Investigating the effect of different type of visual content on psychiatric patients during a stressful episode

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Preface

This master thesis marks the end of my time at the Eindhoven University of Technology (TU/e). Five years ago I started my time as a student in the bachelor of Innovation Sciences. The reason why I chose this bachelor was the combination of people and technology. Therefore, it was no surprise that after three years I decided to follow the master Human-Technology Interaction, a user-centered program with a solid psychological foundation. This study gave me tools to conduct research and develop myself as a person in a field I was interested in. I enjoyed my time here, but look forward to start the next chapter called ‘the working life’.

I would not have been able to complete this final project without the involvement of a number of people. Therefore, I would like to use this opportunity to thank those who have helped me during this process. First, I would like to thank my primary supervisors Yvonne de Kort and Femke Beute for their advice and patience. The door was always open when I needed some advice. Additionally, I would like to thank Daan van Bel and Wijnand IJsselsteijn for their fresh insights during critical parts of the project. I also want to give a special word of thanks to my external supervisor Erik Kuijpers. Thank you for your enthusiasm and help during my time at the GGzE. I really enjoyed my time there. Furthermore, I would like to thank my “office-members” Marlies, Tom and Mirjam for their support and laughter during these last six months. To share a room with friends who were all joining the same rollercoaster ride and shared the same experiences was really a great support and motivation.

Last, but certainly not least, I would like to pay my gratitude to the people who stood by me all these years. My parents for their unconditional love and always believing in me, and my brothers for sometimes giving me a hard time like only brothers can do. I would like to thank them for helping me to become the person I am today. I would like to thank my friends for the great moments when I did not have to study. And finally, my boyfriend Erik for his never-ending support and love. His positive spirit and work ethos often helped me to remind that every cloud has a silver lining.

Joyce de Laat

Eindhoven, August 2012.
Summary

Being separated during psychiatric crisis can be traumatizing and counter-effective. The GGzE tries to reduce the need for separation and other interventions by creating an environment that is supportive to the client. Together with the TU/e and Philips they are working on a sensory room that will be placed in the high care department of the crisis unit centre of psychosis. The aim of this research was to gain more knowledge about what type of visual content could be applied in the sensory room to help prevent escalation in an early stage, leading to reduction of the use of seclusion rooms and length of stay. We investigated whether two types of positive visual stimuli – nature content and social connectedness cues (photographs of the participant’s loved one) - increase self-regulation and improve affect. Both types of content have been reported to reduce stress and enhance self-regulation in restoration and self-control literature. In a mock-up of a seclusion room we tested whether recovery from a mentally demanding task was facilitated by exposure to different types of content via a digital display. A within-subjects design, with four consecutive and counterbalanced blocks, tested effects of four types of visual content (nature vs. social connectedness vs. neutral vs. none) on self-reported affect, physiological measures, and performance on the Sustained Attention to Response Task (SART). Participants (N=25) were experts of experience (former psychiatric in-patients). In every block, dependent measures were probed directly after the mentally demanding task and after the visual content. Afterwards, an in-depth interview was performed to reflect on participants’ experiences. Results showed significant effects of visual content on self-reported relaxation and positive affect, but did not render significant effects on task performance. This supports expected restoration on affect, but lacks evidence on restoration of self-regulation. Both nature content and connectedness cues showed positive effects on both relaxation and positive affect, with stronger effects for connectedness. Results from the interviews validated the positive effect of visual stimuli. Participants confirmed that visual stimuli could contribute to the calming process of clients, with a preference for social connectedness cues followed by nature content. Physiological data showed a significant increase in skin conductance during exposure to nature content and pictures of loved ones. This indicates increased arousal, but based on the other findings we suspect that the increased arousal has a positive impact on the participants. We can conclude that positive stimuli may offer a means to reduce psychiatric crisis and the length of stay in separation.
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Abbreviations

ART  Attention Restoration Theory

GGzE  Mental Healthcare Eindhoven (“Geestelijke Gezondheidzorg Eindhoven”)

GGz  Mental Healthcare

HR  Heart rate

HRV  Heart rate variability

INS  Inclusion of Nature in Self Scale
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>IOS</td>
<td>Inclusion of the Other in the Self Scale</td>
</tr>
<tr>
<td>IQ</td>
<td>Interaction quality</td>
</tr>
<tr>
<td>LMM</td>
<td>Linear Mixed Models</td>
</tr>
<tr>
<td>PANAS</td>
<td>Positive and Negative Affect Schedule</td>
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<tr>
<td>RQ</td>
<td>Relationship quality</td>
</tr>
<tr>
<td>RS</td>
<td>Relationship salience</td>
</tr>
<tr>
<td>SART</td>
<td>Sustained Attention to Response Task</td>
</tr>
<tr>
<td>SC</td>
<td>Social connectedness</td>
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<tr>
<td>SCEQ-S</td>
<td>Social Connectedness Experiences Questionnaire Regarding a Specific Other</td>
</tr>
<tr>
<td>SCR</td>
<td>Skin conductance response</td>
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**Abbreviations pre-study (Appendix B)**

<table>
<thead>
<tr>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>IQ</td>
<td>Interaction quality</td>
</tr>
<tr>
<td>PB</td>
<td>Perceived benefit</td>
</tr>
<tr>
<td>RQ</td>
<td>Relationship quality</td>
</tr>
<tr>
<td>RS</td>
<td>Relationship salience</td>
</tr>
<tr>
<td>SCEQ-S</td>
<td>Social Connectedness Experiences Questionnaire Regarding a Specific Other</td>
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<tr>
<td>SC</td>
<td>Social connectedness</td>
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<tr>
<td>SS</td>
<td>Social support</td>
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<td>SSL-I</td>
<td>Social Support List – Interactions</td>
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1. General introduction

We have all seen them on movie screens or on television, the seclusion rooms in psychiatric institutions where people who are losing control will be placed without any of their own clothes or possessions and only a bed and toilet as interior of the clinical white room. Completely dependent on the system and nothing to say or do. Unfortunately, this scenario not only exists in movies or TV shows, but is still the reality for a lot of psychiatric patients nowadays. Patients who are escalating are no longer able to regulate their impulses and can become uncontrollable or aggressive. For their own safety and that of staff and co-patients, they may be separated and placed in a seclusion room until they have calmed down. But instead of helping the situation of the patient, such low-stimulus environments could make the situation worse. Separation negatively affects the bond between patient and caregiver, it can lead to anxiety and even posttraumatic stress of the patient (Kappen & Kuijpers, 2008; Lezy, 2007). Nowadays, the field of psychiatry tries to reduce coercion and compulsion. Coercion occurs when a patient is forced to do or to stop doing something. In this situation the patient has no freedom of choice. Compulsion means that the patient will be influenced which leads to reduced freedom of choice (Schermmer, 2003).

The ‘Geestelijke Gezondheidszorg Eindhoven en de Kempen’ (GGzE), translated: Mental Healthcare Eindhoven and de Kempen, tries to reduce the need for separation and other interventions by creating an environment that is supportive to the client. Together with Philips they are working on a sensory room that will be placed in the high care department of the crisis unit centre of psychosis; a room with ambient lighting, sound and an interactive design to enhance wellbeing and support the feeling of being in control for the patients. The room also contains a display on which content can be displayed. Psychological and technological knowledge should be combined to make the sensory room a success. Ambient and mediated technologies can be applied to the room, but have to be adapted to its users to make it work. It is expected that supportive design and healing environments will foster the process of recovery, support dealing with stress, and can be complementary to the healing effects of drugs and other medical technologies. Ulrich (1991) already discussed three components of supportive design: a sense of control with respect to physical-surroundings, access to social support, and access to positive distractions in physical surroundings. Supportive designs and healing environments are already regularly applied to healthcare settings in which the physical environment of those healthcare settings ‘can make a difference in how quickly the patient recovers from or adapts to specific acute and chronic conditions’ (Stichler, 2001, p. 2). However, so far this has not been applied to the field of mental health; mediated and ambient technologies in combination to mental health are a rather unexplored area.
The aim of this research is to gain more knowledge about what type of visual content helps to calm down and restore the self of the patients. Therefore the focus of this research shall be on the recovery of self-control and affect, and how to achieve this in the sensory room. First, we provide a description of the context in which the current research was performed. Subsequently, in chapter 2 we will introduce the concept of self-control and affect, explain the psychiatric disorder psychosis and its relationship with self-control, and discuss potential solutions to overcome resource depletion. Chapter 3 describes the study, which applied restoration and social belongingness theories to a psychiatric setting by performing an experiment with experts of experience, investigating the effect of different types of visual content. The results will be discussed in chapter 4, followed by the final chapter in which conclusions will be drawn.

1.1. Organisation

The GGzE is an organisation which offers help and support to people with severe, multiple and often long-term psychiatric problems, like psychotic disorders, personality disorders, autism, mood and anxiety disorders, and psycho-traumas. The GGzE has several locations and psychiatric institutions in the region of Eindhoven and de Kempen. This study was performed at one of those psychiatric institutions, ‘De Grote Beek’, situated in Eindhoven (the Netherlands). In 2011 the GGZe had 15,990 clients in care (GGZE, 2012).

1.2. Theme ‘Dwang en Drang’ (coercion and compulsion)

Both politicians and the GGz’s (‘Geestelijke Gezondheidzorg’, translated: Mental Healthcare) aim is to reduce separation and to improve the quality around coercion and compulsion (Voskes, Theunissen & Widdershoven, 2011). As mentioned in the introduction, separation is damaging in the care of psychiatric patients. Voskes and colleagues (2011) state that separation is seen as the disruption of contact. This damages the client’s trust in the caregivers and it costs a lot of time to re-establish that trust, if it ever does re-establish. Many GGz-institutes have already started projects to reduce and shorten coercion and separation. The project ‘Het Roer Om’ (translated: change of direction) of the GGzE is such a project. The aim of this project is to work towards a situation in which separation is a reserved treatment and only possible at three departments of the GGzE. For quite some time the GGzE has been concerned with the reduction of coercion and compulsion. In 2010, the amount of separations has already decreased with 32% compared to 2009 (GGzE, 2010), and the ambition is to reduce the amount of separations even further.
1.3. Specifications sensory room

The GGzE is building a new facility on GGzE location ‘De Grote Beek’. GGzE, Eindhoven University of Technology (TU/e) and Philips collaborate in developing an ambient sensory room aiming to create an environment that is supportive to the client and can reduce the need for separation. Philips Ambient Experience was contacted to see how certain technologies and design elements could be integrated into this new facility (Philips, 2010). The sensory room is not only for separation, but also to reduce the need for separation by avoiding escalation. The main client needs were identified in a workshop and matched with available ambient environment solutions. The needs were divided into the themes contact, security, here and now, information, keep own identity, choices, supporting the healthy side, personalize, and perspective of the nurse (Philips, 2012). In Figures 1-1 and 1-2 a proposed solution is presented. The sensory room is split in a public section and a private section, which differ in a different colour of carpeting. From standing in the public section, the nurses have to ask for permission to step into the client’s private section. This will give the client a feeling of control and safety. The sensory room will contain a projection area and a glass partition display. The imagery will be projected on a glass wall with projection foil and is presented in portrait style instead of a normal screen. Furthermore, there will be cove lighting and audio speakers, and furniture elements are necessary to make the room less clinical, and more homely. In the monumental former boiler house on GGzE location ‘De Grote Beek’ a life size mock-up of the future sensory room is built to explore relevant design criteria. The specifications of the technologies used in the mock up during our experiment will be discussed in the method section.

![3D Overview](image)

Figure 1-1: Overview sensory rooms (Philips, 2010)
1.4. **Our contribution to the project**

Because there are several organizations involved in the development of the sensory room, everyone has his own focus within the project. GGzE has to stay in charge to ensure their own interests and needs and those of their clients within the project and is responsible for the communication and staff training. Philips takes care of the (ambient) technology and user interface of the sensory room. The TU/e performs several studies in the sensory room pertaining to user experience and effects on the user, of which this particular study is part as well. We examine the effect of nature and social interaction on self-control and affect recovery by performing an experimental study with experts of experience. Our focus is on the type of visual content that should be displayed in the sensory room.

1.5. **Experts of Experience**

Our study will be performed on experts of experience. Experts of experience are important key figures within the organisation of GGzE. An expert of experience is a former psychiatric in-patient who had to seek professional help because of their previous mental state and problems, but who is now in control and able to reflect and understand the reasons for those feelings and find ways of dealing with them more effectively. They are trained to become an expert of experience and have a significant role within the GGzE. Together with psychiatrists and nurses they are working on improving mental health care and running a client-interest office, established to help and guide new incoming patients who experience similar (mental) problems.

