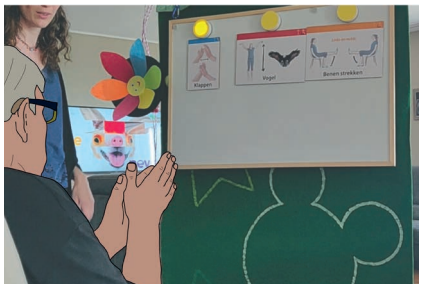
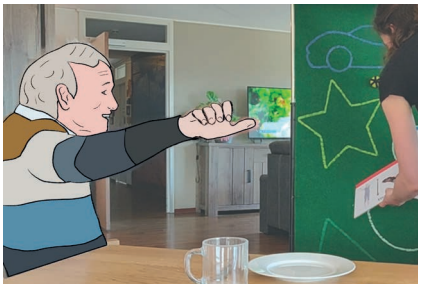
Involving older adults with an intellectual disability in the design process of the

MakiMove

a modular intervention for stimulating physical activity





Master thesis
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MASTER THESIS

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Master Design for Interaction
Faculty of Industrial Design Engineering
Delft University of Technology

December 9, 2022

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PREFACE

Being able to make a small improvement in someone's day in any way has always been my motivation while designing. Especially when, for any reason, that 'someone' could really use such an improvement. In the past two years, as a student of the master Design for Interaction, I always looked for projects related to mental wellbeing. The positive effect that physical activity can have on one's mental wellbeing is generally known and otherwise often reflected in my mood before and after volleyball practice. However, for many people being physically active is not that fun or accessible. In the ideal world, everyone has their own type of physical activity to gain and release some energy. A project about stimulating physical activity in older adults with intellectual disabilities sounded like an interesting combination of my interests and motivations, both in life and design.

And so it happened... This thesis covers the research project on involving older adults with an intellectual disability in the design process of the MakiMove: a modular intervention for stimulating physical activity.
Before going into the content of the report, I would love to thank a few people. Being completely new in this context, without any former experiences with the target group, I needed a lot of help and advice from experts in the field. I have received that help in large numbers from many different people.

In order to help the older adults in the best way, I needed them to help me. Six people from within this target group were willing to allow me into their home, tell me about their experiences, and try out a lot of different activities. The visits and conversations were essential and highly valuable, to the project as well as to me personally. Thank you so much for helping and inspiring me.

I would like to thank my supervisory team for their extremely valuable help and support. Thank you, Jos, Niko, Alyt, and Marije, for initiating the project, extensively thinking along with me from your own expertise, for your enthusiasm, your flexibility, and for sometimes highlighting what went well when I could not see it myself.

The caregivers in the house of 's Heeren Loo were always willing to answer my questions, and to let me carry out my project at their working place. Thank you for your help and for the enthusiastic participation in the creative session. I admire your valuable work and thought it was great to be able to experience it up close. I would like to thank Xander especially, for being the contact person in the house, for being open to my project and for thinking along whenever it was helpful.

Additionally, I would like to thank the caregivers at the daytime activity centres, the physiotherapist of the house, the employees of the innovation department, a logopaedist, the care manager, and 's Heeren Loo in general, for showing interest in the project and being willing to share your expertise with me.

Last, but definitely not least, I would like to thank my family and friends for being there for me in the highs and lows of the project and beyond. Your support and ideas helped me in the project, but perhaps even more valuable was the positive distraction you gave me outside of the project. I look forward to spending more time with you, once I have completed my master.

Thank you! 

Kim Adriaanse

EXECUTIVE SUMMARY

Regular physical activity helps to improve the health, fitness and quality of life of people, and prevent or decline aging related health issues. The amount of physical activity in older adults with an intellectual disability is extremely low. Contextual research indicates that this physical inactivity stems, among other things, from previous negative experiences, the habit of being inactive, limitations related to the cognitive and physical disability, and interventions that are not taking into account these limitations. These barriers emphasize the client's dependence on an external incentive to become physically active, but caregivers of the clients lack time to provide this stimulus. Along with an increased life expectancy of people with an intellectual disability, this increases the need for a physical activity intervention that suits the individual abilities and interests of the clients, while asking minimal time from the caregivers.

Many interventions that have been created for stimulating physical activity in people with an ID, are either not adapted to people of an older age, or not created in (creative) collaboration with the older adults. This project is therefore carried out in close collaboration with six older adults with an intellectual disability, and their caregivers.

Literature and context research showed the current barriers and motivators towards physical activity, from the perspective of the clients, the caregivers, and the physiotherapist in this context. A research through design approach, consisting of creative sessions together with clients, caregivers, and other experts, resulted in a design that is adapted and adaptable to the diverse group of older adults. The design intervention proposed in this project is called the 'MakiMove'.

The MakiMove is a large, vertical game board that offers fun and active activities to older adults with intellectual disabilities. The product provides a positive experience to the older adults, and simultaneously increases their physical activity. The variety of activities and difficulty levels make the design adaptable to the abilities and interest of the individual client.

Although the MakiMove allows the client to move without much assistance, it is not possible to interact with the concept completely independent of a caregiver or other supervisor. With social contact and encouragement being valuable facilitators for the client, it is questioned whether independent physical activity is the road to take. On this basis, it is recommended to look into how to enable caregivers or other supervisors to play a role in increasing the physical activity of the older adults.

To create a successful experience, it is important to adapt a design to the client's abilities and interests. To get to know the clients well, they should be involved in the design process. The experiences in this project have led to guidelines for collaborating with the target group, aiming to inspire future researchers and designers to involve this increasing population of older adults with an intellectual disability in their projects.

TABLE OF CONTENTS

1. INTRODUCTION

This thesis covers the research project on 'Involving older adults with an intellectual disability in the design process of the MakiMove: a modular intervention for stimulating physical activity'. The graduation project is part of the Master 'Design for Interaction', which belongs to the faculty of Industrial Design Engineering at Delft University of Technology (TU Delft). The project is conducted in close collaboration with researchers from the TU Delft and Erasmus Medical Centre, and employees of care organisation 's Heeren Loo. The main roles of the story are however reserved for the residents of the house that is provided as research context by 's Heeren Loo.

1.1 Research problem and aim

The amount of physical activity (PA) performed by people with an intellectual disability (ID) is too low, evidenced by practical experience and scientific research (Kennisplein Gehandicaptensector, 2013). Although this counts for people of all ages, study shows that the PA levels of adults aged 50+ who live with an intellectual disability are even "extremely low" (Hilgenkamp et al., 2012). Much of scientific evidence suggests that PA has a positive effect on the health of people. PA helps in prevention of falling and in maintenance of the independence of older adults. Especially now that the average life expectancy of people with an ID is increasing (Dolan et al., 2019), for instance due to improved healthcare, there is even more value in promotion of PA for this target group. Many interventions for promoting PA exist, but are often aimed at the neurotypical population; people who are not affected with an intellectual or developmental disability. Because people with ID in some respects require different interventions than the neurotypical population, it is important to get to know their needs, wishes and abilities. Taking that into account, this project aims to find a suitable way of increasing the PA level of the older adults by involving them in the (design) process. The main research questions that need to be answered in this project are described below. The third research question is added as a retrospective question that could be of value for future collaboration with this target group.

1. What are the barriers and motivators to perform PA for older adults with an ID?
2. How can older adults with an ID be stimulated to perform PA?
3. How can older adults with an ID be involved in the process of finding ways to increase their PA?

1.2 Research context

The physical context in which the researcher will try to find answers to the research questions, revolves around a specific house of 's Heeren Loo. 's Heeren Loo is a care organisation for people with an intellectual and/or other disability, located in The Netherlands. The organisation offers several types of support to 13.580 clients with various disabilities, of whom more than half also lives in a type of residential home of 's Heeren Loo ('s Heeren Loo, 2021). In 2021, 16.338 employees and 4.804 volunteers were committed to maintaining or improving the quality of life of the clients. Furthermore, the organisation is eager to keep developing by collaborating in scientific research with hospitals, colleges and universities. By providing one of their homes as the context for this research, 's Heeren Loo plays an important role in this project. The house in question is the living place of six residents that belong to the target group of older adults with moderate intellectual disabilities. During the research and design process, these residents and sometimes their caregivers were involved in creative sessions to either try out or come up with ideas for increasing the PA level of older adults with an ID.

1.3 Approach

In order to adopt a structured approach, various research or design methods are used in this project. In many cases, these methods have not been applied completely by the book, but rather have been adapted or combined to make them suitable for this subject and this target group. This subchapter first introduces the methods used in this project, and then provides an overview of the thesis structure, presented in figure 4.

Research through Design

Throughout the project, a Research through Design (RtD) approach is used to find answers to the research questions. RtD is an approach in which knowledge is generated through design activities (Stappers & Giaccardi, n.d.). Iteratively developing prototypes to test certain (elements of) concepts and thereby gradually gaining knowledge about the right direction is an example of RtD. This example is the way in which this method has been applied most in this project, especially notable in chapter 6.

Co-creation and human-centred design

In this project, the residents are recognized as experts of their own experience, which is typical for a co-creative design approach (Sanders & Stappers, 2020). The initial plan was to follow such a co-creative design approach, in which the residents would be involved in the process of designing and ideating. Gradually it became clear that this approach did not seem to match the cognitive level of the participants in this research. Although the residents are still approached as the experts of their own experience, their contribution mainly consists of trying out prototypes (RtD) and having conversations about their experiences, thoughts and feelings. Now that the co-design activities itself are mostly left out, the approach tends more towards human-centred design (HCD). In HCD, the researcher or designer still focusses on the people they design for (Zoltowski, 2010), but does not necessarily involve them in the design activities itself. The four principles of human-centred design, presented in figure 1, are kept in mind during the project.

Double Diamond

The overall project is divided in the four phases of the Double Diamond (Design Council, 2004): Discover, Define, Develop and Deliver. Figure 2 provides short descriptions of each phase, and shows how the alternating divergent and convergent nature of the different phases explain the name of the method.

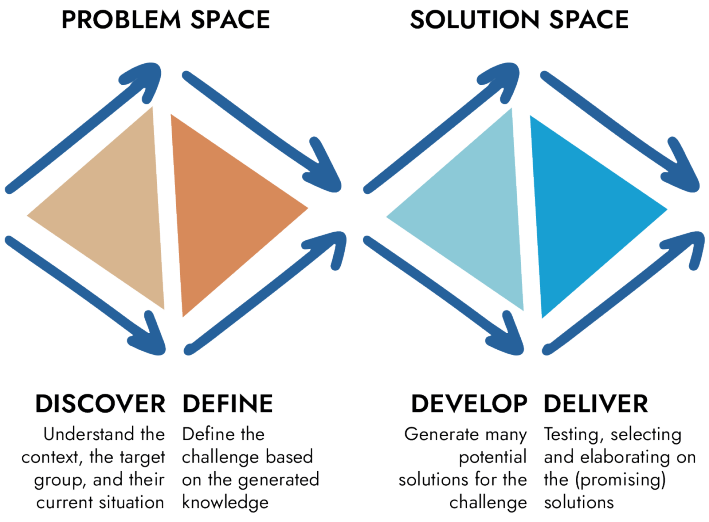


Figure 2. Visualisation of the four phases of the Double Diamond

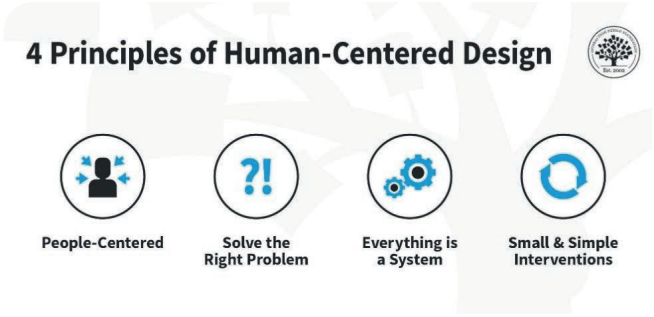


Figure 1. The four principles of HCD according to Interaction Design Foundation (n.d.)

Adaptations to the Double Diamond

For this project, the original Double Diamond has been adapted to a now called 'diamond fish' model (figure 3). This adapted model stems from the idea that the sessions with the residents (the body of the fish) brought us closer and closer to a suitable concept direction. Within this direction, a brainstorm led to several concepts (the tail of the fish) and one concept was elaborated and tested. In figure 3, the chapters are placed inside the different elements in the full process. In addition, throughout this thesis, each chapter starts with this schematic representation with one of the elements highlighted to clarify where you are in the process.

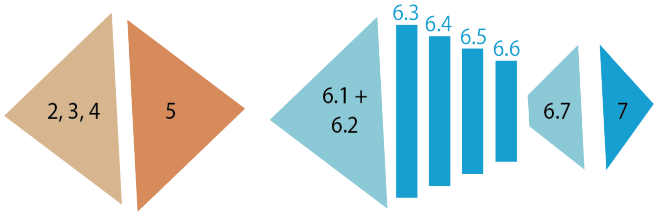


Figure 3. The 'Diamond Fish' model: how the Double Diamond structure is adapted in this project

Figure 4 shows how the phases and chapters are linked to the main research questions. In addition, it mentions the methods that are used in each phase. These methods will be clarified throughout the thesis. The RtD and HCD approaches are applied throughout the whole project.

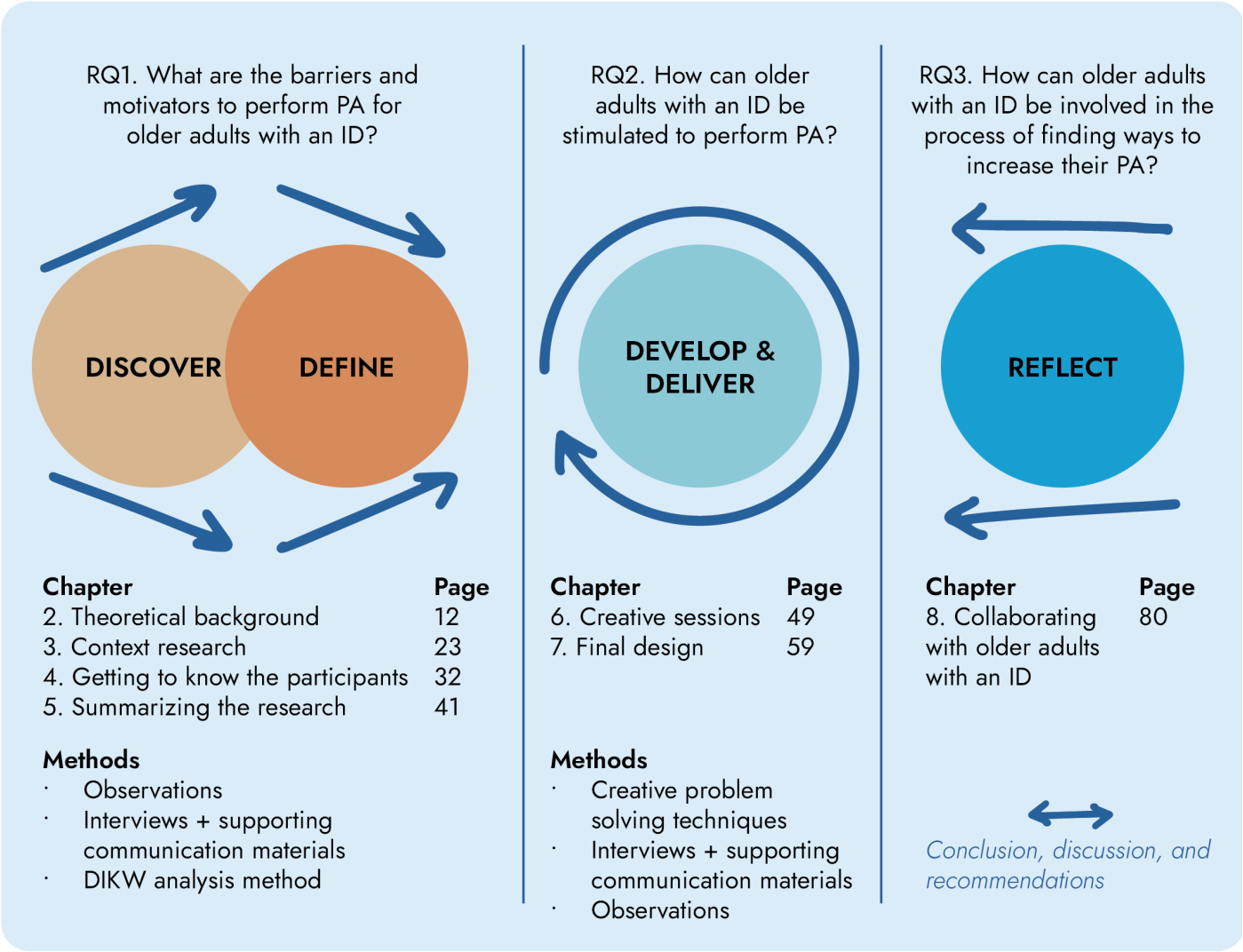


Figure 4. How the research questions, the phases, and the chapters are connected to each other, and which methods are used

DISCOVER

The main function of the Discover phase is to gain a thorough understanding of the current situation and to find an answer to the first research question:

What are the barriers and motivators to perform PA for older adults with an ID?

First, the necessary information is derived from existing literature (chapter 2). Thereafter, the research context is explained (chapter 3) and the residents who take part in this project are introduced (chapter 4).

2. THEORETICAL BACKGROUND

Since this project requires specific knowledge regarding several domains, there is a necessity to consult existing literature. Therefore, this chapter takes a closer look at the topics mentioned in the subchapters below. Next to literature research, a few experts were consulted, such as the physiotherapist of the house and employees of the innovation department of 's Heeren Loo. Each subchapter ends with an explanation of how the theory is connected to the design process. Below, the questions discussed in each subchapter are mentioned.

2.1 People with an intellectual disability

2.1.1 Definitions, numbers, symptoms

According to the American Association on Intellectual and Developmental Disabilities (AAIDD), an intellectual disability (ID) is defined as "a disability characterized by significant limitations in both intellectual functioning and adaptive behaviour as expressed in conceptual, social, and practical skills. This disability originates during the developmental period, which is defined operationally as before the individual attains age 22." (Schalock et al., 2021). There is a widespread spectrum of intellectual disabilities, from mild to moderate to profound, and each degree comes with different difficulties and needs. In The Netherlands, around 142.000 people live with an intellectual disability, of whom 68.000 with a moderate to profound ID and 74.000 with a mild ID (VGN, 2019).

In this project, the general term 'intellectual disability' will be used, but the focus will be on people with mild to moderate ID. In the following paragraphs, the aforementioned definition will be clarified.

Intellectual functioning

When it comes to diagnosis, the main factor of someone's intellectual functioning is the intelligence of the person (Tassé et al., 2016), which is often determined by measuring the Intelligence Quotient (IQ). Intelligence consists of several factors, including reasoning, planning, solving problems, thinking, comprehending complex ideas, learning quickly, and learning from experience (Arvey et al., 1994; Gottfredson, 1997). These factors are difficult for people with an ID, they experience 'limitations in intellectual functioning'.

The IQ score can be linked to a certain developmental age and to the severity of the ID. Figure 5 shows this categorization, in which you can see that a mild to moderate ID corresponds with an IQ between 35 and 70 and a developmental age between 4 and 12 years old (Trimbos, n.d.). In The Netherlands, people with an IQ of 70 to 85 and severe additional problems can make use of the same support as people with a mild ID (Kenniscentrum LVB, n.d.). This is part of the reason why the exact amount of people with a mild ID differs for various sources.

People with a moderate ID are able to learn to care of themselves, but this takes a long time. They need help regarding social skills and language, and with things like work, transport, and hobby's, while people with a mild ID mainly need help with more complex actions, that involve decision-making or planning (Smit, 2022).

Degree of ID	IQ	Developmental age in years
Profound	0-20	0-2
Severe	20-35	2-4
Moderate	35-50	4-7
Mild	50-70	7-12
Borderline	70-85	12-16

Figure 5. Degrees of IDs, IQ, and developmental age are linked to each other, table based on table of Trimbos (n.d.)

People with a mild to moderate ID experience difficulty with understanding abstract terminology and with abstract reasoning (Douma, 2018). They think in a slower pace and are often limited to concrete topics that take place in the now. This slower thinking results in slower processing of information. Other challenges related to the intellectual functioning of people with a mild to moderate ID are mentioned in figure 6.

- Separating main issues and side issues
- Retrieving and applying knowledge from long-term memory
- Executive functions like controlling emotions, keeping focus, prioritizing information, and organizing or planning
- Reflecting on one's own behaviour, thoughts and emotions
- Seeing the relation between cause and consequence
- Generalizing skills and knowledge to other situations
- Social-cognitive skills like recognizing emotions, understanding social situations and looking at a situation from someone else's perspective

Figure 6. Actions that are difficult for people with an ID, based on Douma (2018)

Adaptive behaviour; conceptual, social and practical skills

Apart from the difficulties related to intellectual functioning, an ID also comes with difficulties in conceptual skills, like reading or writing, social skills, like communication and social issues, and practical skills, like personal care (Douma, 2018). Altogether, adaptive functioning can be explained as the ability to adapt to the demands of society and the extent to which someone is socially reliant (Trimbos, n.d.). In addition, finding words for own ideas, feelings and thoughts can be difficult, partly due to a limited vocabulary. This is something that should be taken into account during the collaboration with this target group.

Diagnosis of a mild to moderate ID

As the definition already explained, an ID starts at an early age. An ID can have various causes (HandicapNL, n.d.):

- Genetics
- Result of a syndrome or disorder
- Health problems of the mother during pregnancy
- Lack of oxygen during the birth
- A meningitis, illness or a serious accident can cause a non-congenital ID

The use of language of people with a mild to moderate ID often indicates a higher level than what they can actually comprehend (Douma, 2018). So although an ID often starts at an early age, it happens regularly that it is only recognized much later in life. Also in their social-emotional development they often seem to be able to do more than what they actually can handle. Moreover, a mild ID is not always visible from the outside. Too high expectations from the environment, and sometimes even from the people themselves, can be a result of all this, which in turn can lead to a negative self-image.

2.1.2 Support in The Netherlands

The majority of people with an ID in The Netherlands receives a type of long lasting support, for instance support in growing up, in finding or keeping a job, in going to school or other daytime activities, or dealing with psychological issues (Landelijk Kenniscentrum LVB, n.d.). Some people can live independently and other people need to live in a house with caregivers. Just like everyone else, the needs of individuals with an ID are highly diverse; care for people with a disability is tailor-made. Most people with a moderate ID need support to meet social expectations, for instance regarding work and planning, or regarding healthy living (Prinsenstichting, n.d.). Some people with a moderate ID can learn to execute tasks related to personal care or the household, but it takes more time for them to be able to do it independently.

Not all people with an ID receive intramural care, but in the past years, there is an increase in people with a mild ID living intramural. Explanations can be that the society gets more individualised and complex, that suitable and simple jobs are less available, and that there is less appropriate support for this group (Zorginstituut Nederland, 2021). Assumably, people with a mild to moderate ID who are of an older age, often live in a home with caregivers.

2.1.3 Aging with intellectual disabilities

Over the last decades, the life expectancy of people with a mild ID has grown in such a way that it almost reaches the life expectancy of a neurotypical person (Pimlott, 2019). Also, people with a more severe ID and people with Down Syndrome are living longer. Heller (2010) mentions medical advances and improved living conditions as explanations for this increase. The increasing age combined with being part of a vulnerable population, increases the risk of having a poor health (Perkins, Moran, 2010). Unfortunately, the rates of morbidity and mortality in people with an ID are still higher than in the neurotypical population. Certain health problems in this population, such as vision and hearing impairment or behavioural/mental health problems, are regularly not recognized or poorly managed (Krahn et al., 2006; Haveman et al., 2010). Partly due to the lack of training of healthcare professionals in communicating

with patients with an ID, the health concerns of people with an ID are not always met. Besides, aging in people with IDs is quite complex, as it depends a lot on the underlying condition (Pimlott, 2019) and people with an ID generally experience aging related issues from an earlier age (+/- 50 y.o.).

Besides the need for improvement in healthcare for people with an ID, there is value in preventive care. Aging related issues regularly include musculoskeletal disorders, osteoporosis, diabetes and dementia (Oviedo et al., 2020), but also problems related to mobility and mental health. Apart from these health problems, the general physical fitness of these adults is low. Studies show that physical activity is a way of preventing or declining the aforementioned health issues (Lee et al., 2007; Pahor et al., 2014; Taylor et al., 1985). In other words, there is value in increasing the physical activity of older adults with an ID. Accordingly, the next subchapter dives into the topic of physical activity.

LINK TO PROJECT

This subchapter provided background knowledge on intellectual disabilities, its associated characteristics in general and for aging people, and introduced the value of physical activity. With this knowledge, it became more clear what to take into account during the interaction and collaboration with this target group. Clearly, extra attention will have to be paid to adapting the co-creation process to the target group.

2.2 Physical activity

2.2.1 Guidelines for physical activity

Much scientific evidence indicates that regular physical activity (PA) plays a role in prevention of chronic physical as well as mental diseases, and premature death (Warburton et al., 2006). Being physically active is an important way to stay happier and healthier (National Institutes of Health, 1998). Subsequently, health organisations worldwide try to promote the importance of PA. In general, PA is defined as “any bodily movement produced by skeletal muscles that results in energy expenditure” (Caspersen et al., 1985). People can be physically active while doing sports and exercising, but also during daily life activities at home, at or on the way to a job, or during leisure activities.

In The Netherlands, the ‘Gezondheidsraad’ set up PA guidelines for various target groups. For adults and older adults, the guidelines prescribe the following four points of advice (Gezondheidsraad, 2017):

- PA is good, more PA is better.
- At least 2,5 hours a week moderately intense PA, spread out over several days. Longer, more often, or more intense PA increases the health advantage.
- At least two times a week muscle and bone strengthening activities, combined with balance exercises for older adults.
- Avoid sitting for a long time.

In 2021, only 47,2 % of the general population in The Netherlands managed to meet these guidelines (Kenniscentrum Sport & Bewegen, 2021). For people with an ID, it is often even harder to meet them. This target group is on average more dependent on their social network and their care or living institution (Van den Berg, 2020). Additionally, the offer in physical activities, for instance at sports associations, is often aimed at the general population, which can increase the threshold to join an association as a person with an ID. When people with an ID are getting older, this sports offer is conceivably becoming even less accessible. Although the general guidelines are still valid for people with an ID, de Gezondheidsraad created adapted PA guidelines for people with an ID, consisting of the following three pillars (Van den Berg, 2020):

1. PA is good, more PA is better
2. Get up more often or change position
3. Add an extra moment of PA to your day

These three pillars apply to each individual in the target group, regardless of their physical function. For this project, the pillars are kept in mind while thinking about ways to stimulate PA in older adults with an ID.

2.2.2 Current PA in older adults

People with an ID often have a higher prevalence of sedentary behaviour and physical inactivity compared to the general population (Bodde & Seo, 2009). Studies have indicated that 58-89% of adults with an ID do not meet the average PA recommendations (Hsieh et al., 2017). Additionally and (partly) because of this, this group of people is more often affected by overweight or obesity (Rimmer & Yamaki, 2006) and chronic health conditions associated with inactivity (Draheim, 2006). This project does not necessarily focus on changing that sedentary lifestyle, but rather on changing the inactivity of the target group. Reducing sedentary behaviour presumably requires more time and effort than available in this project, since sedentary behaviour is habitual and ubiquitous, while joining a physical activity is more planned and concrete.
Hilgenkamp et al. (2012) speaks of extremely low PA levels in older adults with an ID. In their study, only 16,7% of the research participants aged 50 years and

over were able to comply with the PA guidelines they set up. The authors emphasize the importance of lifetime promotion of PA in this growing specific population.

2.2.3 Valuable forms of PA for older adults

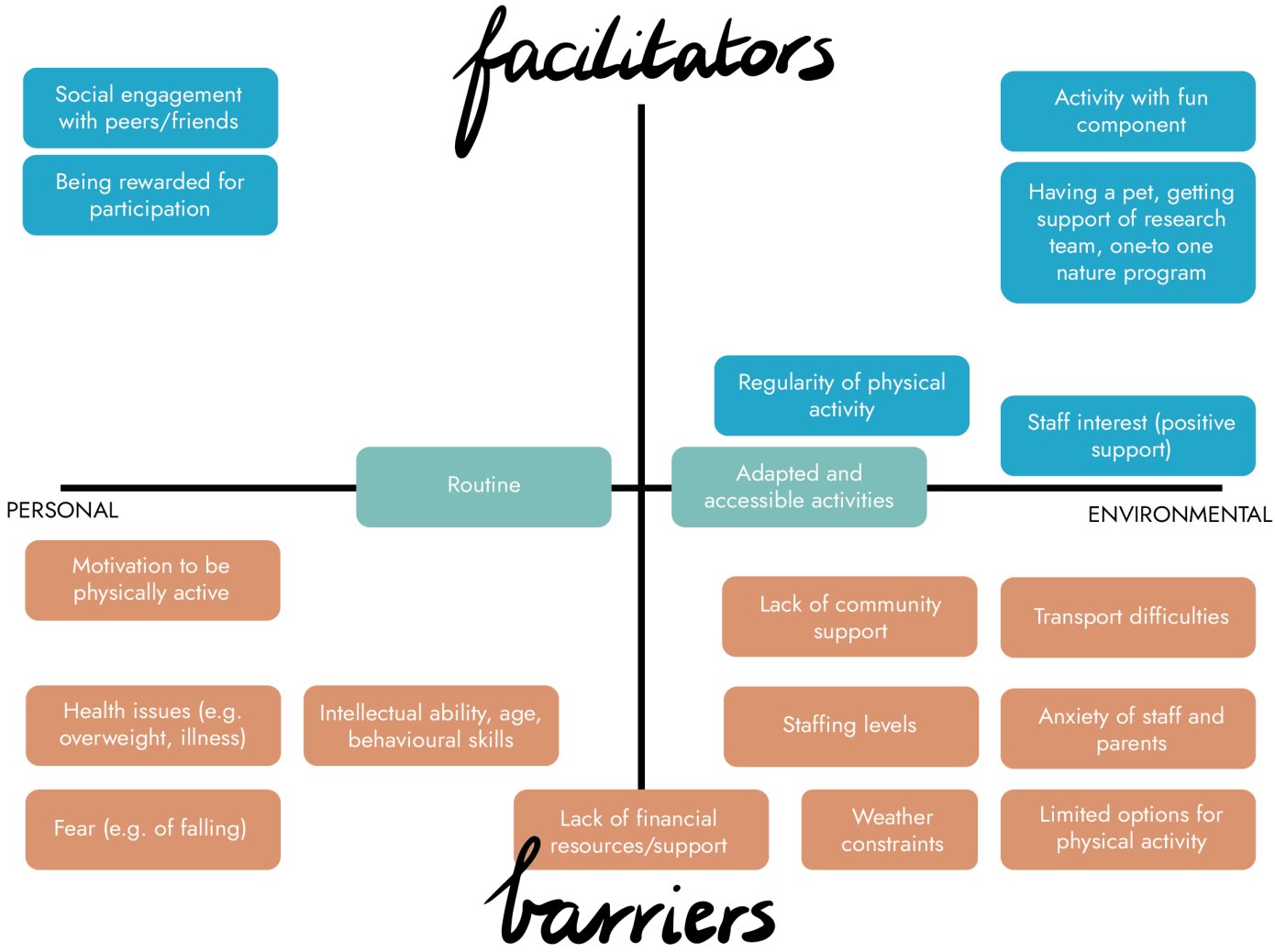
The discussed guidelines of the Gezondheidsraad (2017) also mention specific forms of PA that are useful for (older) adults (figure 7). They recommend doing exercises that help to maintain fitness for at least 2,5 hours a week, and doing bone and muscle strengthening exercises at least two times a week. For older adults, balance exercises are important as well.2.2.4 Barriers and motivators to performing PA

Figure 7. Part of the infographic of Kenniscentrum Sport & Bewegen (2021): valuable activities for (older) adults

2.2.4 Barriers and motivators to performing PA

To understand why older adults with an ID have such a low level of PA and to know more of how this level could be increased, it is important to gain insight into the barriers and motivators of PA in people with an ID. Bossink et al. (2017) did a systematic research on this topic and divided the barriers and facilitators in personal and environmental factors. Some of the most common facilitators are social engagement with peers or friends, being rewarded for participating, and being offered activities with a fun component. On the contrary, common barriers are experiencing fear, limitations in intellectual and physical abilities, health issues, and lack of financial resources or support. The most common barriers and facilitators are mapped out in figure 8.

Figure 8. The most prevalent barriers and facilitators from literature review of Bossink et al. (2017) mapped out



LINK TO PROJECT

The knowledge in this subchapter explained the current low PA level in people with an ID, and the desired PA level reflected in the three PA guidelines. The barriers in figure 8 emphasize what should be avoided or overcome when thinking of an intervention for this target group, while the facilitators serve as inspiration for finding opportunities. Since each individual presumably experiences different facilitators and barriers, the barriers and facilitators for the specific research context will need to be researched as well.

