auditory senses of the user (Tran 2009). The multi-sensory environment promotes well-being by providing a relaxing environment and a calming atmosphere, the interactive stimulations experienced in the environment can also help to generate emotions, particularly pleasure (John 2017). A multi-sensory environment is not structured, and the interactions are not restricted, this allows for the user to interact freely and to have natural responses to the stimulation. The environment allows for sensory skills to be developed while also relieving stress and anxiety (Daljevic 2013). These environments are not restricted to any age or specific diagnosis and can be used by both children and adults (Daljevic 2013). There is some debate within research as to whether regular time spent in a multi-sensory environment has any long-term effects or whether it's affects are limited to the time spent in the environment. Kaplan in Snoezelen Multi-Sensory Environments: Task Engagement and Generalization, concludes that regular time spent in a multi-sensory environment will gradually improve the behaviour of people who are on the autism spectrum, while McKee in Effects of a Snoezelen Room on the Behavior of Three Autistic Clients, proposes that although the participants enjoyed their time in the multi-sensory environment that there was no distinguishable change in their behaviour before and after the experiment.
The origin of the multi-sensory environment is the Snoezelen room, it has only more recently been commonly referred to as a multi-sensory room or a multi-sensory environment (Figure 5.) (John 2017). The Snoezelen room was developed in the Netherlands in the 1970’s. Snoezelen comes from the Dutch words ‘snufflen’, to explore or sniff and ‘doezelen’, to doze or relax (Tran 2009). The Snoezelen room was originally intended for recreation and sensory stimulation for people who were institutionalized (McKee et al. 2007). It was believed that these rooms would help patients who were institutionalised by decreasing self-injury behaviour and helping to calm their anger (McKee et al. 2007). The concept has since become popular in the United Kingdom and Europe where they provide multi-sensory stimulation to a diverse range of people with a variety of disabilities, disorders and conditions, including people who are on the autism spectrum. It has also become part of the special needs curriculum in these countries and can benefit both adults and children as well as those who also suffer from mental health issues, including anxiety and stress (John 2017). Currently multi-sensory environments are most commonly found in schools or medical facilities but have yet to be widely implemented into more public spaces such as shopping malls, supermarkets, public areas and community centres.

Figure 5. Example of a Multi-sensory environment, or Snoezelen Room
The physical appearance of the multi-sensory environments can vary drastically in a variety of forms with passive or active stimulations that can be combined to create the space. Although the appearances can vary, the overall atmosphere of the spaces should make the users feel safe (Daljevic 2013). A common feature of the rooms are padded walls and floors as well as soft furnishings like mattresses and pillows, this is to keep the users safe and reduce the risk of harm (Daljevic 2013). Equipment in the multi-sensory environment aims to stimulate singular or multiple senses at once. An example of commonly used equipment that aims to stimulate multiple senses is the bubble tubes (Daljevic 2013). Bubble tubes (Figure 6.), are water filled clear tubes that have coloured balls and bubbles inside that are in constant motion. The movement of the bubbles and objects throughout the tube stimulates the visual senses. The auditory senses and tactile senses are also stimulated through the vibrations of the tube and by the buttons that are usually at the base of the tube which allows you to change the colour and intensity of the lighting (Daljevic 2013). Other examples of equipment that can be used in the space are interactive sound systems which play different melodies, sounds and instruments to stimulate the auditory sense, balancers, trampolines or swings that can be used for balancing exercises, light projectors, bendable optic fibre lighting and water beds that can massage parts of the user’s body (Daljevic 2013).
Design aim

To promote well-being through a multi-sensory environment that allows the user to interact freely using natural responses to the surrounding environment. Sensory stimulation will be used to either calm or invigorate the user.
Expressions of the text and precedents

Each model is an expression of the research in this chapter and the precedents analysed in the next few chapters. They represent the emotive thoughts experienced in the writing of part C, Interior Architecture and the analysis of the precedents.
Each precedent in this chapter will be analysed using the sensitivities table (p.g. 043), to understand whether the design is stimulating the visual, auditory or tactile sense and how.
Part C, Interior Architecture

A. Context of Autism

B. Well-being

C. Interior Architecture

- Multi-sensory environments
- Well-being spaces
- Architecture for autism
- Precedents

- Quality of life & sensory responses
- Sensitivities & Potential spatial qualities
- Mental health & an inside view

- Open
- Enclosed
- Anxiety

What is Autism

Common factors

My project

Sensitivities & Potential spatial qualities

Intense World Theory

What is Autism
Pennyman Primary School in collaboration with ROMPA converted an unused hydrotherapy area into a multi-sensory environment to help the children at the school who have special needs. The goal was “to create an amazing, unique and changeable environment for the staff, children and community to use that would stand the test of time and give untold benefits to those who need it (ROMPA, n.d., 1).” The multi-sensory environment is designed so that it is fully customisable from one system that controls the entire room, as well as a separate interactive music system. The space is large enough to have more than one child using it at once but the fact that the entire room is controlled by one system means that it will only be customised to suit one individual’s needs at a time. The environment is separated into different areas depending on either auditory, tactile or visual interactive features. The room features both technology and physical interactive features but has a higher emphasis on technology based interactive systems. Soft furnishings can be used as seating and a fully reclinable surface which encase most of the interactive features. There is a large emphasis on visual stimulation which is due to the large amount of different technology based visual features within the space.

**Tactile** - Materials, seating and interactive features  
**Visual** - Artificial lights, projections and colours  
**Auditory** - Silence or a chosen sound
Third party content.
Please consult the print version for access.

Figure 7-10. Pennyman Primary School
McKenzie Centre
Hamilton, New Zealand

The medical centre’s multi-sensory environment is designed for children and provides stimulating activities and experiences to increase motivation, awareness and positive behaviours. The multi-sensory environment was first developed in 2000 and was revamped in 2006 (Altogether Autism 2016). The multi-sensory environment is not just available to patients at the medical centre, it is also available to other children outside of the medical centre ("Multi Sensory Room | McKenzie Centre" n.d.). The space is an overload of different interactive features that have a distinctive play aspect about them, as well as visually stimulating artwork and themes such as a specific sea themed area. The multi-sensory environment includes bubble tubes, a large range of tactile experiences that include soft furnishings and textured features, and cause and effect interactive features that stimulate a range of senses. This multi-sensory environment is designed to accommodate a large number of children at once and while children can choose to interact with different features to stimulate the senses they need to; the space is unable to be fully customised to suit their individual needs.

_Tactile-_ Materials and play/interactive features  
_Visual-_ Artificial lights and colour  
_Auditory-_ Other people in the space
Third party content.
Please consult the print version for access.
The Easter Seals Camp Horizons was established in 1965 and offers outdoor activities based programs for children and adults with disabilities and medical conditions (Camp Horizon n.d.). The camp serves the mobility and accessibility needs of a large range of people and ages. Along with equipment they provide for people with disabilities and special needs, they have a multi-sensory yurt available for use by any camper. The Sensory Yurt is a multi-sensory environment where campers are taken when they become overstimulated or stressed and need to calm down or just when they want to relax. The yurt contains a range of different interactive activities that do not rely on technology to stimulate the senses. The multi-sensory yurt is an intimate space that is designed to be used by one camper at a time under the supervision of camp staff or volunteer member. Because the space is a low technology-based environment the space as a whole is less customisable then a space that is more technology focused where lighting and sounds can be controlled. Although it is less customisable it has a large range of interactive features and activities that can be used by the camper to help stimulate and/or calm their senses, making the activities just as effective, if not more, at stimulating the senses.

**Sensory Yurt**

Easter Seals Camp Horizons
Alberta, Canada

The Easter Seals Camp Horizons was established in 1965 and offers outdoor activities based programs for children and adults with disabilities and medical conditions (Camp Horizon n.d.). The camp serves the mobility and accessibility needs of a large range of people and ages. Along with equipment they provide for people with disabilities and special needs, they have a multi-sensory yurt available for use by any camper. The Sensory Yurt is a multi-sensory environment where campers are taken when they become overstimulated or stressed and need to calm down or just when they want to relax. The yurt contains a range of different interactive activities that do not rely on technology to stimulate the senses. The multi-sensory yurt is an intimate space that is designed to be used by one camper at a time under the supervision of camp staff or volunteer member. Because the space is a low technology-based environment the space as a whole is less customisable then a space that is more technology focused where lighting and sounds can be controlled. Although it is less customisable it has a large range of interactive features and activities that can be used by the camper to help stimulate and/or calm their senses, making the activities just as effective, if not more, at stimulating the senses.

**Tactile**- Materials and a large range of interactive features

**Visual**- Artificial lighting and colour

**Auditory**- Silence or chosen sound
Third party content.
Please consult the print version for access.
Each precedent in this chapter will be analysed using the sensitivities table (p.g. 043), to understand whether the design is stimulating the visual, auditory or tactile sense and how.
A Space For Being

Muuto, Google, Reddymade and Johns Hopkins University
Milan Design Week 2019

A Space for Being is an interactive multi-room installation that explores the field of neuroaesthetics and how design and the elements around us have the potential to impact our biology and well-being. “The exhibit showcases our unique responses to the world around us and the sensory experiences we all encounter on a daily basis. A Space for Being continues the conversation into how human-focused design can impact our well-being (Muuto n.d., 1).” The installation is made up of three rooms that each have their own unique design experiences which include furnishings, objects, colours, textures, lighting, sounds and scents. Each of the three different spaces are a fully immersive experience that engages all of the user’s senses. As guests enter the installation, they are given specially made wristbands to wear that measures specific physical and physiological responses. As guests exit the exhibition, they are given a customised report suggesting which space they felt most comfortable or at ease in based on the physiological responses received through the wrist band. The aim of the experience is to start a conversation about how the sensory engagement of different spaces and design elements can affect our well-being.

**Tactile** - Furniture, furnishings and fixtures

**Visual** - Artificial lights and colour

**Auditory** - Sounds
Third party content.
Please consult the print version for access.
The Cloud Maze

RSAA
Shanghai, China

The cloud maze is an installation that is four metres high made from glossy mesh curtains that hang in circular paths at a range of varying lengths. The installation is set up as a circular maze that can either lead you to a destination or a dead end depending on which path you choose. The installation helps to create unexpected interactions between strangers which aims to make people focus on their social well-being by creating connections in person rather than on social media (Shuang 2019). The varying heights of the curtains allows for people of different ages and heights to have a range of interactions. The mesh curtains create an unusual atmosphere within the installation as the sunlight filters through as well as reflects off the mesh. The space is neutral but also semi-transparent allowing you to see what you are entering into before you step inside. The neutral aspect of the space allows people to focus on human interaction rather than their surroundings.

**Tactile**- Materials and brushing up against the mesh curtains

**Visual**- Lighting, natural and artificial

**Auditory**- People in and around the installation
Figure 21-24. The Cloud Maze

Third party content.
Please consult the print version for access.
Precedents
Architecture for autism

Each precedent in this chapter will be analysed using the sensitivities table (p.g. 043), to understand whether the design is stimulating the visual, auditory or tactile sense and how.
Intense World Theory

Part C, Interior Architecture

A. Context of Autism

B. Well-being

C. Interior Architecture

- Senses Common factors
- Multi-sensory environments
- Well-being spaces
- Architecture for autism
- Precedents

- Quality of life & sensory responses
- Sensitivities & Potential spatial qualities
- Mental health & an inside view

- Open
- Enclosed
- Anxiety

- My project
- Common factors
- Sensitivities & Potential spatial qualities

What is Autism

Part C, Interior Architecture
The Café of the Stars opened in early April of 2018 in Shanghai China. The café aims to help young people who are on the autism spectrum integrate into society. The café is believed to be China’s first programme that helps young people who are on the autism spectrum to improve their communication skills as well as their integration into society (Yan 2018). The café is not open to the public, but it is instead set up as a safe learning environment where the customers are regular volunteers who interact with the staff to improve their communication skills while receiving a free coffee in return (Yan 2018) (Lanlan n.d.). The café space is designed to replicate a typical café you would find in a city, but it is a visually more neutral space with little artwork and neutral furnishings and furniture. The space also lacks the customer noises and background music that is typical for a café, this lack of sound and visual stimulation allows for the staff to focus on building the practical coffee skills as well as their communication skills.