Now we provided the context in which this research is performed, we start with the theoretical background in chapter 2 where the constructs of self-control, affect, the psychiatric disorder psychosis, and potential restorative solutions will be discussed.
2. **Theoretical background**

2.1. **Self-control**

Executive functioning is a high level cognitive mechanism including higher order cognitive processes that involve reasoning, planning, organising, problem solving and successful execution of behaviour (Williams & Thayer, 2009). It plays an important role in stress regulation. Furthermore, a variety of psychological constructs and processes rely on executive functioning, including emotion regulation, delay of gratification, attentional control, self-monitoring, self-regulation and self-control (Williams & Thayer, 2009). Self-regulation is a mechanism, which involves the capacity to behave oneself properly, inhibit unwanted responses, and resist temptations (Kaplan & Berman, 2010). It refers to processes by which the self alters its own responses or inner states in a goal-directed manner (Baumeister, Vohs & Tice, 2007). Executive functioning and self-regulation are both dependent on a common resource. That resource is finite in quantity and can be depleted by heavy demands (Kaplan & Berman, 2010). It is theorized that self-control is a finite resource that determines capacity for effortful control over dominant responses and enables a person to restrain or override a response, thereby making a different response possible (Baumeister, Vohs & Tice, 2007; Hagger, Wood, Stiff & Chatzisarantis, 2010). This means that acts of self-control can temporarily deplete self-regulation capacity, a state also called ego-depletion (Baumeister, Bratslavsky, Muraven, & Tice, 1998). There is another way to look at the construct of self-control. According to Muraven and Baumeister (2000) self-control is “the exertion of control over the self by the self” (p.247). They compare self-control to a muscle’s ability to work, because just as a muscle the resource for self-control has a limited, consumable strength. Exerting self-control consumes self-control, which means the amount of strength available for subsequent self-control efforts is reduced (Muraven & Baumeister, 2000).

Exerting self-control not only causes ego-depletion, but also seems to deplete energy and affect vitality, where vitality is defined as “the experience of having physical and mental energy” (Ryan & Deci, 2008, p.703; Ryan et al., 2010, p.159). In everyday life people show a remarkable capacity to regulate the self and overcome the impulses and drives that tempt us, although they too show frequent lapses in self-control (Hoffman, Baumeister, Förster & Vohs, 2011). Moreover, problems as eating disorders, drug abuse and violent crime have their roots, directly or indirectly, in self-regulation failure (Hagger et al., 2010). Psychiatric patients who are escalating sometimes have trouble to attain control over impulses and regulate their behaviour, which seems to be caused by inadequate self-control as well.
2.2. Affect

Psychology first discovered behaviour, then embraced cognition, and finally in the 1980’s recognized the central importance of affect in human experience. This movement led to tremendous advances in mood measurement (Watson & Clark, 1997). According to Watson and Clark mood ratings reflect a hierarchical structure consisting of two broad dimensions, positive affect and negative affect. Positive affect represents the extent to which one is experiencing a positive mood like energy, alertness, enthusiasm, interest and feelings of joy. Negative affect reflects the extent to which one experiences negative or aversive mood, such as sadness, irritation, guilt, disgust or feelings of nervousness (Watson & Clark, 1997). However, another prominent approach to assess mood in literature is based on dimensions pleasantness versus unpleasantness and activation or arousal (Yik, Russel & Barrett, 1999). The first distinction is about the extent to which one is generally feeling good versus bad and the second distinction is about the extent to which one is feeling engaged or energized. Another way to assess affective responses is with Thayer’s (1978) Activation-Deactivation Adjective Check List. Just like the second distinction mentioned above, this was developed to measure subjective activation or arousal states.

Positive affect makes people feel good, broaden people’s thoughts and actions, and contributes to judgements of life satisfaction, wellbeing and happiness (Diener and Larsen, 1993). It also triggers upward spirals toward improved emotional well-being (Fredrickson & Joiner, 2002). Additionally, there seems to be a link between affect and self-regulation. Affect is not only about feeling a certain way. Research suggests that positive affect seems to facilitate adaptive self-regulation in number of domains, such as processing of negatively valenced information, or goal making (Aspinwall, 1998). Additionally, four studies of Tice, Baumeister, Shmueli and Muraven (2007) showed that when positive mood was induced in between two self-regulation tasks, it led to an improvement in self-regulation, as compared to participants who performed the same self-regulation tasks without a positive mood induction in between. Thus positive affect helps to counteract ego-depletion and facilitates self-regulation. This knowledge could be useful to apply in the field of psychiatry.

2.3. Psychosis

The sensory room will be placed at the crisis unit centre of psychosis at the high care department at psychiatric institution ‘De Grote Beek’ in Eindhoven. Besides patients who cannot be controlled (e.g., very aggressive patients), the sensory room shall be mainly used for psychotic patients who are at high risk of being separated. Psychosis is not the name of a disease, but of a mental state. A psychosis is a state in which the experience, understanding and perception of reality of a person’s environment, oneself, one’s thoughts and feelings are clearly changed (Wunderink, 2001). People with psychosis have an impaired perception of reality. Symptoms and causes of psychosis can be found in Appendix A. Psychoses can occur in various
forms. They can be divided in functional psychoses and organic psychoses. Organic psychoses are psychoses caused by brain disorders, physical disorders or the use of substances like drugs. Functional psychoses (non-organic disorders) could be subdivided in schizophrenia and non-schizophrenic psychoses (Vandereycken & van Deth, 2004). Non-schizophrenic psychoses can be further subdivided in different types of psychoses and schizophrenia in different sorts of schizophrenia. Schizophrenia is a psychiatric disease in which people are more sensitive to getting a psychosis; it even is the most common psychotic disorder. Approximately one in two hundred people will get schizophrenia (Wunderink, 2001). Numbers from the sector report of the GGZ Nederland showed that only in 2009 already 936,887 clients were in treatment, which caused a growth of 8.2% over the year before (GGZ Nederland, 2010). Six per cent of the clients were diagnosed with psychotic disorders (GGZ Nederland, 2010).

An often used treatment for psychosis and schizophrenia is, besides psychotherapy and a psychosocial approach (training, information), the use of antipsychotics (Vandereycken & van Deth, 2004). Antipsychotics especially reduce delusions and hallucinations. They suppress anxiety and unrest and help to reorganize the patient’s thoughts (Reedijk, 1996). Antipsychotics are usually used for the long-term, because discontinuation of the drug could lead to the return of a psychosis. So the antipsychotics are used as solution and prevention for psychosis. However, antipsychotics are also known because of their negative side-effects. Examples of those negative side-effects are parkinsonian effects and akathisia, the development of tardive dyskinesia, weight gain, seizures, decreased libido and sexual dysfunction and other effects like dizziness, nausea and a lack of energy (Fatemi, 2008; Meltzer, Lee & Ranjan, 1994; Wunderink, 2001).

Moritz et al. (2002) analysed the executive functioning of psychiatric patients and showed that the executive functioning in schizophrenics is worse than the executive functioning in healthy people. A psychosis is a stressful episode of a patient in which he or she loses self-control and is no longer able to regulate his/her drives. For the wellbeing of the patient it is important to replenish those self-control resources. Ways to regain self-control could help to prevent escalation and reduce treatments as antipsychotics and seclusion rooms.

2.4. Restoration of resource depletion and affect

There are different ways to replenish self-control resources. Sleep and rest, positive affect, meditation and levels of glucose have been proven to have a restorative potential (Baumeister, 2002; Baumeister, Vohs & Tice, 2007; Gailliot et al., 2007; Kaplan, 2001; Kaplan & Berman, 2010). But also contextual stimuli like nature and social interaction are related to the recovery of self-control and affect, which shall be further discussed in this chapter.
2.4.1. Nature to support restoration

One of the components Ulrich (1991) suggested for the supportive design of health facilities was access to positive distractions in physical surroundings. Nature turns out to be a positive distraction with stress-reducing effects. This can be traced in different theories in literature about restoration.

In recent years, two theoretical perspectives have been proposed regarding the restorative functions that environments may fulfil. The psycho-evolutionary model emphasizes the importance of affective functioning such as restoration from psychophysiological stress (Ulrich, 1983). It proposes that perceiving particular qualities and contents in a scene can support psychophysiological stress recovery. This is founded in Ulrich’s (1983) perspective that humans are biologically prepared to respond positively to environmental features that signal possibilities for survival. Therefore he assumes an evolutionary basis for aesthetics and restorative response to some natural scenes. According to Ulrich and colleagues (1991), an encounter with most unthreatening natural environments has a stress reducing or restorative influence, whereas many urban environments will hinder recovery. Unthreatening natural environments are restorative, because they restrict negative thoughts, sustain non-vigilant attention and reduce arousal. Positive elements of such environments that facilitate restoration are moderate depth, moderate complexity, the presence of a focal point, gross structural qualities, and naturalness like vegetation and water (e.g. Ulrich et al., 1991; Hartig, Evans, Jamner, Davis & Garling, 2003). Positive changes in mood states are directly related to these stress-reducing capacities of environments. Therefore, affective restoration can be measured by improvements in self-reported positive and negative mood states but also by physiological indicators such as lower heart rates and muscle tension (Ulrich, 1983; van den Berg, Koole & van der Wulp, 2003; Karmanov, Hamel, 2008). For example, studies of Hartig, Mang and Evans (1991) and Hartig and colleagues (2003) show that participants who walked through nature showed more positive changes in mood state than participants who walked through urban environments or sat in a room. Ulrich and colleagues (1991) demonstrated that stressed participants who viewed scenes dominated by natural content showed more pronounced changes characteristic of physiological stress recovery, like lower level of skin conductance fluctuations and lower blood pressure than participants who viewed scenes dominated by built content.

Another theory explaining beneficial effects of nature is the attention restoration theory (ART), which emphasizes the importance of cognitive functioning such as restoration from attentional fatigue (Kaplan, 1995). ART identifies two types of attention, distinguished in terms of the effort required for their use. The first type is called involuntary attention, which refers to attention that requires no effort, such as when something exciting or interesting occurs (Kaplan, 1995; Kaplan & Berman, 2010). The other type is called directed attention, which involves effort, because one has to force oneself to pay attention to something that is not particularly interesting. Involuntary attention is more automatic than directed attention. It is more autonomous and stimulus-driven, whereas directed attention is more controlled and goal-driven.
(Kaplan & Berman, 2010). Depletion studies confirm the argument that not all attention is being effortful, for example, effortful executive function tasks suffer from ego depletion, where more automatic processes do not (Baumeister, Muraven & Tice, 2000). ART focuses on directed attention, its fatigue, and ways to achieve restoration (Kaplan, 1995). ART proposes factors that work in the renewal of a depleted capacity for directed attention. The recovery, or restoration, process is more likely to occur in settings that do not require great amounts of directed attention. Kaplan (1995) proposed four different components of restorative environments. As summarized by Hartig et al. (2003) restoration from directed attention fatigue occurs in settings with “psychological distance from routine mental contents (being away) in conjunction with effortless, interest-driven attention (fascination), sustained in coherently ordered environments of substantial scope (extent) when the person’s inclinations match the demands imposed by the environment as well as the environmental supports for intended activities (compatibility)” (Hartig et al., 2003, p.110). Natural environments turn out to be particularly rich in these characteristics needed for restorative experiences (Kaplan, 1995). This is because natural environments evoke so called soft-fascination. Soft fascination means that bottom-up attention needs to be sufficiently gentle so as not to interfere with other thoughts, which allows for reflection, whereas hard fascination precludes thinking about anything else, thus making it less restorative (Kaplan & Berman, 2010). Nature environments are able to capture involuntary attention and minimize directed attention. Urban environments are, unlike natural environments, filled with stimulation that captures attention and requires directed attention which makes them less restorative (Berman, Jonides & Kaplan, 2008). Cognitive restoration can be measured by improved concentration (Kaplan, 1995; Van den Berg et al., 2003). For example, Berman and colleagues (2008) showed that walking in nature or viewing pictures of nature improved directed attention abilities and cognitive functioning, measured with a backwards digit-span task and the Attention Network Task. Cognitively fatigued participants performed better on a proofreading task after a walk through nature, compared with individuals after a walk through an urban environment (Hartig et al., 1991). A walk through nature also improved performance of an attentional test (Hartig et al., 2003).

In sum, although the evidence for restorative effects of nature is still somewhat circumstantial, it appears that stress-reducing effects of nature lead to improvements in self-reported mood states, and physiological indicators. Furthermore, nature seems to recuperate the metaphorical “muscle” or resource called self-control by recovering directed attention. Cognitive and executive functioning improve after exposure or interaction with nature.

2.4.2. Social connectedness to support restoration

A second component, which Ulrich (1991) suggested for the supportive design of health facilities was access to social support. Patients derive important benefits from frequent and prolonged contact with friends and family. Individuals with high social support have been found experiencing lower levels of stress and higher levels of wellness compared to individuals with
low social support (Cohen & Syme, cited in Ulrich, 1991; Sarason & Sarason, cited in Ulrich, 1991). As we will see in the next section, explanations for these positive influences seem to be related to self-control and affect.

Close relationship partners, such as romantic partners, parents, etc., influence people’s self-regulation. According to the Carver and Scheier’s (1982; cited in Finkel & Fitzsimons, 2011) model of self-regulation it is possible to distinguish three key components of self-regulation, namely goal setting and initiation, goal operation, and goal monitoring. All these different phases can be influenced by close others. Close others can influence goal initiation by assigning goals, inspiring goals, or triggering goals. They can provide social support, influence one’s motivation and psychological resources and alter one’s goal-pursuit strategies to influence goal operation (Finkel & Fitzsimons, 2011). The notion of secure relationships is also associated with an increase in energy and feelings of security and willingness to explore (Luke, Sedikides & Carnelley, 2012). Social exclusion impairs self-regulation and causes a decrease in state self-control, whereas close relationships can improve self-control (Baumeister, DeWall & Ciarocco, 2005; Stillman, Tice, Fincham & Lambert, 2009). The current methods in psychiatry seem to neglect this principle. Nowadays, when psychiatric patients are in crisis or experiencing self-regulation failures, they will be separated and placed in the seclusion room. As been addressed before, social exclusion impairs self-regulation; so being excluded or rejected causes decrements in self-regulation (Baumeister, DeWall & Ciarocco, 2005). Excluded and rejected people are more likely than others to behave in aggressive and impulsive manners and less likely to act in prosocial or intelligent ways, they experience cognitive deficits as impaired logical reasoning, distorted time perception, passivity and they exhibit self-destructive tendencies (Baumeister, DeWall & Ciarocco, 2005; Gardner, Pickett & Knowles, 2005; Twenge et al., 2007). Deprivation of belongingness leads to various undesirable effects, including decrements in health, happiness and adjustments (Baumeister & Leary, 1995). So instead of helping the patient, the social exclusion might work in a reversed way. When a patient is placed in a seclusion room, you deny and/or break their social attachments. According to stories of experts of experience being separated feels like being punished.