2.3 Stimulating physical activity

2.3.1 Stimulating behaviour change

Behaviour change

When people are reluctant to be physically active, stimulating them to become more active requires some change in their behaviour. Many models and theories are created regarding (designing for) behaviour change and health promotion. Although there are success stories, it is well known that achieving behaviour change is highly challenging. According to Laverack (2017), it is important to have a more comprehensive approach when it comes to behaviour change and health promotion. The behavioural change approach should be complemented with a "strong policy framework that creates a supportive environment" around the person. But even more important is to make people realize they can take control over making healthy lifestyle choices. In other words, people need to feel supported and confident about their ability to change.

Theory of Planned Behaviour

These last two factors correspond to the subjective norm and perceived behavioural control from the Theory of Planned Behaviour (figure 9) (Ajzen, 1991). The subjective norm is the social pressure that people experience from people around them to perform certain behaviour, and the perceived behavioural control is the degree to which they think they are able to perform the behaviour. As is clear from the diagram of the theory of planned behaviour, a more favourable attitude and subjective norm towards a certain behaviour and a higher perceived behavioural control increases the intention to perform the behaviour in question.

In this project, the general theory is relevant and valuable in analysing and categorizing the current barriers of the target group towards performing PA and in finding opportunities for stimulating PA. For instance, it shows that getting the right support and motivation of surrounding people (e.g. caregivers), and having enough confidence in own abilities to perform an activity are important facilitators to strive for, when creating an intervention.

However, it is questionable whether or not the theory is completely valid for people with an ID. Since they experience more difficulty reflecting on their own behaviour, thoughts and feelings, they make less well-considered decisions (Dermitzaki et al., 2008). Moreover, it is more of a challenge for this population to see links between cause and consequence and to foresee or anticipate (Didden et al., 2008). Therefore, this target group seems to have way less actual control over their behaviour. As visible in figure 9, this lack of actual control directly influences the behaviour of someone and skips the intention. This makes it potentially questionable whether the opportunities arising from this theory will have the desired effect on their behaviour.

For a model to be a better fit for people with mild to

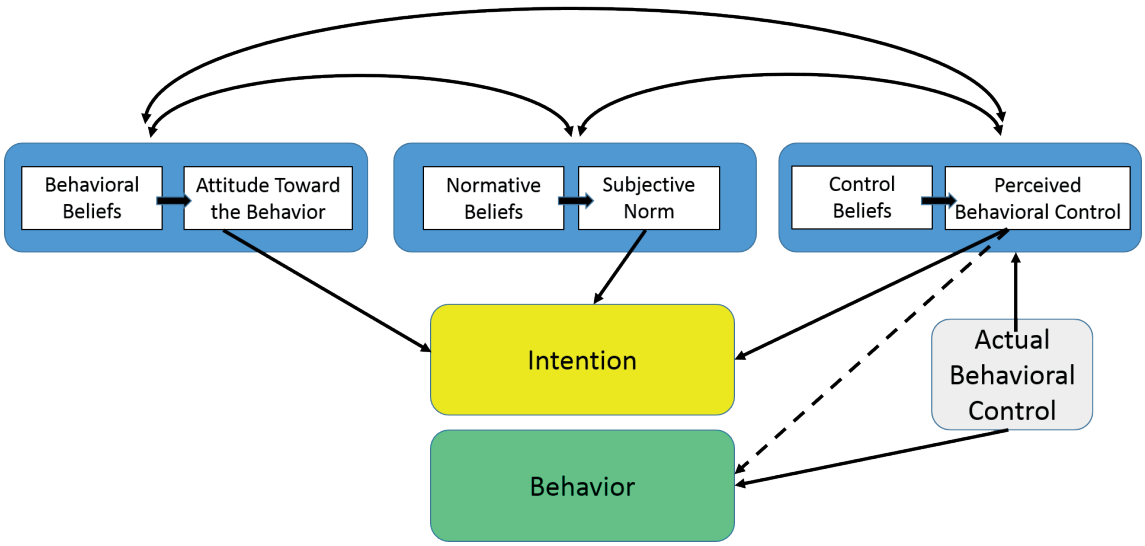


Figure 9. A visualisation of LaMorte (2022) of the Theory of Planned Behaviour (Ajzen, 1991)

moderate ID, it presumably should not have the focus on intrinsic, conscious, reflective, cognitive processes, like the TPB, but rather on extrinsic, more straightforward theories.

The Fogg Behaviour Model

A more straightforward behaviour model that can help in understanding behaviour and in designing for behaviour change is the Fogg Behaviour Model (FBM) (Fogg, 2009). Figure 10 shows the model with its three components: Motivation, Ability and Prompts. In order for a certain behaviour to happen, a person should have the right motivation and ability to perform the behaviour. When motivation and ability increase, the chance that the target behaviour will be performed increases too (illustrated by the arrow in figure 11). The curved line in figure 10 shows that there is a compensatory relationship between motivation and ability (Fogg, 2022). For instance, when motivation is high, people are more willing to do things that are hard to do. Once the motivation drops, people tend to do things that are easy to do and require less ability.

Fogg also delves deeper into the components within the model, for instance by mentioning three core motivators: pleasure/pain, hope/fear, and social acceptance/rejection. Additionally, he lists a few simplicity factors that help to simplify the behaviour (figure 11). These motivators and simplicity factors can be of use in the ideation phase of the project.

Even if motivation and ability are high, there should still be an appropriate prompt or 'trigger' at the right time, in order to reach the target behaviour. Such a trigger must meet three conditions:

1. The trigger should be noticeable.
2. The trigger needs to be associated with the target behaviour.
3. The trigger should happen at a moment when the person is both motivated and able to perform the target behaviour.

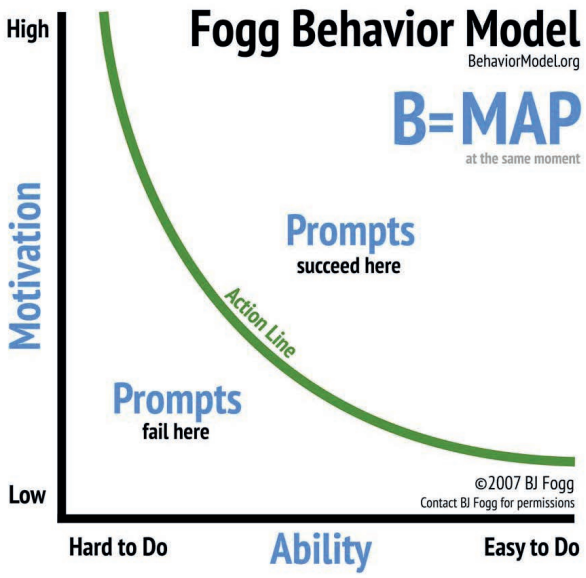


Figure 10. The Fogg Behaviour Model (Fogg, 2022)

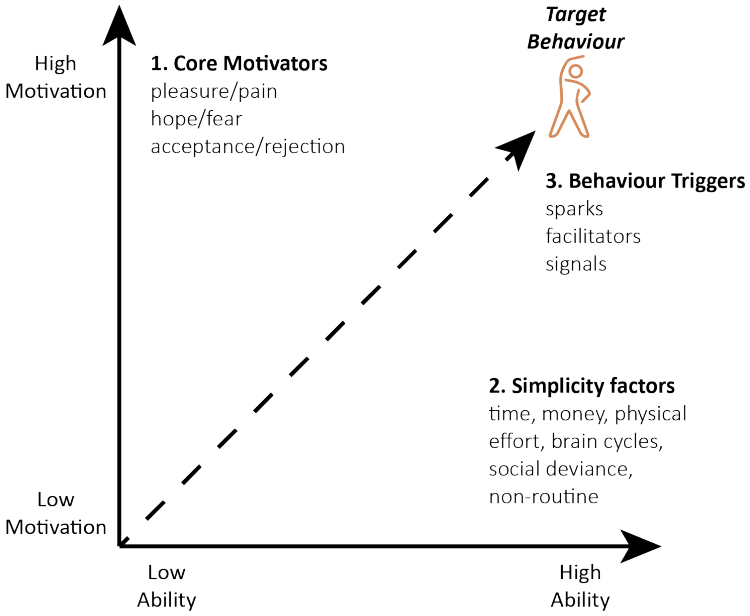


Figure 11. A visualisation of the FBM with additional components, based on Fogg (2009)

Fogg distinguishes three types of triggers: sparks, facilitators and signals. Sparks are suitable when there is a lack of motivation, facilitators when there is a (perceived) lack of ability, and signals when the motivation and ability are already there.

The model teaches to keep both motivation and ability in mind, but also to research what is the right trigger at the right timing. Furthermore, it explains why older adults on average perform less PA; when the physical abilities decline, it gets harder to be physically active and therefore it takes more motivation to perform PA. In other words, the model clarifies the current situation and inspires to find or design ways to let people perform the target behaviour.

2.3.2 Existing interventions for stimulating PA

Aimed at the general population

Since it is important but challenging to meet de PA guidelines, a lot of interventions have been created already in the field of stimulating PA. Interventions reviewed in literature (Hillsdon et al., 2005) are for instance a combination of:

- One-to-one or group counselling/advice
- Self-directed or prescribed PA;
- Supervised or unsupervised PA;
- Home-based or facility-based PA;
- Ongoing face-to-face support;
- Telephone support;
- Written education/motivation support material;
- Self-monitoring

Besides PA programs, there are also physical products, like an outside gym (figure 12), a Fitbit (figure 13) or the piano stairs (figure 14) that try to get people physically active. As we learned from the FBM, it is important that the target behaviour, but also the way the activity is brought to you, matches with your own abilities and motivation. In the TPB we saw that someone should perceive behavioural control in order to feel the intention to perform PA. Assumably, people with an ID will need more guidance in performing PA than that exists in the aforementioned interventions.

Figure 12. An outside gym

Figure 13. Fitbit that stimulates moving (MediaMarkt, n.d.)

Figure 14. Piano stairs that make a sound when you choose for the stairs instead of the escalator (Design of the World, n.d.)

Aimed at people with an ID

Because people with an ID have different needs than the neurotypical population (= people with typical neurological development), many PA interventions have been created especially for this target group. It is relevant to research these existing interventions and analyse what does and does not work for this target group. A selection of interventions was made and categorized in technological products, cheaper accessible products or activities, and methods or tools for stimulating PA. The orientation clarified that most interventions are not aimed at older adults. To find out more about the existing interventions used at ‘s Heeren Loo, an expert of the innovation team of ‘s Heeren Loo was consulted. The following information is derived from his expertise.

◊ It is important that a concept has elements that make it adaptable to a client. Moofie (figure 15) is a stick that makes music as long as the user moves it. The product is customizable by downloading different modules on it.

◊ Using existing resources or remarketing existing products and adapting it to a specific target group are common and useful ways to create new interventions.

◊ Triggers, music, video, images, audio or things that are touchable are often suitable for older adults with an ID. A concept should be visual, physical and simple for the client.

Figure 15. Moofie stick: a product that speaks out loud, makes music and gives exercises to the user (Moofie, n.d.)

Tools & research programs

A lot of tools and methods for stimulating PA in people with an ID are created based on research or expertise in the field. Some of the tools and programs were inspiring and informative for this project. For instance, the 'Beweegwaaier' (Nationaal Kenniscentrum Gehandicaptensport, 2012) contains tips for lowering the threshold for PA (figure 16) and tips about how to exercise together with a client in a simple way. Besides, the exercising program GOUD of Kennisplein Gehandicaptensector (2013) provided knowledge about the target group, an endless list of exercises, and some other insights, such as the value of implementing several levels or variations in the program in order to reach as many people as possible from within the target group. But also the 'Beweegboek', among others commissioned by 's Heeren Loo, gives a whole card set full of PA options and exercises to do together with the client (Teamplayers, 2013).

The application of existing interventions

Despite all these existing interventions, the problem of a low PA level of the older adults with an ID still exists. In consultation with several experts, the following assumptions are listed:

- ◊ People are not aware of the existence of the interventions.
- ◊ The interventions are only created, but not implemented.
- ◊ Each group is different, the intervention might not work at another place/group. For instance, because it does not match with their daily setting.
- ◊ The caregivers do not have enough time for it or it is unclear whose responsibility it is.
- ◊ The intervention is too expensive to buy it for one home.
- ◊ Older adults may experience more physical and cognitive problems for which existing interventions are not always adapted.
- ◊ The interventions are created for a specific target group, but not with them, whereby it does not match with their needs, desires and/or abilities.

- Reward good PA behaviour.
- Place something like a 'beweegwaaier' in the house.
- Place a box or bag full of exercising material in the house together with a binder full of ideas.
- Repeat games and movements regularly.
- Make the PA a habit.
- Do not present everything at once, build op slowly.
- Move together with the client

Figure 17. Some relevant tips of the Beweegwaaier (Nationaal Kenniscentrum Gehandicaptensport, 2012) for lowering the threshold to perform PA

The value of a co-creative design approach is that the target group is involved in the design process from day one. But how exactly do you involve them and what do we need to take into account while interacting and communicating with this target group? That will be discussed in the next subchapter.

LINK TO PROJECT

Stimulating PA in people with an ID requires different interventions than those aimed at the neurotypical population. Being aware of the existing interventions provides inspiration and helps to prevent creating an intervention that already exists. Gaining insight in the presumed reasons why existing interventions did not yet solve the problem, brings some requirements for the concept:

- » The concept should be easy to implement in a house like the house that is involved in this project.
- » The concept should be adapted to the residents of the house as much as possible, but at the same time be suitable for the broader target group as well.
- » The role of the caregivers should be clear and if they have certain tasks, they should be provided with a clear explanation.
- » The concept should be affordable for a house, or at least for a daytime activity centre.

2.4 Co-creative design with people with an intellectual disability

In order to collaborate with the older adults with an ID, it is relevant to delve a bit deeper into the existing knowledge about interacting and communicating with the target group in the right way. This knowledge will also be derived from the expertise of the caregivers at the specific home where the project takes place. Most information in this subchapter is based on people with a mild ID, but the information is also relevant for people with a moderate ID. Since their IQ is somewhat lower, keep in mind that they experience more difficulty in understanding the world around them.

2.4.1 Communicating with people with an ID

A simplified use of language is an important variable when it comes to successful communication with people with an ID. Douma from the Dutch Expertise Centre for people with a mild ID (Douma, 2018) listed a couple of recommendations that can contribute to the correct use of language (figure 18).

- Use short and singular sentences of about five words.
- Use common and concrete words without making it too childish.
- Try to use the same words as the client does.
- Speak in a calm tone and pace.
- Ask one question at the time and leave enough time for the client to come up with an answer.
- Do not use figurative language.
- Make sure non-verbal and verbal information match with each other.
- Check whether the client understood what you said.
- Use visual supporting material, such as pictures or pictograms that match with the experiences and cognition of the client.

Figure 18. Tips for communication with people with an ID (Douma, 2018)

Besides these useful general communication tips, the right formulation of questions is important. Whenever the content of the question is not clear or recognizable for clients, or a certain (self)reflection is required, it can be difficult to give an answer to the questions (Douma, 2018). Questions can easily be not (or mis)understood, which increases the chance of giving the socially desired answer instead of the honest answer.

The first column of figure 19 sums up the issues often experienced by people with an ID, based on Douma (2018). The second column presents ways to overcome or minimize the negative effect of the issues, mainly based on (educated) assumptions.

Characteristics of ID	How to take it into account?
Difficulty seeing things from a(nother) perspective and empathizing with someone	Try out things instead of talking about it, to avoid situations in which the client needs to imagine something and thereby appeal to the ability to take a certain perspective. If this is impossible, choose a perspective of someone or something that is close to the life of the client.
Difficulty recognizing emotions, self-reflection, a negative or too positive self-image, comparing themselves to others	It is easiest for the clients to answer questions about their own basic emotions, such as anger, happiness or sadness. Therefore, it is probably best to stick with these basic emotions while asking questions.
Difficulty having a sense of time	Ask questions in or right after the moment when the relevant experience takes place.
Lower level of comprehensive reading	Make sure to guide people through a questionnaire and use mainly visual language.
Difficulty understanding abstract terms and words not used by themselves	Stay away from unfamiliar or abstract terms and try to be as concrete as possible.
Smaller vocabulary and working memory	Use clear and simple language and ask short singular questions
Difficulty understanding negative or double negative formulations	Avoid these (double) negations and make sure you formulate the questions or statements positive.
Difficulty labelling and forming and verbalizing thoughts and feelings, distinguishing main and side issues	Avoid abstract, completely open questions. Hartley & Maclean (2006) state that an answering scale with five points is preferrable to open questions.
Difficulty differentiating between several options and remembering information	When giving choices, do not give more than six options (Hartley & Maclean, 2006). Support the options by making them visual, so the client can easily look back.
Tendency to follow a certain answering pattern when not understanding a question, especially when asking suggestive questions	A way to prevent or discover this repetitive answering is to switch the order of options every once in a while, or to ask follow-up questions

Figure 19. Challenges of communication for people with an ID, based on Douma (2018), and connected to assumed ways to take the challenges into account

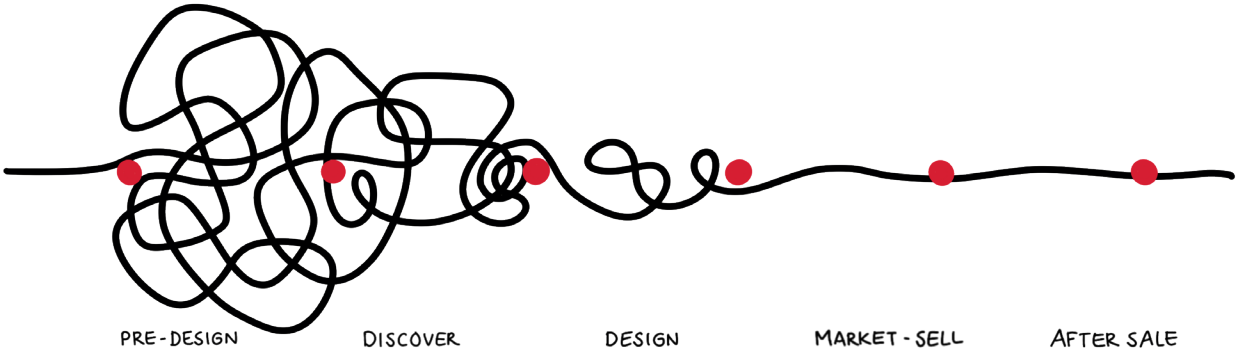


Figure 20. Moments within the design process where co-creation could be used, based on the drawing of Sanders & Stappers (2020)

Involving people with an ID in the design process

This project uses a co-creative design approach, which means the older adults, but also other relevant stakeholders, are involved throughout the (design) process. There are multiple ways to involve people. Furthermore, there are various moments within the process when co-creation can be used (Sanders & Stappers, 2020) (figure 20).

Codesign activities require reflective skills, imagination (Fischer & Dawe, 2007), and creativity (Sanders & Stappers, 2008), and other cognitive skills such as abstraction and conceptualization (Hendriks et al., 2015). The skills that are necessary for the common co-design methods are exactly the things that people with an ID struggle with. For this reason, it is relevant to look into adapted ways of co-designing, in order to make it work for this target group. During the project, a trial and error approach will point out which way of involving the participants works well. However, literature can already be informative about earlier co-design experiences with people with an ID. The following information is valuable to take into account while co-designing with people with an ID.

- Every client has different perceptions and (cognitive) abilities and therefore will have a different role in a co-design process, varying from research subject to cocreator (Vega et al., 2020). Hendriks et al. (2015) tried to find a dedicated co-design approach for working together with people with an ID, but found out that was not the road to take. They suggest to individually adapt a co-design approach to each participant, which is consistent with the idea that researchers and designers always need to adjust their strategy and techniques to the particular situation (participants, context, problem, etcetera) (Muller et al., 1991).

- Because people with an ID experience difficulty in abstract reasoning, it is important to create realistic prototypes in order to derive useful information from the sessions. This way, the participants do not have to imagine what the concept will actually look like. Anderiesen (2017) stated about her co-design project with people with dementia: “Realistic prototypes in the early stages of the design process are often costly and time-consuming, however, these are most likely the only way to explore design concepts.”.

- Anderiesen (2017) mentions the importance of involving the relatives and carers as moderators and experts to learn from. She co-designed with people with severe dementia. Although this target group differs from people with a mild ID, there are similarities.

- It is valuable to pay regular visits to become more “empathic, receptive and competent” in interacting with the people with dementia (Anderiesen, 2017). Assumably, and based on equal messages of experts in the field, this also counts for people with an ID. After all, a good and trustworthy relationship is crucial for and beneficial to a good collaboration (Hwang et al., 2022).

In existing research papers about co-design with people with an ID, the focus is often more on the actual result of the project instead of on the reflection of the co-design process; what methods are used and adjusted. Since adjustments are often not generalized or documented thoroughly, researchers are not really able to learn from each other within this field (Hendriks et al., 2015). This emphasizes the value of not only discussing the actual result, but also the process of how we got there, in this thesis. As Hendriks et al. (2015) found out, not necessarily the methods, but the 'method stories' (Lee, 2014) are valuable to share between researchers and designers. Based on their research, they suggest to include six key points in this method story, which are summarized in figure 21. The method story of this project is presented in subchapter 8.1.

Figure 21. Six key element of a method story, recommended by Hendriks et al. (2015)

LINK TO PROJECT

The knowledge presented in this subchapter will be kept in mind during interaction and collaboration with the residents who are involved in this project. This subchapter gave insights and tips from earlier co-creative projects with people with an ID, that can be applied to this co-creation process. Furthermore, it emphasized the value of reflecting on the co-creative process itself, instead of staying limited to the tangible results of a project. This is why chapter 8 contains an elaborate method story about the collaboration in this project.

3. CONTEXT RESEARCH

As valuable and insightful the information in literature is, it does not automatically correspond with the research context in this design project. This chapter explains the context of this project: a specific home of care institution 's Heeren Loo that provides housing and 24/7 guidance to six older adults with a mild to moderate ID. The following subchapters will provide a first (visual) insight in the context and current living situation of the older adults. The majority of information is based on observations and conversations with caregivers in the house and in the daytime activity centres.

3.1 The residents

The house that was selected for this project is part of a residential complex with several floors. The main floor involved in this project is the home of six residents who live together, each of them having a mild to moderate ID and being of older age. Five of the six residents on this particular floor gave consent to take part in this project. One resident who lives one floor higher only started to participate in the project from the ideation phase onwards. Figure 22 shows representative illustrations of the six participants. The majority of these residents has a moderate intellectual disability. This is just a short introduction, more information about the residents follows in chapter 4.

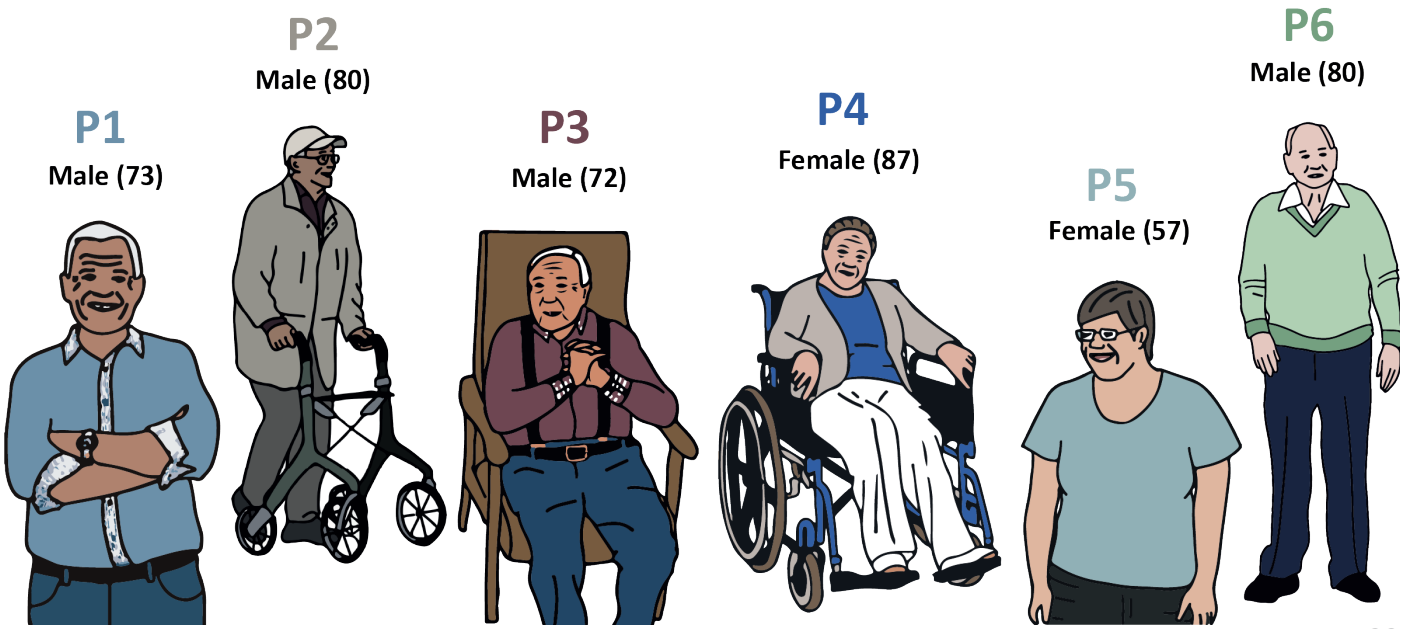


Figure 22. Representative illustrations of the six residents involved in the project

3.2 House and direct environment

To give a clear impression of the physical context of the residents, this subchapter shows a lot of pictures of the house and direct environment. Each resident has their own bedroom and bathroom. For privacy reasons, only pictures of the common area of the houses are shown. The building consists of three floors that provide shelter for different groups of six people living together. Five of the six participants live together on one of these floors. That is the house that will be discussed in this subchapter.

3.2.1 A tour through the house

Figure 23 shows a schematic floor map of the house, consisting of individual bedrooms and bathrooms, a living room with balcony (figure 24), and everything connected by a hallway. The living room consists of a work place for the caregivers, a kitchen, a seating area with couches and tv (figure 25), and an area with a large dinner table (figure 26). Above the dresser near the table, a lot of pictures of (previous) residents and caregivers are giving an impression of the house atmosphere. In the dresser, a collection of puzzles and games is present. Depending on the time of year, the living room is decorated with crafts (figure 27), sometimes made by the clients at the daytime activity centres.

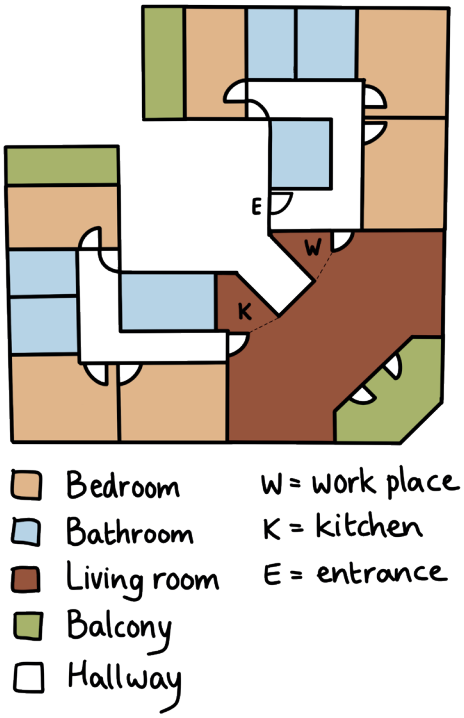


Figure 23. A schematic floor map of the house

Figure 24. Balcony connected to the living room

Figure 25. Seating area with couches, some personal chairs, television

Figure 26. The dinner table

Figure 27. Home-made crafts connected to holidays, this case Easter

3.2.2 Triggers for being physically active

In the living room is an old exercising bike (figure 28). Unfortunately, none of the participants says they make use of it, mainly because they do not like it or because it is too high. The television is often turned on by default. Sometimes in the early morning, 'Nederland in Beweging' is on (figure 29), which is a Dutch television program with workouts and music, aimed at older adults. Apart from these two objects, there are no objects in the common area that stimulate any form of (physical) activity. Some objects might stimulate inactivity, such as the couches and television.

Figure 28. An exercising bike that is in the living room

Figure 29. Nederland in Beweging on Dutch television

3.2.3 The direct environment

The house is located in a regular street and at the edge of an ordinary residential area. Parallel to this street is a busy car freeway and roundabout. In the neighbourhood there are a lot of curbs and uneven road surfaces. For most residents it is not safe to go outside without guidance. Because the participants are not safe in traffic in such an environment, they are also not allowed to cycle outside independently. This reduces the opportunity to be physically active outside the house. Regarding PA possibilities, living in this house might be disadvantageous compared to living in the residential care park of 's Heeren Loo, twenty minutes from this house. At this central location of the 's Heeren Loo region, the environment is completely adapted to people with physical and/or intellectual disabilities (figure 30).

Figure 30. Residential care park and regional central location 's Heeren Loo (IAA Architecten, n.d.)

3.3 Caregivers of the house

Inextricably linked to the house and to the residents' lives, are the caregivers. A group of around five fixed caregivers alternately work at the house, the remaining shifts are filled by flex employees. This subchapter discusses the tasks and daily program of the caregivers, and shows the perspective of several caregivers on the topic of PA in the residents.

3.4.1 Shifts and tasks of the caregivers

Each day consists of two work shifts, one from 3 pm to 11 pm and one from 7 am to 3 pm. During the night, a caregiver sleeps in the building. In other words, there is 24/7 supervision of the caregivers. They help the residents with household tasks and personal care, and support them practically and mentally whenever necessary. Although the house is a 'guidance home', decline of the residents slowly transitions the house towards a 'care home'. Besides the mentioned tasks, the caregivers are busy with administration, such as setting up and keeping track of the care plan for each resident or reporting what happened during the day, so other caregivers and family are kept up to date. Some of the tasks and responsibilities are divided over the caregivers.

As five of the six participants have a job at a day activity centre, it is rather quiet at home during weekdays. Most of the days, a maximum of two residents are at home, meaning the caregivers have more time to execute all the administrative and household tasks. On weekend days, all residents are at home. Figure 31 presents a general program of the day, but in reality it obviously depends a lot on the day, the individual resident and caregiver, and on their mood.

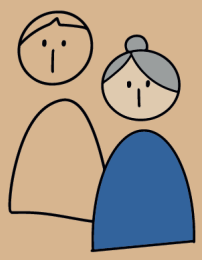
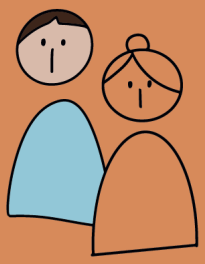
	7.00 - 13.30	13.30 - 16.00	16.00 - 18.30	18.30 - 23.00
Resident 	Get up, shower, get dressed, eat breakfast, wait for the taxi to go to work, or on free days: have a good sleep and lunch at home	Working or taking rest at own bedroom, watching televisi-on, sometimes having (healthca-re) appointments	Coming home from work, drinking coffee, sometimes assisting in cooking, eating, showering	Drinking coffee, taking rest, watching televisi-on, sometimes a game
Caregiver 	Help all residents with getting up, showering, getting dressed, eating breakfast. Some time for administrative tasks. Setting up and having lunch.	Bring one resident to bedroom to rest. Do administrati-ve tasks, go to appointments with residents, hand over to next caregiver.	Drinking coffee together with the residents, talk about their days, cooking, getting resident out of bed, having dinner together.	Help clients with showering, coffee + some-times a game, hand out medici-nes, bring client to bed, admini-stration/write handover, send clients to bed, hand over to night shift

Figure 31. General program of a day at the house involved in the project

3.4.2 Barriers and motivators: the house caregiver's perspective on PA in the residents

While getting to know the context, several caregivers were asked questions about their experiences in general and their view on the topic of PA. Two caregivers emphasized that the residents are the ones who make their job so nice (quote 1). Although the caregivers were aware of the importance of PA for the older adults, they experienced a shortage in time to really pay much attention to it (quote 2). The conversations with the caregivers brought their perspective on the barriers and motivators towards PA in the older adults with an ID. Those assumed to be most relevant are mentioned below, clarified by one quote or observation for each factor.

#1 *"Each resident is so nice in their own way. And if a resident is not having his/her day, I will try my best that they still have a smile on their face that day. It gives a great feeling to be able to make them happy and vice versa" - C1*

#2 *"When you work at a home, you start your day with preparing medication, getting clients out of bed, washing and drying them, putting clothes on, compression stockings, make sure they get breakfast and then send them to the daytime activity centres. I felt like I worked in a car wash. And nowadays, there are a lot of computer tasks too, I was so done with that." - former home caregiver*

Barriers or other non-stimulating factors

- Caregivers not having the time

"I really see the problem of them not getting enough PA, but we just do not have the time." – C1

- Clients not feeling like being physically active

"Sometimes you can try as much as you want, but they just do not want to go outside" – C1

- Clients being quickly overwhelmed

"The clients are overwhelmed faster. Just packing a bag already means that the whole day is full. It's something very big in their head." – C2

- Clients being at the day activity centre throughout the week

"It depends on the house where you work, but at this house (of this project) only one resident is at home and the others are away from home the whole day long." - L2 (who once worked at the home of this project)

- Caregivers not wanting to patronize the clients and clients not wanting to be patronized

"You can say 'go for a walk, that's good for you' every now and then, but they do not want to be patronized. One client indicated that she does not want the caregivers to look after her PA anymore. She wants to do it herself." – C2

- Interest, motivation or priorities of caregiver regarding PA

"I believe we as caregivers could do more PA together with the clients, but it just does not always have the priority." – C3

Motivators or other stimulating factors

- Setting a certain challenge or goal

"Sometimes I go outside for a walk together with a client in a wheelchair and the I say 'okay you have to walk on your own until that pole'." – C2

- Having an own task or responsibility and getting compliments

"Sometimes the client always gets the post or brings the garbage outside. Then I say 'thank you so much, so nice of you to do that!'. Such a compliment works very well." – C2

- Unconscious PA, not (only) about the PA

"You should not let it be about PA. People are often 10 times more willing to join for a walk when you walk with a dog." – C2

- Motivation and interest of the caregiver regarding PA

"Sometimes the caregiver feels like walking and asks the clients who wants to join." – C1

3.4 Daytime activity centre

For people with an ID it is more difficult to find a job or another useful daily activity, and to create a social network. To offer more structure and a more meaningful spending of the day, they can work at a daytime activity centre. Such centres come in all sorts and shapes, but all consist of structural activities with supervision of a professional. Five of the six participants in this project have a job at such a daytime activity centre. To get a clear view of the whole context, three of these locations were visited (L1, L2, L3) and two of the caregivers who work there were interviewed. This subchapter provides a visual impression of the daytime activity locations and discusses the conclusions derived from the observations and conversations regarding PA. The clients who work at these locations are often referred to as 'employees'.