The skills the young adults on the autism spectrum learn are skills that can potentially be carried over into a job in the future, but more importantly they are skills which will help improve their relationships with others and their ability to adapt to different or changing situations.

**Tactile**- Making coffee
**Visual**- Artificial lighting
**Auditory**- People interacting and coffee machines
Third party content.
Please consult the print version for access.
**Sensory PLAYSCAPE**

Sean Ahlquist  
2015

Designed by architect Sean Ahlquist, Sensory PLAYSCAPE is a formless playscape that is constructed from 3D knitted elastic textiles which are stretched by sinuous glass-fibre reinforced polymer rods (Budds 2017). The inspiration and idea for the playscape came when Ahlquist’s daughter was diagnosed as being on the autism spectrum. The elastic textiles are doused in colourful light projections, which creates an inviting, tactile and pliable environment, this helps his daughter, who is nonverbal, to overcome her sensory-based anxieties. Ahlquist explains that “she (his daughter) could discover the ways that she wanted to engage with it (Risen 2018, 1)”, unlike with conventional playground equipment. The form and use of the knitted material were realised from Ahlquist’s desire to create architecture out of fabric, playing with the distinction between textiles and structures. He explains that the design aims “to help improve children’s level of physical activity, provide a better understanding of fine and gross motor control, and do so within a sensory rich and sensory rewarding environment (Budds 2017, 1)”, while also delivering “the diversity of multisensory experiences that the audience of children with autism commands (Risen 2018, 1)”. The design of the Playscape allows the users to have full control over their surrounding environment through how they interact with the space. The space actively engages the tactile and visual senses while helping with motor skills, the space does not account for auditory sensitivity.

**Tactile**- Interacting with the installation  
**Visual**- Artificial colours and lighting that change through interaction  
**Auditory**- If other people are interacting with the installation
Third party content.
Please consult the print version for access.
The Holding-Breath Chair

Ray Jiao & Yi Wang
2013

The Holding-Breath Chair is an inflatable chair that integrates compression systems that mould to the shape of the user. The chair is made up of detachable bags that are filled with foam particles and fitted with a valve that allows for air to be let out and in of the chair (Bryant 2013). The chair moulds to the user through the release of air, when the user sits on the chair and lets out the air via the pump, the bags get smaller and mould to the back and hips slowly getting harder. Letting the air back in ‘rebuilds’ the chair and allows for it to be reshaped to the next user. The chair was inspired by the fact that some “people with autism like to be squeezed (Bryant 2013, 1)”, which is referring to the desire for a deep pressure stimulation which is craved by a number of people on the autism spectrum. As well as providing a deep pressure sensation the chair also provides a soft tactile sensation. The chair is part of a collection that includes a rocking chair, bar stool, sofa and chair.

Tactile- Material of the chair
Visual- Chair deflating and inflating
Auditory- Sound of materials when sat on and deflating/inflating
Third party content.
Please consult the print version for access.

Figure 33-35. The Holding-Breath Chair
Precedent analysis

Precedents are analysed in relation to the sensitivities table, (pg. 043).

<table>
<thead>
<tr>
<th>Location</th>
<th>Tactile</th>
<th>Visual</th>
<th>Auditory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pennyman Primary School</td>
<td>Tactile</td>
<td>Visual</td>
<td>Auditory</td>
</tr>
<tr>
<td>McKenzie Centre</td>
<td>Tactile</td>
<td>Visual</td>
<td>Auditory</td>
</tr>
<tr>
<td>Sensory Yurt</td>
<td>Tactile</td>
<td>Visual</td>
<td>Auditory</td>
</tr>
<tr>
<td>A Space For Being</td>
<td>Tactile</td>
<td>Visual</td>
<td>Auditory</td>
</tr>
<tr>
<td>The Cloud Maze</td>
<td>Tactile</td>
<td>Visual</td>
<td>Auditory</td>
</tr>
<tr>
<td>Cafe of the Stars</td>
<td>Tactile</td>
<td>Visual</td>
<td>Auditory</td>
</tr>
<tr>
<td>SensoryPLAYSCAPE</td>
<td>Tactile</td>
<td>Visual</td>
<td>Auditory</td>
</tr>
<tr>
<td>The Holding-Breath Chair</td>
<td>Tactile</td>
<td>Visual</td>
<td>Auditory</td>
</tr>
</tbody>
</table>
### Sensitivities

<table>
<thead>
<tr>
<th>Auditory sensitivity</th>
<th>Tactile sensitivity</th>
<th>Visual sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can be easily distracted by background noises.</td>
<td>Does not like to be touched.</td>
<td>Disturbed by bright lights.</td>
</tr>
<tr>
<td>Overreacts to sounds.</td>
<td>Avoids doing tasks that have strong tactile elements e.g. clay, food preparation, water.</td>
<td>Avoids sunlight.</td>
</tr>
<tr>
<td>Has unpredictable reactions to noises.</td>
<td>Finds clothing uncomfortable and will not wear certain types of clothing that creates too strong of a sensation.</td>
<td>Follows any movement that enters their field of vision.</td>
</tr>
<tr>
<td>Puts hands over ears to block out certain sounds.</td>
<td>Responds negatively to textures in food, toys and furniture.</td>
<td>Covers parts of their field of vision, e.g with hands.</td>
</tr>
<tr>
<td>Screams or cries at certain sounds in the surrounding environment.</td>
<td></td>
<td>Covers parts of their field of vision, e.g with hands.</td>
</tr>
<tr>
<td>Responds physically if the sound is perceived as a threat.</td>
<td></td>
<td>Blocks field of vision.</td>
</tr>
</tbody>
</table>

### Hyper-sensitivity behaviours

<table>
<thead>
<tr>
<th>Auditory sensitivity</th>
<th>Tactile sensitivity</th>
<th>Visual sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does not respond if their name is being spoken.</td>
<td>Does not understand the concept of personal space.</td>
<td>Unaware of the presence of other people around them.</td>
</tr>
<tr>
<td>Seems to be oblivious to sounds in the surrounding environment.</td>
<td>Does not notice the touch of others.</td>
<td>Unable to locate desired objects or people.</td>
</tr>
<tr>
<td>Creates constant sounds to stimulate themselves.</td>
<td>Frequently puts things in their mouth for texture and taste.</td>
<td>Loses sight of people or objects when they move.</td>
</tr>
<tr>
<td>Does not react to sounds that indicate potential danger.</td>
<td>High pain threshold which can make them unaware to danger due to a low response to pain.</td>
<td>Cannot distinguish figure-ground relationships, identifying a figure from the background.</td>
</tr>
<tr>
<td>Does not respond to any type of sound.</td>
<td>Does not change clothing that would usually cause them irritation.</td>
<td></td>
</tr>
</tbody>
</table>

### Hypo-sensitivity behaviours

<table>
<thead>
<tr>
<th>Auditory sensitivity</th>
<th>Tactile sensitivity</th>
<th>Visual sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Can be easily distracted by background noises.</td>
<td>- Does not like to be touched.</td>
<td>- Disturbed by bright lights.</td>
</tr>
<tr>
<td>- Overreacts to sounds.</td>
<td>- Avoids doing tasks that have strong tactile elements e.g. clay, food preparation, water.</td>
<td>- Avoids sunlight.</td>
</tr>
<tr>
<td>- Has unpredictable reactions to noises.</td>
<td>- Finds clothing uncomfortable and will not wear certain types of clothing that creates too strong of a sensation.</td>
<td>- Follows any movement that enters their field of vision.</td>
</tr>
<tr>
<td>- Puts hands over ears to block out certain sounds.</td>
<td>- Responds negatively to textures in food, toys and furniture.</td>
<td>- Covers parts of their field of vision, e.g with hands.</td>
</tr>
<tr>
<td>- Screams or cries at certain sounds in the surrounding environment.</td>
<td>-</td>
<td>- Covers parts of their field of vision, e.g with hands.</td>
</tr>
<tr>
<td>- Responds physically if the sound is perceived as a threat.</td>
<td>-</td>
<td>- Blocks field of vision.</td>
</tr>
</tbody>
</table>

### Potential spatial qualities/conditions

<table>
<thead>
<tr>
<th>Auditory sensitivity</th>
<th>Tactile sensitivity</th>
<th>Visual sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Creating a quiet space.</td>
<td>- Soft furnishings.</td>
<td>- No bright lights.</td>
</tr>
<tr>
<td>- Do not have multiple sounds.</td>
<td>- Has a dedicated space where there are a range of different textures that can be interacted with but can also be avoided.</td>
<td>- Lighting colour and intensity is able to be controlled.</td>
</tr>
<tr>
<td>- Sound is able to be controlled and changed, melodies, different sounds or instruments, through an interactive sound system.</td>
<td>- Interactive display system that can display a range of moving scenes, colours or static images.</td>
<td>- Interactive display system that can display a range of moving scenes, colours or static images.</td>
</tr>
</tbody>
</table>

This table has been reworked by the author from Gaines, Bourne, and Pearson, 2016, *Designing for Autism Spectrum Disorders.*
Research conclusions

From each section of the research (part A, B and C) key words were taken from the text. These key words were then analysed, and any common key words were identified as common factors between the different research areas. Design aims for the project were produced from these common factors.

Approach to initial design

The design aims and the potential spatial qualities will be used to inform the first design iteration.
### Key words

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diversity</td>
<td>Time Alone</td>
<td>Stimulate</td>
</tr>
<tr>
<td>Complex</td>
<td>Complicated</td>
<td>Soothe</td>
</tr>
<tr>
<td>Predicable</td>
<td>Safe</td>
<td>Calming</td>
</tr>
<tr>
<td>Control</td>
<td>Change</td>
<td>Invigorating</td>
</tr>
<tr>
<td>Contribute</td>
<td>Overstimulation</td>
<td>Interact</td>
</tr>
<tr>
<td>Awareness</td>
<td>Multi-Sensory</td>
<td>Responses</td>
</tr>
<tr>
<td>Intense</td>
<td>Adapt</td>
<td>Well-Being</td>
</tr>
<tr>
<td>Sensory</td>
<td>Predictable</td>
<td>Controlled</td>
</tr>
<tr>
<td>Coping</td>
<td>Interacting</td>
<td>Environment</td>
</tr>
<tr>
<td>Secure</td>
<td>Sensitivity</td>
<td>Passive</td>
</tr>
<tr>
<td>Non-Surprising</td>
<td>Sensory</td>
<td>Active</td>
</tr>
<tr>
<td>Tailored</td>
<td>Calm</td>
<td>Safe</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Familiar</td>
<td>Multiple Senses</td>
</tr>
<tr>
<td></td>
<td>Relax</td>
<td>Multi-Sensory</td>
</tr>
<tr>
<td></td>
<td>Anxiety</td>
<td></td>
</tr>
</tbody>
</table>

### Design aims

**Developed from common factors**

- **To create a controllable space.** This will allow the user to tailor the environment to their individual needs, creating a predictable and calm environment that will make the user feel safe.