Contrary to social exclusion and deprivation of belongingness is the feeling of being connected. People have a fundamental need for belongingness and relatedness to others, which is labelled as social connectedness (Van Bel, in press). Feelings of social connectedness make people feel good about themselves and others; they enhance self-esteem, provide a sense of security, support, and perceived control and are associated with health, healthy lifestyles and feelings of vitality (Gardner, Pickett & Knowles, 2005; Van Bel, in press). More importantly, feelings of connectedness enhance self-regulation (Stillman, Tice, Fincham & Lambert, 2009). This corresponds to the belongingness hypothesis of Baumeister and Leary (1995) that human beings have a pervasive drive to form and maintain at least a minimum quality of lasting, positive and significant interpersonal relationships. When social interaction is temporarily unavailable, people turn to indirect social strategies to satisfy belonging needs (Gardner, Pickett
& Knowles, 2005). Just thinking about close relationships can already initiate goal pursuit and goals can be triggered without the physical presence of significant others (Twenge et al., 2007; Finkel & Fitzsimons, 2011). According to Stillman et al. (2009), participants who were primed with thoughts about a close family member were less depleted than participants who were not primed with those thoughts. Van Bel (in press) states that “thinking of other persons can serve as a surrogate for interaction and help to feel connected by mentally reaffirming social bonds”. This can be stimulated by just looking at photos or by mediated provision of awareness information (IJsselsteijn et al., 2009). Gardner and her colleagues (2005) have proposed that there is something like a “social snack” which provides temporary stopgaps for social hunger when a “social meal” like interaction with an accepting other is unavailable. Any reminder of a social bond or tangible reminder of being connected and accepted can serve as a social snack and can at least temporarily fulfil belonging needs. “Social snacks” appear to be successful in reaffirming and replenishing a subjective sense of connection and could act as social reserves to be drawn upon when direct social interaction is thwarted or impossible (Gardner, Pickett & Knowles, 2005).

Summarized, social exclusion impairs self-regulation and causes a decrease in state self-control and affect. Close relationships and social connectedness enhance self-regulation. Even when social interaction is temporarily unavailable, just thinking about a loved one or looking at photos could already contribute to the positive feelings of social connectedness. Therefore it is interesting to apply the gained knowledge about the positive influence of social relationships on self-regulation to the field of mental health.

2.5. The present research and hypotheses

We have seen that one act of self-control can deplete a limited resource, resulting in lower subsequent self-control. There are indications that nature and feelings of social connectedness recover self-control resources. They seem to improve the related constructs of self-regulation and executive functioning. Additionally, nature and social connectedness enhance positive affect. This is grounded in earlier research findings, but also addressed in a qualitative study of students of the University of Technology Eindhoven about exploring contextual effects on wellbeing of experts of experience. They found that nature and availability of (contact with) other people, especially loved ones, were important qualities on people’s mood1 (Baten, Brieger, Lomas & Van Den Broek, 2012).

At the moment, evidence for the link between nature and social connectedness to the replenishment of ego-depletion is largely circumstantial. Moreover, the proposed mechanisms were never examined in the context of mental health or for psychiatric patients. In the present

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1 Other important qualities found in this study were atmosphere, safety, and the ability to influence the environment. Based on these factors, a requirements list was constructed for an interactive multimedia “ambiance” room as a replacement for current seclusion rooms (Baten, Brieger, Lomas & Van Den Broek, 2012).
research, we examine for the first time the effect of nature and social connectedness on self-control recovery and affect by performing an experimental study with experts of experience. This research focuses on the type of content that could be used in the sensory room of GGzE by investigating the effect of different types of visual content.

The research question that will be investigated is whether natural and/or social connectedness cues are better to recover self-control and affect after depletion than are neutral or no stimuli.

Based on the theoretical framework presented earlier, we formulated the following hypotheses. First, we expect that pictures of nature help to recover self-control, because nature has restorative potential, and leads to replenishment of the self. Second, we anticipate that pictures of loved ones help to recover self-control, because they evoke social connectedness and/or belongingness which enhance self-regulation. Finally, we presume that neutral content is preferable over a low stimulus environment with no content at all, because the images will cause some distraction. A low stimulus environment could lead to sensory deprivation. If stimulation is too high, like intense lighting, sound, bright colours and so on, it could have a stressful effect on patients. However, on the other hand, when stimulation is too low, it may lead to sensory deprivation, which could increase stress even further, because the patient may focus more on their own worries and thoughts. Sensory deprivation could even lead to delirium and psychosis (Flynn, 1962; Keep et al., 1980).

A pre study was conducted to decide how to develop social connectedness cues. The aim of this survey study was to examine whether social connectedness to a loved one was comparable to social connectedness to a pet, which made us able to decide what kind of content we should use in our main study. This study can be found in Appendix B. Based on the results of this study we decided to only focus on loved ones as social connectedness cues. In the next chapter we will discuss our main study, which investigated the effect of different kind of visual stimuli on self-control recovery by performing an experimental study with experts of experience in the mock-up.

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2 Interviews and a diary study with probes showed that pets, in addition to close relations, were often mentioned as helpful and important in the life of the participants (Baten et al., 2012).
3. Method

The goal of this study was to investigate whether natural and/or social connectedness cues are better to recover self-control and affect after depletion than neutral or no stimuli. We expected that pictures of nature and social connectedness cues of loved ones help to recover self-control, because they enhance self-regulation and executive functioning. Additionally, they seem to improve mood. Furthermore, we assume that neutral stimuli are preferable over a low stimulus environment with no content at all, because a low stimulus environment could lead to sensory deprivation. For the ecological validity of the results it would be the best scenario to perform this study on real clients, but since this was a first exploration, this study was performed on experts of experience. Compared to normal people, experts of experience can use their psychiatric background to reflect their experiences on, which makes it useful for more in-depth information. In contrast to real clients, they are able to reflect on their previous mental state and put this knowledge in perspective. Moreover, participation to this study cannot affect any treatment, because experts of experience are already recovered.

3.1. Design

A within-subjects design consisting of four consecutive and counterbalanced blocks tested the effect of four types of visual content (natural stimuli vs. social connectedness cues vs. neutral stimuli vs. no stimuli) on self-reported affect, physiological measures and performance. Afterwards, qualitative interviews were conducted.

3.2. Participants

Twenty-five experts of experience participated in the study (16 female). The average age of the participant was 37.0 years (SD=10.20; 21-56 years). The participants were recruited at the client-interest agency (clienten belangen bureau (CBB)) at the GGzE location ‘de Grote Beek’ and during classes at the ROC Eindhoven course ‘experience-expertise’ (ervaringsdeskundigheid). The participants came from different psychiatric backgrounds with disorders as psychosis, depression and borderline, but were all treated successfully for this.

3.3. Setting

The experiment took place in the mock up situated in the monumental former boiler house at GGzE location ‘De Grote Beek’. The mock up had a reception area where participants were welcomed. The reception area also functioned as the control room of the experimenter (Figure 3-1).
The experiment took place inside the mock up: in a simulated seclusion room. For the purpose of this experiment a table and chair were placed in the room. A notebook, a baby monitor and a mobile physiology measurement tool were situated on the table. The cove lighting in the mock up remained constant during the whole experiment on a bright neutral colour\textsuperscript{3}. The slideshows were displayed on a 50 inch television screen in front of them, which was placed in portrait style in the mock up (Figure 3-2).

\textsuperscript{3} All three RGB components were set on 255 (maximum value) resulting in the brightest representable white. Illuminance: 1255 lux. CIE coordinates: $x = 0.305$, $y=0.216$. Colour temperature: 10500K.
The post-experiment interview took place outside the simulated seclusion room in another corner of the mock up. This corner of the mock up was furnished in a way to create a more private, homely and comfortable atmosphere. The interview corner is depicted in Figure 3-3.

![Mock up - interview corner](image)

Figure 3-3: Mock up - interview corner

### 3.4. Manipulations

#### 3.4.1. Sustained Attention to Response Task (SART)

To test whether or not exposure to restorative content facilitates recovery from mental fatigue we used the Sustained Attention to Response Task (SART), a sustained attention test based on a “go no-go”-paradigm. It measures sustained attention and/or inhibition capacity (Robertson, Manly, Andrade, Baddeley, & Yiend, 1997). We used the SART as a manipulation to induce mental fatigue (the baseline measure), as well as a dependent measure. This made us able to compare the results before and after exposure to the different kinds of content. The baseline SART before exposure had a duration of four minutes; the dependent SART after exposure had a duration of two minutes. Participants were asked to respond with pressing the spacebar to all “go” stimuli (digits from 1 to 9). However, they had to avoid pressing the spacebar when a “no go” stimulus (e.g., 6) appeared. They were instructed to respond as quickly as they could, but to make few mistakes as possible. To prevent learning effects, we changed the “no go” stimulus for each block. To measure possible recovery after depletion, the variables reaction time (RT) and number of errors were taken into account.
3.4.2. Stimuli

During the four consecutive and counterbalanced blocks, the participants were exposed to four types of visual content: natural stimuli, social connectedness cues, neutral stimuli, and no stimuli. Several slideshows were developed for the purpose of this study. The slideshows were all made in Windows Live Movie Maker. The theme used was ‘Pan and Zoom’ with transitions of two seconds and a display time of nine seconds. The slideshows all consisted of six pictures, which were shown in a continuous loop for two minutes.

About two weeks before their session, participants were asked by email to send a minimum of six pictures of their most precious loved one. This meant that the participants had some control over the stimuli, because they controlled the chosen pictures. To keep all conditions equal, the participants were given some control over the other conditions as well. In the same email they were asked to give their preference of different types of nature and different categories of neutral objects, which was used during the experiment. The content of these different fixed slideshows (nature and neutral) as well as an example of personal content for social connectedness cues can be found in Appendix D.

3.4.2.1. Nature content

The participants were able to choose between three different natural landscape themes; forest, heath and dunes. They chose the landscape they were most attracted to. Each of the themes consisted of six pictures, which were transformed into a slideshow. The pictures were all collected by using Google Images. The assumptions the pictures should meet, the requirements, were the following: they had to have a high resolution, the quality of the pictures across landscapes had to be equal, the colours and light between the pictures had to be approximately equal and the pictures had to be equal to the season in which the study was performed, in this case the pictures should be taken in spring. For this study we excluded pictures which included water features, because water has a very positive influence on people’s emotional states and people prefer pictures when a water feature is present (Ulrich, 1986). In these different types of landscapes it is difficult to control for an equal amount of water in the pictures; therefore we decided to exclude this influence. An example of natural stimuli is depicted in Figure 3-4.

4 Pictures of a winter/autumn landscape displayed in summer/spring or sunny pictures of a summer/spring landscape in winter/autumn could evoke associations with the period the pictures were taken. Therefore we wanted the period the pictures were taken to be congruent with the season of the experiment.
3.4.2.2. Social connectedness cues

Before the actual experiment was scheduled, participants sent six pictures of their most precious loved one. These pictures were converted into a personal slideshow, used to serve as social connectedness cues. They could send the pictures digitally, or alternatively send it by post mail. There were no requirements on the type of pictures, except that their loved one had to be clearly visible and preferably alone in the picture. These pictures were used to compile the slideshow with social connectedness cues. An example of social connectedness cues is depicted in Figure 3-5. The face of the person is blurred because of privacy reasons.

3.4.2.3. Neutral content

For the neutral content the participants had the ability to choose between three categories of neutral objects. These objects were selected from the Bank of standardized stimuli (BOSS), a set of 480 normative photos of objects to be used as visual stimuli in cognitive research (Brodeur, Dionne-Dostie, Montreuil & Lepage, 2010). The pictures have been normalized for name, category, familiarity, visual complexity, object agreement, viewpoint agreement and manipulation (the object’s positions and actions that can be applied to the object). For this study we offered three categories for participants to choose from, namely kitchen items, electronics and school supplies. Because the objects had to be as neutral as possible, a requirement for the pictures of objects was a DKO value of 0% (percentage of participants who Didn’t Know the Object) and a DKN value of 0% (percentage of participants who Didn’t Know the Name of the object). Another requirement was that the objects could not evoke any dangerous or violent associations like sharp knives or tools. Each slideshow contained six objects. An example of neutral stimuli is depicted in Figure 3-6.

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5 Some participants were not able to send six pictures, so a minimum of four pictures was kept.
3.4.2.4. No content
For the ‘no content’-condition we did not use a slideshow. We showed no content on the screen, which resulted in a black screen, implying that the screen was turned off.

3.5. Measures
Measures can be divided in recurring measures and measures employed only at the end of the experiment. Self-reported affect and performance are measures that were taken in the beginning of the experiment (general baseline), and at the beginning and end of each block, nine times in total. Physiology changes were monitored during the whole experiment. Traits and social connectedness were measured once, immediately after the experiment.