3.4.1 Tours at the daytime activity centres

Two of the three centres were focused on art and creative activities, such as ceramics or painting (figure 32), whereas the third centre offered administrative or industrial work, such as assembling labels for products (figure 33). All locations consisted of different rooms or departments with large tables (figure 34). At these tables, the employees worked individually on specific tasks or products that are either sold in a store or returned to a supplier.

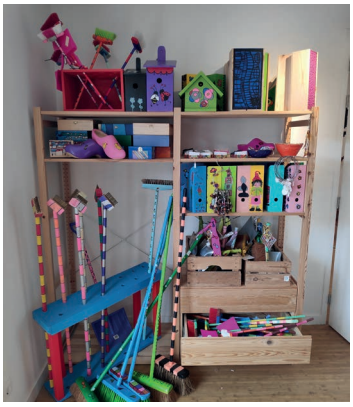


Figure 32. Creative projects

Figure 33. Assembly work

Figure 34. Work place of a creative activity centre

> **#3** *"So I said we are going by stairs! He said 'no I can't'. So I said 'yes you can, we are going upstairs while singing'. I just make some sort of party out of it. When we had to go downstairs again, he said 'I'll go downstairs on my own!'" - L2*

3.4.2 PA at the daytime activity centre

At each of these daytime activity centres, the caregivers are well aware of the importance of PA for the employees and, to a greater or lesser extent, they pay attention to the topic. At the first location, one of the employees took care of the coffee and tea and brought it upstairs towards the caregiver and me, while we were having a conversation. "In this way, he gets some movement", said the caregiver.

The second location had more space and stimulating materials for PA, such as walking devices for people who are in a wheelchair, an exercising bike, or a scaffold with rings and ropes to play with (figure 35). Additionally, the caregiver mentioned several examples of how she successfully implements PA in the interaction with the employees, making use of her contagious enthusiasm (quote 3).

At the third location, the employees had the opportunity to join a short walk after lunch. Every now and then, some central break activities were organised, but since this was voluntary, a lot of employees just stayed at their table.

In other words, the centres try to integrate something active throughout the day. However, the bottom line is that the employees work seated all day long, often performing the same (repetitive) task for hours.

Figure 35. One of the materials that could activate the clients

3.4.3 Barriers and motivators: the daytime activity centre caregivers' perspective

The observations and the interviews with the caregivers were analysed and translated to barriers and motivators towards performing PA, experienced or sometimes assumed by these caregivers. Some of the factors are not specific motivators or barriers towards PA, but more towards any action or behaviour. The factors that are assumed to be most relevant are mentioned below, clarified by one quote or observation for each factor.

Barriers or other non-stimulating factors

- The client decides, so if they would not like to join any PA, they will not be physically active

A musician visits and is going to play music in a central hall. This is announced by the intercom and everyone has the choice whether they go there or not. Many of the older adults are just staying at their work place, where they actually sit for hours. – observation L3

- Not having the right materials or space for PA

"I myself just really like being physically active. And on Facebook there is an application that is just so nice. I don't know the name. It is a physiotherapist who is really focused on the older adults. But in his videos you see a sports room and all kinds of materials. We just don't have that at our place, because this is more focused on creativity." – caregiver L1

- Physical impairment of clients

"There is also one client who wants to move, but is not allowed to walk a lot, because her back is fixed. So finally someone wants to move, and now he is not allowed to…" – caregiver L2

- Not associating the location with PA, resulting in reluctance and negative reactions

"It has always been a difficult topic for me. It is also partly because of the goals of the daytime activities we do here. This is just not the gym, so why would you throw over with a ball. The clients then say 'don't act so crazy'. Despite that we really do want to get them more active." – caregiver L1

- Difficult to come up with activities themselves

"Then 's Heeren Loo says that the clients need to be physically active for at least twenty minutes a day, but how can you do that? Walking the stairs up and down is one minute. Then we really have to be creative, we just won't make it. Because we also run into it ourselves: what do you have to come up with, at some point you are just out of options" – caregiver L1

- All tasks are seated and do not involve any PA

All tasks performed by the older clients are seated and do not involve PA in some form. Some tasks are even the same repetitive action for a whole day, while they are sitting in a non-ergonomic posture. – observation, especially at L2, but also at L1 and L2

Motivators or other stimulating factors

- Caregivers understanding the value of letting clients do things independently

"Whenever a client says 'I need this', I say go and ask upstairs." – caregiver L2

"At first, when a client dropped something, I just picked it up for them. But when the client gets older, you see that letting them pick it up themselves has a certain goal. Being physically active. You learn to see those kind of things when you are working in this field for a longer amount of time"

- Clients seeing fellow employees or residents do something and having fun with it

"That is why it happened so easily with the standing up and screaming hooray, because P3 saw others do it too and it looked actually quite fun. Secretly, when it happens, he likes it anyway, he changes his attitude and is at the front row to join." – caregiver L2

- Contagious enthusiasm of the caregiver

"Yesterday a colleague's anniversary was and we went singing and clapping for her. So we started with a hooray and I just kept on going. I said to the clients 'you are able to put your arms higher!!' and we kept on going and then I thought 'yes I did it again'." – caregiver L2

- Holidays or seasons incite to actions, such as craft projects

"We always have a theme, now the theme is garden: so flower pots, a scoop, etcetera. And soon, the summer market starts. But also Father's day, Mother's day, Easter, Valentine. All those holidays are integrated in the activities in the period before they start. For instance, in October, we already start with Christmas." – caregiver L2

- Adapting to the individual's needs

"We have a client whose motoric skills were very bad when she arrived here. I sat down with her and put stickers on the pencils and on the colouring book and in this way learned her to colour (figure 36). Also, with diamond painting, she now really sees the differences in colours." – caregiver L2

Figure 36. Colouring book of a client who could not colour at first

3.5 Physical activity: current situation

The observations and interviews with caregivers indicate that the current amount of PA performed by the residents could and should be increased. In order to work towards a desired situation, we first need more information about the current PA and about the (physical) possibilities of the residents. Therefore, the physiotherapist that is connected to the house was consulted. Information in this subchapter is mainly derived from her expertise.

3.5.1 The function of the physiotherapist

The physiotherapist is linked to the particular house where the six participants of the project live. She knows most of the residents to some extent. Because the physiotherapist only sees the people with specific complaints or injuries and not for preventive care, not all information about the individual residents might be completely up-to-date.

The physiotherapist explains how one of the common problems in aging people is keeping balance. When a resident is experiencing difficulties with keeping balance, there is a high risk of falling and a 'falling team' will need to be consulted. Such a team often consists of the physiotherapist, an occupational therapist, a dietician, a doctor and a behavioural scientist. Preventive care, to prevent falling, is provided by the movement agog. Once the problem already occurred, the falling team will start making a plan based on the falling risk analysis. They discuss whether interventions are necessary, such as practice therapy, biking on the duo bike, or doing specific exercises at home. Maintaining these exercises at home is often a challenge, which is why the home caregivers are also advised on how to support the client. Moments of direct contact between the physiotherapist and the caregivers are valuable.

3.5.2 Valuable forms of PA and the physical abilities of the target group

Each individual has its own physical abilities and difficulties, but some issues are more prevalent than others in aging people. When the physiotherapist was asked which exercises or movements are of most value for the target group, she mainly mentioned moves that are important for keeping independence. This line of thinking is consistent with a lot of research about the positive effect of PA on the independence of a person (Marques et al., 2014). Since independence increases the quality of life, at least for neurotypical people (Gündoğdu et al., 2019), it is a valuable factor to take into account in the design phase. Examples of valuable movements mentioned by the physiotherapist are presented in figure 37.

- Independently standing up and, if possible, walking
- Just standing up and sitting down
- Independently dressing and undressing
- Learning to walk straight
- Other skills necessary to perform activities of daily living (ADL) such as eating, showering and aforementioned points
- Moving in a wheelchair independently

Figure 37. Valuable movements to practice to maintain more independency

Additional advice from the physiotherapist brough the following insights

- Every bit of PA is welcome (quote 4)
- Avoid the risk of falling, especially in this particular group of residents (quote 5)
- Build up slowly and earn trust, then you get more done
- For many residents, it is all about keeping active and not deteriorating
- Something simple can already be an exercise. Moving to music or standing up one more time.
- The intervention has to be accessible, simple and impact resistant.
- The concept should be well visible, in general and also in terms of colours.

Apart from general advice, the physiotherapist also provided some points of attention for the individual residents that she knew well. This information is kept in mind during the project.

#4 *"Grabbing something that is high, doing something sideways, something with balance, and whenever possible, doing all that while standing". - physiotherapist*

#5 *"You will probably do a lot of seated activities and maybe let some of the walking people walk through the room or let them stand up several times". - physiotherapist*

3.5.3 Barriers and motivators: the physiotherapist's perspective

The expertise of the physiotherapist and her knowledge about most of the participants make her perspective a valuable one. Therefore, below the barriers and motivators from the physiotherapist's perspective are listed.

Barriers or other non-stimulating factors

- Anxiety for falling or pain

"Clients are regularly afraid to fall or to experience any pain. They often say 'I should not be physically active, because I have pain', but then they often mean muscle pain."

- Habitual behaviour, not being used to PA

"I believe too little PA is a result of habits"

- Dependence on an external stimulus

"Not being able to take the initiative, there is a need for an external stimulus."

- Dependence on someone else

"To be able to do something independently, their level of cognition should be high enough."
"When clients participate in an activity together, they can get into an argument. A caregiver is necessary to prevent or solve this."

- Not understanding the activity

"Not understanding a game or something similar is frustrating."

Motivators or other stimulating factors

- Continuous positive encouragement

"It is important to motivate the clients a lot, like saying 'Well done! You are already able to walk for five meters'. Those kind of things."

- Doing activities together, but adapted to each individual

"A nice atmosphere, stimulating each other, and learning from each other."
"Nice to do things together, does not have to be the same level. Just adapted to everyone. For instance, singing a song together."

- Music, preferably from back in the days

"Songs from back in the days, children songs and then move to the rhythm of the music."
"Something simple can already be an exercise, such as moving to music."

LINK TO PROJECT (CH3)

Visiting the house and the activity centres, and talking to the caregivers and the physiotherapist helped in getting a clear view of the research context. It became clear that experts try to stimulate the older adults to be more physically active every now and then, but the barriers often make it too challenging. And although the house caregivers could play a role in the PA of the clients, they really lack time to do so. The perspectives of the experts on the barriers and motivators for the older adults to perform PA will be included in the continuation of the project. However, the most important stakeholders are the residents themselves. Their perspective will be discussed in the next chapter.

4. GETTING TO KNOW THE RESIDENTS

Parallel to the process of researching existing literature and exploring the context of the project, the process of getting to know and forming a connection with the residents took place. This group is vulnerable and tends to have difficulty regulating stress, which makes a trustworthy relationship extra important (Fortior, n.d.). This chapter is entirely devoted to the process of getting to know the residents and their thoughts, feelings and experiences regarding PA.

EVEN KENNISMAKEN... MET KIM

Hoi bewoners en begeleiders van [redacted]

Mijn naam is Kim en ik zal jullie binnenkort in het echt ontmoeten. In deze brief leg ik alvast uit wie ik ben en waarom jullie mij komend jaar regelmatig zullen zien. Leuk dat jullie dit even lezen, verder hoeven jullie niets te doen!

Wie ben ik?
Ik woon al zes jaar in Delft en ga daar ook naar school. Mijn hobby's zijn volleyballen, zingen en wandelen in de natuur. Ook vind ik het leuk om creatief te zijn, door te knutselen of foto's te maken. Als ik klaar ben met mijn opleiding, ben ik een ontwerper en kan ik bijvoorbeeld nieuwe producten uitvinden.

Waarom kom ik langs?
Ik kom langs omdat ik binnenkort wil onderzoeken op welke leuke manieren jullie vaker zouden kunnen bewegen in de week. Hiervoor zou ik heel graag met jullie samenwerken!

Wat gaan we dan precies doen?
We zullen eerst samen praten over bewegen, bijvoorbeeld over wat jullie wel of niet leuk vinden aan bewegen. Als we elkaar een beetje hebben leren kennen, gaan we ook creatief worden in 'creatieve sessies'. We gaan dan samen ideeën bedenken en bijvoorbeeld knutselen om de ideeën ook echt uit te proberen.

Ik vind het leuk om jullie binnenkort te ontmoeten!

Groetjes, Kim

Figure 38. The announcement sent to the house

4.1 Breaking the ice

The first couple of visits to the house of the residents functioned as opportunities to let the researcher and the residents get used to each other. The residents and caregivers were informed in advance about the arrival of the researcher and the content of the project (figure 38 and appendix A). The residents slowly got to understand why the researcher was at their home and the researcher learned more about the communication and interaction with the individual residents. Furthermore, this phase lend itself to organise the ethical process of asking consent to the residents and their legal representatives.

4.1.1 Icebreaking activities

To get used to each other, some activities were created and executed together with one or two residents. These first interactions and conversations helped a lot in learning how to interact with the target group.

Figure 39 (and appendix B) shows a memory game, that was created as a conversation facilitator for this project, and was played together with two residents individually. Playing this memory game brought the following insights:

- It was hard to remember what was on the card after turning it. The advantage of a memory game was that the level could be adapted by leaving out cards.
- Having a conversation about the categories on the cards helped in exploring what kind of questions are suitable. Figure 40 explains a pattern of asking questions that seemed to work okay.

A more active game (figure 41) gave the insight that this resident likes to do sports. The balloon is a great example of an activity that is active, but not going too fast. It is suitable for people whose reaction time is long.

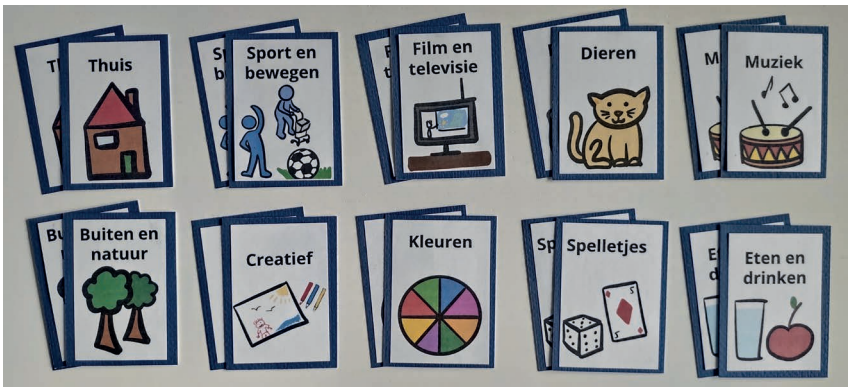


Figure 39. A memory game created as a conversation facilitator

- Asking a closed question about (earlier) experiences, e.g. '*Do you ever watch television?*'. The resident often answered with 'Sometimes.'.
- Asking for an example, for instance '*What do you like to watch when you watch television?*'. Regularly, the resident was able to give an answer to that type of question.
- Asking a follow-up question like '*What do you think of that?*' seemed to be too difficult, the resident did not answer most of these types of questions.

Figure 40. A pattern of asking quesions used during first visits

Figure 42. A craft made by one of the residents

Figure 41. Playing with a balloon

A craft assignment of making a bird was prepared and executed together with one resident (figure 42). The following insights were derived:

◊ The particular resident was highly focused on the task.
◊ The example bird seemed to be helpful, she looked a lot at it while performing an action.
◊ When offering a choice, it is important to give her thinking time that might be longer than usual. After getting enough time, she was able to make a choice.
◊ Fellow residents sometimes came by to look what she was doing and even complimented her on her creative skills. One resident asked if he was allowed to make such a bird too.

4.1.2 Ethical process

The ethical committee of the TU Delft approved the ethical application written for this study. In addition, for 's Heeren Loo a contract was signed and a statement of conduct (Dutch: VOG) was requested for the researcher. The next step was to ask for consent of the residents. Because most of them are not legally competent to sign a consent form, the legal representatives of the residents were approached as well. To also ask the residents for consent, a more visual and simple consent form was created (appendix C). In practice, the form turned out to be too long and difficult to go through together with the residents. Filling in the forms came down to asking them whether they wanted to join a few games and whether we were allowed to collect the data. Taking into account that the legal representatives already gave their consent, this was enough permission for conducting the research project. In the end, the six participants of figure 22 were willing and allowed to join the project.

4.2 Preparing the sessions

After generally exploring the context, being introduced to the residents, and collecting the informed consents, the collaboration with the residents could start. This subchapter discusses the preparation of the first sessions.

Figure 44. Grabbing a card

Figure 45. Discussing the card

Figure 46. Putting the card in an emoji

4.2.1 Explanation of the activity

The first session was created with the aim to get to know the interests and experiences of the individuals, in PA as well as in general. After all, connecting to the world and interests of the individual residents assumably helps in motivating them later on. With the activity, we try to find answers to the following questions:

- What do the residents like to do? (within the activities that are offered on the cards)
- What do they not like to do? (within the activities that are offered on the cards)
- What are their experiences, thoughts and feelings regarding PA and other activities or interests?

The activity consists of several elements (figure 43): a high hat, loads of cards with images and words, and three 'emoji trays'. The little cards are all in the high hat and the resident is asked to grab one of the cards out of the hat (figure 44). Each card represents an activity, from sleeping to walking and from making music to helping others. After looking at the card (figure 45), the resident can decide if they like it (green emoji), do not like it (red emoji), or do not know whether they like it or not (orange emoji) and put it in one of the trays (figure 46). Based on the card and the choice, the resident is asked certain questions to trigger a conversation about the activity and why the resident likes it or not. Once the conversation stopped, the next card can be grabbed. If there is time left, the resident is asked to select the cards they like most and make a collage out of it.

Figure 43. The ingredients of the activity

4.2.2 Extra preparation

To allow for flexibility in the moment, it is important to prepare the session well. Part of the preparation was to repeat some points of attention regarding the communication, such as being positive, short and clear and not saying multiple things in one sentence. Additionally, the following possible questions for during the game were noted down beforehand:

- What do or don't you like about [card]?
- Did you ever do [card]? With whom? When? Where? (going back to one experience to keep it concrete and less abstract)
- Did it go well at the time?
- Would you like to do it again?

If it occurs that the game is too difficult or in any other way not suitable for the resident or moment, the following alternatives were prepared:

1. Only making a collage of cards, selected by the resident, leaving out the game
2. Only grabbing cards from the hat and asking questions about it, leaving out the emojis
3. Making a balloon man
4. Smashing a balloon towards each other
5. Colouring
6. Making a puzzle and first searching for the pieces in the room
7. Joining Nederland in Beweging

4.3 Reporting the sessions

Three participants played the full game, one participant had to stop after fifteen minutes due to an appointment, and one participant did an alternative activity, due to tiredness. P6 was not yet involved in the project at this time, so information about him is based on a conversation with his caregiver. Below, some insights from the individual sessions are discussed.

Some insights worth mentioning:

◊ With one participant, it was valuable that there was time for making a collage (figure 47). By letting the resident select cards within the broad selection of cards she liked, it became clearer which activities were her favourite.

◊ The image on the cards were sometimes too specific. In the example shown in figure 48, the image caused a conversation about stamps, in which it was difficult to bring the conversation back to whether the resident was collecting 'something'. It seemed better to avoid these abstractions or, when it is about the broad activity, to not put one example on the image.

◊ Most participants understood and seemed to like the game. However, although the conversations were insightful, it stayed hard to reach a deeper level of why the residents liked certain things. "What do you like so much about dancing?" was for instance answered with "Yes I really like it". This shows the necessity of analysing all conversations and trying to find patterns. Sometimes, this might go hand in hand with making assumptions.

The information derived from the individual sessions led to informative introductions of the six residents, presented in figure 49 to 54.

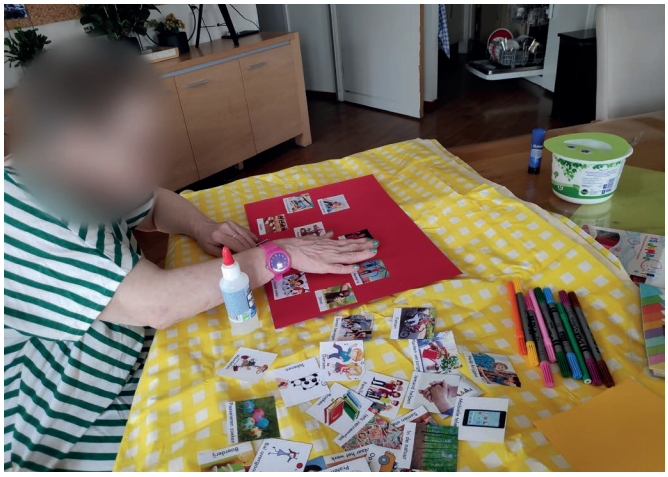


Figure 47. The resident makes a collage of the activities she likes most

Figure 48. A card 'about collecting something' with stamps as a specific example image mainly causes a conversation about them not collecting stamps

PARTICIPANT 1: THE MUSICIAN

P1 is a 73-year-old man who is still very active and fit.

P1 takes classes in drumming, singing and dancing.

P1 goes out on his own, for example to the thrift shop, where he drinks coffee.

P1 goes to a daytime activity centre 4 days a week.

P1 performs some household tasks

P1 only moved to the house a year ago, after living independently.

It is important that P1 stays as fit and active as he is now.

"Maandag ga ik muziek maken, woensdag heb ik zingen, dinsdag heb ik dansen"

Figure 49. Description of P1

PARTICIPANT 2: THE COMPETITIVE

P2 is an 80-year-old man who is talkative and likes to joke around.

P2 likes to watch sports on his television at his own room, expecially Max Verstappen and Feijenoord.

P2 goes to a creative daytime activity centre, where he often knits.

P2 does not like to make puzzles or to play tennis.

P2 prefers doing activities alone.

P2 often moves forward while sitting on a rollator, but it is better for him to walk behind the rollator.

"Yahtzee heb ik ook een keer gedaan, veel punten gehaald"

Figure 50. Description of P2

PARTICIPANT 3: THE PUZZLE MAKER

P3 is a 72-year-old man who often needs some time to change his negative attitude into a curious, more positive one.

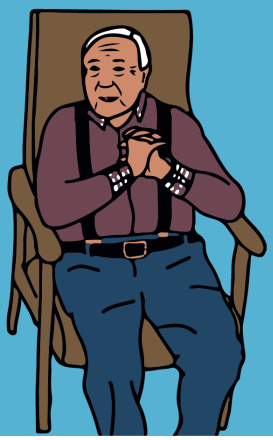
P3 likes to make puzzles and to craft.

P3 works five full days a week at a creative daytime activity centre.

P3 is sensitive to getting rewarded.

P3 has a high falling risk, he needs to walk with a walker.

P3 does not like to be phyically active, he rather sits in his chair. Important to practice standing up and walking behind a rollator.



"Boeken van Ot & Sien lees ik ook altijd. Ken je die niet?"

Figure 51. Description of P3

PARTICIPANT 4: THE SPORTIVE

P4 is an 87-year-old woman who is calm and enjoys company.

P4 really likes sports and being physically active. Two times a week she attends a short 'exercise class'.

P4 is at home throughout the week.

P4 likes to join NL in Beweging and to recite or sing old poems and songs.

P4 sits in a wheelchair and needs care and guidance for most activities.

The vision of P4 is not optimal and she has a long response time.

"Vroeger deed ik dat, maar nu niet meer"

Figure 52. Description of P4

PARTICIPANT 5: THE CREATIVE

P5 is a 57-year-old woman who likes positivity and humour.

P5 is very creative. She likes to draw, sing, and dance and has experience in theatre.

P5 works three days a week at a creative daytime activity centre.

P5 does not like to clean or to go on the exercising bike.

P5 needs some time to see which way the wind blows before joining an activity.

P5 likes to perform PA together with others.

"Soms is bewegen wel leuk en soms ook niet"

Figure 53. Description of P5

PARTICIPANT 6: THE GAME FANATIC

P6 is an 80-year-old man who likes to play simple, sportive games, for example with balls.

P6 does not like complicated games with rules.

P6 goes to the daytime activity centre for three days a week. He is able to walk without support.

P6 can say what he wants, but it is hard for him to explain his thoughts or feelings.

"P6 houdt vooral van simpele sportieve spelletjes zonder al te veel regels" - caregiver

Figure 54. Description of P6

4.4 Analysing the sessions

Now that the six participants are introduced and the individual sessions are reported, it is time to analyse all data and find patterns. The aim of this analysis is to define barriers and motivators to performing PA, and finally translate those into criteria for a final concept.

4.4.1. Analysis method

Ackoff (1989) created a scheme that guides and explains the process of analysing raw data (figure 55). Data in this project represents the pictures, videos, audio and notes of the visits and sessions with the clients. Once the data is interpreted by the researcher, it becomes information (Sanders & Stappers, 2020). When information is associated and different pieces of information are linked to each other, it becomes knowledge.

The barriers and motivators based on the conversations with the caregivers, presented in chapter 3, are examples of information. Most of the quotes are first combined and then together translated to one barrier or motivator. In other words, the interpretation and association step is a bit intertwined, which makes the barriers and motivators actually already a form of knowledge. The final step from knowledge to wisdom is made by applying the knowledge in a way to another situation. In this stage of 'wisdom' it is important to realize that the knowledge is "a reduction of reality" (Sanders & Stappers, 2020), which is strong, but can have its limitations. In this project, the knowledge is used to set up criteria for the final concept (chapter 5).

4.4.2 Collecting the data

The data was collected by recording audio, taking pictures and videos, and writing down notes of observations. By listening back the recordings, relevant quotes were noted down by the researcher. In the end, each resident was linked to a collection of quotes, observations and pictures that belonged to them.

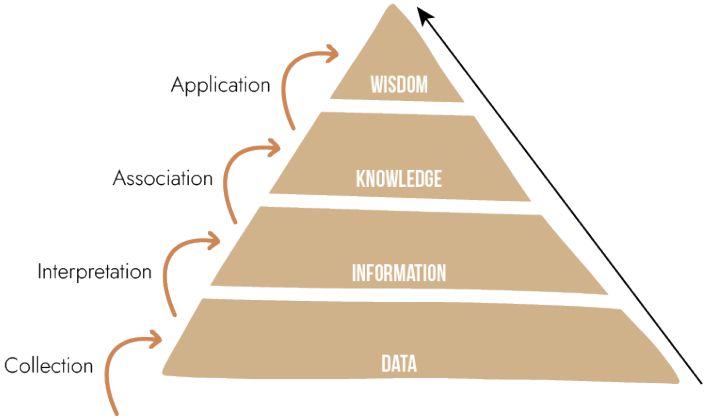


Figure 55. A visualisation based on the DIKW scheme of Ackoff (1989)

4.4.3 Interpreting and associating the data

Figure 56 shows the four levels of knowledge (Sanders & Stappers, 2020). As the figure explains, interviews and observations often only reveal explicit and observative knowledge. These two types of knowledge come from information that is, respectively, easy to explain in words or easy to observe. On the contrary, tacit knowledge are things that we know, but cannot easily verbalize to others. The deepest level, called latent knowledge, represents thoughts and ideas that people did not yet experience, but on which they can form an opinion. For example, "I would like to have a robot that teaches me how to move". Presumably, this type of knowledge is important for brainstorming,

Tacit and latent knowledge can be reached with the use of generative techniques, in which people are asked to make something, such as the collage made by P5. Because the conversations during the sessions with the residents remained quite superficial, most knowledge derived from these sessions seemed to be explicit and observable. Furthermore, for tacit and latent knowledge, one must be able to reflect on their own thoughts and needs, which is difficult for the target group. However, since people with an ID have more

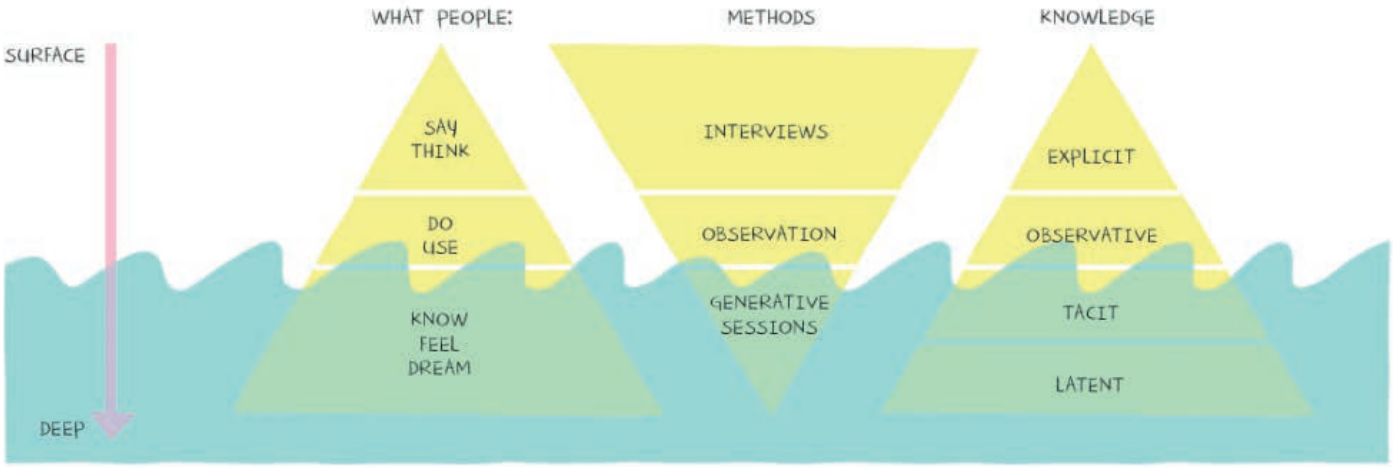


Figure 56. This figure of Sanders & Stappers (2020) shows how different methods can help in retrieving different levels of knowledge

difficulty verbalizing thoughts and feelings or imagining something, you could also argue that more knowledge is tacit and latent for them. From that perspective, the generative techniques did capture these deeper levels of knowledge that would not have been captured through usual interviews or observations.

The collected quotes and observations were interpreted and combined into motivators or barriers towards performing a certain action such as PA, from the perspective of the clients. In appendix D all barriers and motivators based on these client sessions are listed. Factors that are assumed to be most relevant are selected and mentioned below, clarified by one quote or observation for each factor.

Barriers or other non-stimulating factors

- Decline in physical and cognitive abilities and therefore being allowed and/or able to do less and less

"I did enjoy walking once, but now I don't do it anymore, because it hurts my leg. I had fallen on my hip. So now I walk with a rollator." – P3
"If you are good at bowling, I did it a dew times, you have to aim well. I do not do that anymore, then I would fall over." – P2

- Lack of motivation

"Sometimes you can try as hard as you want, but you cannot stimulate the residents to go outside." – C1
"I do not move, I don't like that and I think it is childish" – P3

- Earlier negative experiences

"I'll never do that again. I find it a bit difficult to use hand brakes. I once went on a tandem bike and it all went wrong. I didn't know what to do at all." – P1

- Something being too difficult to understand or execute / not being adapted to the client's abilities

Observation: While playing memory it was very hard for P4 to remember what image was placed where for longer than a few seconds.

- Needing some start-up time

Observation: P5 often needs some time to start with an activity and P3 often needs time or an example before he gets enthusiastic enough to join.

- Being dependent on someone else

"I believe the lack of (enough) PA is caused by habit, by the residents not being able to take initiative, and by the fact that they need an external stimulus." – physiotherapist

Motivators or other stimulating factors

- Integrating humour in the interaction with the clients

Observation: the clients and caregivers like to make fun of each other, for instance the clients by hiding the caregiver's keys or the caregivers by making jokes

- Being able to win something

"Dancing? Yes I do! I have a lot of certificated from my dance class" – P1

- A feeling of success and being good at what they do

Observation: Each time something goes well, they get a smile on their face

- Structured and regularly planned activities

"On Monday I make music, Wednesday I sing, and Tuesday I have dancing class" – P1

- Together with others

"I once biked on a duo bike. That was really fun, the pedalling went very fast" – P5

- Having a goal

"Going for a walk with a goal helps. When we are walking without a goal, the client constantly asks 'shall we go back here?'. When we have a destination, they do not do that." – C2

- Creating a tension: triggering curiosity

Observation: P5 clearly was more engaged because she was grabbing in the high hat, shown by the way she looked to the other side.