- **To create a space where young adults on the autism spectrum can remove themselves from an environment that is overstimulating and demanding of their senses, creating constant anxiety and negative reactions.**

- **To promote well-being through a multi-sensory environment that allows the user to interact freely using natural responses to the surrounding environment. Sensory stimulation will be used to either calm or invigorate the user.**
Multi-sensory environment must have

From the research and the analysis of the precedents it is clear that for the design to succeed as a multi-sensory environment it must have three factors:

1) **C**ontrol over the space by the user,
2) **I**nteractive elements,
3) **D**iversity must be considered when designing to accommodate for all of the unique individuals on the autism spectrum.
Controllable
+
Interactive
+
Diversity
Conclusions and design guidelines were taken from the initial research and precedent analysis. This information informed the first iteration. Questions raised from the first iteration will be carried through into the second iteration where it will aid development. The same process will happen with the third iteration which will be a detailed final design. The outcome of this project will be a set of design guideline that will act as a framework for future designers.

Sites

Each iteration will explore the design through different sites. This is to test the design in different environments, conditions and with different users. The first design will be tested in the urban environment, the second in a semi-private space and the third will revisit the urban environment through mass production.

Thesis structure
Research

What is Autism?

Precedents

Public site

1st Iteration

Hypo and hyper

Semi-private site

2nd Iteration

Confrontation

Urban environment & other possibilities?

3rd Iteration

Mass production

Design Guidelines
1st iteration
First iteration

The first iteration will consist of three separate designs, an auditory, visual and tactile focused space. The three designs will concentrate on understanding the possible hypo-sensitivity and hyper-sensitivity sensory triggers as well as the potential spatial qualities that could be used to reduce the potential of these triggers. Understanding how to design for both the hypo and hyper sensitivities within one space is critical for accommodating to the vast diversity within autism. The aim is to design for the tactile, visual and auditory sensitivity separately to determine that each sensitivity is working effectively independently before combining them into one design for future iterations.

The first iteration will be designed within the Wellington Central Business District. This is to both challenge the design with the sensory extremes of the busy and noise Wellington CBD, while also allowing a large amount of people on the autism spectrum to access the designs.
“The clamour of many voices, the different smells – perfume, cigars, damp wool caps or gloves – people moving about at different speeds, going in different directions, the constant noise and confusion, the constant touching, were overwhelming.”

- Crane, Goddard, and Pring
Harsh sensory experience
Noise vs. sound

Through exploring the urban environment, it became clear that there was a need to understand the difference between noise and sound and how this might affect someone who is auditory sensitive. A potential hurtful urban sound that was not properly considered until this process began was background noises. It became important to take note of any sounds that were in fact noises but were in the background. These background noises may not affect those not on the spectrum but may be overwhelming and intense for those who are.

Auditory sensitivity

Sound becomes a noise when it is unwanted or causes a negative reaction. Noise is subjective and can change depending on personal preferences or sensitivities.
Noise

Unwanted sound

Can cause negative reactions

Subjective

Human reaction

Human interaction

Can cause negative and/or positive reactions

Sound

Music, the wind, people talking

Made by vibrating objects
Site 1, Urban environment

The Wellington Central Business District was chosen as the scope of the project because it is well known by the author, busy and compact. The urban environment can be a challenging place for people who are on the autism spectrum due to the constantly changing, busy and noisy surroundings. Often there are uncontrollable factors that occur in the urban environment that become sensory extremes for people who are on the spectrum. For people who are on the autism spectrum the urban environment can be an unpleasant and sometimes impossible place to go, making it a challenging but rewarding site for a multi-sensory environment.

To settle upon some possible urban site locations it was decided to explore the Wellington CBD area noting down any tactile, visual or auditory extremes that was experienced by the author. Only these sensory extremes where recorded because they are what the designs will be focusing on. The experiences at these different sites were listed as possible site locations for the first and future iterations.

Tactile sensory extreme
Visual sensory extreme
Auditory sensory extreme
1. Confusing amount of sound and noise which is distracting. Makes it hard to cross the already difficult intersection.

2. Traffic noise, chatter from passing and waiting pedestrians as well as noise from Thistle Hall. A lot of movement of both people and cars.

3. Has a relaxing quietness, a lot of different textures grass, concrete, marble, gravel and more.

4. Very bright and noisy music, distracting noise, colours and movement.

5. Had to squeeze through the noise, smoke and huddles of people.

6. Uneven and wet cobble stones, colours moving and water spraying.

7. Movement of people and cars is constant, colours are vibrant and in your face.

8. Had to weave through people standing and moving. Very noisy as people talk and buses arrive/leave.

9. Uneven ground, construction noise, light filtering and flashing, some people tread carefully making little noise while others confidently stride through.

10. Moving water and people, textures of grass, stone and water.

11. Water dripping down stairs and walls, art work and a large green wall.

12. Lots of coarse and wild vegetation that is growing over textured concrete.

13. Noise from traffic and echoes from the tunnel, have to pass over the noise, very intimidating.

14. Building covered in bright and complex artwork, very eye-catching and distracting when crossing road.

15. Overload of patterns, colours and textures which all contrast one another and line the pavement and buildings.

16. Different colours and patterns that in contrast with one another to form a mismatch of visual stimulation.

17. Plants line the walls and sway in the wind, art work in nearly every doorway. Concrete vs. brick.


20. Distractingly bright colours flash out at you from inside. Eyes are drawn inside where there is an overload of colour and movement.

21. Creates the urge to peer through the coloured windows, layered seating which creates the feeling of uneven ground.

22. Have to weave through walking and standing people, sudden surges of people when a bus arrives/leaves.

23. Dark and dirty but graffiti is bright and bold. Mixture of colours and patterns creates distraction when walking down.

24. Pops of colour catch the eye, gusts of wind send waves of movement through planting.

25. Floor rises and falls with unevenness. Unevenness combines with different textures and colours is distracting.
Sensory Boards

The multi-sensory designs created for this project will focus on creating physical interactions rather than technology based experiences. It was important to explore how different senses could be stimulated using physical objects, materials and substances.

**Smell:** Each bag has a different smelling substance. The bags can be removed so each smell can be experienced individually and collectively.

**Sound:** Each material has a different sound when struck or moved. Other objects such as pencils and pens can also be used to interact with the sound board.

**Touch:** Each material has a different texture, some more pleasant than others to touch. There is also a visual aspect to this board.
Ist Iterations
Reducing anxiety

The approach to the first design is to create a space that reduces anxiety for the users. The urban environment can be an anxiety inducing place, especially in the Wellington CBD where it is loud and busy with people, cars and buses. The aim of the design is to create a multi-sensory environment of peace that reduces the anxiety felt by young adults on the autism spectrum when they first enter the space.

As previously mentioned in research part B, Well-being (pg. 038), reducing anxiety will also reduce stress, which will help to make a positive change to the user’s well-being. A secondary space is then created and that is controllable to the user through interactions, this will help to create a customisable, calm and relaxing environment that caters to the user’s individual needs.
No sensitivities

High anxiety

Low anxiety

Moderated anxiety

Open urban space

Multi-sensory environment

Interaction by the user

Overload of sensitivities

No sensitivities

Tactile sensitivity

Visual sensitivity

Auditory sensitivity
The approach to the first iteration is to design for each of the three sensitivities separately. This is to ensure that the balance between hypo and hypersensitivity is correct before combining the visual, tactile and auditory together in the second iteration.
Tactile Sensitivity: Soft vs. rough
Visual Sensitivity

Movement vs. pattern
Auditory Sensitivity  Sound vs. silence
Hypo-sensitive interpretation

Figure 36. Cuba Street
Hyper-sensitive interpretation

Figure 37. Cuba Street
The cube, pyramid and egg

Three different shapes were explored through the first iteration as exterior forms. These shapes were explored due to their common use in forming architectural buildings and interior spaces. These three shapes were the cube, egg and pyramid. These shapes were tested on how they affected the interior space, how they fitted in the site and how they were portrayed by potential users. Each of the sensitivities, tactile, visual and auditory used one of these shapes as their form.

The average New Zealand male height is 177cm or 5 foot 8 inches, a height of 183cm or 6 feet was used in the drawings deliberately allowing for more room so the space is not claustrophobic.
Visual
Scale 1:40

Tactile
Scale 1:40

Auditory
Scale 1:40
Construction tunnel
Chosen site: construction tunnel

Site 9 was chosen as the first site for iteration one due to the extensive amount of noise and visual stimulation experienced at the site.

Walking through the site is an assault on your senses. The tunnel is cramped and made to seem smaller by the constant flow of people moving through it from both directions. The metal frame amplifies the surrounding traffic noise as well as the noisy footsteps and conversations of the people walking through the space. As soon as you enter the space there is an overwhelming amount of visual stimulation which is not helped by the continuous flashes of sunlight. The cramped spacing means that it takes longer than usual to walk through the space as a bottle neck effect makes you feel as though you are trapped.

Uneven ground, construction noise, light filtering and flashing, some people tread carefully making little noise while others confidently stride through.

- Tactile sensory extreme
- Visual sensory extreme
- Auditory sensory extreme
- Construction tunnel
Sensory extremes

The sensory extremes felt in the site are documented using the graph to the left. These are personal sensory extremes felt by the author.

Site 1

What: 
Construction Tunnel
Where: 
Corner of Lambton Quay and Willis Street, Wellington CBD
Most intense extreme: 
Auditory sense
Site plan with sensory extremes

- Orange: Construction zone
- Red: Auditory noise
- Green: Directly affecting
- Light green: Indirectly affecting

Sensory extremes:
- Tactile
- Visual
Construction Tunnel, Corner of Lambton Quay and Willis Street, Wellington CBD

Construction Tunnel, Corner of Lambton Quay and Willis Street, Wellington CBD
Tactile Sensitivity
Summary of spatial qualities for tactile hyper and hypo-sensitive behaviours.
From Sensitivities table (p.g. 043-044)
Physical Modelling

Hand held physical models were made from clay to explore the hypo-sensitive and hyper-sensitive side of tactile sensitivity. The models were made of a range of different surfaces that explored both textured as well as smooth surfaces in relation to one another. The models were created at varying sizes.
Design stages and developments

The design developed through the use of the egg shape as the exterior form. Textures were taken from the physical model and applied to the interior surfaces. The surfaces and textures of the interior were the focus of the development of this space, rather than the exterior. The design was intentionally made at a scale that accommodated for one or two people in the space at a time. This is to allow the user to focus on the different surfaces without other people becoming a distraction.
Tactile design on site

The first iteration for the textile sensitivity was first explored using the egg shape, which then morphed into the more organic shape you see to the right.

The hypo-sensitive area highlighted on the plan is where the textural aspects of the design is located, the hyper-sensitive areas are at the entrance and exit of the design and are made of a smooth surface to help entice people into and through the design.
Hyper-sensivities
Hypo-sensivities
Sensory extremes
Final design in site plan
Final design in site
Tactile design

The hypo-sensitive area highlighted on the section is where the textural aspects of the design is located, the hyper-sensitive areas are at the entrance and exit of the design and are made of a smooth surface. This is to help entice people into and through the design as well as to accommodate for the hyper-sensitive users.
Section in site
Scale 1:10
Visual Sensitivity
Summary of spatial qualities for visual hyper and hypo-sensitive behaviours.
From Sensitivities table (p.g. 043-044)
Physical Modelling

A hand held light box was made where users could push and pull different colours in front of a white and/or yellow light. This was to explore user interaction and how different colours can mix with different coloured lighting.