3.5.1. Self-reported affect
The participants’ mood was measured with a composed mood questionnaire based on the Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988) and the Activation-Deactivation Adjective Check List (Thayer, 1978). The participants answered the question ‘How do you feel at this moment’ for ten items, all with a five-point response scale ranging from 1: not at all to 5: very much. The items were dived in the subscales ‘energy’, ‘relaxation’, ‘sadness’ and ‘positive affect’. The items used can be found in Appendix E. The subscales had moderate to high internal consistencies with Chronbach’s alphas of respectively 0.72, 0.80, 0.90 and 0.79 before exposure of the content and 0.80, 0.81, 0.86 and 0.80 after exposure of the content.

3.5.2. Physiology
To measure physiological changes during the experiment, we used a mobile physiological measurements tool which recorded skin conductance response (SCR) (or Galvanic skin response (GSR)) and heart rate (HR). SCR is a method of measuring the electrical conductance of the skin which records activity that is controlled by the autonomic nervous system and is used as an indication of psychological or physiological arousal (Ulrich et al., 1991). Ulrich and colleagues
(1991) state that SCR normally increases during stress and decreases during recovery. HR and heart rate variability (HRV) are autonomic measures which provide indices of self-regulatory strength and activity (Segerstrom & Nes, 2007). However, due to some complications, heart rate could not yet be analyzed and included in this report.

Skin conductance was measured using finger electrodes. Two electrodes were placed on the tip of the index and middle fingers of the non-dominant hand. The sample frequency was 1024 Hz. In the beginning of block 1 the experimenter had to press the external button on the mobile physiological measurements tool to set a marker in the physiological data. Simultaneous an internal marker was set in the software program used for this experiment. The rest of the marker points were also saved internally, which gave us the ability to recalculate the marker points in the physiological data. The internal markers were set in the beginning and end of each block, and at the start of each content. Physiological signals were reprocessed using the MATLAB programming environment and Ledalab (2009a, The Mathworks, Natick, MA; Benedek & Kaernbach, 2010). The data was resampled to 32 Hz and a low pass Butterworth filter was applied at 1 Hz to remove noise. Mean skin conductance values over epochs of 30 second intervals were calculated and served as measure for skin conductance.

3.5.3. Traits

At the end of the experiment we used the Inclusion of Other in the Self (IOS) Scale to assess how close the participants felt to their loved one and nature. The IOS is a single-item, pictorial measure of closeness which can be seen in Figure 3-7 below (Aron, Aron & Smollan, 1992). The IOS has a seven-point response scale.

![Figure 3-7: Inclusion of Other in the Self (Aron, Aron & Smollan, 1992)](image)

For our study we translated the IOS into Dutch, changed the word ‘other’ into ‘X’ and adapted the question into Please indicate which of the pictures below describes best how you experience your relationship with X. (X= your most precious loved one from the slideshow). Furthermore, we used an adapted IOS to describe the participant’s relationship with nature. In this Inclusion of Nature in Self Scale (INS) the word ‘other’ is changed into ‘nature’ with the corresponding question Please indicate which of the pictures below describes best how you
experience your relationship with nature (Schultz, 2002). The translated IOS and INS scales can be found in Appendix F.

3.5.4. Social connectedness
To measure social connectedness we used the same questionnaire as in the pre-study: The SCEQ-S (Social Connectedness Experiences Questionnaire Regarding a Specific Other) (van Bel, in press). The SCEQ-S consisted of 13 items, divided in the subscales Interaction Quality (IQ), Relationship Quality (RQ) and Relationship Salience (RS), all with a seven-point response scale ranging from 1: completely disagree to 7: completely agree. The SCEQ-S concerning loved ones had a Chronbach’s alpha of 0.89.

3.5.5. Post-experiment interview
The post-experiment interviews provided qualitative and in depth information about the experiences and recommendations of the participants after the first part of the study. The interviews were set up as a structured interview. Different themes were discussed extensively in the interview like former separation experience, possible evoked associations of the room and participants’ content preferences. Subsequently, there was room to discuss other possible types of visual content, and additional non-visual recommendations which could be applied in a future sensory room. At the same time, this part of the study was also used as a debriefing session in which we applied funneled debriefing. We started the interview with the most abstract and open-ended questions about what participants thought the purpose of this study was, and their experiences. This was followed by the more specific questions about their preferences and recommendations. The questions can be found in Appendix G.

3.6. Procedure
The participants were welcomed in the reception area where they were able to leave their personal belongings. Then participants took place behind the table inside the simulated seclusion room of the mock up. After signing the informed consent, the participants placed the sensors of the mobile physiological measurement-tool on their body with help of the experimenter. The participants were asked to read all instructions carefully and were asked to start the first “practice round”. During this “practice round” the experimenter left the room, but the door remained open. This was necessary to collect baseline measurements of the participants, because the feeling of being locked up in the mock up once the door was closed could already be a stressor itself. After the first mood questionnaire and SART task the participant pressed the baby monitor, which was a sign for the experimenter to come in. If there were no more questions, the experimenter closed the door and the experiment continued. The participants started with a minute rest and a mood questionnaire. Then they performed the SART task which was used as a baseline measure and stressor at the same time. After the task the participants pressed the baby monitor and watched the large screen in front of them, which was a sign to the experimenter to start the slideshow.
After the slideshow participants filled in the mood questionnaire followed by the short version of the SART, which was used as a dependent measure. Then the second block started, in which all the steps were repeated, but with different content (see Figure 3-8 for an overview of the experiment). A more detailed flowchart of the experiment can be found in Appendix H. The order of the slideshows was counterbalanced between participants. After the fourth and last block, the participants were asked to fill in the two trait questions concerning their loved one and nature, and their age and gender. Then they were asked to press the baby monitor as a sign for the experimenter to come in, remove the sensors and guide them to the next part of the experiment. The second part of the experiment took place in a different, more casual and homely place in the building. The participants were offered something to drink and eat, and asked to first fill in the social connectedness questionnaire. After this, the interview took place where the participants were asked about their experiences and recommendations concerning the experiment and sensory room. If there were no further questions, the participants received a certificate as proof of their participation and token of appreciation (see Appendix I). Because the participants were all experts of experience (in progress) they could use the certificate for their portfolio.

Figure 3-8: Schematic overview of the experiment
4. Results

4.1. Sustained Attention to Response Task (SART)

SART data were collected nine times: once during the general baseline period and then pre and post content in every experimental block. The pre-content tasks were used as a baseline, the post-content tasks as dependent variables. For each task an outlier analysis of the reaction times (RT) was performed. Outliers were calculated per block and for each participant separately to take individual differences into account. Outlier analysis was based on three standard deviations, which means that standardized z-scores below -3 or above 3 were excluded for further analysis. The mean reaction time was calculated for each participant for each task. The errors were divided into two categories: inhibitions errors and the remaining errors. The inhibition errors were the errors which occurred when the participant pressed the spacebar when a “no go” stimuli (e.g. 6) appeared. Because the length and number of trails of the baseline and dependent SART differed, we used percentages to indicate the amount of errors.

Because of the within-subject design we used Linear Mixed Models (LMM) to analyze and compare the effects of condition on reaction time and the amount of errors. In all analyses, post-treatment measures were included as dependent variables, pre-treatment measures were entered as covariates, condition (treatment) as fixed factor. Results for reaction time showed that there was no significant main effect of condition, $F(3, 95) = 1.07, p = 0.37$ (see Table 4-1 for means). The same analysis was performed for the number of errors. Again there was no significant main effect of condition on the amount of errors, $F<1$, NS. The two types of errors (inhibition errors and remaining errors) were analyzed separately as well, but no effect was found, with both $F<1$, NS. The means of the number of errors can be found in Table 4-1 below.

Table 4-1: Descriptives of the pairwise comparisons for the SART (LMM)

<table>
<thead>
<tr>
<th>Nature</th>
<th>Reaction time (ms)</th>
<th>Number of errors (%)</th>
<th>Inhibition errors (%)</th>
<th>Remaining errors (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Social connectedness</td>
<td>305.52</td>
<td>5.99</td>
<td>294.97</td>
<td>5.99</td>
</tr>
<tr>
<td>Neutral</td>
<td>14.60</td>
<td>1.28</td>
<td>16.14</td>
<td>1.27</td>
</tr>
<tr>
<td>None</td>
<td>3.34</td>
<td>0.41</td>
<td>3.60</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td>11.39</td>
<td>1.25</td>
<td>12.48</td>
<td>1.25</td>
</tr>
</tbody>
</table>
4.2. Self-reported affect

First, to exclude the possibility that the simulated seclusion room functioned as a stressor, we examined the effect of the closed room on mood with a paired-sample t-test. We used the first mood questionnaire taken when the door was still open as a baseline measure and the second mood questionnaire which was taken after a minute rest in the closed seclusion room as the dependent measure. Results showed that the room had no significant effect on self-reported energy, relaxation, sadness or positive affect (all p-values >0.05). Therefore, we can conclude that being locked up in the room did not work as a stressor.

Again, we used LMM to analyze and compare the effects of condition on self-reported mood. In this model, the post-treatment mood measure was the dependent variable, the pre-treatment mood measure was included as a covariate and condition (treatment) was included as a fixed factor. This was repeated for each of the four subscales of mood: energy, relaxation, sadness and positive affect.

There was a significant main effect of condition on relaxation and positive affect, respectively F(3, 69.38) = 5.8, p<0.05 and F(3,70.54) = 12.10, p<0.05. Pairwise comparisons of the conditions indicate that after exposure to nature content or social connectedness cues participants were significantly more relaxed than after exposure to neutral or no content, with stronger effects for social connectedness (see Table 4-2 for post-treatment means). This was confirmed with a paired sample t-test, which showed an significant increase in relaxation after exposure to nature content (before exposure: M=3.68, SD=0.15; after exposure: 3.85, SD=0.14), t(24)= -2.59, p<0.05. Social connectedness cues also had this positive effect on relaxation (before exposure: M= 3.61, SD=0.17; after exposure: M=3.84, SD=0.17), t(24)=-2.587, p<0.05. LMM showed that social connectedness and nature content did not differ significantly from each other (p=0.66). The differences between the conditions can be found in Table 4-3.

Table 4-2: Descriptives of the pairwise comparisons for self-reported affect (LMM)

<table>
<thead>
<tr>
<th>Affect</th>
<th>Nature</th>
<th>Social connectedness</th>
<th>Neutral</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Energy</td>
<td>2.97</td>
<td>0.13</td>
<td>3.10</td>
<td>0.13</td>
</tr>
<tr>
<td>Relaxation</td>
<td>3.90</td>
<td>0.08</td>
<td>3.95</td>
<td>0.08</td>
</tr>
<tr>
<td>Sadness</td>
<td>1.66</td>
<td>0.11</td>
<td>1.94</td>
<td>0.11</td>
</tr>
<tr>
<td>Positive Affect</td>
<td>3.00</td>
<td>0.11</td>
<td>3.50</td>
<td>0.11</td>
</tr>
</tbody>
</table>

LMM showed that participants reported more positive affect after exposure to their loved ones compared to the other conditions. Positive affect differed significantly from the nature, neutral and no content conditions (all p-values <0.01). This was supported by a paired sample t-
test on positive affect after exposure to social connectedness (before exposure: M= 2.78, SD=.16; after exposure: M=3.42, SD=0.19), t(24)= -4.151, p<0.05, which indicates that participants become significantly more satisfied and happier after exposure to their loved ones.

Furthermore, LMM analysis showed marginal trends which suggest that nature also led to more positive affect compared to neutral and no content (respectively p=0.07 and p=0.09), and social connectedness cues led to more sadness than exposure to nature (p=0.06). Results showed that there was no significant main effect of condition on energy or sadness, respectively F<1, NS, and F(3, 63.77) =1.346, p = 0.27. A paired sample t-test on energy showed a negative effect after exposure to the no-content condition. After the exposure to a black screen, the no content condition, participants reported to feel less energetic (before exposure: M= 3.11, SD=0.16; after exposure: M=2.91, SD=0.87), t(24)= 2.45, p<0.05. However, according to LMM this is not significantly different to the other conditions.

Table 4-3: Mean differences on self-reported affect (LMM)

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Affect Energy</th>
<th>Relaxation</th>
<th>Sadness</th>
<th>Positive Affect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature</td>
<td>-0.13</td>
<td>-0.04</td>
<td>-0.29**</td>
<td>-0.50*</td>
</tr>
<tr>
<td>Social</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>-0.48</td>
<td>0.17**</td>
<td>-0.17</td>
<td>0.27**</td>
</tr>
<tr>
<td>None</td>
<td>0.72</td>
<td>0.32*</td>
<td>-0.22</td>
<td>0.25**</td>
</tr>
<tr>
<td>Social</td>
<td>0.13</td>
<td>0.04</td>
<td>0.29**</td>
<td>0.50*</td>
</tr>
<tr>
<td>Nature</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>0.08</td>
<td>0.21*</td>
<td>0.12</td>
<td>0.77*</td>
</tr>
<tr>
<td>None</td>
<td>0.20</td>
<td>0.36*</td>
<td>0.07</td>
<td>0.75*</td>
</tr>
<tr>
<td>Neutral</td>
<td>0.05</td>
<td>-0.17**</td>
<td>0.17</td>
<td>-0.27**</td>
</tr>
<tr>
<td>Nature</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>-0.08</td>
<td>-0.21*</td>
<td>-0.12</td>
<td>-0.77*</td>
</tr>
<tr>
<td>None</td>
<td>0.12</td>
<td>0.16</td>
<td>-0.05</td>
<td>-0.02</td>
</tr>
<tr>
<td>Neutral</td>
<td>-0.07</td>
<td>-0.32*</td>
<td>0.22</td>
<td>-0.25**</td>
</tr>
<tr>
<td>Nature</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>-0.20</td>
<td>-0.36*</td>
<td>-0.07</td>
<td>-0.75*</td>
</tr>
<tr>
<td>None</td>
<td>-0.12</td>
<td>-0.16</td>
<td>0.05</td>
<td>0.02</td>
</tr>
</tbody>
</table>

* The mean difference is significant (p<0.05).
** The mean difference is marginal significant (p<0.10).
4.3. Physiology

Outliers were calculated for each participant separately to take individual differences into account. Outlier analysis was based on three standard deviations, which means that standardized z-scores below -3 or above 3 would be excluded for further analysis. However, no outliers were detected. Additionally, outliers were calculated for all participants together based on three standard deviations as well. One participant was excluded for further analysis. For the analyses we used the last two minutes of the SART (induction) as a baseline measure and the two minute exposure to the content as a dependent variable. These four minutes were divided in eight epochs of 30 seconds each, so we used the mean of the first four epochs as the baseline measure and the mean of the last four epochs as the dependent variable.