- Encouragement and compliments

Observation: Compliments and high fives motivate and jollify the clients.

- Matching with the interests of the client

"P4 really likes to join Nederland in Beweging. She sometimes even grabs my hand and says "We still need to exercise!"" – C1

Changing the approach

After the first sessions, the general approach of this project changed a bit from co-design towards human-centred design. Coming up with ideas requires the ability to make decisions, think creatively and use your imagination. The experiences in the first sessions taught that this would be too difficult for the residents to actively take part in. The residents will obviously still be involved a lot in the process, but on a level of trying out things rather than designing the concepts itself. To emphasize, the residents will thereby still have a lot of value in the project and also in the decision-making towards a final concept.

DEFINE

The main function of the Define phase is to process and summarise all relevant retrieved information of the Discover phase into a solid basis for the Develop phase.

5. SUMMARIZING THE RESEARCH

In this chapter, all relevant insights derived from the Discover phase are defined. First, the problem statement covers the essence of the problem in a concise manner, with reference to all the found barriers towards performing a sufficient amount of PA, from both literature and context research. Secondly, the found barriers and motivators are translated into criteria for the final concept that needs to be designed later on. Finally, the design goal and interaction vision are formulated.

5.1 Problem statement

The problem addressed in this project regards to older adults with an intellectual disability, of whom the majority do not meet the guidelines of physical activity. Reasons for their physical inactivity diverge from lack of motivation to fear of falling and from health issues to a shortage of staff. Literature research unveiled more barriers towards performing a form of PA, of which some were presented in figure 8.
Within this target group, six residents were recruited to take part in this research and design project. They live together in a house in a regular residential area and are offered guidance 24 hours a day. The low level of PA also occurs in most of these participants. Reasons for their inactivity partly correspond with the barriers found in literature. Based on interviews with residents, caregivers and the physiotherapist, more barriers and facilitators were found for these specific residents (figure 57).

Many interventions have already been created for trying to stimulate people with an ID to be more active. However, the majority of these interventions is both not focused on people of an older age, who are often experiencing more physical and cognitive limitations, and not created in (creative) collaboration with the older adults. This project strives to fill part of this research gap, by researching what would be an appropriate intervention for this specific target group to increase their PA. Although the main aim is to achieve a design that meets the criteria of chapter 5.2, an important second aim is to research how such a co-creative design approach with this population could be shaped and optimized and how it affects the success of the intervention.

Now that people with an ID are getting older, without getting physically active, they need to spend more years with an increased chance of physical and mental health problems. If there is a way to get people with an ID active, preferably before the health problems caused by inactivity occur, this will increase the quality of life of the older adults. As long as there is not a suitable solution for this problem, opportunities for increasing the health and quality of life of this target group are missed. This affects the older adults themselves, but also the caregivers (who are in short supply) and any social relatives. In addition, the problem of inactivity is also prevalent among people with dementia or older adults in general, who might therefore also benefit from the new interventions.

This project aims to explore the challenges of performing PA from the perspective of the residents, their caregivers and physiotherapist, but also the opportunities for increasing this level of PA. The project also looks into possibilities of involving the older adults in the research and design process, and how this can lead to a valuable intervention for increasing the PA level of older adults with an ID.
Interviews, observations, generative techniques, and data analysis methods were used to identify the barriers and motivators regarding PA. In the Develop phase, several brainstorm techniques will facilitate divergence. With Research through Design methodology, insights are derived along the way and finally, some testing and evaluation methods are used or created to estimate the effectiveness of the final concept.

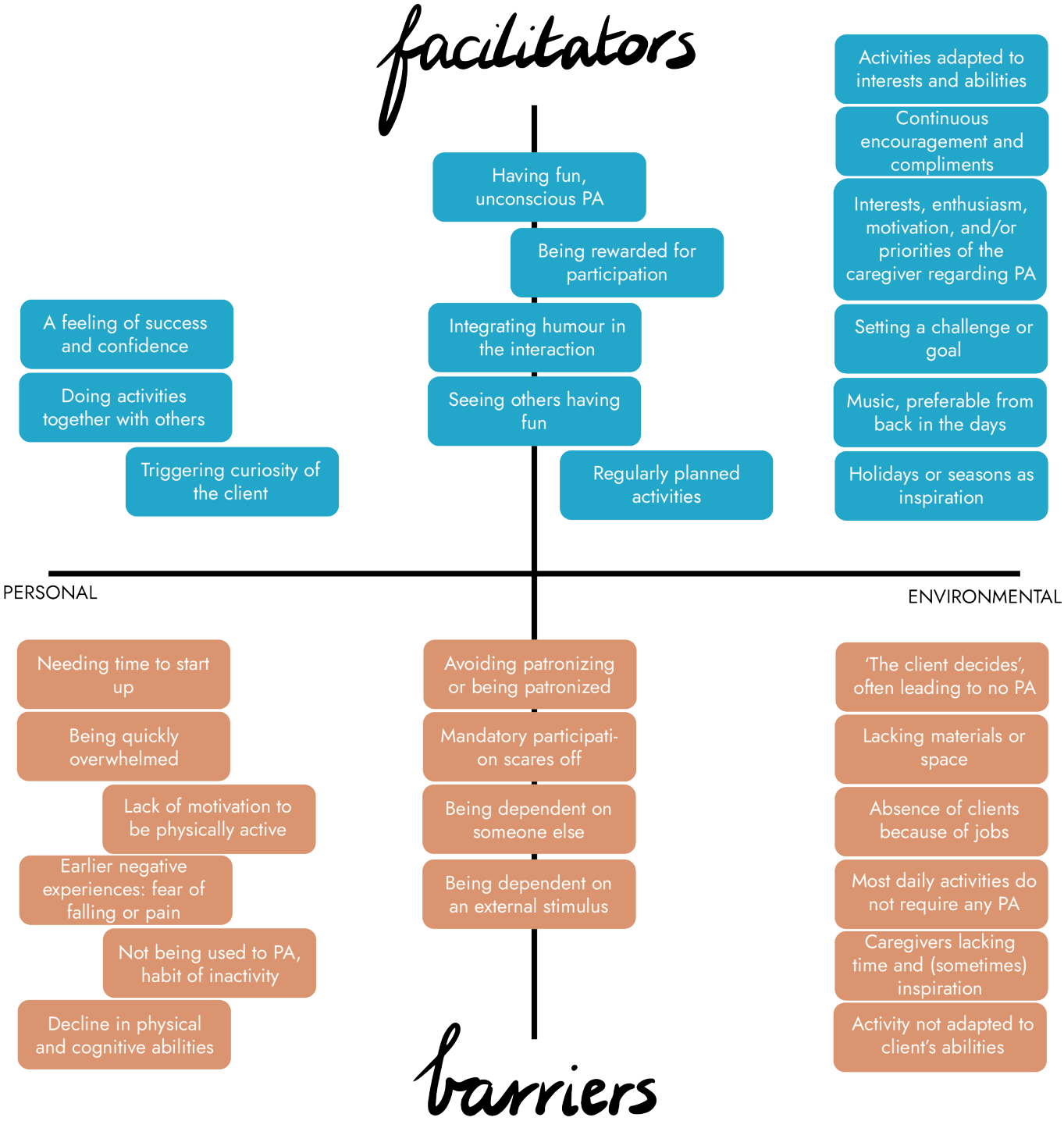


Figure 57. The found barriers and motivators towards PA, from the perspective of the residents in the research context, their caregivers and physiotherapist

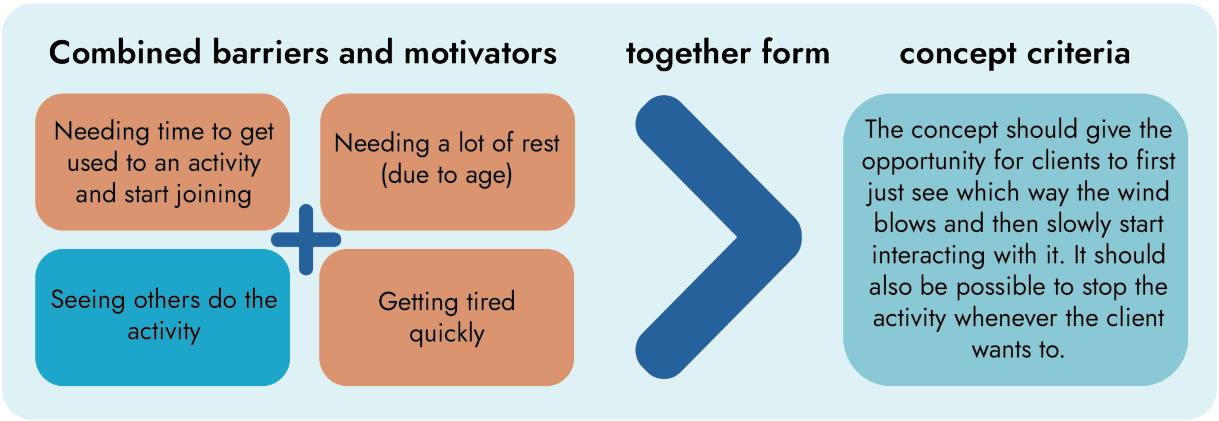


Figure 58. How three barriers and one motivator together form a criterion for the concept

5.2 Design criteria

The 'wisdom' layer of the DIKW scheme from Ackoff can be reached once the created knowledge is applied. The barriers and motivators formulated in chapter 3 and 4 are important knowledge that should be kept in mind during the rest of the project. To be able to check or evaluate potential concepts later on, criteria are necessary. Therefore, the barriers and motivators are connected to each other and form a list of criteria, presented in this subchapter.

Figure 58 shows an example of how some barriers and motivators are linked together and form a criterion for the final concept. The barriers and motivators were combined based on their topic, although sometimes a criterion was created first and the barriers and motivators were linked to it. Appendix E shows where all criteria are based on.

Below, the criteria are presented and divided in requirements (about the concept itself, the interaction, and the implementation) and wishes. Wishes also originated from the barriers and motivators. A criterion is formulated as a wish when it is either too challenging or not crucial enough to set it as a requirement, or when it is not possible to set a specific target, for example 'the amount of PA'. The criteria are ordered in importance within each category. This order is based on assumptions and the amount or quality of argumentation. The blue criteria are the ones that are integrated in the specified design goal in chapter 5.3.

<u>Requirements</u>

About the concept itself

1. The concept should be safe to interact with, for the clients and for other potential users.
   - The concept should also come across as safe.
   - The concept should be impact resistant.

2. The concept should be modular, meaning it should be adaptable to the physical and cognitive possibilities of the individual client.
   - The concept should be simple and easy to understand, yet not childish.
   - The concept should be understandable after one short explanation.
   - The concept should make use of visual and/or audio information as much as possible, and only textual information when necessary.
   - The concept should also be usable for people who experience problems with their vision, to the point where they are still able to see something. (limitation of the concept might be that is will not be suitable for blind people)

3. The concept should give a repetitive stimulus to hold the attention of the client.
4. The goal of the concept should be communicated, but the main focus should not (necessarily) be on PA.
5. The concept already should contain the necessary materials.
6. The concept should be suitable for being physically active alone and together with others.

About the interaction with and experience of the client

7. The concept should evoke a feeling of success and proudness.
8. The concept should facilitate 'having fun' for the client.
   - The concept should make the clients feel at ease and should therefore not put pressure on them.
9. The concept should evoke physical activity in the clients.
10. The concept should fascinate the client in such a way that they want to interact with it. The concept needs to evoke curiosity.
11. The concept should approach the client in a positive way or facilitate this positive approach.
12. The concept should give the opportunity for clients to first just see which way the wind blows and then slowly start interacting with it. It should also be possible to stop the activity whenever the client wants to.
13. The concept should stay interesting in the long term.

14. Interaction with the concept should be optional, not mandatory.

Implementation of the concept

15. The concept should encourage a certain structure; the PA should take place regularly (at least once a week) and therefore should be planned beforehand.
16. The concept should be easy to implement in a house like the house that is involved in this project.
    - The concept should not cost more than 100 euros, so that a house or daytime activity centre is able to purchase it.
17. The concept should be active or present during particular moments, not continuously. In this way, the concept gives an external stimulus to the clients.

Wishes

1. The concept should ask as little time or effort as possible from the caregiver.
2. It is desirable if the client could use the concept independently (or as independent as possible).
3. It is desirable if the client is able to initiate the interaction with the concept. The threshold for interacting with the concept should therefore be as low as possible.
4. The concept should encourage as much PA as possible.
5. It is desirable if the concept is also adaptable to the interests of the clients.
6. It is desirable if the concept can have variations over the long term.
7. The concept should be as little as possible dependent on the location where it is used. It is desirable to make it usable inside and outside the house.
8. It is desirable if the clients can explain the activity to each other (in words or by showing how) and are able to motivate each other to join the activity.
9. It is desirable if the concept enables a client to create something.
10. While interacting with the concept, the client should have to make as little decisions as possible.

In the Deliver phase of the project, the criteria return as a tool to check and improve the final concept. During the ideation process, the criteria are in the background for a while to prevent any limitations in creative thinking.

5.3 Design goal

The Discover phase led to a more thorough understanding of the current situation, which also enables to further specify the design goal. The criteria that are marked blue in previous subchapter are assumed to be most important and therefore integrated in the final design goal. The requirement of the concept needing to be safe is not included in the design goal, assuming this will always be taken into account in the development of a product. The final design goal is formulated in figure 59.

'The concept aims to stimulate older adults with an intellectual disability to be physically active on a regular basis, in a way that suits their individual abilities and interests, asking minimal time and effort from their caregivers.'

Figure 59. The specified Design Goal

5.4 Interaction vision

What the interaction with the concept should feel like can be explained in an interaction vision. This vision is created by identifying an event or activity unrelated to the design context, but in which the interactions are similar to the desired interaction with your concept (Pasman et al., 2011). Thereafter, the various qualities of the interaction, or in this case more the experience, are mapped and can function as inspiration for the concept. This subchapter presents the interaction vision of this project.

5.4.1 The vision explained

The interaction vision in this project originated from the idea of being physically active without focussing on the physical activity itself; potentially a promising design direction in this project. In the Austrian mountains, I mainly enjoyed the beautiful views and the company of my friends, rather than the quite intense physical effort. The interaction vision for this project was defined as presented in figure 60. Figure 61 on the next page shows a visual representation of this experience.

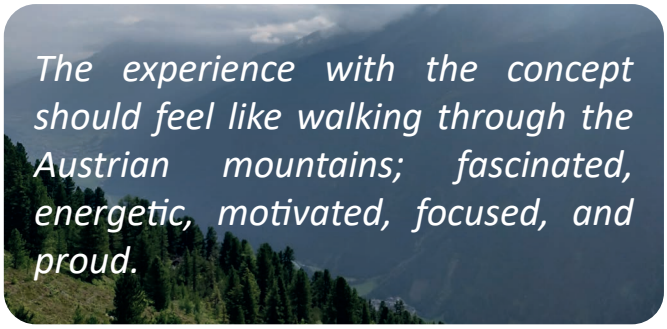


Figure 60. The Interaction Vision

Figure 61. Walking through these Austrian mountains on a sunny day is the inspiring experience belonging to the interaction vision. Photo by: Niek Rijnders

5.4.2 Interaction qualities

The following paragraphs explain for each interaction quality how it is manifested in the interaction vision, and how this could be translated to (elements of) the concept.

Fascinated
Fascination contains both getting lost in what is happening and being curious about what is coming. In the interaction vision this is manifested in the beautiful mountains, the constantly changing views, and not knowing what view will be next until you reached the top of the mountain. Being in a new environment with unfamiliar animals or flowers can fascinate people as well. These attributes could be translated into a concept, for instance by putting endless variations in it or by hiding certain elements to trigger curiosity of the user.

Energetic
This interaction quality is more literal than the other qualities. The concept should evoke energy in the clients, so they keep a physically and mentally active attitude during the interaction. In the mountains, this energetic mood is encouraged by the cold fresh air of the mountains, the physical activity of walking and using your muscles, but also by walking companions who keep you awake with conversations, and by the whole 'doing instead of thinking' aspect of the activity. These attributes could be translated into a concept, for instance by adding an element that keeps making noise, or by ensuring the resident has to keep moving during an activity.

Motivated
The motivational aspect of walking through the mountains arises from the will to reach the top and to show you are able to do that. The pace of others who walk in front or behind you can be motivating, as well as the possibility of finding things that you have not seen before. It all can motivate you to keep moving without being constantly aware of the physical activity that you are performing. This quality can be integrated in the concept by, for example, adding a certain goal in the form of getting points, collecting something or creating something.

Focused
Although walking through the mountains is more about being active than it is about thinking, keeping focus is highly important. One should choose the right stones to step on and keep balance while taking those steps. The fact that there is only one repetitive task (walking) and one goal (finish) at once enables you to keep that focus. Keeping focus is also important in the final concept, since this is a quality that should help in staying physically active for a longer amount of time without constant supervision of a caregiver. Giving the residents a clear repetitive task could be of help when they need to continue their activity without supervision.

Proud
As mentioned in the Discover phase, a lot of activities or tasks are not possible anymore for the residents, because of physical or cognitive relapse. Therefore, it could be extra valuable for them to learn something new for once and even be successful at it. The proud feeling that comes from this success is also present in the mountains, for instance when overcoming fears, reaching the top or becoming better at mountain climbing. The encouragement of others, the view you get as a reward, and the book on the mountain top in which you can write your name all contribute to this proud feeling. To increase the proudness, the concept could contain a certain encouraging mascot or the residents could earn a reward.

DEVELOP & DELIVER

The main function of this Develop and Deliver phase is to find answers to the second research question:

How can older adults with an ID be stimulated to perform PA?

Accordingly, chapter 6 will report on the different creative sessions that led to the concept that is presented, tested and iterated upon in chapter 7.

Figure 62. An overview of the seven sessions, including participants, aim, main questions, and main insights

6. CREATIVE SESSIONS

This chapter explains the ideation process consisting of seven creative sessions, in chronological order. Figure 62 tells the concise story of these sessions, including the goal, research question and some of the main insights of each session. The seven sessions are reported more extensively in the following seven subchapters. Each subchapter ends with the main insights of the session. The blue sentences represent insights that are highly relevant to keep in mind in the continuation of the design process.

6.1 Session #1: A kickstart to the ideation process

The caregivers of the house are closely related to the residents and are experienced in caring for or guiding them in everyday life. Their expertise is used at the start of this ideation process, by involving them in a creative session. The participation of two supervisors of this project added more perspectives to the session. This subchapter explains the session from plan to insights.

6.1.1 The session set-up

The full session plan can be found in appendix F. The session took place on the balcony of the house of the residents (figure 63), since being in the context of the 'research problem' can work inspirational. The goal of this creative session was to kickstart the ideation process by collecting ideas, and at the same time learning more about the caregiver's perspective. Creative problem solving techniques of Heijne & Van der Meer (2019) were used to encourage the resource group in setting the context, finding ideas beyond the obvious (figure 64 and 65), and highlighting the promising direction.

Figure 63. Brainstorming at the balcony with caregivers and project supervisors

6.1.2 Session results

Mapping the context

The context that was set up by the resource group (figure 66) showed the variety in possibilities; PA can take place in all kinds of locations, in all kinds of ways, and at various moments during the week. The resource group mentioned various reasons why caregivers are not always able to take action regarding PA. They either do not have the inspiration to think of activities, or they do not have the time, materials or motivation. However, several other stakeholders could be of help, for instance volunteers, family members, or people living in the neighbourhood. Why PA is important for the residents was clear to all resource group members. It can make the older adults happier, more energetic, maybe even less lonely. It can even be a welcoming form of pastime, especially for the residents who are not going to the daytime activity centres.

Figure 64. Brainstorm techniques called 'Random objects' and 'Visual stimulation' (Heijne & Van der Meer, 2019), used during the brainstorm to find ideas beyond the obvious

Figure 65. One of the sheets full of ideas

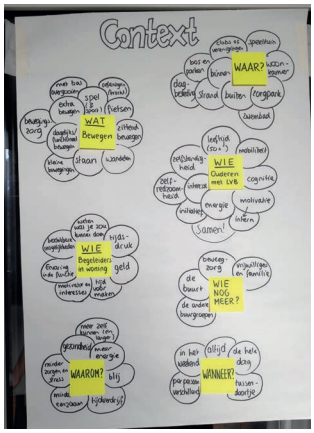


Figure 66. Setting the context during brainstorm

Analysis and main insights

Because of the shortage in time, the clustering process of all the options was not done during the session, but executed by the researcher afterwards. 'Spontaneous Clustering' (Heijne & Van der Meer, 2019) was used to find categories within all options. The clusters that came out, are presented in figure 67 and clarified with some examples of the ideas surrounding the cluster circles. These clusters or 'themes' were chosen, because they seemed to be covering the solution space that was created by the resource group. More specific clusters or broader clusters would have worked less inspiring for the next steps of the project. Descriptions of the clusters can be found in appendix G.

Responses from resource group

In the wrap-up of the session, some points were emphasized by the members of the resource group.

- The value of PA together and, on the other hand, the value of 1 on 1 contact between client and, for example, caregiver
- The absence of complicated technology; simplicity seemed to be important
- The value of such a brainstorm with caregivers, which could already play a role in increasing the PA of the residents

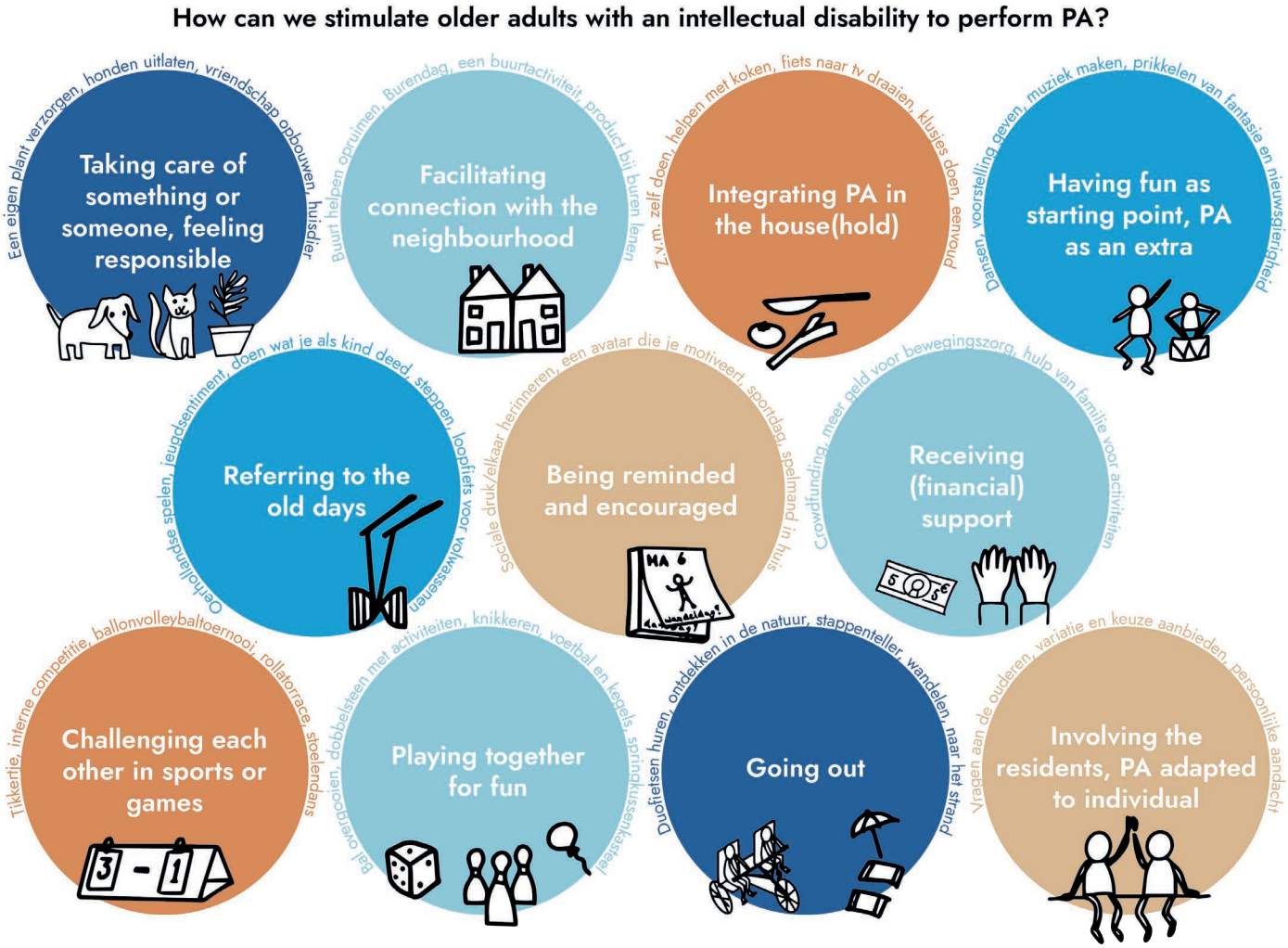


Figure 67. The clusters made by the researcher of the ideas of the resource group in the session. Some ideas are mentioned around the cluster circles

Main insights

Apart from what would be the best or most promising direction for achieving the design goal, being able to test it within the time and possibilities in this project is also an important criterion. Figure 68 shows a more general categorization of all the options. Planned or spontaneous activities with others, integrating PA in daily living, and collaborations in any form are quite challenging to work out within the limitations of this project. Examples of these limitations are the limited amount of time the researcher is able to spend at location and the limited time the caregivers have to be joining more sessions. Therefore, the focus will be on products, and activities that could be executed by the residents with as little supervision or help as possible.

Because the time for the creative session was too short, there was no chance for the resource group to work out some promising ideas into concepts or solutions. Therefore, no specific concepts were taken to the next ideation round. However, all themes derived from the session will be kept in mind in future ideation.

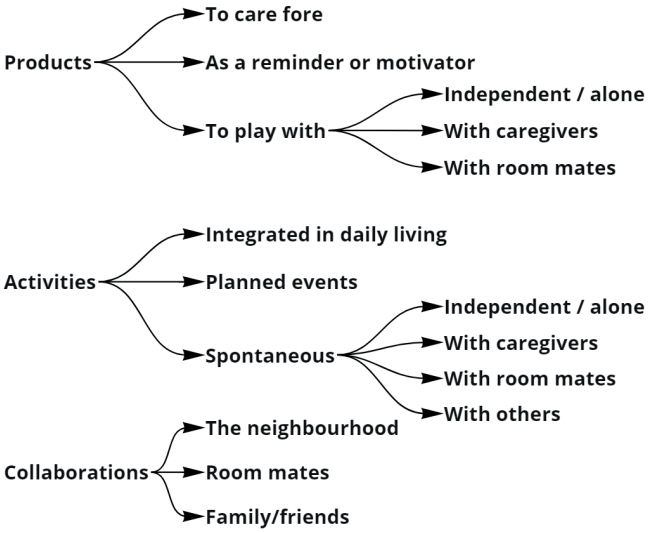


Figure 68. A more general clustering of all the post-its in the first session

6.2 Session #2: Extending the solution space

6.2.1 The session set-up

A second ideation round was conducted to extend the solution space and generate more options that match with the criterion of being testable, and feasible to work out within the boundaries of this project. This session was not conducted together with others, but by the researcher herself. Just as in previous session, brainstorm techniques were used to go beyond the obvious, by analysing pictures or objects and using the different aspects of those as inspiration for generating options for the research problem. With the help of these techniques, a lot of options were generated (figure 69) and clustered in the clusters on the right.

Figure 69. Brainstorm techniques and sheets full of ideas

6.2.2 Session results

By using Spontaneous Clustering, all options were categorized in the following clusters, each explained concisely. Descriptions of the clusters can be found in appendix G.

1. Making a party out of it
2. Getting assignments
3. Searching for something
4. Having a common goal
5. Feeling responsibility
6. Interacting with a product
7. Contact with outside world
8. Organizing activities
9. Evoking PA with music
10. Immersing yourself in a story
11. Inspiring / helping each other
12. Creating together

6.2.3 Main insights

A form of interaction with a physical product, music, a storyline, and game elements pass by regularly as parts of evoking PA in the first two brainstorms. Due to the necessity of an external stimulus to get physically active, the 'Getting assignments' cluster is important to explore further as well. It raises questions about how these assignments or other forms of triggers should be designed in a way that works best for the residents. This will be further researched in the next subchapter

6.3 Session #3: Testing various interactions

6.3.1 The session set-up

Inspired by the previous sessions, individual sessions with two clients were set up to find out what type of interaction from concept to resident stimulates the resident to be active, and how leading this approach should be. What we want to find out in the session is represented by the following questions:

1. *What type of interaction, stimulus or assignment ensures (most) involvement of the resident? Total freedom, a general assignment, a specific assignment, a challenge, an assignment wrapped in a story?*
2. *What is the effect of someone else joining the activity on the effort and motivation of the client to be active? What is the effect of them showing an activity to someone else? And of imitating someone else?*

The complete answers to the questions can be found in appendix H. This subchapter shows a short description of the session, and quickly jumps to the main insights, that are mainly derived from observations and conversations with the residents.

To find answers to the research questions, the following tasks were explained to the residents.

1. Move freely without music
2. Move freely with music
3. Show the movements to the other person, who needs to imitate
4. Move with your arms
5. Show the movements to the other person, who needs to imitate
6. Make a climbing movement with your hands
7. Imitate the movements visible in this movie (figure 70)
8. Help the bird fly by moving your arms up and down (story in figure 71)
9. Try to fly as fast as possible (a challenge)
10. Move while holding this product
11. Play with the product together with someone else

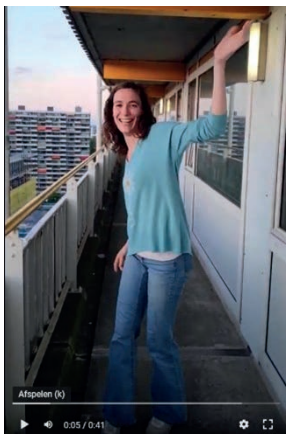


Figure 70. Movie with movements to imitate

"Er was eens een vogel, Iep was haar naam. Zij kon heel goed vliegen en dat deed ze dan ook graag. Ze vloog de hele wereld over, van New York tot Praag. Maar Iep is toch wel errug moe vandaag. Iep wil daarom graag naar dromenland, maar is nog niet in haar bed beland. Daarom moet Iep nog een stukje vliegen, maar dit kan ze niet alleen. Helaas ziet ze nergens een vliegtuig om haar heen. Gelukkig ziet Iep jou staan en vliegt ze snel even naar je toe. Kun jij mij helpen om naar huis te komen? Vraagt Iep, nog steeds moe. Je kunt me helpen door je armen van boven naar beneden te bewegen, alsof je vliegt. Help je mij mee?"

Figure 71. Assignment wrapped in a story

6.3.2 Main insights

◊ Once the music was turned on, both residents were immediately more active and looked happier. Music as a stimulus is therefore something that will be elaborated upon in chapter 6.5.

◊ In addition, the movie seemed to increase the PA of two residents and amuse them (figure 72 and 73), so something/someone visual that can be imitated is a promising direction. A third resident was not as happy with the activity, so there should be other types of activities too in a final concept.

◊ An assignment should be specific and clear (figure 74) instead of general and free. The resident also needs some reassuring confirmation that they are doing well.

◊ A competitive challenging element seemed to embarrass the residents (figure 75), but they did prefer playing together with someone else (figure 76). Playing together is therefore tested and reported in chapter 6.5.

◊ The storytelling element (figure 77) made it too challenging to keep focus and execute an assignment simultaneously. It is not a suitable direction.

Figure 74. P5 making a climbing movement: a specific and movement assignment

Figure 75. Movie with movements to imitate

Figure 72. P5 imitating the video of figure 70

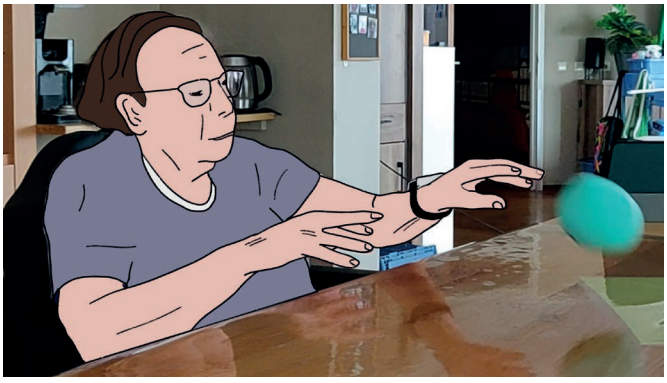


Figure 76. P4 throwing the ball to the researcher

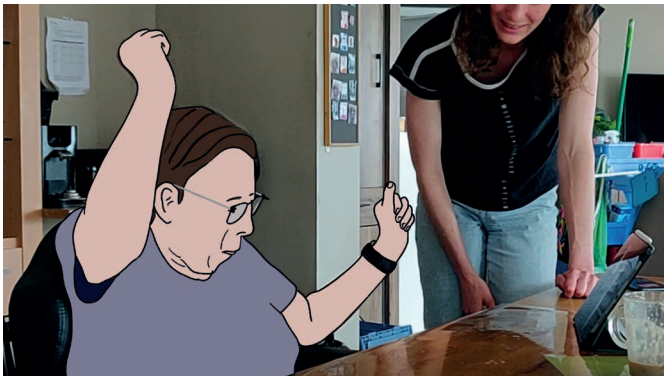


Figure 73. P4 imitating the video of figure 70

Figure 77. Storytelling assignment, in which the example of the researcher was necessary

6.4 Session #4: Triggering curiosity

6.4.1 The session set-up

One of the interaction qualities from the interaction vision in chapter 5.4 is 'fascination', which is closely related to being curious about something. This session tries to find an answer to the following questions:

1. *What triggers the clients to start interacting with it? What makes them curious?*
2. *How does this open way of testing and trying out together with the clients work?*

To find out what made the residents curious, a collection of items was presented to them. In first instance, this test was only conducted with one resident. Later it was adapted and conducted with another resident. To think about what products would be relevant for this test, a list with all sorts of characteristics that could function as a trigger was generated (figure 78). Then, all kinds of products from within these categories were collected (figure 79). By displaying these products in front of the resident, observing and asking questions, we could test which products or product characteristics triggered their attention (figure 80).
The complete answers to the questions can be found in appendix H.