Inside the light box

Inside the light box
Author using the light box

Author using the light box

Author using the light box
Design stages and developments

The design developed through the use of the cube as the exterior form. The effect of merging light and colours were taken from the physical model and applied to the interior space. The interaction between the colour, light and users was the focus of the development of this space, not the exterior. The design was intentionally made at a scale that accommodated for one or two people to use the space at a time. This is to allow the user to have more control over the space to suit their individual needs.
The visual sensitivity was first explored using the cube shape, which when became more rectangular through development. One wall of the first iteration is made up of different coloured glass windows which allows rays of sun and colour to enter the design. Users can control the colour and amount of light that enters the space by sliding panels across the coloured windows, blocking the light and colour from coming in to the space. This allows for user control and for the user to customise the space to their needs.
Hyper-sensivities
Hypo-sensivities
Sensory extremes

Final design in site plan

Final design in site
Visual design

This design focuses on the interaction between colour and light. As you first enter the space it is white and dim. Sliding panels on one wall can be moved by the user to reveal five different coloured windows. When exposed the light filters through the coloured windows into the space. Users have the opportunity to expose one colour at a time or multiple, allowing the user to mix the colours and light within the space.
Section in site
Scale 1:10
Auditory Sensitivity
A different approach was taken for the auditory design where precedents were analysed instead of a physical model. The precedents chosen explored how to bring sound into a space through interaction.

Summary of spatial qualities for auditory hyper and hypo-sensitive behaviours.
From Sensitivities table (p.g. 043-044)
LINES

Anders Lind
Umea, Sweden

LINES is an interactive sound art exhibition designed by the Swedish composer Anders Lind. In the exhibition Lind explores how different coloured lines could be used as a musical instrument. Five different coloured lines are placed at different heights along the walls of most of the exhibition space, each line produces a note of sound at a different frequency when touched. The exhibition is interactive where multiple or singular people can create sound together or separately. Lind believes that the exhibition is best explored in groups where the aim of LINES is to “explore new forms of musical interaction, new artistic expressions and to provide unique and inspiring musical experiences ("Project: LINES - Interactive Sound Art Exhibition | Cycling ’74" n.d.)."
Third party content.
Please consult the print version for access.
Sound Forest

Minori Nagashima and Hideyuki Nakazato
Keio University, Tokyo Japan

The sound forest is an art installation where the concept was to create different “communications with space (Lepine n.d.).” The installation is contained within a large metal frame of cold dark grey metal. The space contains eight hanging metal balls which are called ‘sound beads.’ The sound beads are suspended from chains covered in metal netting which hang in the space at what appears to be random intervals. The sound bead is a tactile sound device that is made up of two speakers with capacitance sensors within, each sound bead produces a different sound. As a user walks through the space they are able to touch the different sound beads which provides a haptic sense of sound as well as changing the environment around them. The ability to change the sound of the surrounding environment through touch allows the user to create a unique communication with the space. The installation focuses on both the tactile and auditory sensitivities and can be used by multiple people but would work best by having one user at a time.
Third party content.
Please consult the print version for access.
The design developed through the use of the pyramid shape as the exterior form. The aim of the auditory design was to create two spaces, one silent and a secondary space which allowed the users to control the sound within it. The design was intentionally made at a scale where one or two people can enter the secondary sound space at a time, while more people could enter the quiet space. This is to allow the user within the secondary space to have more control over the sounds they individually preferred.
The first iteration for the auditory sensitivity was explored using the pyramid shape, which morphed into a more organic shape. The auditory design is focused on creating a space where there is little to no sound as you first enter the design. The design then has a second pyramid within the first space that allows the user to control the amount of sound they would like to add back into the space through pushing certain buttons.

Auditory design on site
Final design in site plan

Final design in site
Auditory design

As you enter the space the noises and sounds from the surrounding environment are muted, creating a calming and quiet space. Within the design there is a second space where users can bring sound back into the environment through interaction. Buttons line the walls of the secondary space, when pressed the buttons will each play a different sound. One sound can be played at a time. Users can either enjoy the quiet or the sound space depending on their preferences.
Section in site
Scale 1:20
Reflections
Tactile first design

The form of the tactile design worked well in drawing people in and through the design by having the soft and smooth texture on the entrance/exits. The textures in the centre of the design could be confronting to users due to the lack of variety and the intensity of the textures.

Moving forward

The intensity and scale of the textures, especially the spikes could be too overwhelming for some, especially people who are on the autism spectrum. These would need to be ‘toned down’ or ‘rethought for the next iteration”
Visual first design

The visual design consisted of a simple and easy to use system of allowing both light and colour in to the space. The weakness of this design was that you are unable to allow either colour or light into the space, you have to allow both in at once. This may limit the usability of the space for certain people on the autism spectrum as they may want to a space with only light and no colour, or vice versa.

Moving forward

For the next iteration options need to be explored where the user of the space is able to control both the colour and light intensity of the space separately. This will cater for more people on the autism spectrum.
While the overall concept of having the almost 'buffer' threshold where all noise and most of the sound is cancelled out worked well, further development needs to take place on the second interactive and controllable space where sound can be brought in by the user. Sound could be brought into the space in a variety of ways and actions that should be further explored.

Moving forward further analysis of the precedents is needed to make the second controllable space more interesting as well as interactive. Further thought on what sound can enter the space also needs to be explored.
Form

Experimenting with the three different forms tested the sense of security and levels of confrontation. As each of the three iterations developed the forms naturally became more organic in shape. The organic shapes helped to create intrigue and to draw people into the spaces.

The organic shaped spaces created a sense of security. This was due to an increased level of privacy as well as a low level of confrontation due to the fact that the designs tended to have an almost natural looking exterior form. Moving forward organic shapes will be explored further.

Relationship to the ground

The relationship to the ground was something that was not consider while designing the first iteration. How the ground can become part of the experience as well as how the design can interact with it needs to be considered moving forward.

How the design 'sits' in its environment is a key part of the design that was overlooked in the first iteration. Although it is a seemingly small detail it could be a key factor in how people on the autism spectrum react and interact with the space. How the second iteration is related to the ground will not be overlooked in the design of the second iteration.
2nd iteration
Second iteration

The second iteration will consist of combining the three sensitivity designs, auditory, visual and tactile into one space. The design will concentrate on understanding how the three sensitivity spaces will work together as one cohesive and effective design. The semi-private site will have different challenges than the urban setting. This will hopefully establish new questions and limitations surrounding the design which can be taken into the third iteration.

The second iteration will still be designed within the Wellington Central Business District. The design will be in a semi-private site with a program to challenge the design within an interior architecture setting.
Precedents
Research
What is Autism?
Public site
1st Iteration
Hypo and hyper
Semi-private site
2nd Iteration
Confrontation
Urban environment & other possibilities?
3rd Iteration
Mass production
Design Guidelines
Site 2, Semi-private

The semi-private interior site will introduce the new challenge of working with a pre-existing program. The interior environment has different sensory extremes than the urban environment but can still be a challenging place for young adults on the autism spectrum to navigate. Interior aspects such as artificial lights, colours, visual images, temperatures and textures are all elements which can be overwhelming for people on the spectrum. Interior environments can also bring the extra challenge of social interactions. The challenge of this design will be how to combine all three sensory elements into one design while also gently integrating into the program.
Sensory extremes

Possible sites

My interpretation

1st Iteration

Confrontation

Urban environment & other possibilities

Hypo and hyper

Site 1

Site 2

Site 3

Design Guidelines
Participant A discussed how when they were a child they had a pool which was coated in paint that bubbled and flaked. The texture and visual aesthetic of the flaking and bubbling paint became so off-putting and disturbing to them that they were unable to enter the pool or go near it. This led to a discussion on how some people on the autism spectrum, if they find something too extreme, they are unable to focus on anything else.

Questions raised

Toning it down?

The discussion with participant A raised the question of whether the textures created in the first textile iteration would be too extreme for some people on the autism spectrum and whether this would deter people from entering the design.
Toning it down
Three possible ways:

1st
Less confrontation

2nd
More organic, less in your face textures

3rd
Toning the textures down.
Rethinking how to approach the textures in the tactile design. Should the textures be approached from a material point of view or from an interactive point of view.

Toning the textures down.

Carpet  Stone  Wood
Having the design in the urban environment without some sort of 'buffer' or threshold may discourage people from using the design because it may be too confrontational. Introducing a program into the design that acts as a 'buffer' or threshold space may encourage more people to use the multi-sensory environment.
More organic shapes

Introducing more organic and natural shapes into the design to make the multi-sensory environment appear less clinical and more welcoming.
Combining the sensitivities
Shapes of spaces

Iterations exploring the different shapes of the spaces and how they could interact with each other. Whether each sensitivity should have its own specific shape or whether they should all be the same shape.

- **Tactile**
- **Visual**
- **Auditory noise**
User movement

Iterations exploring how people may move through the spaces. Would the user only visit one of the spaces and sensitivities or would they explore all of them.

Personal interaction bubble
Hypersensitive vs. hypersensitive

Iterations exploring how the hypo and hypersensitive space for each sensitivity could interact collectively once the spaces were combined into one.

$H = \text{hyposensitive}$

$h = \text{hypersensitive}$
Introducing limitations

Limitations

It became clear at this stage of the project that limitations needed to be introduced in order to scale down the scope of the project to better meet the design criteria.
**Before limitations**

**Who for**
Everyone on the autism spectrum

**Why**
To help people who are on the autism spectrum in their daily lives by improving their well-being by reducing stress and anxiety

---

**After limitations**

**Who for**
Young adults on the autism spectrum

**Why**
Help aid young adults on the autism spectrum in their daily lives by improving well-being through reducing stress and anxiety, as well as providing aid in the transition from teenager to adult. This time can be especially hard for young adults on the spectrum as there are very little support systems out there to help aid in this transition.
Introducing a program

Possible sensory trigger
Starting a conversation

By introducing a program into the multi-sensory environment it can help to aid those most comfortable in the multi-sensory environment to exist outside of it. This will also allow those who are more comfortable outside of the multi-sensory environment to become comfortable within one.

By introducing the design into a program it will help to create a conversation around autism and how design can affect those on the autism spectrum.
Program and multi-sensory environment interaction

Iterations exploring how a multi-sensory environment and a program could interact within one space. The iterations also explore how users may enter and exit the space and how this could change the interaction between the different environments.
Iterations exploring how the relationship between the program and the multi-sensory environment might change if a threshold space was introduced as a ‘buffer’ between the two spaces.

Program, multi-sensory environment and threshold interaction

- Red = Multi-sensory environment
- Blue = Program
- White = Threshold
“We have a focus on fostering resilience and supporting young people to make positive decisions.”

- Evolve
Evolve

Evolve is a ‘one stop shop’ in Wellington, New Zealand that was first opened in 2004. It provides a range of free services, activities and events for young people who are aged between ten and twenty-four (‘Who We Are | Evolve Youth Service’ n.d.). The range of services they provide include general sexual and medical health care, counselling, social support as well as youth development activities and groups. They aim to make it as easy as possible for young people to get support when they need it. Evolve has a focus on fostering resilience and supporting young people to make positive decisions. Evolve has twenty-six staff in total, as well as the therapy dog, Bailey, who sometimes makes an appearance to the clinic.

“Empowering young people to unleash their potential”

- Evolve
Informal chat with an Evolve staff member:

Q: How many people who are on the autism spectrum do you get as patients at Evolve?

A: It is hard to determine the exact numbers of patients who are on the spectrum we get because most patients are undiagnosed.