LMM investigated the effect of content on the physiological measures. In this model, the post-treatment skin conductance measure was the dependent variable, the pre-treatment skin conductance measure was included as a covariate and condition (treatment) was included as a fixed factor. No significant main effect was found of condition or order on skin conductance, respectively F<1, NS and F(3,68)=1.21, p=0.31 (see Table 4-4 for means).

Table 4-4: Descriptives of the pairwise comparisons for skin conductance (LMM – 8 epochs)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Skin conductance (µS)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature</td>
<td>5.47</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>5.56</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>5.58</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>5.55</td>
<td>0.06</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Skin conductance (µS)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 1</td>
<td>5.59</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Session 2</td>
<td>5.54</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Session 3</td>
<td>5.59</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Session 4</td>
<td>5.45</td>
<td>0.06</td>
<td></td>
</tr>
</tbody>
</table>

6 The exclusion of the participant did not affect the significance of the results.
Because the data was divided in epochs of each 30 seconds, we plotted a graph to see in which epoch the biggest effect occurred. In Figure 4-1 you can see changes in skin conductance for each condition. Skin conductance decreases in the last minutes of the SART and increases after exposure to the content. We can conclude that the greatest effect seems to occur in the first two epochs (first minute) of content exposure. Therefore, for further analysis we decided to use the last minute of the SART induction as a baseline and the first minute of content exposure as a dependent variable; epoch 3, 4, 5 and 6 in Figure 4-1.

![Figure 4-1: Changes in skin conductance (µS) for each condition](image)

With the data of these four epochs we again performed a LMM analysis with post-treatment skin conductance as the dependent variable, the pre-treatment skin conductance as a covariate and condition (treatment) or session included as a fixed factor. Again, we did not find a significant main effect of order on skin conductance, F<1, NS. However, we did find a significant main effect of condition on skin conductance, F(3, 90)=5.87, p<0.05. In Table 4-5 the mean values for both condition and order can be found. Table 4-6 shows that natural content and social connectedness do not significantly differ from each other, just as neutral and no content do not significantly differ from each other. However, nature content and social connectedness cues differ from the no content condition. Exposure to natural content is also significantly different from exposure to neutral content on skin conductance. The mean difference scores can be found in Table 4-6. From these findings we can conclude that nature content and social connectedness cues seem to evoke more arousal (positive or negative) than neutral or no stimuli, which leads to higher skin conductance.
Table 4-5: Descriptives of the pairwise comparisons for skin conductance (LMM – 4 epochs)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Skin conductance ($\mu$S)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature</td>
<td>5.62</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>5.55</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>5.40</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>5.27</td>
<td>0.07</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order</th>
<th>Skin conductance ($\mu$S)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session 1</td>
<td>5.45</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Session 2</td>
<td>5.45</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Session 3</td>
<td>5.44</td>
<td>0.07</td>
<td></td>
</tr>
<tr>
<td>Session 4</td>
<td>5.49</td>
<td>0.07</td>
<td></td>
</tr>
</tbody>
</table>

Table 4-6: Mean difference scores on skin conductance for condition (LMM – 4 epochs)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Skin conductance ($\mu$S)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature</td>
<td>Social</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>None</td>
<td>0.22*</td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>Nature</td>
<td>-0.08</td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>Social</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>Social</td>
<td>0.28*</td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>Nature</td>
<td>-0.22*</td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>None</td>
<td>-0.15</td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>None</td>
<td>0.135</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>Nature</td>
<td>-0.36*</td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>None</td>
<td>-0.28*</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td></td>
<td>-0.14</td>
<td></td>
</tr>
</tbody>
</table>

* The mean difference is significant (p<0.05).
4.4. Traits and social connectedness

After the study the participants filled in their feelings of closeness towards their loved one and nature, measured with the IOS and INS. The IOS and INS had a mean of respectively 4.96 (SD=2.00) and 4.04 (SD=1.79). As depicted in Figure 4-2, the mean of social connectedness to their loved one was 5.5 (SD=1.16) on a seven-point scale. The participants’ feelings of closeness to their loved one was positively correlated to social connectedness with that same loved one (r=.38, p<0.01). Neither social connectedness nor the feelings of closeness had a correlation with mood, nor did they predict mood after exposure to the participants’ loved one. Therefore, we decided to exclude these variables from further analysis.

![Figure 4-2: Social connectedness to a loved one](image)

4.5. Post-experiment interview

The interview was used to collect in depth information about the experiences and recommendations of the participants after the first part of the study. The interviews were recorded, transcribed and coded according to a pre-defined coding scheme to cluster different categories as seclusion experiences, preferences, recommendations on the visual content and other recommendations. These categories will be discussed below.

4.5.1. Seclusion experience

Thirteen of the twenty-five participants (52%) had experience with actually being secluded as a patient. The majority of the participants imagined themselves back in time and confirmed that the room evoked a lot of associations and emotions of that period. Attributes that evoked those associations were mostly the door, the interior of the room (e.g. bed, toilet, a black surface) and the silence and feeling of being locked up. However, some of the participants did
not experience these “flashbacks” and explained that the presence of the TV screen, different lights, furniture and material usage made the room look more friendly and homely. The experimental context and voluntary participation added to that feeling.

Participant 5 (female):

“You are so busy with the task, that you, luckily, don’t have much time to realize that you are in a simulated future seclusion room. Because you are busy.”

Participant 7 (female):

“You know that it is an experiment. I knew: if I’ll freak out because of seeing a picture or question, I knew that I could go outside.”

Participant 8 (male):

“Yes, that thick door especially, that thick door reminds me of seclusion rooms.”

4.5.2. Preference

Pictures of loved ones

Regarding the content of the slideshow, the majority (60%) of the participants preferred the slideshow of their loved one. Generally, the reasons for this preference were the familiarity, positive emotions, feelings of happiness and feelings of strength the pictures evoked.

Participant 1 (female):

“When I see pictures of my partner, it evokes those positive emotions. My partner really is a key figure. When I am with him, I can really be myself.”

Participant 4 (male):

“My children gave me the strength to get me out of that place.”

Participant 19 (female):

“When I saw those pictures, especially that first one, I thought: Oh, it is so good that I fight so hard for this. Because that’s the reason why I do it, to see my mother happy. And she was happy on that picture. That gives me strength.”

However, not everyone felt that pictures of loved ones should be applied in a sensory room. Some people addressed that the use of pictures is ambiguous. On the one hand, it could evoke those positive feelings, but on the other hand it also has a downside. It could emphasize
the physical distance between you and your loved one, it could evoke guilt and shame and it could evoke negative aspects and feelings of the relationship, like recent arguments between you and your loved one. Very interesting was the fact that sometimes a participant’s expectation did not match his or her final preference. Sometimes they expected initially that they would perceive a lot of support from pictures of their loved ones, which eventually led to the opposite effect and turned out in a negative experience.

Participant 3 (male):

“It is ambiguous, because on the one hand it is someone you love very much and that thought gives you comfort. But on the other hand also the awareness of being here and not being able to go there.”

Participant 6 (female):

“It evoked something in me, I have to go there, I have to go to her!”

“Yes, initially I thought ‘give me pictures of my family’, but now I realize that I prefer to watch television or something else ha ha.”

Participant 16 (female):

“Pictures of loved ones are very nice, but it also evokes those bad things, which doesn’t have a peaceful effect.”

Some of the experts of experience with a psychotic background explained the feeling of distrust the pictures could cause.

Participant 8 (male):

“Now I am in a neutral state and sent the pictures myself, but the fact that they could show me pictures which I might possess, but didn’t give to them myself, I would become very suspicious and it would hurt me deeply because it is about my loved ones on that pictures.”

**Pictures of nature**

Nature content was preferred by 32% of the participants. Most of the participants addressed the calmness and peacefulness of nature. It enables people to fantasize of being outdoors and someone mentioned the fact that nature is a safe category to choose, compared to loved ones.
Participant 2 (male):

“I got the feeling that I’m out of the room and I am just walking somewhere, that I’m in the nature.”

Participant 3 (male):

“I thought the forest was very nice, because it is peaceful and has more distance to me than pictures of my loved one.”

Participant 13 (female):

“During the forest-pictures I can totally imagine walking there.”

Participant 24 (female):

“I think that during a crisis situation this could definitely help to calm and to settle down.”

However, a minority of the participants did not like the pictures of nature, because they were too boring for them or too confronting because it emphasizes even more that you are not able to go outside at the moment of exposure.

Neutral content

Only one participant preferred the neutral content, because of the reason that it did not bring any negative associations with it. She became happy when she saw the kitchen tools, because she immediately wanted to cook and bake. She even thought that it could be used as part of therapy, to first show pictures of attributes like for example kitchen tools, and when the client is calmed down to actually cook something together with the nurse, adapted to the hobby of the client. Most of the participants indicated that the neutral content had no effect on them, that it did nothing for them.

No content

There was one participant who preferred no content, because it enabled him to concentrate better. However, when locked up in a seclusion room, he would like to have pictures of loved ones, because they evoke a feeling of control.

Participant 20 (male):

“When I am sitting in my own room, I would prefer black, because then I have a choice. A choice to see pictures if I want to. When I would be in a seclusion room, I would like to see pictures of my family.”
For other participants the black screen caused anxiety and restlessness. People were expecting something to come, or they felt like being watched. Almost everyone, except for two participants with a psychotic background, preferred images over no images at all. Those other two participants stated that during a psychosis people are very distrustful and full of delusions, so every noise they hear or object they see, in the room or on the screen, will be distorted according to their current state of mind and could be a trigger to something.

Participant 10 (female):

“Yes, that neutral black, I became very nervous because of that. It is the waiting for something and the uncertainty. Yes, I became very restless, a bit panicky.”

Participant 18 (female):

“But that black screen, that didn’t work for me. I become very flat and very, eh, even dejected. And I feel powerless. And the fact that nothing happens, and you are sitting there. I get sick when there is nothing and I can’t do anything and I just have to let it go. Yes, that’s very difficult for me.”

Participant 23 (male):

“I felt being watched. I would be very suspicious. Why is there a screen? What’s behind it? Are there people behind it? Are they watching me? What kind of screen is it.”

4.5.3. Recommendations visual content

The participants were also asked if they could think of other types of visual content which could be applied in the sensory room to calm and relax people. Most often mentioned recommendations were images of their pets or other animals, the use of colour and images of water or the ocean. Other interesting advices were more pictures of natural landscapes, holiday pictures, visual art, or images related to the client’s hobby. However, some of the participants point that personal content like for example their own pets could have the same negative effect as social connectedness cues. It could emphasize absence of it and the physical distance between them, so they could become very sad and miserable instead of feeling calm and at ease.

Participant 7 (female):

“I have a dog, and that is never a negative thing. I think that a lot of people when they see a picture of their pet, or when they talk about it, that they will get a smile on their face.”

Participant 13 (female):

“Just colour, because colour has a very powerful effect.”
Participant 16 (female):

“Images of things you love, your hobbies, things that calm you. The ocean, palm trees, that kind of things, things that relax.”

Participant 17 (female):

“Maybe pictures of countries, a holiday-idea. Maybe holiday pictures of your own, of places you have been and to which you have good memories attached to it.”

4.5.4. Non-visual related recommendations sensory room

Other physical adaptations and/or additions to the sensory room were the use of light, sound, temperature. Light and temperature should be customizable. Some participants would like to have music in the room, other participants prefer background sounds like birds singing and the sound of the ocean, which could support the visual content. However, just as the individual flexibility of light and temperature, it is important that the client experiences control over the choices they could make, like music genre. Additionally, they should be able to stop the music or visual content, when they feel overstimulated. This feeling of control was very important for every participant. Participants also addressed the importance of contact. That could be with nurses or with loved ones. Being in a seclusion room deteriorates the feeling of contact, which has a negative effect on clients. Other ways to improve the sensory room could be the use of other types of materials; more soft materials and fabrics which makes a room more homely and less clinical. Several participants believe that stimulation of smell by using odors could contribute to the relaxation process. One very interesting advice was the use of a frosted tv screen, because now you will be confronted with your own appearance when the screen is turned off, which is not beneficial during a crisis.

Participant 8 (male):

“Music has such a calming and harmonizing influence, because you become calm, you will clarify things, weighing up the situation, and see things in a different perspective.”