Figure 78. List of (characteristics of) products

Figure 79. Products from the thrift store that represent the characteristics of figure 78

Figure 80. All products in front of the resident

6.4.2 Main insights

Since showing off a skill like acting or playing an instrument seemed to be a great motivator for two residents (figure 81 to 82), products that enable the resident to show their abilities, in other words to create something, are promising.
In terms of testing methods, the takeaway of these sessions was that it is important to not overwhelm the resident and just present one or a maximum of three products at once.

Figure 81. P5 acting with a hand puppet towards the caregiver

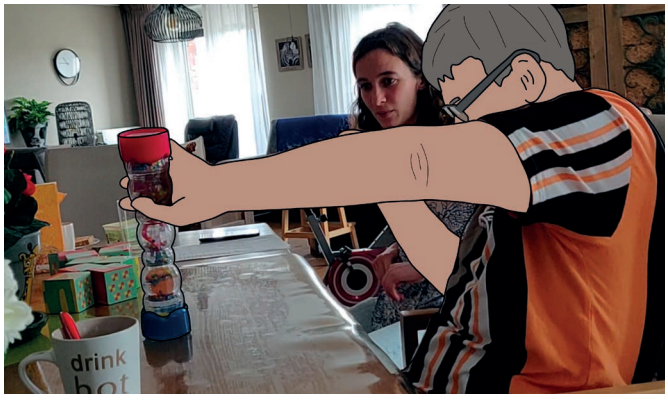


Figure 82. P3 showing how to use the rain maker

6.5 Session #5: Playing together + combining play with music

6.5.1 The session set-up

As became clear several times already, the residents prefer to do activities together instead of alone. Because the physiotherapist claimed that playing together often goes hand in hand with quarrels, it seemed valuable to test whether the residents are able to play together and how much supervision is necessary. In order to test this, four residents were asked to sit together and play a few games. At the same time, the combination of two promising elements, music and play, is tested. The exact goals of the test are reflected in the following questions.

1. *How does moving and playing together with housemates work out? Are they able to encourage or even help each other? Where do they need help from a caregiver or other supervisor?*
2. *What is the effect of a 'game of chance' like playing with a dice on the engagement of the residents?*
3. *To what extent does the combination of music and play resonate with the residents?*

To find answers to the questions, the residents were asked to play the following games while they were being observed and helped whenever necessary.

- Take turns rolling a large dice and coming up with a move that everyone must perform in the amount of how much was on the dice (figure 83).
- Take turns throwing balls in a cup
- Each individual choosing one musical instrument and playing music together based on a video. The video shows alternating pictures of the instruments, when you see your instrument, you need to play (figure 84).

The answers to the questions can be found in appendix H, this subchapter only presents the main takeaways.

Figure 83. Alternately throwing a dice and coming up with a movement

6.5.2 Main insights

- The residents were focused and absorbed in the musical activity, presumably because of the continuous visual and auditory stimulus of the movie.
- Quite some supervision is necessary, especially when the required action changes (e.g. turn switch or having to think about an exercise for the group). Either the concept should take over the role of a supervisor/caregiver in this or the fact that there will always be some guidance necessary should be accepted.
- The sessions with the residents until this point bring to front the wide variety of interests between the residents. They are musicians, sports or games enthusiasts, or creatives. They either like sports or do not like it at all. And in addition, they have quite different cognitive and physical abilities. A final concept should be challenging enough for a resident with a higher cognitive level, and at the same time understandable enough for a resident with a lower cognitive level. To achieve that, the concept will have to contain a variety of activities and levels.
- The short intermezzo of two residents drumming together (figure 85) led to the insight that playing together in duos would probably be the optimal balance of not having to play alone, but also not being overwhelmed by the presence of many people.
- Lastly, the activities are not enough focused on PA at the moment; the clinical value of the PA that is taking place is quite low. Therefore, the activities tested in the next subchapter will contain more PA.

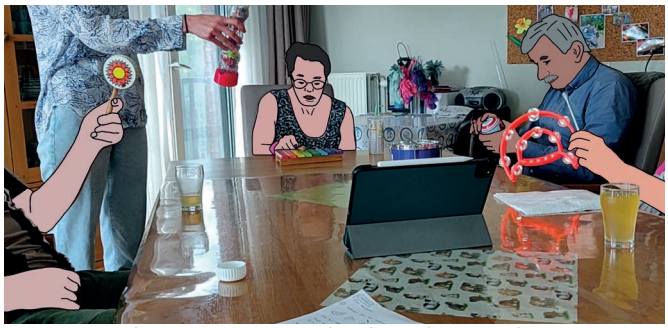


Figure 84. Playing music together based on a video

Figure 85. Playing drums in a duo

6.6 Session #6: Increasing PA

6.6.1 The session set-up

From this moment, the sixth resident was involved in the project. The aim of the session is to find answers to the questions presented below. The first research question is answered by the preparation of the activities rather than by the test itself.

1. *How could there be more PA integrated in the activities?*
2. *To what extent is the resident motivated to perform the PA integrated in the game?*

The following games were executed by P6 together with the researcher (figure 86):

- Throwing balls in a bucket
- Throwing balls to each other and catching with a cone
- Hitting the balloon back and forth
- Letting a ball bounce up by moving a towel together
- Standing up and sitting down to let a ball roll to the other player

6.6.2 Main insights

Taking one movement and creatively thinking what could trigger this movement is a suitable way of integrating PA in a concept. The more active aspect of these kinds of activities should also be tested with the residents who are less font of active games.

Now that all clients tried out a bunch of activities, it is time to combine all insights and start ideating on what could be a final concept. This ideation is reported in the next subchapter.

Figure 86. P6 doing activities that require more PA than previous activities

6.7 Session #7: Directed brainstorm towards a concept

6.7.1 The session set-up

A directed brainstorm was conducted based on the following information: the barriers and motivators, the design goal and interaction vision of chapter 5, a general description of the six clients, and an impression of the sessions of chapter 6 so far. The goal of this brainstorm was to combine the knowledge derived until this point and generate options for a concept that matches this knowledge. The brainstorm was held by two participants, one of whom is the researcher in this project.

On the one hand, a complete open brainstorm was not relevant anymore at this point in the project. On the other hand, a brainstorm with boundaries can always lead to limited creativity. Therefore, the following three questions were the Red Thread through this brainstorm session.

1. How can we stimulate PA? (figure 87)
2. How can we stimulate PA using music? (figure 88)
3. How can we stimulate PA using games? (figure 89)

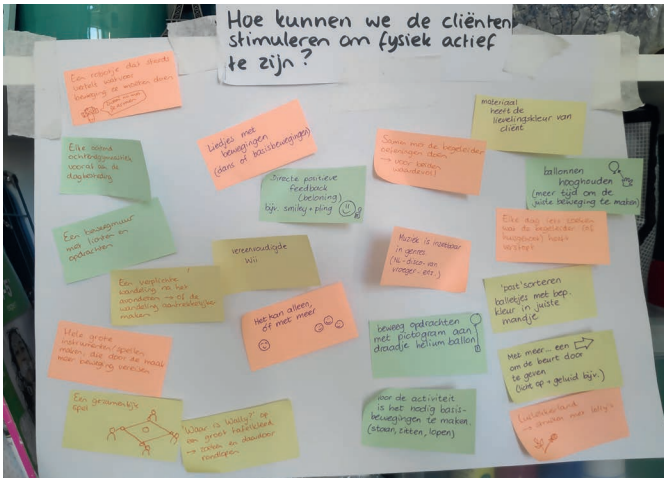


Figure 87. Directed brainstorm on how to stimulate clients to be physically active

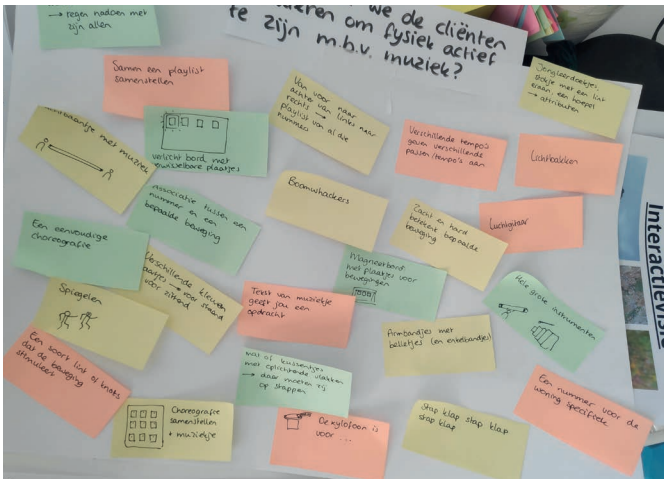


Figure 87. Directed brainstorm on how to stimulate clients to be physically active using music

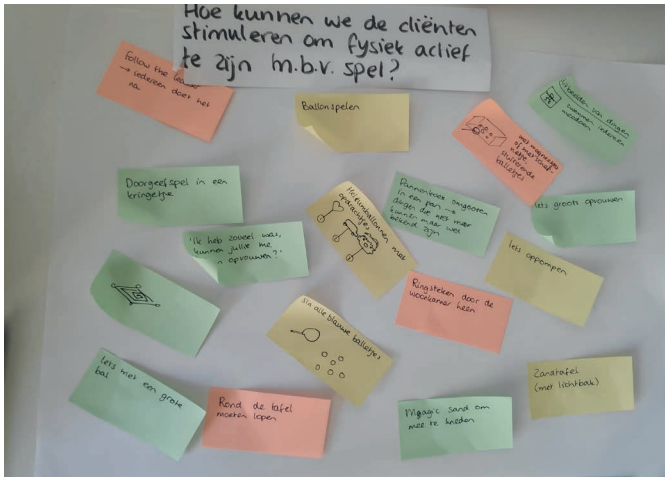


Figure 88. Directed brainstorm on how to stimulate clients to be physically active using games

6.7.2 Session results

All generated options were clustered into the following clusters:

1. **Move to music** Music can encourage people in several ways to move. Either the song lyrics could present certain exercises, or a visual choreography could be created. Music can function as background, but also at the main part of the activity.
2. **Making music** The music could also be created by the residents, as previous tests showed. Existing instruments can be used, but very big instruments could evoke more PA. Various ways of making music are reflected in the options within this cluster.
3. **Physical minigames (with a goal)** This cluster contains all kinds of minigames like the ones in session 6. From searching for objects to catching balls with a fish net and from circus like activities to holding up balloons.
4. **Brighten up/ imitate everyday tasks** The options in this cluster have in common that they use everyday tasks as an inspiration for a game like alternative. For instance, an idea is to create a pan with a fake pancake in it that can be flipped by moving the pan up and down. In this way, residents are enabled to perform some tasks that they are in reality not able to do anymore.
5. **Being encouraged and/or directed by the product** This cluster contains ideas that direct or help the residents a bit, for instance a certain arrow that starts flickering and turning towards the next player. Concepts that give the residents assignments that involve PA belong to this cluster too.
6. **Moving together (including caregiver)** The caregivers could also be involved in the PA, since it is valuable for both residents and caregivers.
7. **Remaining** This is an incoherent cluster containing specific ideas, like a sand table with a light box underneath on which you can make sand art.

6.7.3 Converging to a concept direction

After reviewing all options while keeping the criteria in mind, the most promising options were selected to elaborate. The brainstorm and additional ideas led to the four directions visible in the figures on the right. Below, a short explanation of the concepts and the main positive and negative aspect are mentioned.

Concept 1. A cabinet with materials that evoke PA, divided in several categories like music, creative and games (figure 89)

+ This concept is well adaptable to different people with different abilities and interests.

- This concept seems to be quite complicated as it is a collection of many different small products and all those products should be designed or collected, and explained as well. The caregivers will have to put quite some effort in it.

Concept 2. Helium balloon game with assignment cards like 'Put the balloons in order of size' or 'Find the sun and bring it to the car'. (figure 90)

+ This game makes use of the space in the house and encourages people to walk, which is one of the most important skills to maintain.

- Helium balloons need to be replaced after only a few days which makes it a bit inconvenient. It is also quite a specific activity; when someone does not like it, there is no alternative.

Concept 3. A replacement of the exercise videos created earlier is the Choreo board, on which all kinds of movement cards can be placed. On the board, lights can switch between the cards, indicating what movement the clients have to execute. (figure 91)

+ This concept is well adaptable in level by having different categories of exercise cards. Also, the previous sessions with residents proved the exciting aspect of music.

- It is unclear whether static images of exercises would be clear enough for the residents.

Concept 4. In this concept, the resident becomes an artist by following a light that moves over a big board, while they are holding a pencil. Afterwards, the resident has created a nice drawing while having moved up and down and from left to right. (figure 92)

+ The fact that it is a surprise for the artists what they are drawing hopefully makes them curious and helps in keeping focused. Also, it corresponds with the insight in subchapter 6.4, where the residents seemed to prefer creating something themselves.

- It is still uncertain whether this activity is possible for the residents to execute somewhat successfully and whether it indeed leads to PA. For the less creative residents, an additional activity should be possible.

Figure 89. Cabinet full of PA materials

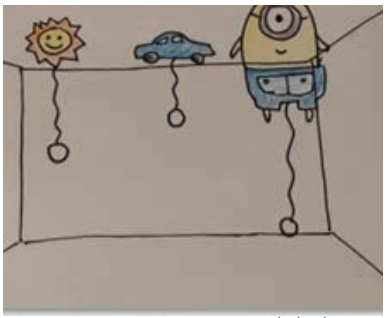


Figure 90. Minigames with helium balloons

Figure 91. Choreography board and cards

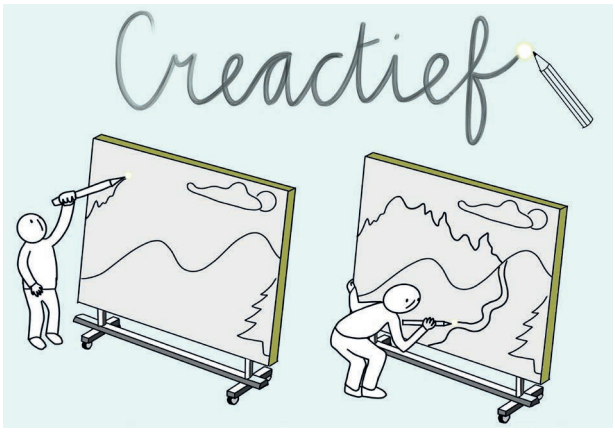


Figure 92. Drawing by following a light

Because concept 1 and 2 are respectively a too complex collection of different products gathered together, or a too specific activity that is less adaptable to the individual, they are not included further in the project.

Since the previous sessions with residents pointed out the value of music and creating something, there is a chance concept 3 and 4 will be more promising. Concept 3 revolves a bit more around PA, which could lead to more reluctance for some residents. A more unconscious way of being physically active is present in concept 4. To make these last two concepts more modular, like in concept 1, they could be combined in one concept and maybe have included additional activities. Chapter 7 presents how this train of thought led to a final concept.

7. FINAL DESIGN

This chapter explains the MakiMove, the final design in this project, by first presenting the design, and later on, discussing the process towards the MakiMove. Afterwards, the evaluation results are summarized in a short conclusion of this chapter.

7.1 Final design: MakiMove

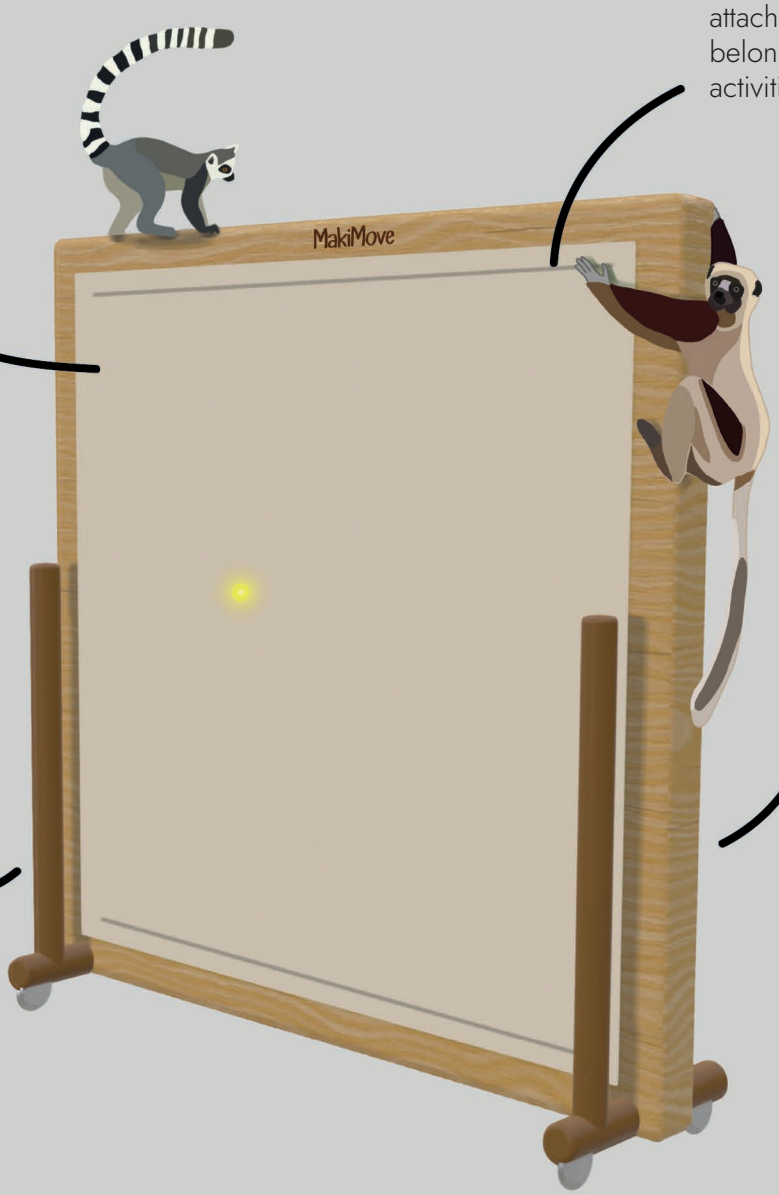
This subchapter presents the MakiMove, and goes into more detail about the activities, the mobile application, and the appearance of the design.

MakiMove

The MakiMove is a large, vertical game board that offers fun and active games to older adults with intellectual disabilities. The design as presented below is the basis for various activities, explained in more detail on the right. The aim of the product is to provide a positive experience to older adults with an intellectual disability, and simultaneously increase their physical activity.

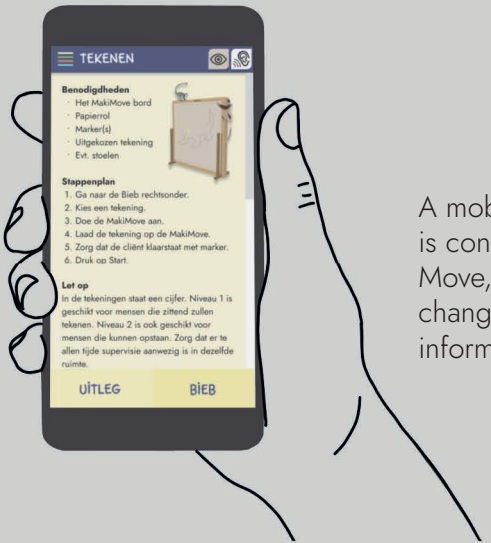
Velcro strips to attach the sheets that belong to the various activities

Semitransparent plate with white-board foil



A CoreXY mechanism in the board controls a light. A small computer enables a Bluetooth connection to the board.

Vertical poles as support for people who stand during an activity at the board

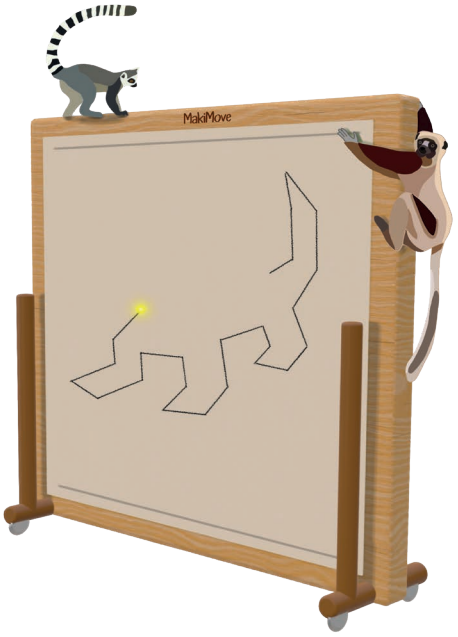


A mobile phone application is connected to the Maki-Move, enabling someone to change settings and send information to the board.

Wheels with brakes to move and secure the MakiMove

DRAWING ACTIVITY

Necessary materials: marker, optional materials: paper, chair
In this activity, the client is asked to follow a light with the marker they hold in their hand. The light jumps to a new place whenever the client's marker reached it. By following the light and making a large drawing, the client is encouraged to reach with their arms, and if possible to stand up and sit down. The image on the right shows that the light in the board shines through the semitransparent plate. Due to a thin foil on the plate, the resident can wipe out the drawing when using the right markers. Attaching an empty paper on the board is possible as well.
With the application, many different drawings can be uploaded to the MakiMove, and settings about the height of the drawing can be changed.

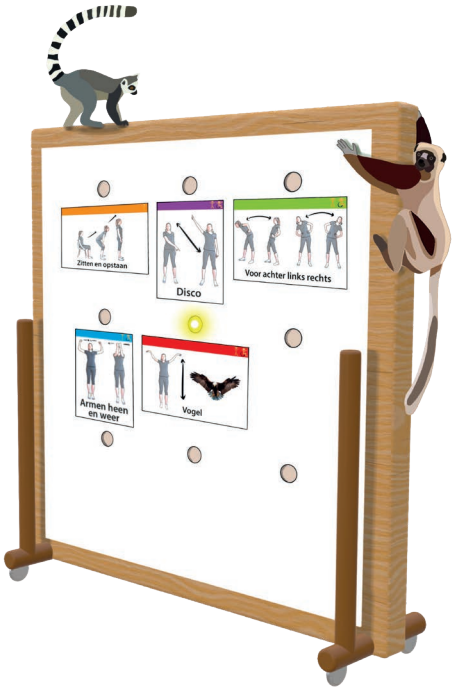


BALL GAME

Necessary materials: fabric sheet, balls in a basket
Optional materials: points, different figures, chair
This activity challenges people to throw Velcro balls to a fabric sheet with figures on it. By throwing the balls, the client moves the upper body. For the more fanatic people, points can be added to the different figures on the board. In addition, it is possible to move the figures or to replace them with other shapes.

MOVING TO THE MUSIC

Necessary materials: magnetic sheet, movement cards
Optional materials: chair
This activity asks the clients to put their dancing shoes on and move to the music. A set of magnetic movement cards shows all types of rhythmic movements, that can be imitated by the clients. The image on the right shows how the cards are attached to the sheet on the board. Holes in this sheet make it possible to let the light in the board shine through, thereby indicating which movement the clients need to execute.
With the application, different songs and 'choreagraphies' (patterns of the light) can be uploaded to the MakiMove. Settings about the amount of cards, and the pace of the choreography can be changed.



Additional activities

The fabric sheet, the magnetic sheet, and the whiteboard foil on the board, all create possibilities for other activities, either because it is easy to attach things to it or to draw or write on it. One example that was already tested with the residents is a puzzle activity where the magnetic sheet is used for making a large puzzle while standing.

Application

A mobile phone application is connected to the board and enables the caregiver, another supervisor, or maybe a client, to control several activities on the board. Although options to let the text be read out loud or to see videos of the activities are added to the application, currently the application is more focused on the caregiver. The main functions of the application are:

- Upload a drawing or choreography to the board (figure 93 and 94)
- Provide instructions about the activities (figure 95)
- Adapt settings to the individual client
- Control the board from a distance, for instance turning on another song

The complete application should still be designed and tested with the caregivers and clients. It might be interesting to add personalisation options, such as:

- a galery in which pictures of the active clients can be added, and of which a nice photo booklet with memories can be created.
- an option to save settings, drawings, or choreographies for specific clients.

Appearance

The appearance of te board is based on three topics that seemed to interest or activate each of the six residents to some extent: nature, animals, and music. The lemur (in Dutch: Maki), who lives in the beautiful Madagascar and who seems to move like a dancer (figure 96), can be related to these common interests, and became the inspiration for the appearance and name of the concept. As a large piece of furniture, the appearance of the board itself is kept subtle in terms of colours. The additional materials, such as the figures for the ball game or the movement cards, have a more playful design to attract the clients.

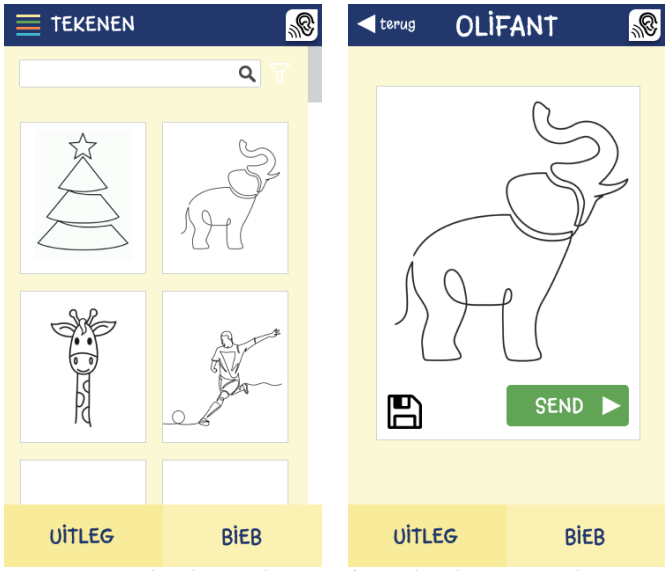


Figure 93. Uploading a drawing from database to MakiMove

Figure 94. Uploading a song and choreography

Figure 95. Instructions of the ball game

Figure 96. Lemurs move like dancers (Madagascar Wiki, n.d.; Caters New Agency, n.d.)

7.1.2 Design in context

Intended interaction
In chapter 5, the intended interaction of a final concept was created as inspiration for the Develop phase in the project. The vision stated that 'the experience with the concept should feel like walking through the Austrian mountains; fascinated, energetic, motivated, focused, and proud.'
In more straightforward language, we mainly strived for activities that the residents like to do, are able to do, and are able to focus on for a while. The MakiMove should facilitate a positive, successful, proud experience.

The fascination and motivation appear from the urge to see the end result of the drawing and to hit the figures (and points) in the ball game, but also from the light that unpredictably switches between the movement cards in the third activity. The music in the third activity, the fanatic 'energy' of the ball game, and the curiosity triggered in the drawing activity are all causing an energetic and excited feeling in the residents. The tangible end results of the activities, namely the drawing and the amount of balls on the board, create a feeling of pride. Compliments and encouragement during the activities strengthen this feeling.


Figure 97a. MakiMove in the house

Time and location
From observations and conversations with several caregivers, a few moments seemed to be possible and suitable for executing some activities together with the client:
- On a client's free day between waking up and lunch or after lunch
- On a weekend day

Because the residents value structure in their days, it is useful to have a standard moment in the week for interaction with the MakiMove. In planning the activity for each individual, it should be taken into account whether the resident prefers playing alone or together with a fellow resident. An example:
- P4 and P5 in this project like to do activities together
- They are both free of activities on Tuesday
- Each week on Tuesdays between 11.30 and 12.30, these two residents interact with the concept

One hour a week might not be enough according to the PA guidelines of chapter 3, but as one of the three pillars of the Gezondheidsraad (2020) says: 'the more PA, the better'. Next to the fixed moments for each individual, it should be possible to interact with the concept when a client wants to, also outside this hour.

To remind the residents of the planned activity, a planning could be created and hanged next to the existing planning, that hangs in the living room and shows which caregiver will be present when. Figure 97 visualises a suggestion for this planning board.

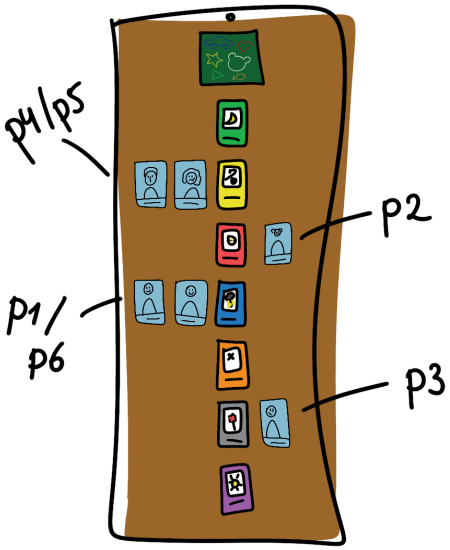


Figure 97b. Suggestion for planning board

Although the caregiver has to play a role during the interaction with the MakiMove, the clients will be able to play independently of the caregiver for part of the time. When the clients play with the board near to the caregiver's desk, it enables the caregiver to keep an eye on the clients, encourage them every once in a while, and simultaneously work on administrative tasks behind the computer.

The role of the caregiver
While interacting with the MakiMove, the residents do need some assistance from the caregiver or another supervisor. The main tasks for the caregiver come down to:
- Help the clients in preparing the board and the materials
- When necessary, explaining the activities to the clients
- Depending on the activity, sending a drawing to the board or turning on the music with the application
- Keeping an eye on the clients and encouraging them (from a distance)
- Help the clients in storing the board and materials

By default, the caregivers will be the ones who have to initiate the activities. However, it would be desirable to have the clients initiate it.

7.2 The road to MakiMove

This subchapter explains the road from the first idea (figure 91 and 92) to the final concept (chapter 7.1). First, the original idea will be elaborated to a testable concept. An evaluation plan clarifies how this concept will be tested with the residents. Afterwards, the prototyping, evaluation and iteration steps are presented for the general concept and for each separate activity. The subchapter ends with a criteria check and design recommendations.

7.2.1 From idea to concept

'The concept aims to stimulate older adults with an intellectual disability to be physically active on a regular basis, in a way that suits their individual abilities and interests, asking minimal time and effort from their caregivers'

That is the design goal that was created in this project. 'In a way that suits their individual abilities and interests' is presumable the most important part of the design goal. From the tests and overall interaction with the residents was derived that all six residents were different in at least the following aspects.

1. The types of activities they like, varying from making music to making puzzles, and from watching sports to diamond painting. This includes the extent to which they like to be physically active.
2. The attitude and motivation while joining an activity, varying from wanting to win to wanting to play together without pressure.
3. The cognitive abilities, which influences the understanding of the product and the amount of guidance required during the activities. This influences the interests of the resident as well.
4. The physical abilities, varying from being in a wheelchair and dependent on someone else to being very active already and almost completely physically independent.

To achieve an intervention that is adaptable to each individual, these four aspects were taken as a starting point in developing the idea into a first version of a concept.

1. Variety in types of activities they like
The first idea takes into account people who like to create and people who like music and/or moving to the music. What is still missing is an activity that matches with the interests of the sports fanatics and the puzzle maker of the group of residents. Therefore, two other activities were added to the concept (figure 98 and 99). The combination of these four concepts should cover the interests of the six residents at home. This increases the chance that there is an activity for everyone. Moreover, being able to switch activities could also make the concept more interesting for the long term.

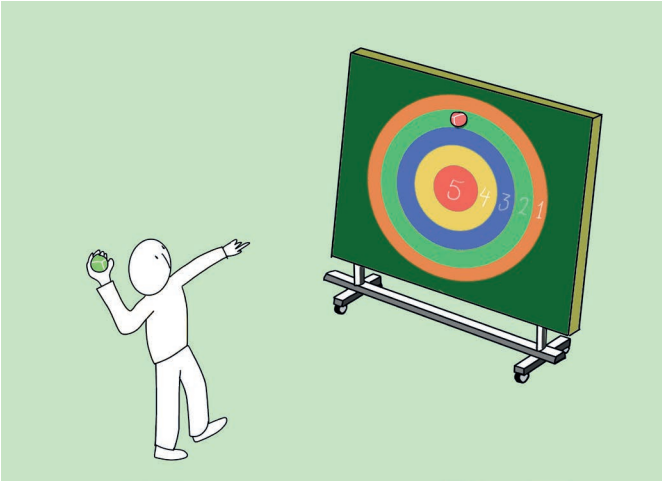


Figure 98. A ball game added as activity


Figure 99. A puzzle game added as activity

2. General attitude and motivation in an activity
In the conversations with the residents, it became clear that their attitude and motivations differ from each other. For instance, P2 is competitive and wants to either win points or win from other players, while P5 shuts down when there is pressure. Therefore, the sheet from figure 98 was changed to a score sheet that does not have points by default, but just optional (figure 100).