A lot of the patients we get at Evolve tend to be more towards the high-functioning side of the spectrum.
Evolve has a range of clients who use the services and a variety of staff who work for them, due to the wide range of services they provide.
Services

The different services that are provided by Evolve

- General health care
- Sexual & reproductive health care
- Mental health care
- Youth justice support
- Social work support
- Income & employment support
- Young parent support
- Youth development
- Workforce development
- School based health service/outreach
- Gender & sexuality support
Design focus

The design will be primarily focused on integrating into the mental health care service provided by Evolve, the counselling rooms, to provide additional support to the mental well-being of young people who are on the spectrum (pg. 045).
Evolve

The current evolve floor plan, recreated from original technical drawings onto a 3D modelling software.
Evolve existing floor plan
Scale 1:200 @ A4
Drawn by author
Experimenting with how the different sensitivities could start to take over the reception and waiting areas and how they could start to interact with each other.

Experiments are drawn over the existing Evolve floor plan.

Reception & Waiting areas

Experimenting with how the different sensitivities could start to take over the reception and waiting areas and how they could start to interact with each other.

Experiments are drawn over the existing Evolve floor plan.
Not to scale
Drawn by author
Experimenting with what would happen if the design started to take over the counselling rooms, the primary focus, as well as the reception and waiting areas and how this would affect any additional spaces.

Experiments are drawn over the existing Evolve floor plan.
Not to scale
Drawn by author
Reception
&
Waiting areas
&
Counselling rooms
&
Hang out space
&
Corridors

What happened if the design started to take over the whole space? How would this affect the designs of the different sensitivity spaces and how they related to one another? Would this become too overwhelming?

Experiments are drawn over the existing Evolve floor plan.
Not to scale
Drawn by author
With the addition of further limitations, young adults on the spectrum, it became easier to detail and design the ergonomics of the space.

How the multi-sensory environment is design in proportion to the human body had become lost in the first iteration. A series of tests through photography and physical modelling were undertaken to regain some of this human body to design connection.

I decided to use my own body for the experiments, being a young adult myself. The aim was to try and better understand how the everyday movements of the human body can influence the design of a space around them.
Exploring limb movement, flexibility and range with author’s body.
Body in relation to space 1
The first physical model explores the influence the author’s body makes on the form of the wall from a standing position to a bending and reaching position.

Body in relation to space 2
The second physical model explores the influence the author’s body makes on the form of the wall from a crouched down and reaching position to a standing and reaching position.
Mould around the body

Designing a single use space creates an opportunity to use the users body to become a template for the exterior form. It is important that the space feels intimate without being claustrophobic and is designed to the dimensions and size of a young adult.
Concepts
Hypo-sensitive interpretation

Figure 42. Waiting room
Hyper-sensitive interpretation

Figure 43. Waiting room
Initial concept drawings

Pen drawings exploring pod like exterior forms as well as materiality and potential sensory elements.
Further research and informal chats
Informal chats

The following chats occurred during the designing phase of the second iteration and helped immensely in the development of the final design.

The informal chats occurred with two people who work closely with young adults and children who are on the spectrum, as well as their families. Questions surrounding the effectiveness of the design as well as potential solutions were discussed. Unfamiliar terminology was also explained, which has been researched and included (pg. 231-234).
Stimming
Stimming is common in people who are on the autism spectrum and causes repetitive body movements or repetitive self-stimulatory behaviour (Smith 2018). It is proposed that stimming behaviours can occur when some people are nervous, but it is not fully understood what causes these behaviours (Smith 2018). Some theories suggest that stimming releases pleasure sensations, provides comfort and has a calming effect. The stimming behaviours vary in intensity and type and can occur in reaction to a variety of emotions. Different stimming behaviours can include vocal sounds, tapping on objects, covering and uncovering ears, repetitive speech, skin rubbing or scratching, hand movements, staring at moving objects, repetitive blinking, spinning, rocking, pacing, smelling objects or people and licking. Stimming is not often a dangerous behaviour, but it can still have negative physical, emotional or social effects on some individuals (Smith 2018). Some behaviours can become potential physical risks to the individual as well as others, but often it is a nonverbal method of communication and can help individuals cope with their emotions (Smith 2018).
Dyspraxia
Dyspraxia is known as a developmental coordination disorder that can be present among people who are on the autism spectrum. Speech and language can be affected by dyspraxia as well as fine motor control, whole body movement, coordination, body image and physical play (Synapse n.d.). Some people who have dyspraxia may have sensory integration dysfunction which creates abnormal over or under sensitivity to physical stimuli such as textures, touch, sunlight, temperature and sounds (Synapse n.d.). Dyspraxia is often described as having no mind to body contact. This means that people who have dyspraxia may have no control over the need to interact with certain objects again and again, without considering how this repetitive interaction is affecting their well-being.
There will need to be a type of ‘threshold’ between the pods and the counselling spaces that acts as a buffer between the safe spaces. This threshold space will help to draw people out of the pods and into the counselling rooms. Interactive elements should be designed so they do not introduce unhealthy stimming. The spaces should be ‘bland’ to start off with, catering to hyper-sensitive users, layers of ‘intensity’ can then be added to this through interaction to cater for individual diversity and hypo-sensitive users.

How do you create a space that is engaging enough to help the well-being of users without introducing unhealthy stimming behaviours or creating a space that people will not want to leave?
Textures that are in the spaces should be mouldable textures/surfaces rather than just ‘feel’ textures. Textures such as thinking putty and textiles that you can change through interaction, etch a sketches, magnetic boards and marble runs. Objects that people can fiddle and play with can help to also reduce stress, they can be hand held, attached to furniture or take away objects that could be taken into the counselling rooms. Deep pressure sensation objects such as weighted cushions that can be draped over users and can help to reduce anxiety and stress. Visual puzzles that are interactive can be more effective than just colour and light. It is easier to start with a neutral space that you can add layers of intensity to.

Users may have no control over the need to interact with everything in the space over and over again, rather than stopping and a ‘setting’ that improves their well-being. If this happens, will the spaces help with user’s well-being or harm it?

Questions raised

Mentions from participant C
4pm 20th August 2019

Textures that are in the spaces should be mouldable textures/surfaces rather than just ‘feel’ textures. Textures such as thinking putty and textiles that you can change through interaction, etch a sketches, magnetic boards and marble runs. Objects that people can fiddle and play with can help to also reduce stress, they can be hand held, attached to furniture or take away objects that could be taken into the counselling rooms. Deep pressure sensation objects such as weighted cushions that can be draped over users and can help to reduce anxiety and stress. Visual puzzles that are interactive can be more effective than just colour and light. It is easier to start with a neutral space that you can add layers of intensity to.
Fidgets
Initial concept drawings

Pen drawings with colour explore different handheld fidget toy shapes as well as potential interactive elements.
Final Design
Final design

The final design of iteration two consists of the different sensitivities, tactile, visual and auditory, brought together as one cohesive design. Further elements such as the wall fixtures and the fidget designs were introduced to the Evolve space to further aid users beyond the different pod environments.

The design is focused on the reception area, waiting areas, the counselling rooms and the journey to them. It was decided that the design would only occupy these spaces instead of taking over the whole Evolve space. This was to focus the attention on mental well-being for young people who are on the spectrum.
Questions raised from iteration one

Relationship to the ground

How will the design sit in the environment and relate to the ground?

Questions addressed from iteration two

Relationship to the ground

The material used as flooring in the designs have been addressed and chosen with the different sensitivities in mind. How the design relates to its surrounding has been shown through sections and a floor plan.
How is sound going to be brought into the space and what will this sound be?

How can the colour and light intensity in the space be controlled differently?

How can the textures be rethought or 'toned down' for the next iteration so they are less intense for the already sensitive user?

Auditory

Visual

Tactile

The textures for the tactile sensitivity space have been approached in a different way using interactive and mouldable textures in the space rather than the intensely visual and tactile textures. These new textures are more interactive and less intense for the user.

The interactive elements that bring colour and light into the visual sensitivity environment have been made separate, so the user has more control over the space to suit their individual needs.

Auditory

How is sound going to be brought into the space and what will this sound be?

How can the colour and light intensity in the space be controlled differently?

How can the textures be rethought or 'toned down' for the next iteration so they are less intense for the already sensitive user?
Evolve floor plan with the proposed design

The floor plan shows separate auditory, visual and tactile pods. Each pod is suited to only one sensitivity. As well as the pods there has been wall fixtures designed in the counselling rooms and in the corridor leading to the rooms. This was to provide additional support beyond the pods and to help create a more pleasant journey for users from the pods into additional spaces.
Evolve floor plan

Level 2 James Smith Building,
Corner of Cuba and Manners Street
Wellington
Section through space

The three pods do not reach ceiling height to create a greater feeling of intimacy and safety within the pods. This also allows for a separate, controllable, individual light to be in each pod.
Auditory pod section

The auditory pod has additional seating outside of the pod, but this seating is surrounded by varying height walls to still allow for privacy as well as some noise protection. The auxiliary station and speakers are within the pod. Sound can only be controlled and heard within the pod as to not disturb others in the additional seating areas. A range of seating is provided to account for the diversity of the users. Hand held fidget toys are also supplied within the pod.
Tactile and visual pod section

The visual pod has two lights compared to the other pods which only have one. These two lights are designed to be ‘starry night sky’ lights which mimic the stars in the night sky when turned on. The pod has a range of different visual interactions including a variety of visual puzzles and colour windows. A range of seating is provided to account for the diversity of the users. Hand held fidget toys are also supplied within the pod.

The tactile pod is focused on having weighted cushions and beanbags as seating rather than a range which the other pods supply. This is to cater to the hyper-sensitive user who would prefer soft and comfortable surfaces to relax on. The interactive textures in the space are all mouldable textures which allows users to ‘change’ the textures. There are also other interactive features such as an etch a sketch and marble run in the space. Hand held fidget toys are also supplied within the pod.
Wall fixtures
Separate tactile and visual wall features will be used in the counselling rooms to provide the user a method of stress relief if they are becoming anxious or stressed while talking to a counsellor. The counselling rooms will also be sound proofed to avoid unwanted noise or distraction. Separate tactile and visual wall features will also be used in the corridors leading to the counselling rooms to provide a ‘buffer’ between the pods and the counselling rooms. This ‘buffer’ will help to manage stress and anxiety when traveling between spaces and will help to draw people out from the pods, guiding them to the counselling rooms when it is time for their appointment.

Wall features
The tactile wall feature has some of the same interactive elements as the tactile pod. These interactive features include an etch-a-sketch, marble run and mouldable textures. The tactile wall feature is deliberately lacking in colour to avoid stimulating the visual senses, focusing purely on the tactile.
<table>
<thead>
<tr>
<th>Tactile wall fixture section D-D’</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:20 @ A4</td>
</tr>
</tbody>
</table>
Visual wall feature

The visual wall feature has some of the same interactive elements as the visual pod. These interactive features include colour windows, a visual puzzle and a magnetic sticker puzzle.
Visual wall fixture section E-E'

1:20 @ A4

Weighted cushions  Colour windows  Visual puzzle  Sticker puzzle
Fidgets
Fidgets come in many different shapes and sizes, but all have the same purpose of introducing repetitive interactions that help to reduce anxiety and stress in users.