Participant 15 (male):

“What is also very calming are odors, I really love incense. I think that a smell or odor also will be very calming for me.”

Participant 19 (female):

“Yes, sound and different lighting. It doesn’t have to be like a club, but now it is very clinical. It doesn’t have to be romantic, but eh, a different colour, I don’t know. Maybe you have to ask it to the client who is there at the moment, like ‘hi, what colour do you like’. So that you can adapt the lighting. I think people will like that.”
Participant 22 (male):

“Images and sound, odor and colour. That’s it I guess.”

Participant 23 (male):

“That you image that you are walking there, that you hear birds chirping around you, yes, that is calming as well.”
5. Discussion

5.1. Evidence of restorative effects of visual stimuli

The main study gave us insight in the effect of different types of visual stimuli. The aim of the study was to investigate whether natural and/or social connectedness cues are better to restore self-control and affect after depletion than neutral or no stimuli. An experimental study performed on experts of experience partially confirmed our hypotheses that pictures of nature and loved ones help to restore depleted resources. Mood measures indicated that participants felt more relaxed after exposure to pictures of nature and loved ones, with stronger effects for social connectedness cues. Moreover, participants reported stronger positive affect after exposure to their loved ones compared to the other three conditions. Results from the interviews confirmed the positive effect of visual stimuli as well. Participants confirmed that visual stimuli could contribute to the calming process of clients, with a preference for social connectedness cues followed by nature content. Physiological data showed that exposure to nature or social connectedness cues led to higher skin conductance than neutral or no stimuli, indicating increased arousal. Increased arousal could be either positive or negative, but based on the other findings we suspect that the increased arousal has a positive impact on the participants. Participants indicated that neutral stimuli had no particular effect on them. During the interview some of the participants stated that the black screen in the no content condition had a negative effect on them, it made them feel restless and uneasy. This was mainly due to the lack of stimuli, which could lead to sensory deprivation (Ulrich, 1991). Moreover, a paired sample t-test showed that after exposure to a black screen, participants reported to feel less energetic. This corresponded to our hypothesis that neutral content is preferred over no content. However, LMM analyses on mood and physiological data showed no significant difference between neutral content and no content. The absence of an effect on the self-reported energy level of the participants was rather counterintuitive. Studies from Ryan and colleagues (2010) and Luke and colleagues (2012) stressed the vitalizing and energetic effect of respectively nature and secure relationships, but this effect was not replicated in our study. Furthermore, no significant effects were found on performance of the SART. The SART is a concentration task and evokes fatigue, but does not induce stress. After a stress induction, exposure to nature leads to a decline in skin conductance (Ulrich et al., 1991), so this could be another explanation why we did not found a decline of skin conductance during exposure after the SART. The reason why we did not found any effect on performance and vitality could be due to the fact that the expected ego-depletion of the SART was not strong enough. Therefore, we are not able to provide evidence that exposure to nature or loved ones lead to improved self-regulation and self-control.

5.2. Theoretical and methodological implications

The effect of supportive designs in health facilities in combination with ambient technology was to our knowledge never applied to the field of mental health. In order to develop a successful
supportive mental health facility, this study examined for the first time the effect of nature and social connectedness cues on self-control recovery by performing an experimental study with experts of experience. Although Roe and Aspinall (2010) already investigated the restorative benefits of walking in nature on people with good and poor mental health, the effect of nature on self-control and affect was to our knowledge never studied in this context. Findings from this study showed that nature could be a positive contribution in the field of mental health and during the healing and calming process of psychiatric patients. Before this study, the link between social connectedness and the replenishment of ego-depletion and affect was largely circumstantial and unexplored as well. We can now conclude that there seems to be a link between social connectedness and restoration of affect. Social connectedness cues had the strongest positive effect on relaxation, and contribute to an increase in positive affect. After exposure to loved ones participants felt significantly more satisfied and happier. This is positive, because positive affect not only supports people’s wellbeing, but it also seems to improve self-regulation (Tice et al., 2007). However, interview data and a marginal trend discovered in self-reported mood showed that it could also evoke negative feelings and sadness. This could imply that social connectedness cues evoke more affect overall, positive or negative. This is supported by the increased arousal after exposure to pictures of loved ones, which could be either positive or negative. It could be interesting to examine if this effect is due to the impact of moving pictures of loved ones, compared to other objects or nature. Perhaps a picture of a loved one that zooms in and out had more impact than a picture of nature or a neutral object that zooms. Research showed that stimuli that loom directly toward an observer should capture more strongly than stimuli that loom toward a point beside the observer (Franconeri & Simons, 2003). That same research also stated that some features carry more weight than others, and features can attain a high activation weight either by default or via current goal states (Franconeri & Simons, 2003). Even though all stimuli in our study were looming, we suspect that looming pictures of loved ones could be perceived as captured more directly and could include more features that carry more weight or attract more attention to a person than pictures of landscapes and neutral objects.

It would be very interesting to further study the effects of social connectedness, and to widen it and include pets in this construct. For the purpose of this study we decided after the pre-study to exclude pets as a social connectedness cue, as they could lead to confound, partly because of their plausible link to other animals or natural cues. However, interview data showed that a lot of participants would like to see their pets in a certain situation, because they could evoke the same positive feelings as their loved ones without the negative feelings after recent arguments or judgements that loved ones could evoke. Also the high internal consistency values from the pre-study indicated that the adapted constructs of social connectedness, social support and perceived benefit could be applied to pets as well.

Even though we did not find any significant results on performance, it is promising to notice that it seemed to be that participants made fewer errors after exposure to nature content and had a shorter reaction time after exposure to social connectedness cues. This could suggest...
an improved executive functioning, but because of the lack of significance no conclusions can be drawn upon these results. One possible reason for the lack of effect on the SART could be due to the number of tasks the participants had to perform. The SART was chosen because of the within-subject design and the duration of the study. For the purpose of this study it was important that the induction and dependent tasks were short and did not include a learning effect. However, this was the first time that the SART was used as an induction and dependent measure in the same experiment and for multiple times. Therefore it is hard to rule out the chance that there still could be influence of previous trials on following trials. Another reason for the lack of effect on performance could be the nature of this type of task. The SART is a sustained attention to response task, which measures both inhibition capacity as sustained attention (Robertson, Manly, Andrade, Baddeley, & Yiend, 1997; Berto, 2005). In their meta-analysis, Hagger and colleagues (2010) categorized depleting and dependent self-control tasks for dual-task paradigm experiments into seven spheres including controlling impulses and controlling attention. The SART should focus on both these spheres but concentration and attention seems to predominate. That combined with the chosen within-subject design, the duration of this study, and the amount of tasks the participants had to perform, could have made it difficult to come up with the expected results. The dominance of sustained attention could also explain that there seems to be a trend in which participants make most errors after exposure to social connectedness cues. Those images could have affected their concentration, because they evoke a lot of (positive and/or negative) thoughts and memories. However, this finding was not significant. For the purpose of this study a different kind of depleting and depending task would perhaps have been more suitable and effective, but concessions had to be made in order to let the design succeed.

As already mentioned, the duration of the experiment that resulted from the within subject design could be a limitation to the study, because it demanded a lot of the concentration and energy of the participants. Counterbalancing of the conditions was a solution in order to ensure it would not have an effect. Besides, it was no option to set up a between subject design, because we were determined to use experts of experiences as participants in this study. This is an exhaustive group of people. For the ecological validity of the study, this was the closest we could get to the current real-life situation in mental health care. Due to ethical reasons and considerations it was not possible to use real clients for this study. For future research it could be interesting to validate our results by performing a study on real clients who are still in treatment. Besides a screen, the sensory room already possesses other ambient technologies like sound and cove lighting. To exclude interaction effects we only focused on visual content. Though, for future research it could also be interesting to examine the effect of the combination of visual content, sound and lighting. Participants already addressed in the interviews that they expect that a combination of these tools could even evoke a more intense effect and be a stronger contribution to the calming process of clients.
5.3. Practical implications

This study showed that visual content, in particular nature content or social connectedness cues, had a positive effect on mood, and evoked physiological changes in skin conductance. Visual content could enhance the calming process of the clients and increase positive affect. Participants confirmed this statement in the interviews. Almost everyone thought that the use of visual content contributes to the calming down of clients to hopefully prevent separation. Other contributions could be the use of sound and light, and combinations of these three. Positive stimuli may offer a means to reduce psychiatric crisis and the length of stay in seclusion. The findings of this study will be applied in the sensory room which is placed at the crisis unit center of psychosis at the high care department at the psychiatric institution ‘De Grote Beek’ in Eindhoven. One of the characteristics of psychosis is the chance of relapses. This means that when recovered, a client is likely to fall back in a crisis or psychosis. Because they are likely to fall back, it is possible to make precautions. The GGzE could have some fixed theme options ready for usage, but most preferably, clients could set up their own preferences. Clients could in a normal state of mind, possibly in collaboration with the nursing staff, compose their own “crisis-package” with images of their loved ones or preferred nature scenes which could be used when clients or nurses perceive the beginning of a crisis. During the beginning of that crisis they could go to the sensory room to calm down by viewing their preferred images. It is important that the client is involved in this process, because otherwise it could be counterproductive. People with psychosis could become even more distrustful when they are not involved, and not everyone wants to be confronted with loved ones during a crisis period. The client should have control over the type of visual content and be able to decide what to watch and what not to watch. Additionally, it is important that they could stop the content when they feel overstimulated. During interviews, participants stated that it should be adjustable to each client and that it will not work for everyone. Different people have different needs. For example, for people with psychosis or some other mental illnesses it could also lead to overstimulation or suspicion, which has a negative effect on their calming process. However, it remains questionable if participants could foresee the effects of their choice, especially the effect it could have during a psychotic episode. Some participants had a change of mind after participating in the experiment, because their initial preference turned out to have a negative effect on them. Therefore, implementation of this new way of calming patients should be done with care and guidance of nurses.

Ambient and mediated technologies can be applied to a room, but have to be adapted to its users to make it work. This study focussed on visual content projected in a room and found that visual stimuli had a positive effect on individuals. The gained knowledge from this study could be added to the existing knowledge of healing environments and supportive designs, which should be applied to the field of mental care. This will hopefully prevent escalation in an early stage, leading to reduction of the use of seclusion rooms and length of stay in such a room to finally secure the bond between client and caregiver and enhance the wellbeing of the client.
Bibliography


Appendices

Appendix A – Symptoms and causes of psychosis

Symptoms

Symptoms of psychosis can be divided in positive and negative symptoms. Positive symptoms are symptoms that stand out because of their presence. The most known positive symptoms of psychosis are delusions, hallucinations, incoherent speech and disorganised or catatonic behaviour. Delusions are beliefs that are not congruent with reality, but are perceived as real and people act accordingly to those beliefs. Hallucinations are sensory perceptions of which the stimulus is not present. Someone with hallucinations feels, hears, smells and/ or tastes things that are not really there. With incoherent speech it is impossible to understand the speech of the patient. This could be among others because the patient rambles, changes the subject without reason, or speaks with unknown fictional words. Disorganised or catatonic behaviour is characterized by behaviour in which no pattern can be seen, with very aimless, meaningless and inefficient behaviour. Forms of catatonic behaviour are meaningless repetitions of movements, jerky or halting movements and aimless and unfocused locomotion (Wunderink, 2001). Negative symptoms are symptoms that stand out because there is something missing. Some examples of negative symptoms are flattening of emotions and affect, lack of spontaneous movements, catatonic inhibitions, catatonic delays. Some other negative symptoms are lack of motivation, interest, attention and passivity (Vandereycken & van Deth, 2004; Wunderink, 2001).

Causes

A psychotic state is caused by a disorder of the signal processing in the brain. This could be due to drugs, some forms of epilepsy, brain tumours or other diseases that cause brain damage. However, a psychosis could also be triggered by stress, or a long term stay in a low stimulus environment (Reedijk, 1996; Vandereycken & van Deth, 2004; Wunderink, 2001). Schizophrenia often originates from the deficient or different function of neural circuits. The combination of hereditary factors and negative environmental influences like a flu or problems during the pregnancy of the mother can cause developmental disorders before birth (Vandereycken & van Deth, 2004; Wunderink, 2001).
Appendix B – Pre-study

In an earlier study, students of the University of Technology Eindhoven explored how various environmental stimuli affect psychiatric patients’ moods, and how those qualities could be understood in order to increase the quality of the treatment offered to patients in various psychiatric clinics (Baten, Brieger, Lomas & Van Den Broek, 2012). Interviews and a diary study with probes showed that pets in addition to close relations and nature experiences were often mentioned as helpful and important in the life of the participants. Literature also shows that contact with animals has beneficial health effects. A study of Anderson and colleagues (1992) showed that pet owners have a better health than people who do not own a pet. A study of Katcher et al. (1984) showed that watching an aquarium reduces stress of patients in waiting rooms for surgery. The presence of a dog in the same room led to a lower blood pressure of children in an experimental study of Friedman and colleagues (1983).

We performed a pre-study in order to find out which social connectedness to use: only loved ones or beloved pets as well. The goal of the pre-study is to examine whether social connectedness to a loved one is a comparable construct to social connectedness to a pet and how they relate to each other. We expect that the constructs are comparable, which allows us to use both loved ones and pets in our main study as social connectedness cues.

Design
A survey among experts of experience and members of the general population, both with and without pets, was performed to examine whether or not there is a difference between social connectedness and social support of loved ones versus pets. Two questionnaires were developed, one for participants with pets, and the other for participants without pets.