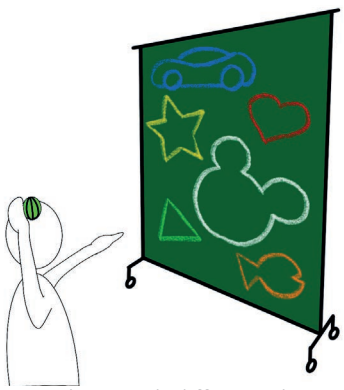


Figure 100. Score sheet with different shapes

3. Cognitive abilities

- The ball game of figure 98 contain circles in various sizes. Since people with an ID experience difficulty in abstract thinking, the abstract circles were replaced with familiar figures as presented in figure 100.
- The choreography activity was worked out with the variety of cognitive abilities of the residents in mind. This meant that the movements are visualized as clear as possible, preferably with realistic pictures of a person, according to a consulted logopaedist of ‘s Heeren Loo. Since some of the residents are able to read, the visuals are supported with concrete concise explanations of the movement. This led to the cards presented in figure 101, see appendix I for the complete collection.

4. Physical abilities

In the choreography cards the variety in physical abilities of the residents is important to take into consideration, especially because some movements require certain balance and are therefore not suitable for all residents. After discussing these safety issues with the physiotherapist of the house, some cards were left out during the tests, because these movements could make the residents dizzy. Overall, the physiotherapist expected this activity to be one that needs supervision (from a distance) of one of the caregivers. When the residents execute the movements while sitting, this will be way more safe. This means that the cards need to be visible from a difference.

To make the activities accessible to people who are in a wheelchair or who have other reasons why they need to execute the activities seated, the board or the activities should be adaptable in height and reachable from the (wheel)chair. For people who can stand but are quite unbalanced, there should be something to hold on to. How all this is applied in the concept will be discussed in the remaining of this chapter.

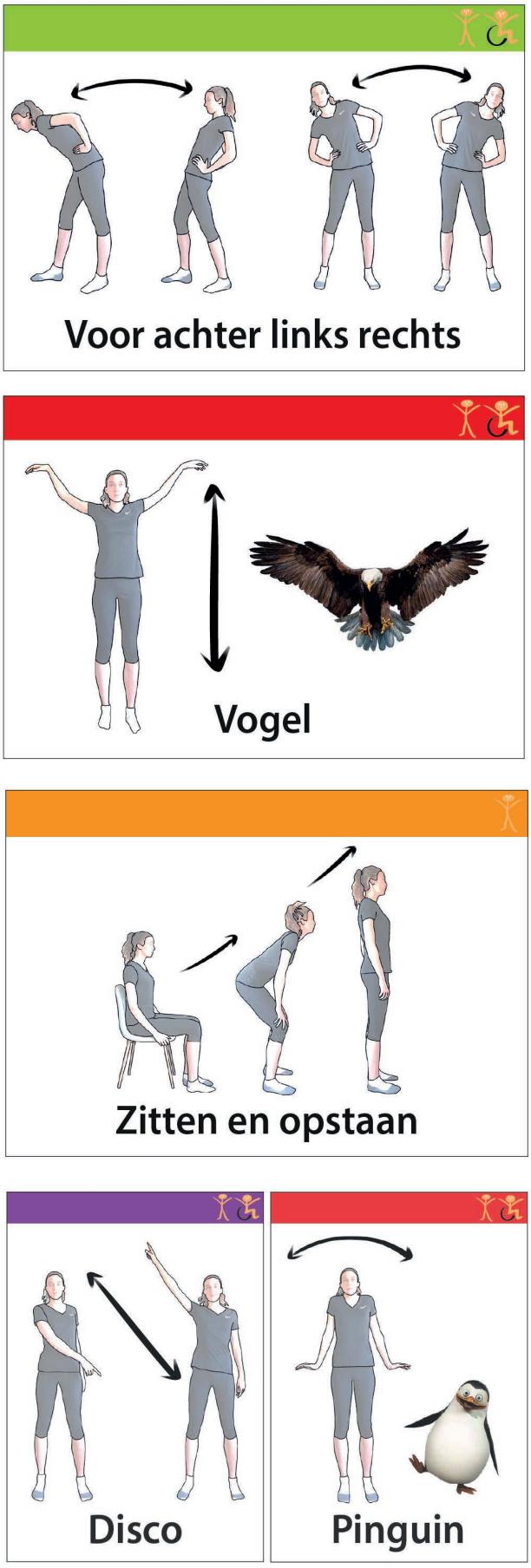


Figure 101. Selection of movement cards

7.2.2 Evaluation plan

A valuable way of finding strengths and weaknesses of the concept is by testing it with the people for whom it is created: the residents. This subchapter discusses the preparation of these tests, consisting of questions and an evaluation plan.

Questions

To be able to get the desired information out of the tests, the following research questions were set up. The research questions either come from the criteria of chapter 5.2 or from the interaction qualities of chapter 5.4. Appendix J explains how each question was measured in the tests.

1. How much do the residents enjoy performing the activity?
2. How well can the activity be understood and/or carried out by the residents?
3. To what extent can the residents carry out the activity independently?
    a. What can they do themselves?
    b. What do they need help with? How much time and effort does it require from the supervisors?
4. To what extent can the residents keep their focus to the activity?
5. To what extent can residents motivate each other to participate in an activity? To what extent can they help or motivate each other during the activity?
6. To what extent does physical activity take place while performing the activity?
7. To what extent can the activity be adapted to the individual resident with their interests and abilities?
8. To what extent does the concept remain interesting for residents in the long term?
9. To what extent does the client feel motivated to interact with the concept?
    a. Do they initiate it themselves or does the facilitator have to do this?
    b. Are they motivated to start the activity?
    c. Do they remain motivated during the activity?
10. How curious do the residents feel before or during the interaction?
11. How proud do the residents feel during or after the interaction?
12. How energetic do the residents feel during or after the interaction?

To find answers to the questions, the residents will execute the activities. A general test program was prepared.

General test program

1. Introduction and asking some starting questions
2. First activity: The resident chooses one activity
3. Evaluation the activity (if possible/necessary) with the evaluation map
4. Second activity: The researcher chooses one activity
5. Evaluation the activity (if possible/necessary) with the evaluation map
6. If still possible, another activity and evaluation
7. Staying to observe the reaction afterwards

Evaluation method

The evaluation map that is mentioned in the program was created as supporting material for the conversation about the activity that was just performed by the resident. Figure 102 shows the map that contains statements with an image at the beginning and a scale from disagree to agree next to the statement. The resident is asked to put the several activities they did on this scale (figure 103). This map was created after a conversation with a consulted logopaedist, who explained they work with conversation maps similar to the one created in this project.

Figure 102. Evaluation map created for evaluating the concept together with residents

Figure 103. P6 is placing the activities he just did on the evaluation map

Prototype

As mentioned before, people with an ID experience difficulty in abstract reasoning, which makes it important to create realistic prototypes. The feasibility of making a realistic prototype was an influential, and sometimes limiting factor while creating the design. The physical prototype is integrated in the next subchapter, as well as the evaluation results and iterations of the concept.

7.2.3 Prototyping, evaluation & iterations

The upcoming five spreads (two pages) represent the development of the general concept and the four designed activities, by answering the following questions:

1. What is the initial design of the activity?
2. How is this design processed in a prototype?
3. What were the main insights from the tests?
4. What iterations have been made during and after the tests?

All research questions that were presented in the previous subchapter were answered for each activity and for the general concept. The answers regarding the general concept can be found in appendix K. Only the most notable insights are mentioned in the following spreads.

7.2.3.1 GENERAL CONCEPT

INITIAL DESIGN

The concept as it is tested with the residents consists of four separate activities (figure 104) that can all be played on a board with a height of about 2 metres and a width of about 1,5 metres. The different activities make use of separate sheets that can be hung on the board. All activities are adjustable in height, enabling residents to perform the activities either sitting or standing.

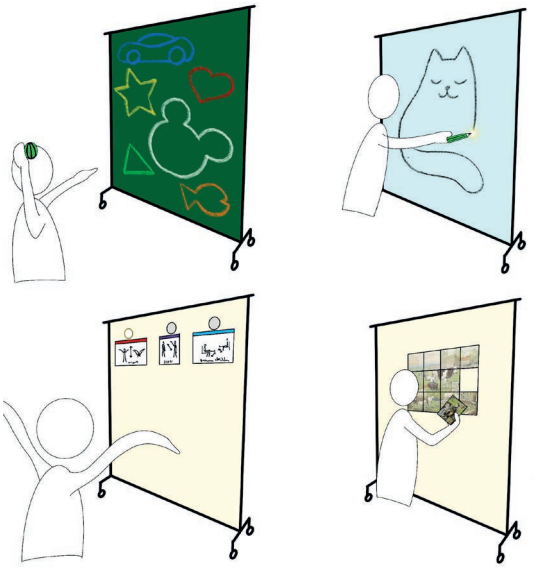


Figure 104. The four activities that are tested

PROTOTYPING

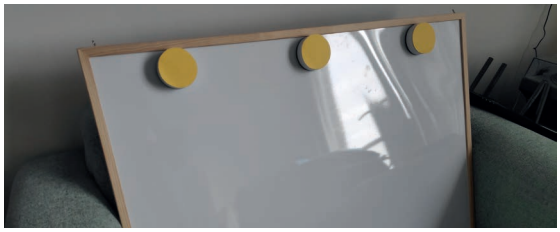
Since the large size of the board is one of the facilitators of the actual PA performed by the resident, the prototype is about 1 by 1,5 meter. A large sheet of Plexiglas is connected to a movable clothing rack (figure 105). The different sheets are presented by a role of garden carpet for the ball game, a large paper roll for the drawing game, and a magnetic whiteboard for the choreography and puzzle game (figure 106). All these elements can be attached to the clothing rack or the Plexiglas.

Figure 105. A Plexiglass sheet with tiewraps on a clothing rack

EVALUATION INSIGHTS

+ For each resident, at least one activity seemed suitable and fun
+ Most residents were able to perform activities on their own, as long as the required action stayed the same
+ The size of the concept makes it striking

- More attention should be given to the accessibility of the board for people who are in a wheelchair and the safety for people who have a higher risk of falling
- During most activities, the encouragement of the researcher was necessary to keep the resident going. This could partly be taken over by an element in the concept. A clear trigger as a start of the activity is still missing as well.
- The caregiver is needed while setting up and putting away the product. These actions should be clear and simple for the caregiver, and should therefore be defined.
- The roll system is still a bit inconvenient and not yet defined in detail.



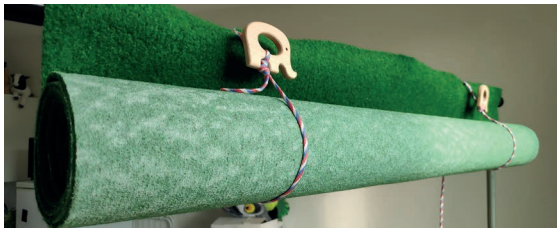


Figure 106. A paper roll for drawing, garden carpet for the ball game, and whiteboard for other two activities

ITERATIONS

Necessary iterations derived from the tests are mentioned below. The iterations are either worked out in the final concept or mentioned in the recommendations.

1. Encouraging the resident with the flower mascot (figure 107): One of two participants reacted positive to this mascot that could turn and tell all sorts of compliments. The large high five hand also made some residents look happy (figure 108). It requires more testing and iterating to know what kind of mascot or encouragement works best.
2. Open play activity (figure 109): Since each activity has a goal (corresponding to the found motivators), an option for an open play activity was added and tested with one participant. This was no success, due to limited time it is not tested more elaborate.
3. A clear trigger should be integrated in the concept, at least as start of the activity (keeping FBM in mind).
4. To define the role of the caregiver and support them in the best way, an application is created, including a database for drawings and choreographies that can be loaded to the board (figure 110).
5. Improving the physical accessibility of the board for people in wheelchairs and the safety for people with a high risk of falling.
6. Defining when and how often the activities should take place.
7. Simplifying the roll system.
8. Defining a name and a final appearance.

Figure 110. Homescreen of the application

Figure 107. Flower mascot with self-made soundboard

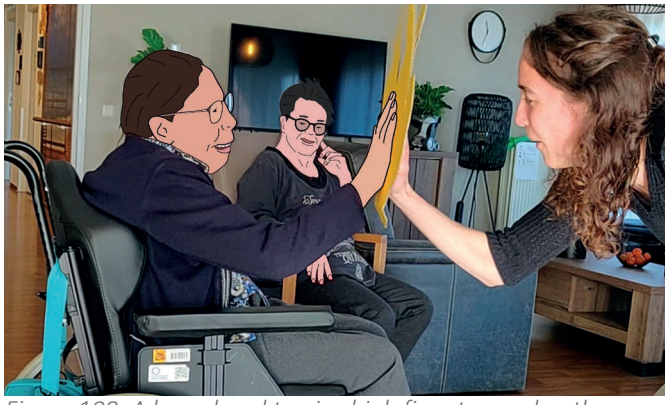


Figure 108. A large hand to give high fives too makes the clients laugh

Figure 109. Resident looking at the open play activity

7.2.3.2 DRAWING ACTIVITY

tested with six residents

INITIAL DESIGN

The drawing activity (figure 111) tries to combine PA with the residents' interest to create something, in this case a drawing. In the large board is a light that can move across the entire board using the existing CoreXY mechanism (figure 112). This mechanism needs to be controlled by two small motors. The board itself consists of a semi-transparent screen that lets through the light that is connected to the CoreXY mechanism. By loading a drawing to the board, the light will slowly move across the board in the line of the drawing. A large sheet of paper is put on the board. The client gets the assignment to follow the light with a marker. At the end of the activity, the user has created a drawing that he/she could hang on their wall. Because of the size of the drawing, the client will be forced to reach with their arms and, depending on the drawing, to stand up and sit down. The idea is that there are endless drawings, but that the user does not yet know what he/she is drawing until it is finished.

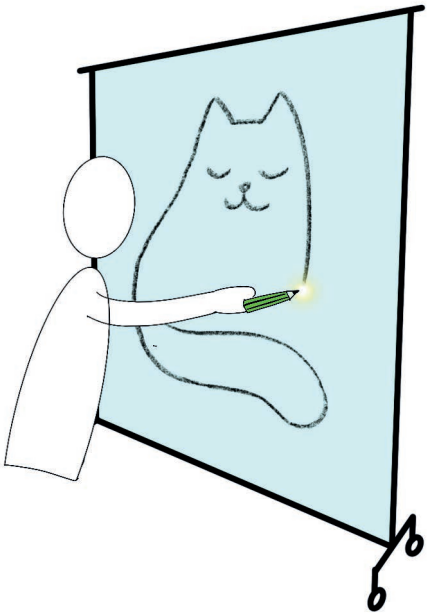


Figure 111. The drawing activity

PROTOTYPING

Because the size of the board is crucial for the amount of PA caused by the activities, a large screen was created, making use of an adjustable clothing rack and a Plexiglas sheet of about 1x1,6m (figure 113). A roll of paper was placed on the board. On the other side, line drawings were put on the board (figure 114). For the test, this line drawing was followed with a small light, by the researcher or an assistant (figure 115).

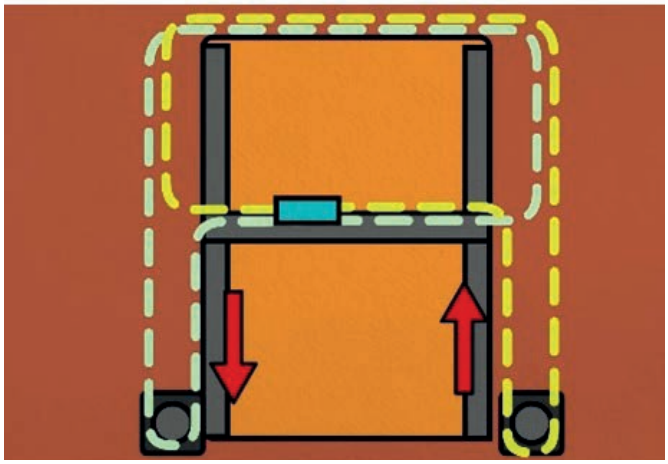


Figure 112. CoreXY mechanism (Stuff made here, 2022)

Figure 113. Paper on Plexiglass

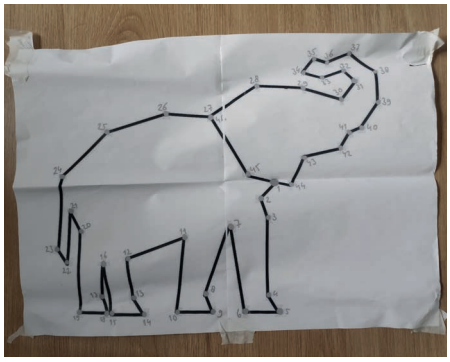


Figure 114.Drawing to place on other side of Plexiglass

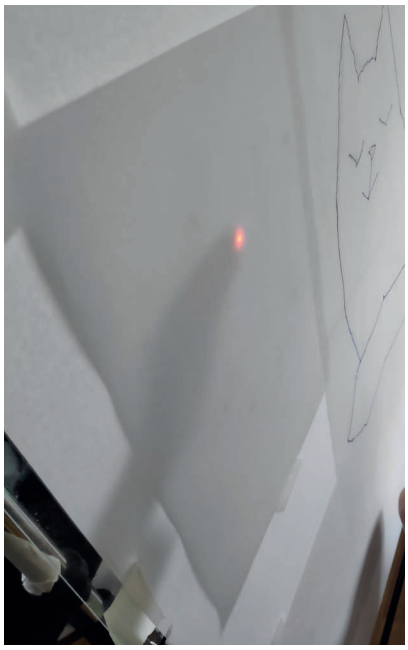


Figure 115. Someone shines light through Plexiglass

EVALUATION INSIGHTS

+ Half of the residents really enjoyed the activity, shown by their engagement and expressions.
+ Five of the six participants were able to carry out the activity, more or less (figure 116)
+ Most residents were able to keep their focus during the activity
+ After the iteration of the light course (iteration 1), the pace was adjustable to the resident
+ The residents were curious about what they were drawing (figure 117)

− Continuous moving of the light was stressful (iteration 1)
− Residents needed some help during drawing but mainly will need help in loading the drawing to the board (iteration 3)
− There was limited PA, although some residents stood during the activity (iteration 2)
− For one resident, this activity was too challenging (right drawing of figure 118)

Figure 116. P2 is drawing a cat

Figure 117. P5 whispers to the researcher

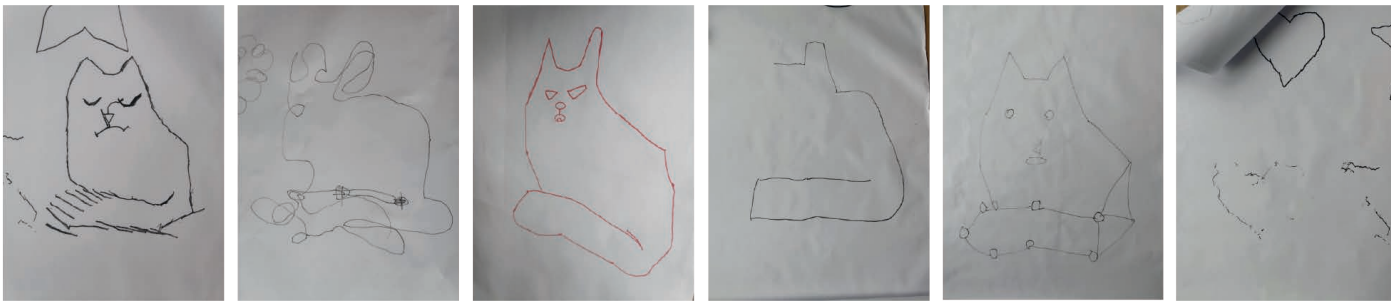


Figure 118. Drawing made by the residents

ITERATIONS

1. Continuous light changed into a light that moves to the next point once the resident arrived at the light (figure 119).
2. Larger drawings to evoke more PA.
3. Work out the drawing database and levels.
4. The residents were not asking whether they could keep the drawings. For sustainability reasons, it might be better to use a semi-transparent, flexible whiteboard sheet, that still lets through the light, but that could be wiped out afterwards (figure 120).

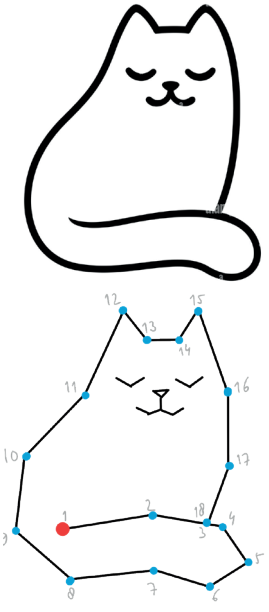


Figure 119. Iteration 1

Figure 120. Transparent whiteboard film

7.2.3.3 BALL GAME

tested with six residents

INITIAL DESIGN

This activity (figure 121) consists of a score sheet of soft material that can be placed on the board. The sheet will be made of material that Velcro balls can stick to. The score sheet consists of figures, that can be aimed at by the residents. By throwing balls to the sheet, the resident can score in the figures or even earn points when the numbers are put on the sheet. The resident can throw the balls to the sheet from any distance or height and either alone, together with others, or against others.

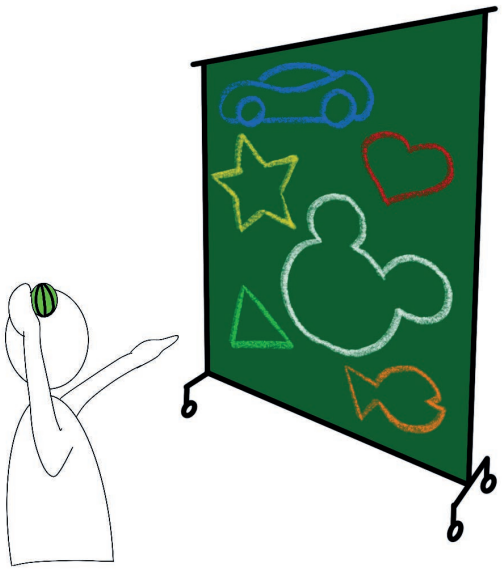


Figure 121. The drawing activity

PROTOTYPING

A garden carpet was used as a score sheet, and to the residents familiar figures were painted on it (figure 122). Velcro tape was put on the balls, and the balls were put in a basket (figure 123). The sheet was foldable by rolling it up. Numbers with Velcro were created to place on the sheet (figure 124). A dice was created to increase the unpredictability and curiosity in the game (figure 125).

Figure 122. Painting shapes to the carpet

Figure 123. Balls with Velcro

Figure 124. Points with Velcro

125. A dice to increase curiosity

EVALUATION INSIGHTS

+ All residents enjoyed the activity at least for one load of balls.
+ All residents understood and were able to carry out the activity (figure 126)
+ Residents showed happiness and pride when they hit a figure, with or without points
+ The activity was in various ways adaptable: sitting/standing, with or without points, together or alone
+ The residents were able to keep focus

− Taking the balls back (figure 127) was hard for the residents who were not able to stand stable. They also stopped the activity once the basket was empty (iteration 1).
− Especially people who sat during the activity only moved their upper body.
− The lack of curiosity during the game might lead to only a short interest in the activity (iteration 2).

"125 points, that is a lot, isn't it? People do not often win so many points, right?" – P2

ITERATIONS

The following iterations could be made to the final design, but are not yet processed.

1. More balls in the basket
2. Holes in the sheet will make it possible to let the light jump to several figures which might increase the curiosity and motivation of the resident

Figure 126. P4 and P2 throwing balls

Figure 127. P6 getting back the balls

7.2.3.4 MOVING TO MUSIC

tested with six residents

INITIAL DESIGN

In this activity (figure 128), residents are stimulated to move to the music by executing movements that are visualized on the movement cards like those presented in figure 129 and appendix I. The sheet for this activity is magnetic and consists of a grid of holes, which are placed in such a way that the light in the board shines through one of the holes to indicate which movement needs to be executed. All cards are magnetic, numbered, and consist of a level and additional information about the value of the movement and the things that need to be taken into account. The choreography can either be suggested by a manual and combined with a song (e.g. Queen – Crazy Little Thing Called Love: cards number 1, 6, 10, and 11) or can be set up by the caregiver and/or residents themselves.

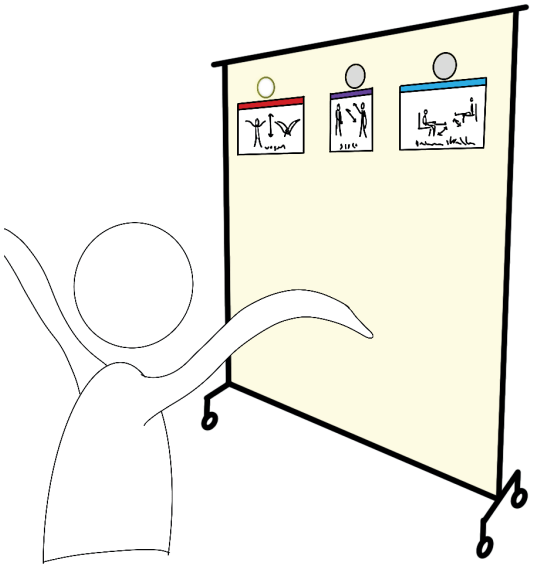


Figure 128. Moving to music

PROTOTYPING

Some movement cards were worked out and checked in terms of safety with the physiotherapist. The visuals are created as clear as possible, with real pictures (figure 130, on the advice of the logopaedist), clarified by keywords. The cards can be found in appendix I. For the prototype, a magnetic whiteboard is used and put on the clothing rack (figure 129). With push lights the jumping light in the design is simulated (figure 131).

Figure 130. Movement cards based on real pictures

Figure 129. The movement cards on a whiteboard

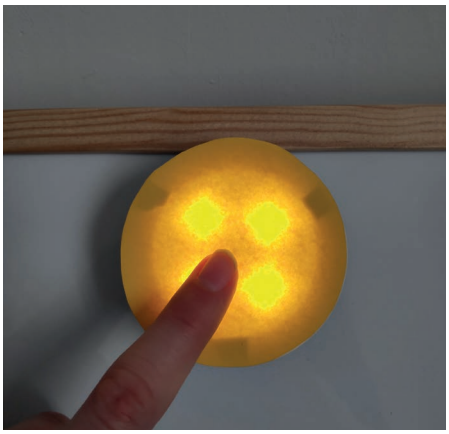


Figure 131. Push lights to simulate the jumping light in the board

EVALUATION INSIGHTS

+ Almost all residents liked the activity, concluded from their own answers during the evaluation, from their focus and engagement during the activity (figure 132), and from observations of the caregiver (quote below).
+ Five of the six residents understood the movements they had to execute from the cards, and that they needed to execute the movement of the card where the light was turned on (figure 133).
+ From a test with two residents emerged that a client could be helped by another client (figure 134) and have more fun while moving together (figure 135)
+ The activity evoked the most (varied) PA.

− Quite some supervision will be necessary, especially when clients do the activity while standing.
− The cards are not yet checked on suitability for people with vision problems.
− Some movements were too risky because of turns that could cause dizziness. Those were not tested.
− The card set needs to be elaborated and worked out: creating different levels and categories to make it challenging enough for some residents.
− From a distance, it might not be visible enough.

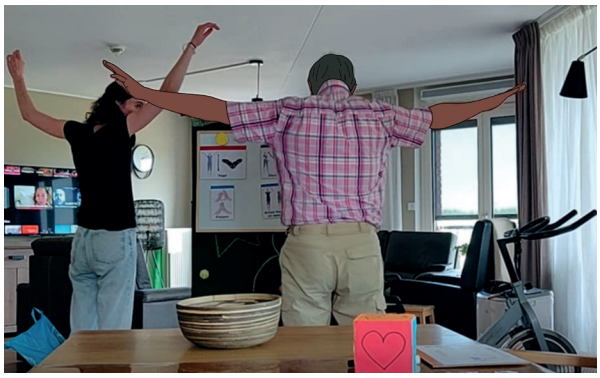


Figure 132. P1 moving to the music

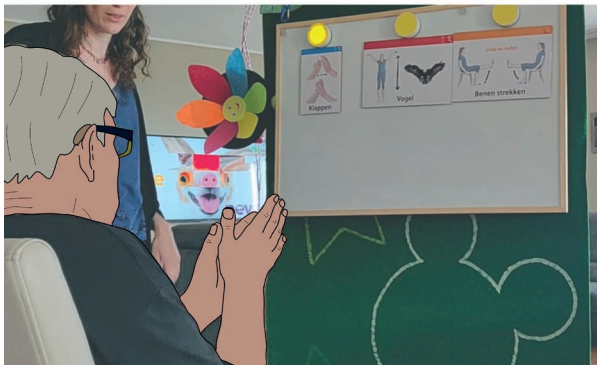


Figure 133. P3 clapping because the light is at the clapping card

"You can see that P4 really likes this activity, you see the relaxation in the face and she even looks very happy. She always talks about this for weeks after she did these activities." – caregiver about P3

"The pinguin I had at dancing class too" – P1

Figure 134. P4 looks at P5 to know what to do

ITERATIONS

The following iterations could be made to the final design, but are not yet worked out completely.

1. Working out the application, including setting the pace and the music
2. Defining how the choreography is connected to the music. Is a certain choreography suggested? Or should we keep it simple and just let the lamp randomly point out cards.
3. Check visibility of the cards for visually impaired people
4. Increase size of cards
5. Design the back of the card

Figure 135. P4 and P5 having fun together while moving

7.2.3.5 MAKING A PUZZLE

tested with two residents

INITIAL DESIGN

The puzzle making activity (figure 136) can be executed on the same sheet as activity three. Only a magnetic large image of the puzzle needs to be placed on the sheet and magnetic puzzle pieces should be placed around it. Puzzles should be marked with a certain level.

Figure 136. Making a puzzle

PROTOTYPING

For the prototype, puzzles were created by cutting an existing image in square pieces and drawing a grid on the original image (figure 137). The image and all pieces were put on the magnetic whiteboard. After the first puzzle appeared to be too difficult, another puzzle was created (figure 138). The image of this puzzle was chosen based on the interests of the client that tested it.

Figure 137. The first puzzle that was tested with P6

EVALUATION INSIGHTS

+ Well adaptable to the abilities and interests of the resident by choosing suitable puzzles
+ A familiar activity to some of the residents, which makes them enthusiastic
+ The end result can make people proud

− Easily too difficult, which ruins the experience (iteration 1)
− Hard when the pieces are not super distinguishable (iteration 1)
− No curiosity because the image is already there (iteration 2)
− Too little PA during puzzling, mainly because in the prototype, the client could reach the puzzle while sitting (figure 138)

Figure 138. A puzzle with less pieces and adapted to the interests of P3

ITERATIONS

1. Less pieces, better distinquishable, and image adapted to interests
2. Different shapes of puzzles and keeping it secret what image it is going to be
3. Increase size of the puzzle

Because the puzzle is not tested elaborate enough within this project, the puzzle activity is not included in the current final design. It is however easy to integrate it in the design, because the magnetic sheet of the Move to Music activity could be used for it.

"I think this is quite difficult." - P3

7.3 Conclusion of evaluation

Below, the most important insights of checking the concept with the criteria of chapter 5, and the general answers to the questions of subchapter 7.2.2 (appendix K) are summarised.

In general, the extent to which the resident enjoys the activity is clearly dependent on the extent to which the activity matches with their abilities (cognitive and physical). The more it matches, the more they seemed to enjoy the activity. Although some activities asked more from the memory and attention span of the residents, overall, most residents were able to understand and carry out most activities. Having various levels and activities clearly increased the concept's adaptability to the cognitive level, physical abilities, and interests of the residents.

During the tests of the MakiMove with the residents, they were asked simplified questions from which could occur whether they felt the intended interaction qualities. The residents clearly felt proud after executing most activities (as visible in figure 139), especially when they were successful during the activity, when they had a tangible end result, and/or when they got encouraged by the researcher or the caregiver. Most clients also really liked to do the activity and felt energetic because of it (quote on this page).

Because we stated that it is desirable if the client is able to use the concept independently, it would be valuable to dive deeper into how to integrate that encouragement in the concept and thereby unburden the caregiver.
The more the resident was able to keep focus, the less supervision and encouragement was necessary. Keeping focus was easiest when the required action stayed the same for a long time, e.g. when throwing balls, or when a continuous trigger was there, e.g. during the drawing activity. Extending this time or adding more triggers, thus, is a way of achieving more independent play.

The amount of PA depended on the resident's physical abilities and on their motivation during the activities. Being dependent on a wheelchair or being somewhat unstable forced at least half of the clients to sit during the activities, which decreased the amount of PA. Despite that, doing the activities certainly achieved a higher PA level in the residents, when compared to their usual spending of a free day, without such activities.

Although most evaluation results are processed in the final design, some elements in the design still require more tests and iterations. Due to limited time in this project, these elements are only explained in the following design recommendations.