Implementing two different types of fidgets into the design creates an easily accessible tool for users in addition to the other design elements to further reduce stress and anxiety.
The fidget toy that will be available in all of the pods will be hand held and will have six different types of interaction that users can use to help reduce stress and anxiety.
Switches
Spinning knobs
Turning cogs
Flexible knob
Buttons soft
Buttons stiff
The fidget toy for the counselling rooms will be slightly different from the hand held fidget toy that will be used in the pods. This fidget toy will be attached to the arm of the counselling chairs. By having the toy attached to the arm of the chair it will help to keep users seated in the chair during their counselling session.
Auditory Pod
Auditory pod

The auditory pod focuses on creating a soft and quiet space where patients can relax in peace or plug in their phones to listen to music.

The pod is soundproof to not let noise in or out, but this is also combated by the music system which will only allow the music in the pod to reach a certain level as to not disturb the rest of Evolve. The pod has a selection of seating both soft, cushions, weighted cushions and beanbags, and a hard chair depending on user preference. The lights within the space are controlled by a dimmer switch to give the user full flexibility over the space. Surrounding the pod are extra seating options for when the pod is in use or when patients want a more private and quiet seating option.
Hyper-sensivities
Hypo-sensivities
Auditory pod sensitivities
1:25 @A4
Auditory pod plan
1:25 @A4
Visual Pod
Visual pod

The visual pod focuses on creating an interactive space where puzzle solving, and colour are the core features.

The pod has a selection of seating both soft, cushions, weighted cushions and beanbags, and a harder chair depending on user preference. The lights within the space are starry night lights which are lights designed to give the impression of the stars in the night sky when turned on. These starry night lights are controlled by a dimmer switch to give the user full flexibility over the space. Visual puzzles and colour windows line the walls allowing users to play with them or leave them alone depending on their mood. These puzzlers are aimed to stimulate while also being fun.
Visual pod sensitivities

1:25 @ A4

Hyper-sensivities
Hypo-sensivities
Weighted cushions
Sound proofing
Beanbag
Soft white carpet
Smooth white wall finishes
Dimmer switch
Visual puzzles, colours and art work
Starry night sky light
Hyper-sensivities
Hypo-sensivities

Visual pod plan
1:25 @A4
Visual pod hyper-sensitive
1:40 @A4

Visual pod hypo-sensitive
1:40 @A4
Tactile Pod
Tactile pod

The tactile pod focuses on creating a soft and mouldable environment.

The pod has a selection of soft seating in the form of cushions, weighted cushions and beanbags. Mouldable textures line the walls of the pod allowing users to enter an immersive and textured experience. The lights within the space are controlled by a dimmer switch to give the user full flexibility over the space. As well as the mouldable surfaces, an etch a sketch and a marble run line the walls to provide a different kind of tactile experience than the mouldable surface. These interactive features also provide an element of fun to the pods.
Tactile plan sensitivities
1:25 @ A4

Hyper-sensivities
Hypo-sensivities
Weighted cushions
Sound proofing
Smooth white wall finishes
Light
Dimmer switch
Mouldable textures and interactive features
Soft white carpet
Beanbag
Hyper-sensivities
Hypo-sensivities
Tactile pod plan
1:25 @A4
Tactile pod hyper-sensitive
1:40 @A4

Tactile pod hypo-sensitive
1:40 @A4
Construction
Pod construction

The pods will be moulded in two halves that will be bolted together to form each pod as well as the partition walls that are part of the auditory pod.

The exterior and interior of the pods and partition walls will be fibreglass with fibreglass fabric for reinforcing. Sound insulation foam will fill the gap between the two moulded fibreglass shapes to provide sound insulation.
Moulded fibreglass
Bolt
Fibreglass fabric
Matte white paint

Exterior

Moulded fibreglass
Sound insulation foam
Bolt
Fibreglass fabric
Matte white paint

Interior

Matte white paint
Bolt protection cap
Reflections
Wall fixtures and fidgets

It is unknown whether the wall fixtures and/or fidgets will be too distracting for some or all of the patients who are on the autism spectrum while they are having appointments in the counselling rooms. While this distraction may be positive for the patient and improve their well-being, it may impede the counsellors in their jobs or while they are trying to assess their patients.

Moving forward

Depending on where the designs are placed, a distraction could be a positive or a negative occurrence. Because the wall features and fidgets were placed within a program they may become more of a problematic distraction than if they were placed in the urban environment.
Informing the users of the possible changes and the features of the pod before they enter was not something that was considered while designing the second iteration. This will create a higher uncertainty around the pods which could deter young adults on the spectrum from entering or interacting with the pods.

There is also no possible way of knowing if the pods will improve the users well-being, or if it will even have any effect on their well-being at all.

Moving forward, for the third and final design iteration, possible ways of informing potential users of the changes that can occur in the pod as well as the features that exist will be explored.

Due to the vast diversity within the autism spectrum it has to be excepted that it is impossible to create a design that will improve the well-being or even effect everyone who is on the autism spectrum. The range of individual needs, strengths and weaknesses is too large to create a ‘one design fits all’ solution.
3rd Iteration
Possible sensory trigger

Patterns

Eating noises
The third iteration will focus on documenting the construction, materials, details and assemblage of a chosen pods. This is to establish how the pods will be constructed and assembled as if they were going to be mass produced. Other possible locations and programs that the pods could be integrated into will also be explored.
Site 3, Urban environment & other possibilities

The site for the third iteration revisits the urban environment but it is explored in a different way from the first iteration. Multiple possible site locations will be explored that make up different ‘journeys of peace’ that could be taken by young adults on the spectrum throughout Wellington CBD. The third location will be part of one of these possible journeys.
Initial concepts
Marble run on the side of a building

Visual puzzle on the side of a bus stop
Questions raised in iteration two

Pods

No information on how the pods can change and what they contain is supplied before people enter the pods. This would create a high level of uncertainty, deterring some people who are on the autism spectrum from entering or interacting with the pods.

Wall features and fidgets

Do the wall fixtures and/or fidgets cause too much of a distraction depending on where they are placed and what the users around them are doing.

Questions addressed in iteration three

Pods

A sign design will be explored that informs potential users of the changes that can occur in the pod as well as the features that exist within.

Wall features and fidgets

Wall features and fidgets will not be further explored in iteration three. The unknowns from iteration two could be dependent on the individual users as well as the particular program. The effectiveness of the wall features and fidgets would have to be tested in future work to understand the affects they have on the users who are on the autism spectrum.
Hypo-sensitive interpretation
Hyper-sensitive interpretation
Possible journeys of peace
Possible journeys

Through mass production of the pods there becomes an opportunity to create multiple ‘journey of peace’ throughout the Wellington CBD. These journeys would provide young adults on the autism spectrum multiple opportunities to use a number of multi-sensory environments in different locations when overwhelmed.

This idea is explored through three possible journeys that could occur in the Wellington CBD. Each journey reflects a series of sensory extremes discovered in the first iteration (p.g 97-104).
Journey 1

2. Arthur street
1. Abel Smith Street
4. Cuba Street
5. Cuba Street
6. Cuba Street
7. Dixon Street
24. Wakefield Street
Journey 2

3. Buckle Street
2. Arthur Street
14. Victoria Street
13. Ghu2nee Street
12. The Terrace
11. Mason's Lane
Journey 3

4. Cuba Street
5. Cuba Street
6. Cuba Street
7. Dixon Street
24. Wakefield Street
23. Opear House Lane
21. Tory Street
22. Courtenay Place
Visual pod in more detail
Mass production

What would happen if the pods became mass produced?

If the pods were mass produced then their core material would be changed from fibreglass to plastic. Creating the pods out of plastic would mean they are more sustainable, easier to produce and cheaper to create. It is important that if multiple pods are being produced that sustainable materials are used that can be recycled.
Thermosetting plastics

Thermosetting plastics or thermostets remain in a permanent solid state which means that they cannot be recycled or re-moulded. Once a thermosetting plastic is moulded into shape it forms a chemical bond that cannot be undone. It begins to decompose when heated, rather than melting and will not reform when cooled.

- Polyester
  - Polyurethane
  - Silicone
  - Vulcanized rubber
  - Cyanate ester

Eco rating: 0

Thermoplastics

Thermoplastics are more commonly used and have the ability to go through multiple melt and solidification cycles without significant degradation. They usually come in small pellets or sheets that are heated and then formed to the desired shape. The process is completely reversible, which means that the plastics can be recycled or melted again to be formed into something different.

- Acrylics
  - Polycarbonate
  - Polyethylene
  - Polypropylene
  - Polyvinyl chloride

Eco rating: 4
Polypropylene

Polypropylene is one of the most commonly produced thermoplastics in the world. It has a relatively slippery surface which can make it difficult to bond with some glues. This means polypropylene has to be welded when a joint is required. This material is lightweight but with a high impact strength and fatigue resistance, it also comes in a large variety of colours and transparencies. Polypropylene is used in a variety of applications including packaging for products, textiles and automotive parts.

Eco rating: 3
Polycarbonate:

Polycarbonate plastics are naturally transparent thermoplastics. Polycarbonate can come in a variety of colours and transparencies. The raw material allows light to pass through it at nearly the same capacity as glass. It is extremely pliable and can be easily moulded without cracking. It has high impact resistance but can be easily scratched. Clear surfaces are typically coated in a scratch-resistant layer for protection. Polycarbonate is most commonly used for plastic lenses in eye-wear, protective gear, medical equipment, green houses and exterior lighting fixtures.

Eco rating: 3
Vacuum moulding

Plastic is clamped to the mould which is then heated and formed by being stretched over the mould. Vacuum forming machines vary in size and complexity from desktop sized devices to industrial sized. Tooling cost for this method of forming is relatively cheap due to the low forces and pressures involved. The moulds can be made from wood, plaster, 3D printed resin or for large production volumes a durable metal mould is used. This process can only be used to manufacture parts with simple geometries and relatively thin walls such as boat hulls, shower tray and product packaging.
**Rotational moulding**

Also called rotomoulding, is a process where a hollow mould is heated and filled with a powdered thermoplastic which is then rotated around two axes to produce hollow objects. The plastic is cooled in the mould to ensure that the shape does not sag or collapse. The moulds can be fabricated, CNC machined, cast or formed from epoxy or aluminium. Once the process is set up then the cost per part is very low relative to the size of the part. It is possible to add pre-finished pieces such as metal threads, internal pipes and structures to the mould. Rotational moulding can produce a range of products such as water tanks, ping pong balls, toys, canoes and helmets.
Reducing the unknown

“I was also very easily frightened by the unknown. I hid from people, fearing punishment from them. When the news was on TV, I never looked at the broadcaster’s face, bowing my head instead.

- Therese Marie Ronan
Possible sensory trigger
Sign

The sign will inform potential users of the contents of the space and how this can change through user interaction.

The sign needs to be a balance between visual and written information to accommodate for all users.
Multi-sensory Environment

<table>
<thead>
<tr>
<th>Etch a sketch</th>
<th>Colour windows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slide the squares to complete the puzzle.</td>
<td>Slide open the windows to reveal the different colours.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Visual puzzle</th>
<th>Starry night light</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrange the magnetic strips to colour in the puzzle.</td>
<td>Change the brightness on the lights to create stars.</td>
</tr>
</tbody>
</table>

Sign design

1:2 @A3

Sign in place

Not to scale
Construction drawings
Dark and dirty but graffiti is bright and bold. Mixture of colours and patterns creates distraction when walking down.