Participants
Twenty-two experts of experience were recruited by employees of the GGzE. The response rate is unknown. In order to get a larger sample size the questionnaire was also sent to an additional group of friends and family. Of the 25 invitations, 19 respondents agreed to participate (response rate: 76%). In total 41 respondents participated in this study (24 female). The average age of the participants was 37.10 years (SD=11.98; 19-60 years). Twenty-one participants were in possession of a pet, mostly a dog or a cat.
Measures

Social connectedness (SC)
A way to measure social connectedness is with the SCEQ-S (Social Connectedness Experiences Questionnaire Regarding a Specific Other) (van Bel, in press). The SCEQ-S consists of three categories: relationship quality (RQ), interaction quality (IQ) and relationship salience (RS). ‘Relationship quality’ is about feelings of closeness, personal involvement, knowledge of each other’s thoughts and feelings and shared understandings. ‘Interaction quality’ is about people’s need for a significant part of their social interactions to take place in the context of affective concern for each other’s well-being in order to feel belongingness and relatedness. Experiences through which people are reminded of their social relationships, thereby providing a sense of relatedness to a specific person and fulfilling their need to belong in situations of social deprivation are covered by the category ‘relationship salience’ (van Bel, in press). Participants had to keep their most precious loved one in mind while answering the items. Participants who had a pet also had to keep their most precious pet in mind. All items were checked and considered appropriate also for probing individuals’ connectedness to their pet. The SCEQ-S consisted of 13 items, all with a seven-point response scale ranging from 1 (completely disagree) to 7 (completely agree). The translated and adapted items can be found in the questionnaire in Appendix B.

Social support (SS)
To measure social support we used the SSL12-I (Kempen & van Eijk, 1995), a short scale derived from the Social Support List – Interactions (SSL-I) (Sonderen, 1993). The SSL12-I is a short measurement instrument to assess the extent of the received social support by means of social interactions with members of the primary social network, but for the purpose of this study we rewrote the 12 items with a focus on social interactions with only one member of their social network, namely their most loved one and/or their pet. This should be the same person/pet as used in the SCEQ-S. The items were divided in the subscales everyday support, support in problem situations and esteem support. All the items had four-point response scales with 1 (seldom or never), 2 (now and then), 3 (regularly) and 4 (very often). Some items from the social support questionnaire were excluded, because they could not be applied to an animal, for example the item ‘Does it ever happen to you that this person invites you to a party or dinner?’ cannot occur with a pet. Therefore we reduced the SSL12-I in the questionnaire about pets to seven items (SSL7-I). The translated and adapted items can be found in the questionnaire in Appendix B.

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7 For example: the item ‘Does it ever happen to you that people invite you to a party or to dinner?’ was rewritten in the item ‘Does it ever happen to you that this person invites you to a party or to dinner?’
Perceived benefit of loved one and pet (PB)

We added three extra items to the questionnaires both of loved ones and pets. The following three items together formed the perceived benefit of a loved one or pet; ‘Does it help to be with your loved one/pet when you are feeling down?’; ‘Does it help to be with your loved one/pet when you need support?’ and ‘Does it help to be with your loved one/pet when you feel tense?’. All the items had a five-point response scale with 1 (definitely not), 2 (probably not), 3 (maybe), 4 (probably) and 5 (definitely). The items can be found in the questionnaire in Appendix B.

Preference

Participants with a pet were asked to choose between their loved one or pet by answering the question: “When you are feeling down, whose company do you prefer?.”

Procedure

Participants received an invitation by email to participate in a small pre-study for a graduation project. In the invitation were three links to the online questionnaire included. One link was provided for people who did not have a pet. They only filled in the questionnaire concerning their most precious loved one. Two additional links were provided for people who did have a pet. Each link connected to two questionnaires, one concerning their most precious loved one, the other concerning their most precious pet. In order to counterbalance the order of the questionnaires, this population was split: people (with pets) whose last name began with A t/m M were asked to select one link, people whose last name began with N t/m Z the other. Participants also filled out basic demographics. The participants then answered questions about the perceived benefit of their most precious loved one. This was followed by questions about social connectedness and social support they experienced with that same loved one. At the end the pet-owners were asked to choose between their loved one or pet. After filling in the questionnaires, the experts of experience were asked if they would be willing to participate in future research. The questionnaire ended with a word of thanks. Participants received no financial compensation.

Results

Demographics

The most mentioned precious loved one was the partner of the respondents (n=17) or a family member (n=12). Some respondents mentioned their best friend and one respondent mentioned their caregiver. The majority of the 21 pet owners had only one pet and the most popular pet was a dog or a cat. All the pet owners had their most precious pet between 1-5 years or longer than 5 years. Five of the twenty-one pet owners (24%) preferred to be with their pet above their most precious loved at times when they felt down.
Internal consistencies of the constructs

To examine whether social connectedness to a loved one is a comparable construct as social connectedness to a pet, we explored the internal consistencies of the constructs. To measure social connectedness the SCEQ was used. The SCEQ-S concerning loved ones had a Cronbach’s alpha of 0.78 and the SCEQ-S concerning pets also had a high internal consistency with a Cronbach’s alpha of 0.85. These high internal consistencies indicated that the constructs for both groups are comparable.

For social support the Chronbach’s alpha of the SSL12-I concerning loved ones was 0.81. We adapted the SSL12-I in a way it would be applicable to pets as well. It was reduced to seven items scale (SSL7-I) with a Cronbach’s alpha of 0.71. This SSL7-I applied to loved ones had a Cronbach’s alpha of 0.77, which justified the reduction. Again these high internal consistencies indicated that the social support for loved ones and for pets are comparable constructs.

The last scale used was our own developed perceived benefit questionnaire. The internal consistency for these items was very high with a Cronbach’s alpha of 0.80 for loved ones and 0.93 for pets. So also this scale seemed to work for loved ones as well as for pets.

The high internal consistencies showed that the constructs for social connectedness, social support and perceived benefit could be applied to pets as well as loved ones. This means that we can draw rather reliable conclusions from the scores of these constructs.

Average scores on constructs

To answer if the degree of social connectedness to and social support experienced from loved ones and pets are comparable, we only took data of the pet owners into account. A paired sample t-test showed that there was a significant difference between the social connectedness to a pet (M=4.46, SD=1.24) and to a loved one (M=5.88, SD=0.50), t(18)=−5.044, p<0.01. There was also a significant difference between social support of a pet (M=2.37, SD=0.63) and the social support of a loved one (M=3.17, SD=0.50), t(18)=−4.38, p<0.01, and a significant difference between the perceived benefit of a pet (M=3.97, SD=1.17) and loved ones (M=4.62, SD=0.41). We can conclude that, in general, loved ones score significantly higher on all three constructs. The means for the constructs can be found in Table Appendix B-1 below.
Table AppendixB-1: Paired samples statistics constructs

<table>
<thead>
<tr>
<th>Construct</th>
<th>Loved one</th>
<th></th>
<th>Pet</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Social connectedness</td>
<td>5.88</td>
<td>0.50</td>
<td>4.46</td>
<td>1.24</td>
</tr>
<tr>
<td>Social support</td>
<td>3.17</td>
<td>0.50</td>
<td>2.37</td>
<td>0.63</td>
</tr>
<tr>
<td>Perceived benefit</td>
<td>4.61</td>
<td>0.41</td>
<td>3.97</td>
<td>1.17</td>
</tr>
</tbody>
</table>

Interestingly, an independent samples t-test showed that pet owners reported significantly higher social connectedness to their loved one (M=5.87, SD=.50) than participants without a pet (M=5.59, SD=1.013), t(34) = 1.09, p<.05). In Figure Appendix B-1 below the means for social connectedness (SC) and its subscales are reported. Additionally, there was a significant difference with higher perceived benefit of their loved one for pet owners (M=4.62, SD=0.09) than non-pet owners (M=4.10, SD=0.93), t(39)=2.23, p<0.05. However, there was no difference between social support of loved ones of pet owners (M=3.17, SD=0.49) and non-pet owners (M=3.02, SD=0.44), t(35)=.95, p>0.05.

Figure AppendixB-1: Social connectedness to loved ones and pets
Correlation constructs

The correlations of the different constructs are also interesting to see if they are applicable for loved ones as well as pets. In Figure Appendix B-2 you can see the correlations of the three constructs applied to loved ones and to pets. All correlations are significant with positive correlation coefficients, which signify a positive relationship between the three constructs.

<table>
<thead>
<tr>
<th></th>
<th>SC</th>
<th>PB</th>
<th>SS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loved ones</td>
<td>0.65*</td>
<td>0.48*</td>
<td>0.61*</td>
</tr>
<tr>
<td>Pets</td>
<td>0.78*</td>
<td>0.60*</td>
<td>0.76*</td>
</tr>
</tbody>
</table>

* These correlations are significant at the 0.01 level (2-tailed).

Figure Appendix B-2: Correlations between constructs

Prediction preferences

To analyze whether or not the three constructs could predict the participants’ preference, we used logistic regression. ‘Preference’ was the dependent variable and as predictors we used difference scores of the three constructs between pets and loved ones. A test of the full model against a constant only model was statistically significant, indicating that the predictors have a significant effect and create essentially a different model preference for their loved one or pet ($\chi^2(3, N = 21) = 10.98, p =<0.05$). Nagelkerke’s R$^2$ indicates a moderately strong relationship of 68.3% between the predictors and the prediction. Prediction success overall was 90% (93.3% for loved ones and 75% for pets). However, Wald statistics show that the three predictors have no significant contribution in the model (‘difference SC’: $\beta= 3.22$, p=0.28, ‘difference PB’: $\beta=4.06$, p=0.09 and ‘difference SS’: $\beta=-3.97$, p=0.30). Therefore we can conclude that the constructs do not significantly predict preference.

Discussion

The goal of the pre-study was to examine whether social connectedness to a loved one is a comparable construct to social connectedness to a pet and how they relate to each other. Cronbach alpha’s of the constructs show comparable high internal consistencies, meaning that they can be used for both loved ones as pets, which indicates that the constructs are comparable. Another indication of the comparison is the comparable positive correlations of the constructs for loved ones as pets. Results showed that there was a significant difference between the perceived benefit, social connectedness and social support of pets and most precious loved ones. In general, people perceived more benefit and support from their loved ones than from their pet. They also felt more connected to their loved one than to their pet. It is remarkable that pet owners give
significantly higher scores on social connectedness and perceived benefit concerning loved ones than participants with no pets.

Although the average scores for loved ones were higher, pets did score high on the different constructs and five of the twenty-one participants preferred their pet over their loved one. However, pets are a little ambiguous as a category. We suspect that other aspects other than social support and social connectedness could have an influence while watching pictures of your pet. It could lead to confound, because we suspect that they are also associated with other animals and/or natural cues. Therefore, it could be difficult to exclude a possible influence of nature. Based on this argument and the significant difference between loved ones and pets, we decided for the purpose of this study to only focus on loved ones.

In sum, analysis indicated that the constructs could be applied to both groups and some people preferred the support of their pet over their loved one. However, for the purpose of this study we thought that animals could also lead to confound, because it could also evoke natural cues. Furthermore, we learned that there seems to be a difference between the social connectedness to animals or to people. People report to be feel more connected to their most precious loved one than to their pet. This knowledge was applied in the main study.
Appendix C - Survey questions pre-study (in Dutch)

*Persoonlijke gegevens*

- Geslacht
  - Man
  - Vrouw

- Leeftijd: … jaar

- Heeft u een huisdier?
  - Ja
  - Nee

- Hoeveel huisdieren heeft u? …

Wanneer u meerdere huisdieren heeft, neem dan nu uw meest dierbare huisdier in gedachte.

- Wat voor huisdier is dat?
  - Een hond
  - Een kat
  - Een konijn
  - Vissen
  - Vogels
  - Anders, namelijk..

- Hoelang heeft u dit huisdier al?
  - 0-6 maanden
  - 6-12 maanden
  - 1-5 jaar
  - Langer dan 5 jaar

- Helpt het om bij uw huisdier te zijn wanneer u steun nodig hebt?
  - Zeker niet
  - Waarschijnlijk niet
  - Misschien wel/ misschien niet
  - Waarschijnlijk wel
  - Zeker wel

- Helpt het om bij uw huisdier te zijn wanneer u zich rot voelt?
  - Zeker niet
  - Waarschijnlijk niet
  - Misschien wel/ misschien niet
Sociale verbondenheid - huisdier

De volgende vragen gaan over sociale verbondenheid. Bij de vragen is het van belang dat u hetzelfde huisdier in gedachte houdt als bij de vorige vragen.

De vragen gaan over hoe u de afgelopen maand uw sociale relatie en sociale contacten met uw huisdier ervaart. Met contacten bedoelen we gesprekken/communicatie in elkaars gezelschap.

Geef aan in hoeverre u het (on)eens bent met iedere stelling.