"It is so nice to do something, otherwise you are just doing nothing all the time, then I get so stiff" – P4

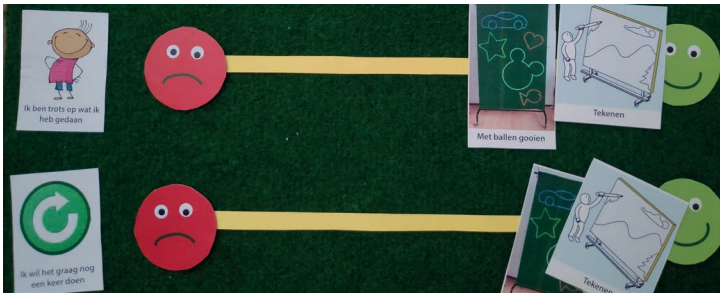


Figure 139. Evaluation map shows that the client felt proud about doing the activities

Design recommendations

Triggers before and during activities
More triggers could be added to the MakiMove, as a clear start of the activities or as stimuli during the activity, so the resident is not distracted. These triggers could make use of visual and auditory signals, like lights, spoken text, or moving objects. Moreover, the triggers should both motivate the client, and make the activity seem easy to execute, corresponding with the triggers in the Fogg Behaviour Model.

Encouragement from concept to resident
The encouragement and compliments of the caregiver or, in this case, the researcher, seemed to be important motivators. In the future, it should be tested more thoroughly whether this effect could also be reached by a mascot or another form of encouragement from the concept itself. The appearance and communication of the mascot would be important. In this iterations, it is important to keep the price of this mascot as low as possible.

Testing for a longer period of time
To be able to answer RQ 8 (to what extent does the concept remain interesting for residents in the long term?), the same activities should be tested a couple of times over a time span of at least a few months. RQ9 about the residents' motivation to initiate, start and/or continue with the activity, could then be answered more thoroughly too.

Testing with other residents
It would be valuable to test the activities with other residents too in order to disconnect the researcher (who does the activities with the residents) from the concept itself. This would increase the chance that the residents are testing the activity in itself instead of the activity combined with the presence of someone they know.

Testing when and how often, involving the caregivers
Although an educated advice was given for when and how often the residents could do activities with the MakiMove, it has not yet been tested with the residents. It would be valuable to test the advice of fixed PA moments in duos on the free days of the residents. The caregivers should be instructed on the exact actions they have to take, so it is clear for them, and we can simultaneously test what should be (improved) in the application.

Safety elements
The researcher thought about safety, but this important element should be defined in more detail and tested thoroughly before the actual concept could be used by the target group. Safety regards the board itself and how it gives physical support to people who are standing, for example while drawing. It also regards the information on the movement cards and, for instance, disclaimers on it, such as: 'this movement is not suitable for people who easily get dizzy or lose balance'.

Involve clients in visual design
The visual design of the board is defined by the researcher and not yet tested or discussed with the residents who took part in the project. It is recommended to test the appearance of the board and to let the residents help in decorating or defining the looks. This might even make them more motivated to use the board later on. After all, we found in the Discover and Develop phase that the clients liked to show their abilities or creations.

Detail the concept: application, drawings, puzzles and movement cards
Due to the time requirements of the project, the concept is not yet worked out in detail. A drawing database should be set up, a system of how to purchase puzzles and potentially other additional materials should be created, and the movement cards should be extended and detailed.

Add more activities (and more PA)
To increase the modularity of the concept and the chance of long-term motivation, activities could be added to the board. These activities can make use of the moving light inside the board, the magnetic sheet or the Velcro sheet. Some examples could be:

- Adding musical instruments with Velcro to the board, providing a more open for of play
- Letting the residents play a form of Pictionary on the board
- A vertical board game on the magnetic or Velcro sheet

Check on visual inclusivity
The visual design for the concept and its additional materials, such as the movement cards, should be discussed with experts on visual impairment.

REFLECT

How can older adults with an ID be involved in the process of finding ways to increase their PA?

That is the third main research question in this project, and the reason why this 'reflect' phase is added to this thesis. Chapter 8 shows a method story and guidelines regarding collaboration with older adults with an ID.

8. COLLABORATING WITH OLDER ADULTS WITH AN ID

Although the main goal of this project has been to create a design concept that fits the needs, abilities and wishes of the residents, also general knowledge on collaborating with this target group was developed. This chapter explains the derived knowledge, first by telling a so-called 'method story'; the rationale behind the co-design approach, and the adjustments made. After telling this story, the main recommendations for collaborating with and designing for the target group are presented.

8.1 Method story

This method story is set up according to the structure suggested by Hendriks et al. (2015) (subchapter 2.4, and appendix L for more explanation) with the aim of letting other researchers or designers learn from the co-design experiences. Since the co-design process of this project sometimes headed more towards a human-centred design approach, the first three points of the method story are a bit less applicable to this project.

1. The positioning of the participants' impairment in the codesign project

The intention in this research and design process was to involve six clients in the full process, with a main focus on their abilities instead of their disabilities. This intention did not mean that the impairment of the residents could be ignored; it definitely played a role. The impairment was, however, never directly a topic in the conversations with the clients themselves. These conversations revolved around getting to know them personally and gaining insight in their experiences and feelings in general, regarding PA, and later about the activities they executed. The impairment did influence the process of collecting information and data (see point 5 and 6 of the method story). Logically, the impairment came up sometimes, for instance when a client did not understand an activity or experienced other characteristics of the disability. This pointed out the importance of adapting the methods and activities to their abilities. Moreover, the impairment and corresponding symptoms were discussed with the caregivers. This knowledge about the clients helped estimate how to approach each client in the best way.

The first phase taught us that it was too challenging to involve the clients in configurating the co-design process or coming up with ideas. From the perspective of focusing on the possibilities, in the continuation of the project they were mainly asked to try out the created ideas and activities.

2. The aim for equivalence: How were equal contributions and collaboration supported?

In this project little or no collaboration in groups took place, we mainly worked with 1-on-1 contact between researcher and client. Efforts have been made to ensure equal involvement of all clients, but due to the varying week schedules of the clients, this was not always possible. Large differences in cognitive and physical abilities even asked for different approaches, precisely to generate a more valuable contribution from each individual.
By trying to speak the client's language and moving along with the needs and abilities of the clients, the researcher tried her best to give the residents a meaningful and positive experience in the project. Despite the effort to adapt everything as best as possible to the different clients, the activities will have been a little too easy or too difficult for some of them sometimes. That is the risk of trying to design something for a very diverse target group.

3. The balancing of viewpoints

Because no legal representatives or other proxies were present during the sessions with the clients, no situation could occur in which the viewpoints of the client and proxy differed from each other. Caregivers were sometimes asked to observe the activity from a distance and analyse the response of the clients to the activity. Presumably, the researcher also developed a greater sense of analysing the clients' reactions during the project. However, the inexperience of the researcher definitely affected the process in a way that it was sometimes hard to obtain information out of tests when it was too difficult for the clients to form or verbalize their opinion. It would be valuable to consult a behavioural scientist for analysing the behaviour of the clients. On the other hand, not involving experts during the client sessions empowered the clients more and let them contribute a lot.

4. Dealing with ethical challenges

During the project, various practical, legal, and ethical challenges occurred and were dealt with. Below, some of the most influential challenges are explained.

Practical challenges

- During the first weeks of the project, the communication between researcher and the caregivers of the house was still somewhat unclear and unstructured. This was solved by designating one contact person from within the group of caregivers.
- Changes in planning or in the physical or mental state of the client regularly caused that a session could not take place (completely).
- The residents all had a different weekly schedule and a different (or no) day off from their work at the daytime activity centre, which made it impossible to test with more than two residents on one day. This challenge was solved by visiting the house on three different days for (almost) each round of testing, sometimes on weekend days, and sometimes at the daytime activity centre.
- The iterative and unpredictable course of a design process made it difficult to schedule regular visits on fixed moments, although this might have been the preference for the residents.

Legal challenges

- The clients and their legal representatives were asked for permission in an informed consent. Because the researcher was not allowed to contact the legal representatives directly, this contact was made via the caregivers. This caused delays and some confusion in the process of obtaining permission. This was solved by staying in contact with the caregivers of the house, where possible trying to send the informed consents via post, and foremost waiting till all forms were completely filled out.
- For ethical reasons, the clients were also asked for permission in an adapted informed consent with more visual and less textual information. In practice, it became clear that this adapted version was still way too difficult for most residents. The residents were therefore only asked whether they would like to join some activities, whether they gave permission to keep the anonymized data for five years, and whether they were okay with being approached for more research later on. Because not all residents were able to write more than their name, these informed consents were not fully filled out.
- Because the researcher was not in direct contact with most of the legal representatives and also had no rights to write in the clients' file, it was hard to involve or update the legal representatives in the project. It is however possible to send an update to the representatives via the caregivers.
- The privacy regulations sometimes stood in the way of an optimal explanation or visualization of the experiences in the process. This is partly accepted and party solved by anonymizing the pictures in such a way that still some facial expression is recognized.

Ethical challenges

- During the project, a well-known ethical dilemma occurred, which came down to the question of whether you should still teach healthy behaviour to someone who is of old age, especially when this client does not feel the need for it. This dilemma was solved by adding the requirement that interaction with the concept should be optional and evoke positive feelings in the clients.
- In a co-design process you would like to involve the target group in all of the phases, so you do not design for, but with them. After all, they are experts of their own experiences. However, for the residents who were involved in this project, it was not an option to be involved in coming up with ideas by themselves. This is solved by still involving them a lot in trying out activities, and by involving the caregivers, who know the residents well, in the generation of ideas.

The impact of this project on the research participants is hard to estimate from the perspective of the researcher. Presumably, the activities mainly had a positive impact to most residents, because they often indicated that they liked the activities and often even asked when would be the next activity. The researcher learnt a lot in finding the right techniques and tools to communicate with the residents, in other words, in designing ways to research something. More about the impact of the project on the researcher can be read in the personal reflection at the end of the thesis.

5. The adjustment of codesign techniques

The ID of the target group made it necessary to make adjustments to existing co-design or research techniques. In particular, a number of specific symptoms of the disability were taken into account. Figure 140 shows these symptoms, how this affected the (choice of) research or design techniques, and whether this worked out or not. The table is the retrospective variant of the table in figure 19, that was created before the sessions.

All in all, a lot of flexibility was required regarding the approach of the sessions. That is why an alternative in the form of a balloon or something creative was always brought along to the sessions, just in case the planned activities did not suit the abilities or mood of the client.

Symptom or difficulty	Adjustments or decisions	Reflection
Difficulty in abstract reasoning	1. The prototypes needed to be detailed, because quick, functional, abstract prototypes would ask too much imagination (and therefore abstract thinking) of the clients. 2. The clients were asked about their concrete experiences and how they liked those instead of asking open questions (e.g. about the why). 3. Trying out things instead of talking about things	1. The detailed prototype helped in collecting the right information, although it still happened that clients only responded to the fact "that the dice was not glued properly". 2. This helped for the clients to be able to give more information. It however led to more interpretation and observation of the researcher in order to gain valuable and generalizable data out of it, which makes data less reliable. 3. Trying out and observing worked well and often better than conversating about activities.
Slower pace of thinking and information processing, limited to concrete topics that take place in the now	The clients did several activities, which were evaluated right after each activity, so it was still concrete and recent	This worked fine, although it would have worked even better to ask the questions during the activity. Sometimes, it seemed difficult to answer the questions right after the activity. For instance, they did not feel like doing it again, because they just did it. It was hard for them to imagine if they would like to do it again another time.
Forming own thoughts and feelings about a topic and verbalize them + lower level of comprehensive reading	Making a conversation map with clear (visual) statements and a choice between a happy and sad emoji; two basic emotions that are familiar to the client	For the clients who had enough attention span and energy left to evaluate the activities, this conversation map seemed to work well. The visuals do need to be well-chosen (see point 6 of the method story).
Differentiating between several options and remembering information	It was tried to let the residents decide between only two or three options at the same time and to visually support the options with clear images	Whether this worked or not depended on the client. Some clients still always chose the last option, which corresponded with the information in chapter 2.4.

Figure 140. Difficulties experienced by people with an ID (Douma, 2018), the decisions and adjustments I made because of these difficulties, and the reflection on how well these adjustments worked out

6. The data collection, analysis and interpretation

Figure 141 shows what and how the data was collected in this project. The data in some ways differs from data that is usually used by researchers and designers. For example, the data obtained from conversations with clients is often more superficial. To complement this data, the caregivers or other experts are consulted, but their information about the clients is second-handed and thereby also influenced by their (expert) interpretation. The same goes for data collected by observations. In addition to that, not all clients were asked the same questions or to execute the same activities, partly due to their different abilities. Together with the low amount of participants, this sometimes resulted in less argumentation for the insights than in usual projects. All these differences as to usual data collection may have negatively affected the reliability of the data and, therefore, of the gained knowledge.

To compensate for these challenges, it was important to reflect on the reliability of each piece of data. If, in a conversation, the client said yes to all questions, the conversation results were less valued, and more attention was paid to observing the video recording of the activity. Besides, the superficiality of the data was deepened by linking the data together and interpreting it. Combining and comparing the data to the insights derived from literature and from other stakeholders in the context also improved the reliability. Lastly, the researcher also had to accept the fact that not a lot of deeper layers or surprising insights would come out of the Discover phase, and trying out products and activities was the more suitable way to gain knowledge.

What data	How it was collected
Physical abilities and risks of the clients	Interviews with the physiotherapist of the clients
Information about the ID and the best way to approach each client	Consulting literature, conversations with the caregivers and access to the care map of the house
Experiences and interests of each client	Interviews with the client in a game like format
Emotions and thoughts regarding the executed activities	Asking questions (with or without supporting material) and/or observing the client during and after the activities, caregiver's observations occasionally
Information about the lives and context of the clients	Interviews with caregivers and clients and observations at the daytime activity centres and the house

Figure 141. Data that was collected in this project and how it was collected

8.2 Guidelines for collaborating with, and designing for older adults with an ID

The experiences in this project led to the following recommended guidelines for collaborating with, and/or designing for older adults with an ID. Since each individual and each group of people with an ID is different, these guidelines might not be applicable to any other individual or group of people with an ID.

1. Think about what specific target group would presumably benefit most from reaching the goal of your project. Think about the desired age, abilities, diversity within the group, and potential earlier experiences or education in joining design or research projects as a participant.

2. Visit and get to know the people and their abilities before deciding on a research or design method. In this way, a mismatch between the used methods and the abilities of the research participants can be avoided.

3. For ethical reasons, the clients and often their legal representatives need to sign an informed consent. Make sure to adapt the form to the level of the clients (appendix C).

4. Before starting the actual research activities, spend enough time on getting to know the residents, and letting them get used to your presence as a researcher. Announce your arrival and project in advance, for example with a clear letter or flyer (appendix A). Explain the project, the goals and the activities the clients can expect.

5. Also get to know the caregivers, and other people/experts that are close to the clients. They can both provide you with relevant information and are very useful to involve in the process of idea generation. You can keep them involved in the project by sending news letters (appendix N)

6. Make sure the tools or techniques to collect data match with the abilities of the participants; avoid a too difficult or childish approach. Finding the right balance is a challenge and a skill that will be improved by trial and error.

7. When using visual material, which is recommended for this target group, consider carefully which images you use. Keep in mind the clients' difficulty with abstract reasoning.

8. Adapt the duration and content of the session to what the client can bear; avoid overwhelming them. Despite a well-considered preparation, sometimes the session does not seem to suit the moment or the client's abilities. Therefore, always bring alternative activities.

9. Be critical about the reliability of the collected data. Learn to recognize when the clients answer based on lack of understanding or the want to give the desired answer. When you think an answer of the client does not match your observations or assumptions, try to check it with the client, for example by giving an example (as in the quote).

   Researcher: "Did you become tired of the activity?"
   Client: "Yes very tired"
   Caregiver (who helped for a minute): "But do you really need to go to bed and sleep now?"
   Client: "No, that is not necessary"

10. Since the clients often have difficulty in imagining what something would look or feel like, let them try out things rather than talking about it. If you need the residents to try out prototypes, make sure the prototypes are close to reality. In this way, you maximize the chance that the clients react to what you want to test.

11. Encourage the client during the session, so you confirm to them that they are doing well. Simultaneously, be aware of the influence your presence has on the results of the sessions.

12. Evaluate a test or activity during or right after the client executed it, so the information is still concrete and recent, making it easier for the client to form an opinion.

13. Ask the caregivers of the house if they can shortly report whenever a client talks about the project in your absence. This helps to gain more insights in the impact of the sessions on the residents, separate from your presence.

14. Once the project ended, award a certificate or other reward to the participants (appendix M).

DISCUSSION

Research questions and findings

RQ 1. What are the barriers and motivators to performing PA experienced by older adults with an ID?

Figure 8 showed the barriers and facilitators that occurred most in the literature review of Bossink et al. (2017). Many similar barriers and facilitators, in this project called motivators, were derived from the context research (figure 57). Being dependent on someone else or an external stimulus, not understanding an activity, having had previous negative experiences, and experiencing decline in physical abilities due to the aging process are some of the most relevant barriers towards PA, either experienced by the older adults in this project or observed by the experts around them. On top of that, the caregivers, who could play a role in increasing the PA of the residents, barely have time left for activities beyond their current range of duties. An intervention for this target group must circumvent these barriers and make use of what does motivate or activate them. Providing the residents with a feeling of success and trust and with structured and regularly planned activities, offering them an option to be active together with others, and encouraging them during an activity are helpful ways to motivate the residents. Most important seems to be that the intervention fits the interests and abilities of the client, and that it does not necessarily have PA as the end goal, but rather as an unconscious side effect.

The found barriers and motivators led to criteria for a final concept, of which the seemingly most crucial ones were integrated in the design goal: stimulating older adults with an intellectual disability to be physically active on a regular basis, in a way that suits their individual abilities and interests, asking minimal time and effort from their caregivers.

RQ 2. How to stimulate older adults with an ID to perform PA?

To enable the residents to successfully join an activity with as little supervision as possible, it is important that they like the activity, they understand the activity, and that they are able to keep their focus. The first research question brought the insight that an intervention of any kind should be adapted to the individual's abilities in order to be successful. Getting to know the residents and involving them in trying out activities yielded the following insights, that brought us closer to a suitable design direction for these residents:

- Playing in duos was the right balance; not alone and not overwhelmed by a group
- Creating something during an activity, enabling them to show their skills, motivated the clients
- Music evokes PA in most residents
- An assignment for an activity should be specific, clear, and visually supported by an example
- Encouragement during an activity motivates and activates the residents
- The large differences between the residents' age, cognitive level, physical abilities, and interests ask for a variety of activities and levels

Responding to all the insights gained, the MakiMove was developed, which offers exercise activities for music lovers, sports fanatics, puzzle talents, and creatives. Each activity takes place on the same board, but requires a different attachable overlay. To respond to differences in cognitive and physical abilities, various difficulty levels have been added and the activities are adjustable in height. Tests showed that for each individual client, the MakiMove offers at least one suitable activity, that is experienced as feasible, understandable, and amusing. Having to perform a repetitive action and/or receiving stimulative encouragement of the researcher enabled most clients to keep their focus to the activity. Despite the possibilities to perform the activities together or alone, with or without points, standing or sitting, and on higher or lower difficulty level, the concept still suits one client better than the other. Although it remains to be seen in practice how much effort is required from the caregiver (or other supervisor), the design goal has been largely achieved.

RQ 3. How can older adults with an ID be involved in the process of finding ways to increase their PA?

Retrospectively, the involvement of older adults with an ID throughout the process was analysed and insights were translated into a number of guidelines for collaboration with this target group. It seemed more important than ever to get to know the individual research participants well, in order to:

- be able to take the abilities and difficulties of the individual into account
- choose the right approach and adapt the methods accordingly
- optimally utilize the contribution of the residents
- ensure a more pleasant experience for the residents

By not only getting to know the residents, but also the caregivers at home and at the daytime activity centres,

a clear picture of the lives of the residents could be generated. In this project, the older adults had a valuable contribution by trying out activities and communicating their thoughts and feelings to the researcher. This was a form of contribution that fitted these residents and this project best, but there is not a general best way to involve older adults with an ID into a design process. However, the method story and the collaboration guidelines were set up to function as inspiration for future researchers in this topic.

Strengths and weaknesses of the project

Strengths

1. Strong focus on the residents and their involvement
A personal approach in the individual sessions empowered the residents and enabled the researcher to design a concept that matched with their abilities. Many sessions were organised to generate knowledge and stay close to the research context. Involving the residents so thoroughly, presumably contributed to the success of the concept.

2. MakiMove: a modular concept
The testing of the final concept MakiMove on all six residents, indicated that for each resident at least one, but often two or three activities were fun and feasible to execute. The various activities, levels, and add-ons (like the score numbers in the ball game) seemingly helped in letting the concept resonate with the individual, while the activities were still suitable for playing together as well. Ideally, the concept is specific enough to resonate with individual clients, but general enough to resonate with the general population of clients. More tests are necessary to appraise whether this ideal balance is achieved.

3. Focus on positive experiences
During the project, the main focus was on creating a positive experience for the resident, rather than on increasing the PA. Increasing the PA was a criterion, but was integrated as a side-effect in the activities, rather than the end goal. This led to both conscious and unconscious successes of this criterion. Focusing on positive experiences eliminates the often present prejudice against PA.

4. Involvement of various stakeholders
A diverse group of expert stakeholders was consulted throughout the project, and strengthened the research. The barriers and motivators for performing PA in the residents were complemented with the perspectives and knowledge of the house caregivers, activity centre caregivers, and the physiotherapist of the house. The innovation department and the logopaedist of ‘s Heeren Loo were consulted to gain more inside in existing interventions and in testing interventions with the participants. Furthermore, the supervisors of the project added valuable information with their expertise in movement sciences, design, the target group, and doing research with the target group.

5. Combination of research and design
The project consisted of many research and design activities, that were often intertwined in a research through design approach. For example, research was conducted through testing different designs and research methods, such as the conversation map, were designed to collect the best possible data. In addition, the research part of the project is strengthened by a more overarching reflection on collaboration with this target group, aiming to inspire future similar co-creative projects.

Weaknesses

1. Small amount of participants
The amount of residents and caregivers involved in this project has been small and all participants lived within the same region. This small amount of people is common for a co-design approach, but makes the results less generalizable. It therefore negatively affects the external validity of this research. The diversity in characters, abilities, ages and interests in the group of residents minimize this negative effect.

2. Validity and strength of collected data
Because people with an ID have difficulty with forming and verbalizing opinions, collecting data was a challenge in this project. People with an ID sometimes tend to acquiesce, especially when they did not understand the question or when they feel they need to give a socially desirable answer (Shaw & Budd, 1982). In other words, the research participants might not have answered all questions according to what they really thought. Figure 142, for example, shows answers of one of the residents in this project. He only gave the socially desired answers, which made me aware of the possibly lower reliability of the data.

Figure 142. Conversation map with only positive answers

Attempts were made to minimize the chance of acquiescence, by using suitable interviewing techniques and supporting material as well as consulting literature and caregivers throughout the project. In addition, the reliability of the generated data has been evaluated and has influenced the extent to which the data has been included in the process. Information from the interviews has often been complemented or supported with the observations of the researcher.

3. Presence of the researcher
What could have influenced the reliability of the data is that the researcher was always present at the sessions with the residents. During the project, the residents got used to this researcher and probably linked the activities to the presence of the researcher and the personal attention they received. The residents might react different to the activities when the researcher is not there. This could have been partially solved by validating the results with new residents who would not yet be familiar with the researcher.

4. Validation of the caregivers
Due to the busy daily program of the caregivers, it was desirable to come up with an intervention that enables the residents to be active independently. Since this appeared to be too challenging for the residents in this project, actions of the caregiver are required in the final concept. Although these actions are defined and the caregivers were involved in the early stage of the ideation process, the final concept is not yet validated and discussed with the caregivers.

General comparison research context and literature review

The barriers and motivators derived from the context research and first sessions with the residents (chapter 4) are largely similar to the barriers and facilitators(/ motivators) found by Bossink et al. (2017) in their literature review (chapter 2). All barriers and motivators were divided over personal and environmental factors. In the context research as well as the literature review, many personal barriers and little personal facilitators to performing PA were found. This clearly reflects the challenge for this target group of remaining sufficiently active and shows the need of a helping hand from the environment; environmental facilitators. The literature shows only a few of those, which is where the context research seems to differ from the literature review. In the context research, more concrete facilitators were found.

Compared to the context research, the barriers in the literature review seemed to be focused on a broader context, for example ‘lack of family support, or transport options’. The scope in the context research was a bit more narrow and limited to one house and the possibilities within that house, which led to the more personal and specific barriers and motivators.

12 of the 24 studies addressed in the literature review emphasized lack of financial resources or support as a barrier to performing PA. Although this barrier is present in this research context as well, it did not came to front in the conversations with the caregivers or clients. However, more money could increase possibilities in increasing the PA, it could for instance enable a house to purchase existing technological interventions that seem to work well, but are quite expensive, such as the Tovertafel (Anderiesen, 2017). Furthermore, money might enable ‘s Heeren Loo to hire someone as a PA supervisor who visits the older clients and do activities with them. A lack of financial resources does however not necessarily mean that PA is not possible. In this project, cheap materials or interventions evoked PA in the residents.

Besides all these barriers and facilitators, the difficulties experienced by people with mild to moderate IDs explained by Landelijk Kenniscentrum LVB (Douma, 2018) were also largely recognised in the residents of the research context. The advice on interaction and communication with the target group was applied successfully in the project.

Strengths and weaknesses compared to other research

Strengths

1. More personal knowledge
The barriers and motivators from the context research contain more specific and personal information compared to the barriers and facilitators found in the review study of Bossink et al. (2017). This could be explained by the focus on getting to know each individual as opposed to a potentially more generalized approach in other studies. As assumed, the more specific and personal barriers and motivators, the more knowledge of the individual clients, the better the final concept matches with the needs, abilities and wants of these clients.

2. Focus on people of older age
Of the 24 studies reviewed in the article of Bossink et al. only one study had about the same age group as in this project, all other studies were executed with youth or young(er) adults with an ID. Since Hilgenkamp et al. (2012) stated that the amount of PA in people with an ID and an age 50 years and over is extremely low, involving people of older age seems to be a strength compared to the majority of previous studies.

3. Combination of older adults, ID, PA, and co-creation
Many studies have been conducted to PA of older adults, to PA in people with an ID, or to co-creating with people with an ID. Rotta et al. (2022), for instance, tried to increase PA in young adults with an ID. This study did not use a co-creative approach and did not include older adults with an ID. Constantin et al. (2022), on the other hand, did look into the use of co-design approaches in developing PA interventions for older adults, but did not include people with an ID. Concluding, the use of a co-creative approach in increasing PA in older adults with an ID adds value to related literature.

4. A physical concept as end result
Many existing studies in the field focus on research rather than on a tangible design. The fact that the generated knowledge is translated into a design in this project, might lower the threshold of implementing the results in the research context.

Weaknesses

1. Less involvement in the act of designing
In this project, the residents were less involved in the ideation itself than in some other studies, such as the study of Vega et al. (2020) where people with an ID were involved in co-design workshops. Presumably, this difference can be partly explained by the fact that most residents who took part in this project are of an older age than in the average participatory and non-participatory research study in which they are usually involved.

2. Less expertise involved
In this project, the sessions with the clients were executed without experts or relatives taking part in the sessions. On the one hand, this empowered the clients. On the other hand, it could be a weakness as opposed to, for instance, the study of Anderiesen (2017), in which carers and relatives played “an important intermediate role” in the sessions.

3. No experienced test participants
The innovation department of ‘s Heeren Loo executed similar projects and sometimes collaborated with people with an ID who were trained as research participants. These clients learned more about how to form and verbalize their opinion about concepts or activities. This might have led to more raw data from conversations and tests with the clients, than in this project.

Implications

The barriers and motivators towards performing PA derived from the context research provide an insight in, respectively, what needs to be avoided or solved, and what can be used as motivating element in potential interventions.

The overview of existing interventions, consisting of physical (technological) products, research programs and tools, show that the implementation of studies and interventions is an important step to really increase the PA of people with an ID.

Results of testing the MakiMove with the residents indicated that the concept, or at least a similar design direction, could be of help in increasing the PA of older adults with an ID. The MakiMove should be worked out in more detail and tested with other people to optimize it. The adaptability of the concept, thus variety in activities and levels, should be taken along as criteria for potential future development of interventions.

Although the goal of the project was to find ways of increasing the PA of older adults with an ID without asking minimal or effort from the caregiver or another person, the barriers appeared to make this aim extremely challenging. Moreover, this goal goes against the client's need for social contact and personal attention, which suggests that independent PA might not be the road to take. This project shows that other issues might need to be scrutinized as well, such as the overload of the caregivers or the lack of implementation of interventions.

This study provides information about how older people with intellectual disabilities can contribute to a design and research project. The results indicate that involving this target group in a design process can be of value and that this value increases when the researcher and participants gain more experience and knowledge about this collaboration. Sharing of experiences and knowledge is therefore important. The guidelines and method adaptations presented in chapter 8 can function as inspiration and help for future researchers or designers that will collaborate with this target group.

Future research

Future steps in this research field could be:

- A follow-up project should be carried out to find the possible routes that can be taken to bring the existing intervention and knowledge into practicse. What are the thresholds, what does and what does not work, what is already being applied, what is necessary in order to apply the different interventions?
- Secondly, a caregiver centred follow-up study should be performed, investigaging what their range of tasks consists of, which tasks they could be relieved of, and how they could spend more time on PA together with the residents, without losing sight of the caregivers' needs, or if another person could fulfil this function.
- Third, it is of value to conduct a similar research and design project with a group of participants who are not yet experiencing physical or cognitive aging symptoms. This might influence the contribution of the participants and enable the researcher to measure whether an intervention can actually prevent or minimize these kinds of complaints.

Research recommendations are presented in chapter 11.

CONCLUSION

The barriers to physical activity (PA) found in the context research make it difficult for the older adults with an intellectual disability (ID) to join any form of PA independently, without external facilitators. Although the caregivers seem to be a suitable 'external facilitator', they lack time to focus on the PA of the clients. These two insights together raised the question of how to stimulate PA in the residents while asking minimal time and effort from the caregivers. To enable the residents to join an intervention with as little supervision as possible, we found it was important that they liked the activity, they understood the activity, and that they were able to keep their focus during the activity. To meet those requirements, it is highly important to create a modular intervention: adjustable to the interests, the physical abilities, and the cognitive abilities of each individual. For creating such an intervention, it is necessary to get to know the interests and abilities of each individual client.

Getting to know the clients and involving them in a suitable way in various stages of the process is the approach taken in this project, expecting this would enable the researcher to design a fitting intervention. As a result of this co-creative and human-centred approach and as a response to the insights gained in the Discover and Develop phase, the MakiMove was created. From tests we derived that the concept, that offers various (difficulty levels of) activities, helped in stimulating the older adults to participate in PA. All residents were able to and liked to execute most of the activities provided by the concept.
Carrying out the activities of the MakiMove independently appeared to be difficult; some assistance form a supervisor will be necessary. On the one hand, this requires an improvement of the concept. On the other hand, we should wonder if moving independently is really the right goal, or if we rather need to look into how to enable caregivers or other supervisors to play a role in increasing the PA of the older adults. This line of thinking is reinforced by the finding that social contact and encouragement were valuable external facilitators for the clients.

Referring to the aims formulated in the problem statement, in the MakiMove we found a concept that largely achieved the design goal:

Stimulating older adults with an intellectual disability to be physically active on a regular basis, in a way that suits their individual abilities and interests, asking minimal time and effort from their caregivers

It should be investigated whether this achievement is an indication of a positive effect of the collaborative approach taken in this project on the success of the intervention. The personal approach at least made the overall collaboration a more pleasant experience for the residents and the researcher. The focus on the collaboration with the residents from 's Heeren Loo led to valuable insights regarding collaborating with older adults with an ID, which is useful for future research. Moreover, the insights fill part of the gap in literature regarding collaboration with older adults with an ID on the topic of increasing their PA.

11. RECOMMENDATIONS

Besides the design recommendations in chapter 7 and future research suggestions in the discussion, this chapter shows recommendations that reflect additional opportunities for increasing the PA of the residents, in the project context, but also in the overall population.

#1. Developing a creative session for caregivers
During the project it became clear that all the caregivers I spoke to at the house or at the activity centres were very different from each other. Thus, they also had different approaches to and perspectives on the topic of PA of the residents. In chapter 6.1, the creative session together with the residents is reported. Many useful ideas came from this meeting, which is why I recommend, for example, the innovation department of 's Heeren Loo to create an interactive creative session or workshop package on the topic of increasing the PA of residents. This workshop is suitable for teams of caregivers at a house or activity centre to brainstorm together on how they can integrate more PA in the daily lives of their clients. This results in caregivers inspiring each other and stimulating the residents to be physically active. The session preparation of appendix F could function as a starting point.

#2. Make someone responsible for PA in the house or activity centre
While researching the existing interventions, it became clear that a lot of interventions have been created over time. Although they are not always aimed at older adults, it is recommended to look into existing interventions, select the most promising ones, and implement them in a house or activity centre. For this, I recommended to appoint one caregiver or other employer as the 'PA commissioner'.