Through mass producing, the pods will slot into a range of different sites throughout Wellington, urban and possibly otherwise. Opera House Lane was chosen from the many possible journeys of peace locations because the lane is dirty but vibrant with an array of different styles of graffiti. The lane is visually stimulating and could become an easy distraction for anyone walking through due to the many different details, patterns and art works to see.
Starry night lights

Ramp for wheelchair access

Plywood stud cut to size

Rotational moulded polycarbonate plastic, white matte finish

Low pressure polyurethane sound insulation foam

Rotational moulded polycarbonate plastic, white matte finish

Waterproof hard wearing laminated flooring

Hard wearing light grey nylon carpeted area
Visual pod plan
1:20 @ A3

Visual pod half one
1:20 @ A3

Visual pod half two
1:20 @ A3

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Section

Section of the pod showing construction and possible placement of the visual interactive features.
visual pod half one
visual pod half two
visual puzzle
chair
low pressure polyurethane sound insulation foam
rotational moulded polycarbonate plastic, white matte finish
hard wearing nylon carpeted area

dimmer switch for starry night lights
colour windows

Starry night light
Cast in mould stainless steel hooks for door attachment and de-attachment
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Pockets of Peace
Drawing: Visual Pod elevation east
Sheet No: A105
Scale: 1:10 @ A3
Address: Opera House Lane Wellington
Author: Rebecca Lockley
Plastic shells

The pod’s plastic shells are rotationally moulded in two halves which are then bolted together. Between the two shells is a sound insulation foam which is a low-pressure polyurethane sound insulation foam.
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Pockets of Peace

Drawing
Visual Pod elevation two halves

Sheet No.
A108

Scale
1: 10 @ A3

Address
Opera House Lane
Wellington

Author
Rebecca Lockley
Starry night light

The light will feature both LED strip lighting as well as LED bulbs, this is to ensure that the lighting will be strong enough to be effective both during the day and at night. The lighting will be controlled to the user’s preference by a dimmer switch on the interior.
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Pockets of Peace

Drawing: Starry night light detail

Sheet No: A109

Scale: 1:2 @ A3

Address: Opera House Lane Wellington

Author: Rebecca Lockley

- Clear polycarbonate plastic light covers
- 5mm polycarbonate plastic CNC cut, white matte finish back painted black
- Rubber seal
- Aluminium casing
- Pod
- LED light bulbs
- LED light strip
- Semi transparent plastic 5mm thick
- Cast in mould plastic fixings

6 16 60 16 60
100
420
Pod shell joint

The two pod shell halves will be moulded to overlap at the join. The two halves will then be bolted together at 300mm intervals.
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| Pockets of Peace | Drawing: Two pod halves connecting detail | Sheet No: A110 | Scale: 1:1 @ A3 | Address: Opera House Lane Wellington | Author: Rebecca Lockley |
Visual interactions

The visual interactions can be fixed anywhere within the pods when assembling on site, but would ideally be fixed at a height which is comfortable to reach by the user when both standing and sitting.
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Pockets of Peace

Drawing: Interactions to pod details

Sheet No: A111

Scale: 1:1 @ A3

Address: Opera House Lane Wellington

Author: Rebecca Lockley

- Visual puzzle interaction
- Low pressure polyurethane sound insulation foam
- Rotational molded polycarbonate plastic, white matte finish
- 35 mm stainless steel bolt
- Aluminium fixing
- 8 mm stainless steel screw
- Plastic fixing
Door

The door is designed to be easily attached and detached. The door will be used to seal off the pod at night, to protect the interior and its contents or when it is under maintenance.
<table>
<thead>
<tr>
<th>Materials and Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interior pod mould</strong></td>
</tr>
<tr>
<td>- Low pressure polyurethane sound insulation foam</td>
</tr>
<tr>
<td>- Rotational moulded polycarbonate plastic, white matte finish</td>
</tr>
<tr>
<td><strong>Exterior pod mould</strong></td>
</tr>
<tr>
<td>- Cast in mould stainless steel hooks for door attachment and de-attachment</td>
</tr>
<tr>
<td>- Cast in mould stainless steel hooks for door attachment and de-attachment</td>
</tr>
<tr>
<td>- Removable door</td>
</tr>
<tr>
<td>- Low pressure polyurethane sound insulation foam</td>
</tr>
<tr>
<td>- Rotational moulded polycarbonate plastic, white matte finish</td>
</tr>
</tbody>
</table>
The ground

The pod interior shell will have a plastic flooring already moulded. The carpet and underlay will be cut and fitted on site after the pod is bolted to the ground on both the interior and exterior to ensure it can not be tipped or be moved.
Lighting

The pod is designed so that light protrudes from the top both during the day and at night. The interior lights will also be effective during the day and a dimmer switch on the interior allows the intensity of the interior light to be controlled.
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Pockets of Peace

Drawing: Day and night lighting

Sheet No: A114

Scale: Not to scale

Address: Opera House Lane Wellington

Author: Rebecca Lockley
Visual interactions

The visual interactions are designed to be visually stimulating through interaction. Two of the interactions are puzzle based while the third focuses on colour.
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Assembly

The exterior and interior plastic shells with the sound insulation layer will be moulded and fixed together off site.

The door, flooring, lighting and attachment of the interactive features will be assembled on site.
Assembled off site

Assembled on site

- Exterior mould
- Interior mould
- Starry night light
- Plastic mould
- Door
- Sign and dimmer switch
- Stainless steel hooks
- Visual interactions
- Nylon carpet

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Pockets of Peace
Drawing: How it fits together
Sheet No.: A116
Scale: Not to scale
Address: Opera House Lane Wellington
Author: Rebecca Lockley
On site

Assembled pod on site in Opera House Lane, Wellington.
Possibilities

Possible locations

Where else can the pods be placed and modified to fit different users and surroundings?
Figure 44. Paris at night
Rehabilitation centre
Residential home

Figure 46. House
In China, people on the autism spectrum are called “children of the stars because they are as lonely and isolated as the stars in the night sky.”

- Huang Lanlan

Location: Paris
Reflections
Mass production and construction

By changing the pod’s core material from fibreglass to plastic the pods become cheaper and quicker to mass produce while also becoming better for the environment.

Having a door that can be attached and de-attached to the pod when needed is the most efficient way of closing the pod off at night to protect its contents, while still allowing it to be open and inviting during the day. While the door is effective, very little thought has gone into its design which had the opportunity to become something special. Further design input into the door can be explored.

Questions raised

Is mass producing the same pods to put into different environments going to be effective? Different environments, programs and cultures may require a different pod designs or feature different interactive features.
Design guidelines
Everyone on the autism spectrum is unique. This means that there is a vast amount of diversity within autism. Someone on the spectrum can experience their own individual struggles in certain areas such as language skills, communication, motor skills, executive functioning, emotional regulation, self-monitoring and the ability to perceive and process sensory information.

**Understanding your user**

It is extremely important for a space that is designed for someone on the autism spectrum to be controlled by the user. Control over how the user interacts and reacts to the space as well as having control of the sensory information around them allows the user to feel safe and calm, while also being able to alter the environment around them to suit their personal preferences.

How sensory information is perceived can be categorized as either hypo-sensitive or hyper-sensitive. Often people on the autism spectrum can fluctuate between the two unpredictably. This can lead to sensory ‘tune outs’, where vision or sound can disappear and then return, multichannel perceptions, where sounds can also provoke a smell or a sensation, sensory overloads and difficulties processing and identifying sensory information.

**Hyper-sensitive vs. Hypo-sensitive**

Hyper-sensitive people usually have a heightened awareness and sensitivity to different incoming sensory information. For someone who is hyper-sensitive their sensory processors need to be calmed down or soothed. Creating a space that is easy on the senses helps hyper-sensitive people to feel more relaxed and less anxious.

Hypo-sensitive people are usually numb or unaware of the sensory information that is around them. For someone who is hypo-sensitive their sensory processors need to be stimulated so they are able to reconnect with the world around them. Creating a space that stimulates their senses will help them to reconnect.
**HYPO-SENSITIVE**

**Visual**

Potential sensory triggers
- Hidden or camouflaged objects.
- Hidden or camouflaged building elements such as doors, stairs, steps or columns.

Spatial qualities
- Way-finding systems put in place that allow for easy detection of objects and building elements.

**Tactile**

Potential sensory triggers
- A range of different textures that can be interacted with by touch.
- Potential harm due to a low response to pain or discomfort.

Spatial qualities
- Range of different textures that can be interacted with.
- Safety for users and recognition of any potential dangers.

**Auditory**

Potential sensory triggers
- No constant sound, a sound that is changing all the time.
- Sounds that can indicate potential danger are not reacted to.

Spatial qualities
- One constant sound in the space.
- Visual or tactile elements are used as warnings as well as sound.
### Visual

**Potential sensory triggers**
- Bright lights.
- Sunlight.
- Certain objects or colours.
- Repetitive movements.

**Spatial qualities**
- No bright lights.
- Shaded areas.
- Control over colours and objects.
- Reduced repetitive movements.

### Tactile

**Potential sensory triggers**
- Strong tactile elements such as furniture and furnishings.
- Close proximity to other people.

**Spatial qualities**
- Soft furnishing and furniture.
- Limited range of textures.
- Spaces that allow users to have space from others.

### Auditory

**Potential sensory triggers**
- A range of different sounds all occurring at once.
- Background noises.
- Sudden or loud sounds

**Spatial qualities**
- A quiet space.
- One controlled sound in the environment at a time.
SENSORY SENSITIVITIES

Sensory sensitivities

People who are on the autism spectrum have abnormal responses to incoming sensory information from the surrounding environment. They have difficulties with sensory integration meaning that they are unable to receive information from their senses collectively, this causes social and sensory over stimulation which drives the behaviours we associate with autism. Interacting with the environment can be a particularly demanding activity and often it is difficult to adapt to the surrounding environment and conditions.

The most common sensory sensitivities:
- Visual
- Tactile
- Auditory

Less common:
- Vestibular movement (movement and balance).
- Proprioception (awareness and movement of the body).
- The ability to sense the position of their own body in space.

Change in surroundings

Sensitivity to change in the surrounding environment is a fundamental condition of autism which can stop an individual from adapting. New stimuli such as new clothing, sounds, smell or environments should be introduced to someone who is on the autism spectrum slowly so that they are able to become familiar with it, multiple new stimuli can become overwhelming and can cause negative reactions. People who are on the spectrum require environments that are secure, non-surprising, structured and tailored to the individual sensitivities. This is why people who are on the autism spectrum prefer to stay in their secure and familiar home environments rather than venture out into the public environment where it is less secure and unpredictable.

Information signs

It is important to inform users of the potential changes that can occur in the space when the environment is designed to be interactive and controllable by the user. This can be achieved through signage at the entrance of the space. This helps to create a predictable space that helps the user to feel safe and secure.

Key points
- Understand your client’s sensitivities and preferences and design to accommodate them.
- Create a space that is interactive and controllable by the user to help engage them while adapting to their individual needs.
- Inform the user of the elements and possible changes of the space before they enter.
- Design for both hypo and hyper-sensitivities as users can fluctuate between the two unpredictably.

In China, people on the autism spectrum are called “children of the stars because they are as lonely and isolated as the stars in the night sky.”
- Huang Lanlan

Conclusion

Designing for people who are on the autism spectrum can be challenging, especially if you are designing for multiple people on the spectrum. Understanding the different design elements that can be used to calm or stimulate the senses is critical in designing a space for people on the spectrum. It is important to recognise the benefit of these spaces for people who are on the autism spectrum and the positive influence they can have on their well-being.
Reflection
Comparisons

Size comparison

The size and capacity of the pods was something that was deliberated and well considered throughout the design process. This section compares the tactile, visual and auditory pod designs from iteration two (pg. 241) with the multi-sensory environment precedents analysed in the research chapter (pg. 063). This is to compare how the designed multi-sensory environments differ from the precedents and how scale may influence the effectiveness.
**Tactile pod**

The tactile pod focuses on creating a soft and mouldable environment.