- Buiten onze contacten om voel ik me vaak op één of andere manier toch "samen" met mijn huisdier.
  - Helemaal mee oneens
  - Mee oneens
  - Enigszins mee oneens
  - Niet mee eens/ niet mee oneens
  - Enigszins mee eens
  - Mee eens
  - Helemaal mee eens

- Ik denk vaak aan mijn huisdier.
  - Helemaal mee oneens
  - Mee oneens
  - Enigszins mee oneens
  - Niet mee eens/ niet mee oneens
  - Enigszins mee eens
  - Mee eens
  - Helemaal mee eens

- Ik weet vaak wat mijn huisdier denkt.
  - Helemaal mee oneens
  - Mee oneens
  - Enigszins mee oneens
Ik heb het gevoel dat mijn huisdier vaak weet wat ik voel.
- Helemaal mee oneens
- Mee oneens
- Enigszins mee oneens
- Niet mee eens/ niet mee oneens
- Enigszins mee eens
- Mee eens
- Helemaal mee eens

Ik heb het gevoel dat ik veel gemeen heb met mijn huisdier.
- Helemaal mee oneens
- Mee oneens
- Enigszins mee oneens
- Niet mee eens/ niet mee oneens
- Enigszins mee eens
- Mee eens
- Helemaal mee eens

Ik weet vaak wat mijn huisdier voelt.
- Helemaal mee oneens
- Mee oneens
- Enigszins mee oneens
- Niet mee eens/ niet mee oneens
- Enigszins mee eens
- Mee eens
- Helemaal mee eens

Ik heb het gevoel dat ik op dezelfde golflengte zit als mijn huisdier.
- Helemaal mee oneens
- Mee oneens
- Enigszins mee oneens
- Niet mee eens/ niet mee oneens
- Enigszins mee eens
- Mee eens
- Helemaal mee eens

Ik heb het gevoel dat mijn huisdier me goed kent.
• Ook als we niet in elkaars gezelschap zijn, voel ik me vaak op één of andere manier toch "samen" met mijn huisdier.

  o Helemaal mee oneens
  o Mee oneens
  o Enigszins mee oneens
  o Niet mee eens/ niet mee oneens
  o Enigszins mee eens
  o Mee eens
  o Helemaal mee eens

• Ik heb het gevoel dat mijn huisdier vaak weet wat ik denk.

  o Helemaal mee oneens
  o Mee oneens
  o Enigszins mee oneens
  o Niet mee eens/ niet mee oneens
  o Enigszins mee eens
  o Mee eens
  o Helemaal mee eens

De volgende stellingen hebben betrekking op hoe u de afgelopen maand uw sociale contacten met mijn huisdier ervaart.

• Het contact met mijn huisdier is oppervlakkig.

  o Helemaal mee oneens
  o Mee oneens
  o Enigszins mee oneens
  o Niet mee eens/ niet mee oneens
  o Enigszins mee eens
  o Mee eens
  o Helemaal mee eens

• Ik heb het gevoel dat mijn huisdier mij niet goed begrijpt.

  o Helemaal mee oneens
  o Mee oneens
  o Enigszins mee oneens
Sociale steun - huisdier

De volgende vragen gaan over de sociale steun die u ondervindt. Neem ook weer bij deze vragen uw zelfde huisdier in gedachte.

- Gebeurt het wel eens dat uw huisdier genegenheid voor u toont?
  - Vaak
  - Regelmatig
  - Af en toe
  - Zelfden of nooit

- Gebeurt het wel eens dat uw huisdier u troost?
  - Vaak
  - Regelmatig
  - Af en toe
  - Zelfden of nooit

- Gebeurt het wel eens dat uw huisdier interesse voor u toont?
  - Vaak
  - Regelmatig
  - Af en toe
  - Zelfden of nooit

- Gebeurt het wel eens dat uw huisdier u hulp biedt in bijzondere gevallen zoals ziekte en verhuizing?
  - Vaak
  - Regelmatig
  - Af en toe
  - Zelfden of nooit
• Gebeurt het wel eens dat uw huisdier u gerust stelt?
  o Vaak
  o Regelmatig
  o Af en toe
  o Zelfden of nooit

• Gebeurt het wel eens dat uw huisdier u in vertrouwen neemt?
  o Vaak
  o Regelmatig
  o Af en toe
  o Zelfden of nooit

• Gebeurt het wel eens dat uw huisdier uw sterke punten naar voren haalt?
  o Vaak
  o Regelmatig
  o Af en toe
  o Zelfden of nooit

• Gebeurt het wel eens dat u met uw huisdier dingen deelt die u niet met een ander zou delen?
  o Vaak
  o Regelmatig
  o Af en toe
  o Zelfden of nooit

Dit waren de vragen met betrekking tot uw huisdier. U bent nu op de helft van de vragenlijst. De tweede helft van de vragenlijst bestaat uit vragen met betrekking tot een dierbaar persoon.

• Neem een persoon in gedachte die u het meest dierbaar is. Wat voor iemand is die persoon?
  o Mijn beste vriend/vriendin
  o Mijn partner
  o Een familielid
  o Een verzorgende
  o Anders, namelijk …

• Helpt het om bij deze dierbare persoon te zijn wanneer u steun nodig hebt?
  o Zeker niet
  o Waarschijnlijk niet
  o Misschien wel/ misschien niet
De vragen gaan over hoe u de afgelopen maand uw sociale relatie en sociale contacten met deze persoon ervaart. Met contacten bedoelen we gesprekken/communicatie in elkaars gezelschap of via media (telefoon, chat, e-mail, sms, etc.).

Geef aan in hoeverre u het (on)eens bent met iedere stelling.

• Buiten onze contacten om voel ik me vaak op één of andere manier toch "samen" met deze persoon.
  o Helemaal mee oneens
  o Mee oneens
  o Enigszins mee oneens
  o Niet mee eens/ niet mee oneens
  o Enigszins mee eens
  o Mee eens
  o Helemaal mee eens

• Ik denk vaak aan deze persoon.
  o Helemaal mee oneens
  o Mee oneens
  o Enigszins mee oneens
  o Niet mee eens/ niet mee oneens
  o Enigszins mee eens
• Ik weet vaak wat deze persoon denkt.
  o Helemaal mee oneens
  o Mee oneens
  o Enigszins mee oneens
  o Niet mee eens/ niet mee oneens
  o Enigszins mee eens
  o Mee eens
  o Helemaal mee eens

• Ik heb het gevoel dat deze persoon vaak weet wat ik voel.
  o Helemaal mee oneens
  o Mee oneens
  o Enigszins mee oneens
  o Niet mee eens/ niet mee oneens
  o Enigszins mee eens
  o Mee eens
  o Helemaal mee eens

• Ik heb het gevoel dat ik veel gemeen heb met deze persoon.
  o Helemaal mee oneens
  o Mee oneens
  o Enigszins mee oneens
  o Niet mee eens/ niet mee oneens
  o Enigszins mee eens
  o Mee eens
  o Helemaal mee eens

• Ik weet vaak wat deze persoon voelt.
  o Helemaal mee oneens
  o Mee oneens
  o Enigszins mee oneens
  o Niet mee eens/ niet mee oneens
  o Enigszins mee eens
  o Mee eens
  o Helemaal mee eens

• Ik heb het gevoel dat ik op dezelfde golflengte zit als deze persoon.
  o Helemaal mee oneens
  o Mee oneens
- Ik heb het gevoel dat deze persoon me goed kent.
  - Helemaal mee oneens
  - Mee oneens
  - Enigszins mee oneens
  - Niet mee eens/ niet mee oneens
  - Enigszins mee eens
  - Mee eens
  - Helemaal mee eens

- Ook als we niet in elkaars gezelschap zijn, voel ik me vaak op één of andere manier toch "samen" met deze persoon.
  - Helemaal mee oneens
  - Mee oneens
  - Enigszins mee oneens
  - Niet mee eens/ niet mee oneens
  - Enigszins mee eens
  - Mee eens
  - Helemaal mee eens

- Ik heb het gevoel dat deze persoon vaak weet wat ik denk.
  - Helemaal mee oneens
  - Mee oneens
  - Enigszins mee oneens
  - Niet mee eens/ niet mee oneens
  - Enigszins mee eens
  - Mee eens
  - Helemaal mee eens

De volgende stellingen hebben betrekking op hoe u de afgelopen maand uw sociale contacten met deze persoon ervaart.

- Het contact met deze persoon is oppervlakkig.
  - Helemaal mee oneens
  - Mee oneens
  - Enigszins mee oneens
  - Niet mee eens/ niet mee oneens
  - Enigszins mee eens
Ik heb het gevoel dat deze persoon mij niet goed begrijpt.
- Helemaal mee oneens
- Mee oneens
- Enigszins mee oneens
- Niet mee eens/ niet mee oneens
- Enigszins mee eens
- Mee eens
- Helemaal mee eens

Ik haal weinig bevrediging uit mijn contact met deze persoon.
- Helemaal mee oneens
- Mee oneens
- Enigszins mee oneens
- Niet mee eens/ niet mee oneens
- Enigszins mee eens
- Mee eens
- Helemaal mee eens

Sociale steun – dierbaar persoon

De volgende vragen gaan over de sociale steun die u ondervindt. Neem bij deze vragen weer dezelfde persoon in gedachte.

- Gebeurt het wel eens dat deze persoon u uitnodigt voor een feestje of etentje?
  - Vaak
  - Regelmatig
  - Af en toe
  - Zelfden of nooit

- Gebeurt het wel eens dat deze persoon gezellig bij u op bezoek komt?
  - Vaak
  - Regelmatig
  - Af en toe
  - Zelfden of nooit

- Gebeurt het wel eens dat deze persoon gebeurt het wel eens dat deze persoon genegenheid voor u toont?
  - Vaak
• Gebeurt het wel eens dat deze persoon u troost?
  o Vaak
  o Regelmatig
  o Af en toe
  o Zelfden of nooit

• Gebeurt het wel eens dat deze persoon u complimenten geeft?
  o Vaak
  o Regelmatig
  o Af en toe
  o Zelfden of nooit

• Gebeurt het wel eens dat deze persoon interesse voor u toont?
  o Vaak
  o Regelmatig
  o Af en toe
  o Zelfden of nooit

• Gebeurt het wel eens dat deze persoon u hulp biedt in bijzondere gevallen zoals ziekte en verhuizing?
  o Vaak
  o Regelmatig
  o Af en toe
  o Zelfden of nooit

• Gebeurt het wel eens dat deze persoon u gerust stelt?
  o Vaak
  o Regelmatig
  o Af en toe
  o Zelfden of nooit

• Gebeurt het wel eens dat deze persoon u goede raad geeft?
  o Vaak
  o Regelmatig
  o Af en toe
  o Zelfden of nooit

• Gebeurt het wel eens dat deze persoon u in vertrouwen neemt?
  o Vaak
  o Regelmatig
  o Af en toe
- Zelfden of nooit

- Gebeurt het wel eens dat deze persoon u om hulp en advies vraagt?
  - Vaak
  - Regelmatig
  - Af en toe
  - Zelfden of nooit

- Gebeurt het wel eens dat deze persoon uw sterke punten naar voren haalt?
  - Vaak
  - Regelmatig
  - Af en toe
  - Zelfden of nooit

- Gebeurt het wel eens dat u met deze persoon dingen deelt die u niet met een ander zou delen?
  - Vaak
  - Regelmatig
  - Af en toe
  - Zelfden of nooit

- Als u zich rot voelt, wie heeft u dan het liefst bij u?
  - Mijn meest dierbare persoon
  - Mijn huisdier
Appendix D – Content slideshows

Nature content

Forest

Heath
Dunes

Social content

The faces are blurred to ensure privacy.
Neutral content

Electronics

Kitchen items
School supplies
Appendix E – Mood questionnaire (in Dutch)

Hoe voel je je op dit moment?

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Appendix F - Traits

Trait connectedness to their loved one

Trait connectedness to nature
Appendix G – Interview questions

1. What do you think the goal of this experiment was?
2. What do you think that we want to accomplish with this?
3. Do you have an idea why we chose these conditions?
4. Do you have any experience with seclusion rooms?
5. How did you feel in this room?
6. Did this room evoke associations with the current seclusion rooms?
7. Did it evoke old feelings?
8. Which slideshow had your preference?
9. Why?
10. What did you think of the other slideshows?
11. What could be another possibility when you think of visual content?
12. What are other aspects besides visual content which could improve such a room?
13. Do you have any questions to me?
Appendix H – Flow diagram of the experiment

From now on the door is closed!

1. Briefing: 7 min
2. Installing equipment: 5 min
3. Questionnaire mood: 2 min
4. SART (official baseline): 2 min
5. Rest + mood: 2 min
6. SART II (baseline induction): 4 min
7. Content I: 2 min
8. Questionnaire mood: 1 min
9. SART II (dependent measure): 2 min
10. Rest + mood: 2 min
11. SART I (baseline induction): 4 min
12. Content II: 2 min
13. Questionnaire mood: 1 min
14. SART II (dependent measure): 2 min
15. Rest + mood: 2 min
16. SART I (baseline induction): 4 min
17. Content III: 2 min
18. Questionnaire mood: 1 min
19. SART II (dependent measure): 2 min
20. Rest + mood: 2 min
21. SART I (baseline induction): 4 min
22. Content IV: 2 min
23. Questionnaire Mood: 1 min
24. SART II (dependent measure): 2 min
25. Trait questions Demographics: 1 min
26. Social connectedness questionnaire: 3 min
27. Interview: 20 min
28. Debriefing: 5 min

Total duration: 1 hour and 25 minutes
CERTIFICAAT

Bewijs van deelname van

(Naam deelnemer)

aan

Onderzoek met betrekking tot de ontwikkeling van de sensory room

Voor het verbeteren van kwaliteit van zorg binnen de High Care GGzE.

Uitgereikt d.d. (datum)

Namens project Het Roer OM GGzE

Erik Kuipers

namens TU Eindhoven

Joyce de Laat
Human-Technology Interaction group
Projectleider: Yvonne de Kort

GGzE

TU/e

Technische Universiteit Eindhoven
University of technology