**Visual pod**

The visual pod focuses on creating an interactive space where puzzle solving and colours are the core feature.

**Auditory pod**

The auditory pod focuses on creating a soft and quiet space where patients can relax in peace or plug in their phones and listen to music.
Pennyman Primary School

1. Technology based.
2. Quite a large space, multiple people can use it at once.
3. Has a lot of focus on visual stimulation, all technology based.
4. The user has the ability to completely control the space, even down to the colour of the lighting.

My designs

1. Has some technology but is more focused on materials and interactive features that are physically moved or changed.
2. The pods are designed for one person.
3. Has three designs, each based on a different sensory stimulation.
4. The user has the ability to control whether they interact with the space as hypo or hyper stimulating.

Figure 7-10. Pennyman Primary School

Third party content.
Please consult the print version for access.
Pennyman Primary School

My designs

Size comparison

There is a considerable size difference between the Pennyman Primary School’s multi-sensory environment and the pods. Although the user has the ability to completely control the space, multiple people may be using the space at one time which would not allow every user’s individual needs to be met. Because the pods are single use, individual’s will be able to control the space to their preferences, meeting their needs.
**McKenzie Centre**

1. Has a lot of different tactile features.
2. There is so many different elements in the space, overwhelming amount of features.
3. Little focus on the auditory sense, only controllable sound occurs when interacting with objects.
4. The space is quite large with lots of children being able to use it at once.

**The designs**

1. Only one of the designs focuses of tactile features.
2. The pods all start off neutral spaces with the opportunity to add layers of stimulation.
3. Auditory pod allows you to control the type of sound as well as the volume.
4. The pods are designed for one person.

Third party content. Please consult the print version for access.
There is a large size difference between the McKenzie Centre's multi-sensory environment and the pods, as well as an age difference between the targeted users. The McKenzie Centre's environment is designed as more of a play space rather than a multi-sensory environment. Although this would suit the children that the centre's environment is designed for, this would not suit the young adults who are part of this projects design brief. The pods have some tentative aspects of play within the interactive elements but they are more focused on improving well-being.
**Sensory Yurt**

1. The Sensory Yurt is designed for one user at a time, accompanied by a staff member or camp volunteer.
2. Low technology use.
3. Caters to all of the sensitivities at once.
4. Has a large range of textures as well as interactive features and games.

**The designs**

1. The pods are designed for one person.
2. Low technology use.
3. Each pod focuses on a different sensitivity.
4. Each pod has a limited amount of interactive features and textures.

Third party content. Please consult the print version for access.

Figure 13-16. Sensory Yurt
The Sensory Yurt and pods have similar features and scales. Both environments are designed for one user on the autism spectrum at a time and both focus on physical elements rather than technology based elements. The Yurt has a larger range of interactive features that can stimulate multiple senses at once, while the pods are three separate designs, one for each sensitivity. Out of all the precedents the pods have ended up being the most similar to the Sensory Yurt.
Reflection on process and design
Multiple testing sessions at two different stages throughout the design process were planned at the beginning of the project. The aim of the testing sessions was to observe the participants interacting with the different sensory aspects of the design. This was to help aid in the development of the designs and to give the author an insight into how people on the autism spectrum would interact and react to unfamiliar environments and interactive sensory objects. Unfortunately, this never happened due to a lack of participant interest. The start of June 2019 was when the search for participants began. Three Wellington based autism organisations and support groups were emailed, Autism NZ, Altogether Autism and The Autism Intervention Trust, explaining the project and asking if they were aware of anyone who fulfilled the criteria of a young adult who would be willing to participate in the testing of the design. The Autism Intervention Trust works primarily with children under the age of 15, which did not fit the participants brief. Autism NZ and Altogether Autism both advertised the participant requests on their respective Facebook and support pages but unfortunately there was no interest. Because the design was never tested it is unknown whether the design will actually improve the well-being of anyone who is on the autism spectrum. Although the space has been designed from research, assumptions have been made surrounding the positive effect the design will have on young adults who are on the autism spectrum.

If the participant recruitment process was repeated, the advertising would be approached in a different way. The primary aim was to inform potential participants of what the testing sessions would involve, this meant that the advertisement consisted of mainly words and no imagery. If the process was repeated, then the advertisement would consist of more imagery and less words. The testing sessions would have been quite a confronting and unfamiliar situation for most people who are on the autism spectrum and this also could have been a large factor contributing to the lack of interest.
**Diversity**

Throughout this process the one key critical dilemma has been how to design for the vast diversity within autism. The limitations of the design and area of research is that it is extremely difficult to design for everyone who is on the autism spectrum due to the large amount of variations in the unique strengths, weaknesses and abilities that everyone who is on the autism spectrum is born with. The limitation of the defined age group, young adults, was added during the design process of the second iteration to narrow down the scope of the project, while also trying to reduce this difficulty. Although this age limitation helped to define the size, form and interactions within the space this difficulty remained. Without testing the final designs on a range of people who are at different ends of the autism spectrum, there is a large unknown whether the designs created will improve the well-being of the users through reducing stress and anxiety. The range of outcome that can be achieved by the user is limited and will not accommodate to the unique needs of everyone who will use the space.

The sites that were chosen had pre-existing limitations in the range of users who would be able to use the space due to their locations. The intention of placing the designs in the urban environment, as well as in a program, was to be able to reach a larger number of users than if the designs were placed in a more private setting such as residential homes or specialist areas. The limitations due to the selection of sites means that the spaces will accommodate to people who tend to be more on the higher end of the autism spectrum rather than people who are on the lower end of the autism spectrum who require more assistance with their individual needs.
Stimming, unhealthy repetitive behaviours and dyspraxia, developmental coordination disorder, are terms that were introduced to the design process during multiple discussion with people who worked with young adults and children with these obstacles. The design has been developed to try and reduce these behaviours, but it is unknown whether the interactive features themselves will encourage these behaviours. If these behaviours were stimulated by the interactive features then users could be prone to engaging with the features over and over, potentially harming their well-being, instead of stopping at a setting which improves it.

A factor that is not controlled with the designs is the length of time that someone is occupying the space. Without having constant monitoring of the space there is no way to predict how long someone may stay in the space for. Ideally users would be in the multi-sensory environment for the amount of time that it takes them to de-stress and become less anxious but this may not be the case as users may instantly leave if they do not like the space or stay a longer amount of time if they are comfortable. This uncertainty has the potential to affect the well-being of others who may be waiting to use the multi-sensory environment but are unable to.

Well-being

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Possible sensory contact
Sensitivities

Only three of the most common sensitivities were designed for, the other sensitivities were documented but never part of the design brief (pg. 037- 040). It is uncertain whether this will limit the number of users who will benefit from interacting with the space.

The unexplored is an uncomfortable boundary for a lot of people who are on the autism spectrum. It is assumed that the space has been designed in a way that reduces this confrontation and discomfort, but it is unclear whether the stress of entering an unexplored space would still be high enough to discourage a number of potential users from entering.

The interactive elements of the space are to engage the hypo-sensitive users who need to be stimulated. It is intended that the interactive features in the designs are for those who need to interact with them, but they can also be ignored for those who do not need or want to interact with them. Because the interactive features are a permanent component in the design it is uncertain whether they will become a distracting feature for users who are wanting to become calmed down from the space around them. It is not clear whether this will hinder the positive well-being progress of some of the users.
Possible sensory contacts,
**Future research**

The design guidelines produced at the end of this process will provide a framework for future designers to build upon the research and process. This process has taken a unique approach to designing for young adults who are on the autism spectrum, the framework provided will open the pathway for others to continue to develop their own individual method. Pockets of Peace and design guidelines are an important contribution to the interior architecture discipline as they provide a new approach to this topic. The outcomes, questions and limitations help to create a greater understanding of how design can affect those who are on the autism spectrum and design decisions can be made that will improve the built environment for people on the spectrum on a daily basis. This educational factor will be built upon as more designers become aware of the sensory implications of the built environment and how these can affect the users who are on the autism spectrum.
Possible sensory contact
The change from adolescence to adulthood is both an emotionally and physically challenging time for young adults who are on the autism spectrum. Pockets of Peace explored how interior architecture can be used to help with this transition by creating easily accessible multi-sensory experiences to help aid the well-being of young adults on the spectrum whilst accommodating for their vast individual diversities. Throughout Pockets of Peace there have been two questions that have defined and shaped the development and design process. How to design for the vast diversity within autism and how to improve the well-being of the users by reducing anxiety and stress. These questions have been a contributing factor of the interactive and controllable nature of the designs. Although these questions have been greatly considered and pondered through tactile, visual and auditory sensory designs, it remains uncertain whether it is possible to design for the well-being and the vast diversity of young adults who are on the autism spectrum.

The outcome of the process was a set of design guidelines that can be used by future designers as a framework to carry on with the research. Although at the end of the process there were still unanswered questions and uncertainties, this research and design process has the ability to open pathways for others to continue the quest to answer these questions. The recommendation for anyone who is wanting to do similar research is to test the created design at multiple stages with people who are on the autism spectrum. There are difficult challenges surrounding the area of design for people on the autism spectrum but as more people approach the topic it will reduce the difficulties and add to the growing knowledge surrounding this topic.

Conclusion

The change from adolescence to adulthood is both an emotionally and physically challenging time for young adults who are on the autism spectrum. Pockets of Peace explored how interior architecture can be used to help with this transition by creating easily accessible multi-sensory experiences to help aid the well-being of young adults on the spectrum whilst accommodating for their vast individual diversities. Throughout Pockets of Peace there have been two questions that have defined and shaped the development and design process. How to design for the vast diversity within autism and how to improve the well-being of the users by reducing anxiety and stress. These questions have been a contributing factor of the interactive and controllable nature of the designs. Although these questions have been greatly considered and pondered through tactile, visual and auditory sensory designs, it remains uncertain whether it is possible to design for the well-being and the vast diversity of young adults who are on the autism spectrum.

The outcome of the process was a set of design guidelines that can be used by future designers as a framework to carry on with the research. Although at the end of the process there were still unanswered questions and uncertainties, this research and design process has the ability to open pathways for others to continue the quest to answer these questions. The recommendation for anyone who is wanting to do similar research is to test the created design at multiple stages with people who are on the autism spectrum. There are difficult challenges surrounding the area of design for people on the autism spectrum but as more people approach the topic it will reduce the difficulties and add to the growing knowledge surrounding this topic.
This research has the immensely important ability to raise awareness about how design can affect those who are on the autism spectrum. Through further research and design, designers as well as the general public’s understanding of autism will grow, improving design conditions for people on the autism spectrum.
Figures

Note:
All figures that are not referenced have been created, drawn or painted by the author, Rebecca Lockley.


3. Image by Grandin, Temple, 1992, Front view of the squeeze machine. The person using the machine has complete control over it. High-Functioning Individuals with Autism / Edited by Eric Schopler, Gary B. Mesibov, p.g. 110

4. Image by Grandin, Temple, 1992, Rear of squeeze machine. Pressure is applied to both sides of the person's body by padded sides. High-Functioning Individuals with Autism / Edited by Eric Schopler, Gary B. Mesibov, p.g 109


44. Image by Philippe Campays, *Paris at night*, 2019


52. Image by Philippe Campays, *Paris at night*, 2019
Works cited


**Ethics approval**

Application ID : 0000027400

Category: A

Application Title : How can we create a specific interior architecture space for a multi-sensory experience within the diversity of Autistic Spectrum Disorder.

Ethics application for working with people who are on the autism spectrum through testing sessions

Date approved: 26th April 2019