#3. Include PA stimulating materials in the living room
We found that the lack of PA of the residents can be explained partially by their habitual behaviour, which is often sedentary and inactive. Presumably, the space in which people spend a lot of time could play a role in activating the residents. It is recommended to the houses and daytime activity centres to add some PA stimulating materials to the common areas. Examples could be a box full of balls, balloons, instruments or games that require PA.

#4. Use the quiet moments to be active with a resident
From observations and conversations was derived that there are several quiet moments in the day, in which the caregiver is alone with one or two residents. Especially the caregivers who are flexibly deployed, who are not required to do a lot of administrative tasks, might have more time left to spend on a short activity with the client. At such moments, it is recommended to do an activity that requires PA, at least of the resident.

#5. Focus on prevention
As the physiotherapist of the house indicated when talking about residents that were quite active, it is important to focus on keeping them active and preventing relapse. A lot of disorders or complaints in older adults partially come from a low level of PA. Since prevention is always better than cure, it is recommended to intervene before the older adults develop any symptoms related to aging or inactivity. Therefore, in an ideal situation, the focus on prevention would be recommended as well.

12. PERSONAL REFLECTION

In the first project of my Bachelor of Industrial Design Engineering, I designed the 'Waveboard' for Oma Trudy (my grandma), who suffered from Parkinson's Disease. This plate helped her get food on her spoon with a bit less effort than with normal plates. Even though this particular plate turned out to already exist, and I had not made a ground breaking invention, I still remember the moment Oma Trudy tested my prototype. It felt very valuable just to focus on a problem someone else is experiencing and, with the help of designing, show the person that I would like to help. Eventually, the ultimate dream is of course to actually be able to help, with or without your designs.

I am glad that I got the chance to try to help people in my graduation project as well, this time with a little more experience. About nine months ago, I started with this final project as a student of Design for Interaction. Now, a little later than planned, but with a bunch of new experiences, I am putting the finishing touches to the thesis. To close off, I would like to reflect on the impact that the project has had on me as the designer and researcher, but foremost, on me as a person.

In several ways, the project was quite challenging for me. In my previous student projects, I mainly conducted interviews with a target group, and afterwards analysed all data extensively in order to get to the deeper layer. That suited my tendency to prepare everything in detail and thoroughly think everything through, which helps me to keep structure in my head. The research phase was always more my thing than the design phase that followed, since this is more chaotic and fuzzy. However, even though I enjoy researching and interviewing, I have always wanted to improve in this design part. Especially since I see the value of applying the found insights to actually make a change or improvement. 'Overthinking' is not always the way to go.

This project was the perfect learning experience. Literature research and interviewing alone was not the suitable way of gathering information, so I had to design other ways of obtaining information. The focus was more on creative thinking, repetitively trying out together with the residents, and communicating to the various stakeholders. A lot more 'doing' and going out of my comfort zone than I was used to. I am honest when I say that there were times when I wished I stayed a bit closer to my comfort zone. But retrospectively, the clichés about 'learning more outside your comfort zone' have turned out to be true. Although I see quite some room for improvement in my project, I have overcome social and practical barriers of designing, interacting with stakeholders, and leading a project, even at times when I was not feeling well. I would not have been able to do this without the support of a great team of supervisors, and of my family and friends.

In other ways, the project actually did suit me. Interaction with the target group required a personal, patient approach with a lot of attention for the clients. Because I enjoy helping others, this was a great opportunity to experience this sector up close and hopefully ultimately contribute something as a designer. I found it impressive to see how well the caregivers interacted with the residents. In the beginning I was insecure about whether I was approaching the clients in the right way. Therefore, I was very pleased to hear from one of the caregivers that, according to him, I had moved along well ('goed meebewogen') with the residents and that I always respected and accepted them as they were.

Although at first, it was quite a step to get to the research context, the threshold became lower and lower. Eventually, I felt welcome and in my place. I owe that partly to the residents, who often welcomed me warmly and asked if I would come back when I left. From them, I learned to be happy with small things and not always be in a rush. I am proud of them for helping me so well in this project and getting their 'Beweegdiploma'. And I think I am even a little proud of myself for taking on this challenge.

If you made it this far, thank you for reading my thesis. I recommend getting a break and some physical activity.

Enjoy your day!

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APPENDICES

EVEN KENNISMAKEN... MET KIM

Hoi bewoners en begeleiders van [redacted]

Mijn naam is Kim en ik zal jullie binnenkort in het echt ontmoeten. In deze brief leg ik alvast uit wie ik ben en waarom jullie mij komend jaar regelmatig zullen zien. Leuk dat jullie dit even lezen, verder hoeven jullie niets te doen!

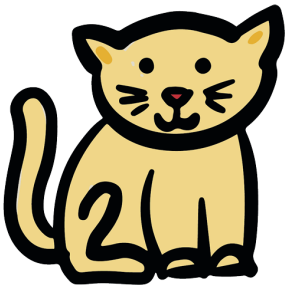
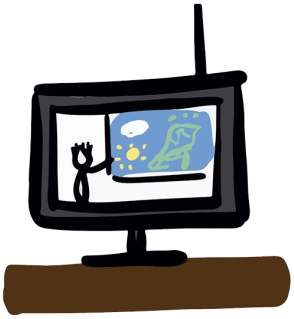
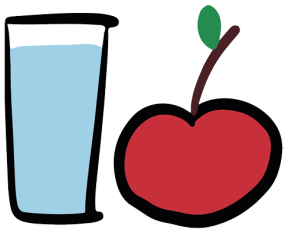
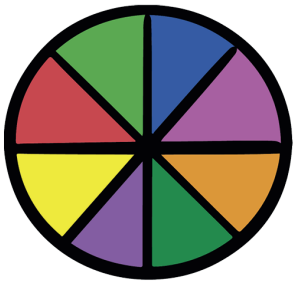
Wie ben ik?
Ik woon al zes jaar in Delft en ga daar ook naar school. Mijn hobby's zijn volleyballen, zingen en wandelen in de natuur. Ook vind ik het leuk om creatief te zijn, door te knutselen of foto's te maken. Als ik klaar ben met mijn opleiding, ben ik een ontwerper en kan ik bijvoorbeeld nieuwe producten uitvinden.

Waarom kom ik langs?
Ik kom langs omdat ik binnenkort wil onderzoeken op welke leuke manieren jullie vaker zouden kunnen bewegen in de week. Hiervoor zou ik heel graag met jullie samenwerken!

Wat gaan we dan precies doen?
We zullen eerst samen praten over bewegen, bijvoorbeeld over wat jullie wel of niet leuk vinden aan bewegen. Als we elkaar een beetje hebben leren kennen, gaan we ook creatief worden in 'creatieve sessies'. We gaan dan samen ideeën bedenken en bijvoorbeeld knutselen om de ideeën ook echt uit te proberen.

Ik vind het leuk om jullie binnenkort te ontmoeten!

Groetjes, Kim

Thuis 	Dieren 	Buiten en natuur 	Sport en bewegen 
Creatief 	Muziek 	Film en televisie 	Eten en drinken 
Kleuren 	Spelletjes 	?	?
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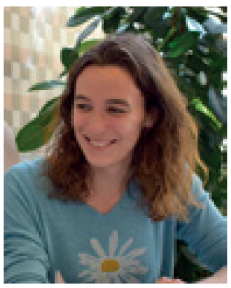
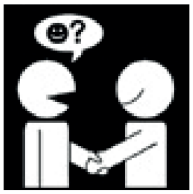


Inleiding

Je krijgt deze brief omdat we willen vragen of je mee wilt doen aan een onderzoek over bewegen. Kim is de onderzoeker, je kunt haar zien op de foto bovenin. In dit onderzoek gaat Kim samen met jou op zoek naar manieren om meer te bewegen op een dag. Jullie gaan bijvoorbeeld samen kletsen over bewegen of samen een spel of sport bedenken en uitproberen. Aan het einde van het onderzoek willen we weten op welke manier jij en de andere mensen in jouw huis meer kunnen bewegen.



In deze brief vertellen we je meer over dit onderzoek. Zo kan je goed nadenken over of je wel of niet mee wilt doen.

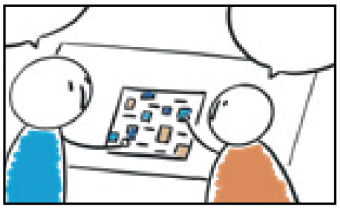
Algemene informatie

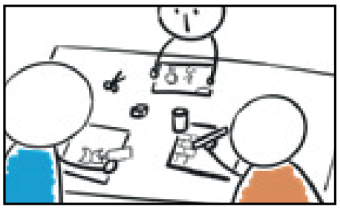
Het onderzoek is bij jou thuis op [redacted] Het onderzoek wordt gedaan door de Technische Universiteit Delft, in samenwerking met Erasmus MC en 's Heeren Loo. De Technische Universiteit Delft heeft dit project goedgekeurd.

1. Waarom gaan we onderzoek doen?

Bewegen is goed voor je gezondheid. Je voelt je fitter! Helaas bewegen veel mensen te weinig. In dit onderzoek gaan we zoeken naar manieren om meer te bewegen. We willen onderzoeken wat je leuk vindt aan bewegen en wat je minder leuk vindt aan bewegen. Zo gaan we samen kijken wat goed bij jou past, zodat het makkelijker wordt om meer te bewegen.

2. Hoe verloopt het onderzoek?





Als je meedoet aan het onderzoek zal je samenwerken met de onderzoeker Kim. Ze zal je vragen wat je wel of niet leuk vindt aan bewegen. Als jullie elkaar een beetje hebben leren kennen, gaan jullie ook samen ideeën bedenken, bijvoorbeeld door te knutselen. En jullie gaan de ideeën ook echt uit te proberen. Zo kunnen jullie samen een goede oplossing bedenken om op een leuke manier meer te bewegen op een dag! Tijdens het onderzoek heeft Kim veel contact met de begeleider in de woning.

Als je meedoet aan het onderzoek, zal je dus meedoen aan gesprekken en activiteiten met Kim. Jouw antwoorden op de vragen die gesteld worden, worden gebruikt voor dit onderzoek. In de resultaten van het onderzoek ziet niemand jouw naam. We gebruiken de volgende gegevens:

- Leeftijd, geslacht, mate van verstandelijke beperking, eventuele fysieke gezondheidsproblemen.
- Jouw antwoorden op de vragen over bewegen.
- Foto-, audio- of videomateriaal van de activiteiten. Deze maken we anoniem. Zodat niemand meer kan zijn dat jij het bent.

3. Welke afspraken maken we?

Als je meedoet aan het onderzoek is het belangrijk dat je het ons laat weten als:

- Je niet meer mee wilt doen aan het onderzoek. Je hoeft hier geen reden voor te geven.
- Je contactgegevens veranderen.

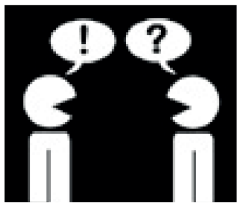
4. Mogelijke ongemakken

Als je meedoet aan het onderzoek betekent het dat je meedoet aan een gesprek of een creatieve activiteit met Kim. Dit zorgt niet voor ongemakken.

5. Voor- en nadelen

Door mee te doen help je ons heel goed om oplossingen te bedenken voor het te weinig bewegen. Meer bewegen is belangrijk voor jouw gezondheid, maar ook voor de gezondheid van heel veel andere mensen. Een voordeel aan meedoen is dat je zelf meedenkt met Kim, de onderzoeker. Samen kunnen jullie een leuke manier van bewegen bedenken die goed bij jou past!

Deelnemen aan het onderzoek heeft geen nadelen. Als je thuis bent en je voelt je goed, dan zal je meedoen aan de gesprekken of creatieve sessies.



Je mag zelf kiezen of je mee wilt doen aan het onderzoek. Om goed na te denken over of je wel of niet wilt meedoen, is het belangrijk om hier met andere mensen over te praten. Bijvoorbeeld met je begeleider. Als je niet mee wilt doen, is dat niet erg en verandert er niets.

6. Wanneer stopt het onderzoek?

Het is belangrijk om te weten dat je altijd mag stoppen met het onderzoek. Je hoeft ons niet te vertellen waarom je stopt. De gegevens die we tot dat moment hebben verzameld, worden nog wel gebruikt voor het onderzoek.

Het onderzoek stopt als:

- Je zelf wilt stoppen,
- De onderzoeker of begeleider het beter vindt om te stoppen.
- De Technische Universiteit Delft of 's Heeren Loo besluit dat het onderzoek moet stoppen.

Het hele onderzoek is afgelopen als we de gegevens van alle deelnemers hebben verzameld. Dit duurt ongeveer 6 maanden.

7. Wat gebeurt er na het onderzoek?

De onderzoeker gaat alle gegevens die zijn verzameld bekijken. De onderzoeker schrijft een verslag hierover. Binnen een jaar krijg je de belangrijkste uitkomsten van het onderzoek.

8. Wat doen we met je gegevens?

Voor dit onderzoek gaan we je gegevens verzamelen, gebruiken en bewaren. Dit zijn je naam, contactgegevens, geslacht, geboortedatum, gegevens over je gezondheid en je deelname aan de gesprekken en creatieve sessies (zie hoofdstuk 2). De gegevens gaan we bewaren. We bewaren ze 5 jaar. Met deze gegevens gaan we de onderzoeksvragen beantwoorden.

Je gegevens worden vertrouwelijk behandeld
Je gegevens krijgen een code. Alleen de onderzoeker en het onderzoeksteam weten welke code je hebt. Verder weet niemand welke gegevens van jou zijn. In verslagen over het onderzoek kan ook niemand zien welke gegevens van jou zijn.

Wie mag mijn gegevens zien?
Om te controleren of het onderzoek goed is uitgevoerd moet een controleur soms de gegevens bekijken. De controleur houdt de gegevens geheim. Wij vragen je of je het goed vindt dat de controleur de gegevens bekijkt.

Hoe lang worden mijn gegevens bewaard?
We bewaren je gegevens nog 5 jaar nadat het onderzoek is afgelopen. We bewaren het op een goed beveiligde plek.

Bewaren en gebruik van mijn gegevens voor ander onderzoek?
Je gegevens kunnen belangrijk zijn voor toekomstig onderzoek naar sport en bewegen bij volwassenen met een verstandelijke beperking. Daarvoor willen we je gegevens 5 jaar bewaren nadat het onderzoek is afgelopen. Op het toestemmingsformulier kan je aangeven of je het goed vindt dat we je gegevens bewaren om te gebruiken voor mogelijk toekomstig onderzoek. Als je dit niet goed vindt, kan je wel gewoon meedoen aan dit onderzoek.

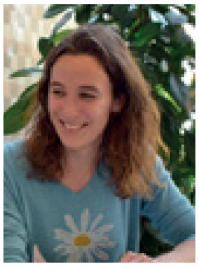
Intrekken toestemming
Je kan je toestemming altijd intrekken. We zullen dan geen nieuwe gegevens meer verzamelen. De gegevens die we tot aan dat moment hebben verzameld zullen we nog wel gebruiken.

Meer informatie
Wil je meer weten over wat we met je gegevens doen? Vertel dit aan je begeleider of familie. Je kunt deze vragen stellen aan Kim of aan de zorgmanager van 's Heeren Loo. De contactgegevens staan in bijlage A.

9. Wat krijg je als je meedoet?

Je krijgt geen geld als je meedoet aan het onderzoek. Wel krijg je aan het eind een certificaat voor jouw deelname aan het creatieve onderzoek!

10. Heb je vragen?



Misschien heb je nog vragen over het onderzoek. Het is belangrijk om deze te stellen. Je kan de vragen stellen aan Kim. Kim is de onderzoeker van dit onderzoek. Je kunt haar een vraag stellen of de vraag doorgeven aan je begeleider.

E-mail: k.adriaanse@student.tudelft.nl
Telefoonnummer: 06 38332390

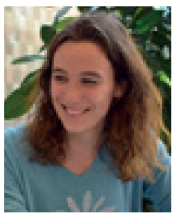
11. Ondertekenen toestemmingsformulier

Wij hopen dat je genoeg informatie hebt om goed te kunnen kiezen of je wel of niet mee wilt doen aan dit onderzoek.

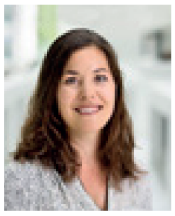
Vul op het formulier (bijlage B) in of je wel of niet mee wilt doen. Doe daarna het formulier in de envelop. De envelop kun je dan aan jouw begeleider geven. Hier hoeft geen postzegel op. Je mag je begeleiders of familie vragen om hierbij te helpen.

Bedankt voor het lezen en nadenken over deelname aan het onderzoek!

Bijlage A. Contactgegevens



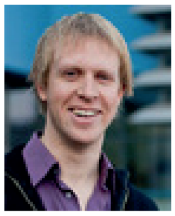
Onderzoeker
Kim Adriaanse, Student Master Design for Interaction
aan de Technische Universiteit Delft
E-mail: k.adriaanse@student.tudelft.nl
Telefoonnummer: 06 38332390



Begeleidend team

Alyt Oppewal
Bewegingswetenschapper, universitair docent Erasmus MC
E-mail: a.oppewal@erasmusmc.nl

Jos Kraal
Bewegingswetenschapper, universitair docent TU Delft
E-mail: J.J.Kraal@tudelft.nl

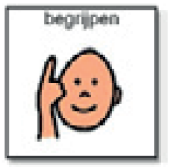


Niko Vegt
Onderzoeker en ontwerper TU Delft
E-mail: n.j.h.vegt@tudelft.nl

Functionaris voor de Gegevensbescherming van TU Delft
Email: privacy-tud@tudelft.nl

Bijlage B. Toestemmingsformulier

Ik heb de brief gelezen.



Ik begrijp de informatie.

Ik heb vragen kunnen stellen.

Ik heb duidelijke antwoorden gekregen.

Ik mag zelf beslissen.
Ik mag op elk moment beslissen om te stoppen.

De onderzoeker mag mijn gegevens gebruiken op de manier zoals staat beschreven in deze brief.

Ik wil meedoen aan het onderzoek.

☐ **JA** ☐ **NEE**

Mijn gegevens mogen 5 jaar bewaard worden en gebruikt worden voor onderzoek in de toekomst.

☐ **JA** ☐ **NEE**

Ik mag gevraagd worden voor een nieuw onderzoek in de toekomst.

☐ **JA** ☐ **NEE**

Mijn naam: .....

Geboortedatum: __ / __ / __

Mijn handtekening: .....

Naam onderzoeker: Kim Adriaanse

Datum: __ / __ / __

Handtekening: .....

Naam begeleider/contactpersoon: .....
Mailadres begeleider/contactpersoon:

.....
Telefoonnummer begeleider/contactpersoon:

.....

D. BARRIERS AND MOTIVATORS OF RESIDENTS

Derived from the sessions with the clients, partly strengthened with insights of the conversations with experts

Motivators

- Humour
- Being able to win (something)
- Being good at something / success
- Structure, planning
- Being part of an association
- Showing something
- Going out, a new environment
- Move together
- Being able to do something independently
- Making others happy
- Nice weather
- Positive experiences
- Having a goal to go to
- A tension that triggers curiosity
- Doing something related to the interests of the client
- Compliments and encouragement
- Seeing others do something
- Imitate someone
- Memories from back in the days
- Creating something
- Getting a responsibility
- Music

Barriers

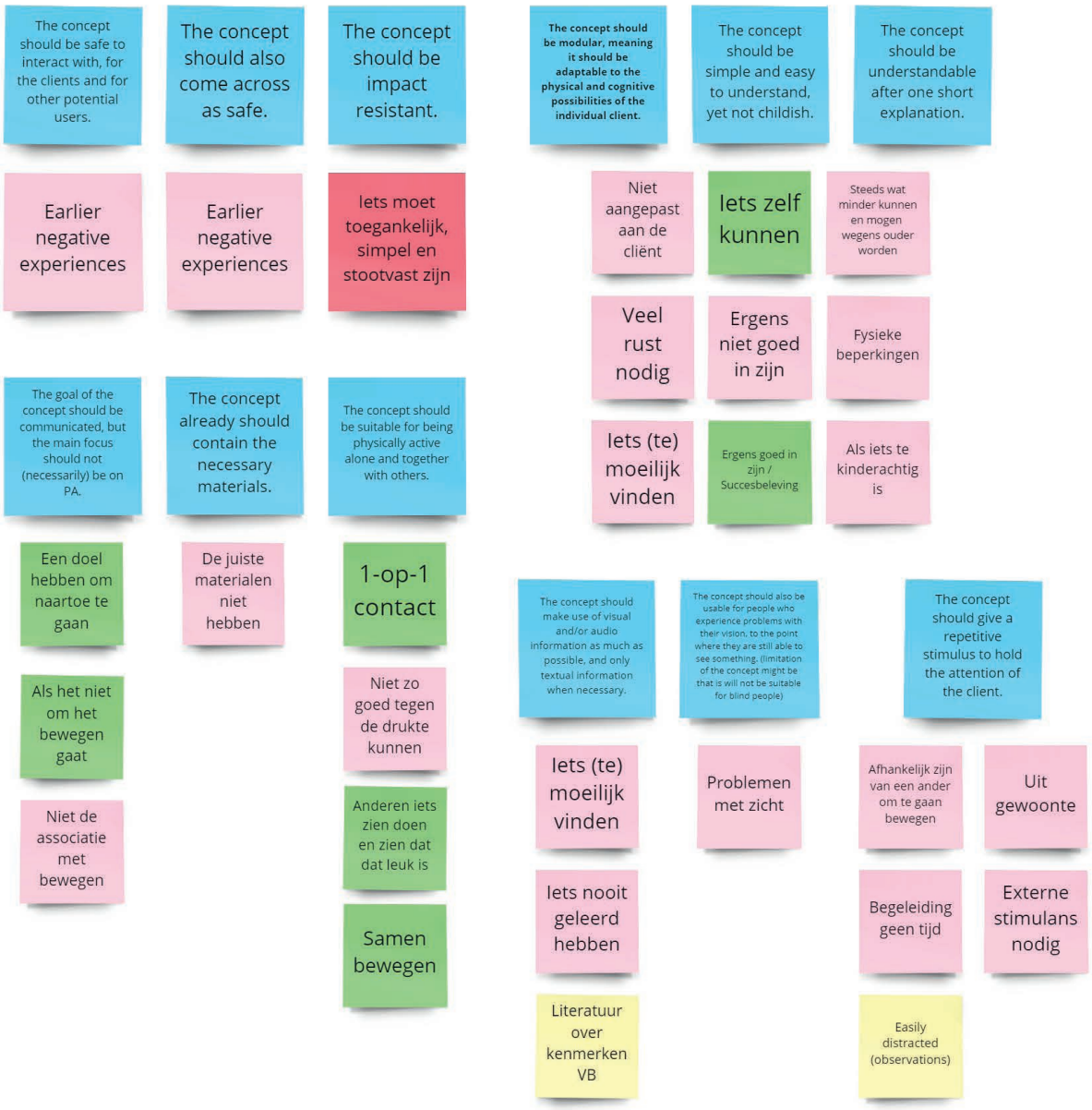
- When the approach is too childish
- Less and less able and allowed due to age-related complaints
- Not being good at something
- Never having learned something
- Earlier negative experiences
- Not being motivated to be active
- Vision impairment
- Something being too difficult
- Caregivers taking over tasks that the resident is able to do on themselves
- Getting tired
- Being overwhelmed by people or tasks
- Having to make choices
- Needing a lot of rest
- Being dependent of other to move
- Needing time to start up or join an activity
- From habits
- Bad weather
- Something not being adapted to the client

E. FROM BARRIERS AND MOTIVATORS TO CRITERIA

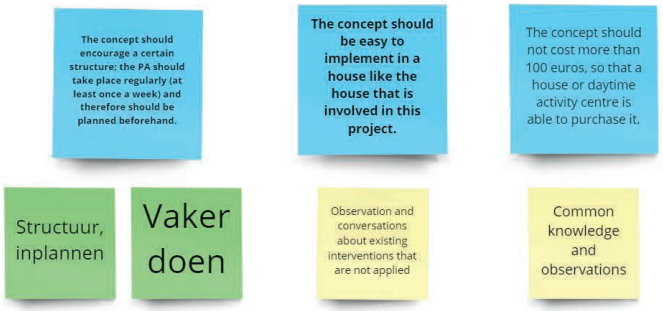
Blue = criteria, pink = barrier, green = motivator, yellow = other sources

Requirements

About the concept itself



Implementation of the concept



About the interaction with and experience of the client

Wishes

Based on criteria and common knowledge about what is feasible and what would be a nice

F. SESSION PLAN CREATIVE SESSION 6.1

Opzet Creatieve sessie dinsdag 31 mei
Aanwezigen: [anoniem gemaakt]
Inloop: 9.45
Start: 10.00
Eindtijd: 12.00

#	Wat	Tijd	In het kort	Materialen
	Introductie	**15**		
1	Welkom + uitleg	5	Welkom, bedankt, wat gaan we doen, waarom, spelregel 1 (geen ja maar / positief reageren)	Blaadje met spelregel 1
2	Energizer	3	Oefenen met spelregel 1 + voorstellen	Eventueel wat objecten
3	Introductie probleem	4	Waarom is bewegen voor ouderen met LVB belangrijk	Script, met wat cijfers
4	Purge	3	Alles uit je hoofd schrijven	1 vel en post-its
	Problem finding	**34**		
5	Uitleg 5W1H	2	Een goed begrip creëren van het probleem: Wat, Wie, Wanneer, Waar, Waarom + Hoe	Markers (verschillende kleuren) 1 of 2 vellen met de W's daarop
6	Wat	3	De Wat pluizen we uit door 'beweging' nader te specificeren	-
7	Wie	3	Denk bij Wie ook aan jullie zelf als begeleiders, welke invloed willen jullie hebben?	-
8	Wanneer	2	Wanneer bewegen?	-
9	Waar	2	Waar bewegen?	-
10	Waarom	3	Waarom?	-
11	Hoe-vragen opstellen	5	Iedereen voor zichzelf twee nieuwe formuleringen van het probleem	Lange post-its
12	Idea gallery / één probleemstelling kiezen / samenstellen	8	Samen kijken naar wat er staat	1 vel
13	SPARK	3	Formulering checken op Specific, Positive, Ambitious, Relevant, Keep it simple	Blaadje met SPARK uitleg
14	Purge	3	Alles wat in je opkomt als je de nieuwe probleemstelling leest, opschrijven	1 vel
15	**Break**	**10**	Even rust	-
	Idea finding	**46**		
	Energizer	3	Om weer actief te worden / bewegen	
	Uitleg ideeënfase + waar ben ik naar op zoek	1	Aangeven dat het heel breed is: van product tot methode tot activiteit tot naar de vaatwasser lopen en terug, alles kan	
	divergeren			
	Random objects en visual stimulation	12	Om bij ideeën te komen die verder gaan dan het voor de hand liggende. Objecten of foto's analyseren en de eigenschappen daarvan als inspiratie gebruiken in de volgende stap.	Objecten en foto's 1 vel
	Brainwriting on post-its	15	Met al het voorgaande als inspiratie gaan we brainstormen over het	Post-its en 2 vellen

			probleem.	
	revergeren			
	Clusteren	10	Clusteren	Nieuw vel, post-its en markers
	convergeren			
	Hits and Dots	6	Iedereen krijgt stickers waarmee ze de volgens hen beste en/of origineelste ideeën kunnen selecteren	Stickers
	Afronden	**10**		
	Ideeën bij elkaar plakken en discussie	8	Discussie, als je zo kijkt naar de ideeën die hier staan, wat zien jullie dan als een volgende stap? Of gewoon: wat komt er dan in jullie op?	
	Reflectie, wrap-up, sluiting en bedankje	5	Rondje met wat is jou het meest bijgebleven? Hoe nu verder? Terugblikken, vragen om feedback, heel erg bedanken	Bedankjes

Materiaallijst

Blaadje met het globale programma
Blaadje met spelregels
Eventueel wat objecten voor energizer
Blaadje met Einstein quote
Post-its
8 lege vellen
Vel met 7 vakken
1 vel met vraagstelling
1 of 2 vellen met W's erop
Markers (verschillende kleuren)
Blaadje met SPARK uitleg
Objecten en foto's
Stickers (twee kleuren)
Bedankjes
Tape
Blaadje met uitleg Hits

1. **Welkom + uitleg (5 _ 0:05)**

- ❖ Welkom
- ❖ Bedankt
- ❖ Opnemen en af en toe een foto
- ❖ Voorstellen iedereen kort: naam, wat je doet, misschien hoelang al, een leuke hobby/sport
- ❖ Onderwerp: bewegen bij ouderen met een (licht)verstandelijke beperking
- ❖ Vandaag: Brainstormen over het onderwerp en de vraag 'Hoe kunnen we ouderen met een lichtverstandelijke beperking stimuleren om te bewegen?'
  - *VGN: Veroudering bij mensen met verstandelijke beperkingen brengt specifieke gezondheidsproblemen en gezondheidsrisico's met zich mee: depressie, dementie, slechthorendheid, visuele beperkingen, diabetes, slikproblemen, psychiatrische stoornissen, bewegingsarmoede en vallen.*
  - *Onder de mensen met een verstandelijke beperking wordt iemand vanaf het 50e levensjaar tot de ouderen gerekend.*
- ❖ Samen nadenken over het onderwerp + zo veel mogelijk antwoorden bedenken, kwantiteit boven kwaliteit
- ❖ Iedereen mag alles zeggen, want alles is goed
- ❖ Je komt met brainstormen het verst als je positief op elkaar reageert. We gaan dit oefenen met een zogeheten energizer.

2. **Energizer (3 _ 0:08)**

- ❖ We gaan een groot feest geven voor alle cliënten
- ❖ Rondje af en iedereen noemt iets wat we kunnen doen/inhuren, wat dan ook
- ❖ De volgende reageert steeds met een reden waarom het geen goed idee is. Dus 'ja, maar …'. Dan bedenkt die persoon een ander idee. De volgende reageert weer met 'ja, maar …'.
- ❖ Aan het einde komt er een heel simpel iets uit.
- ❖ Nu doen we hetzelfde, maar reageren we op elkaar met 'jaaaa en …'

Conclusie

- ❖ Spelregel 1: Je mag alles zeggen of opschrijven
- ❖ Spelregel 2: Elk idee is van iedereen
- ❖ Spelregel 3: Bouw op elkaars ideeën voort: reageer positief en gebruik 'ja én …'

Probeer 'Ja maar' dus uit de weg te gaan, je kunt hier elkaar ook een keertje op aanspreken, maar doe dit dan met een grapje. Het is niet erg als het een keer gebeurt.

3. **Introductie vraagstelling (4 _ 0:12)**

Beweging is zoals jullie weten heel belangrijk om **zo zelfstandig mogelijk** te kunnen blijven leven. Jullie weten als geen ander dat die zelfstandigheid belangrijk is voor de kwaliteit van leven. Dit project is gestart om te onderzoeken op welke manieren de ouderen met een lichtverstandelijke beperking **met plezier kunnen bewegen**. En **wie of wat** is daar voor **nodig**? Ik probeer bij het onderzoek veel samen met de cliënten te praten en uiteindelijk ook ideeën uit te testen.

Omdat jullie als **woningbegeleiders de cliënten zo goed kennen**, maar ook veel weten over jullie **eigen werkzaamheden** en misschien wel **obstakels** om te bewegen, is jullie kijk hierop heel belangrijk. Vandaar deze sessie. Maar ook een **perspectief van buiten de woning** kan heel waardevol zijn, daarom ben ik ook heel blij met de aanwezigheid van Jos en Niko.

Je mag denken aan de specifieke cliënten in deze woning, maar ook gewoon aan de doelgroep in het algemeen. We gaan zometeen dieper op de vraagstelling in, dus als er iets nog niet duidelijk is, dan kunnen we het daar zo over hebben.

4. **Purge (3 _ 0:15)**

We starten nu met een eerste korte brainstorm. Iedereen krijgt een stapel post-its en een marker.

- Groot vel en post-its
- Alles uit jullie hoofd schrijven
- Zodat helemaal blanco begin

5. **Uitleg 5W1H (2 _ 0:17)**

Einstein heeft ooit gezegd…
“If I had an hour to solve a problem, I'd spend 55 minutes thinking about the problem and five minutes thinking about solutions.”

- Wat, Wie, Wanneer, Waar, Waarom en Hoe, om zo de gehele context duidelijk te hebben
- Belangrijk om op zelfde lijn te zitten
- Vraagstelling zo te formuleren dat jullie er binding mee hebben
- Jullie roepen, ik schrijf

6. **Wat (3 _ 0:20)**

- Bewegen
- Wat is bewegen? Welke beweging kan er plaatsvinden? Wat geldt als bewegen? Elk extra beweegmoment op een dag is beter.
- Alles kan gezegd worden

7. **Wie (3 _ 0:23)**

- (3 bloemen: cliënten, begeleiding, potentiële andere rollen)
- Cliënten met een verstandelijke beperking
- Hoe zou je hen omschrijven, wat komt er in jullie naar boven? Welke eigenschappen hebben zij? Welke beperkingen? Welke talenten?
- Jullie als begeleiding: wat komt er in jullie op? Welke rol hebben jullie? Welke werkzaamheden? Lopen jullie misschien tegen problemen aan?
- Wie zouden er nog meer allemaal kunnen bijdragen aan het bewegen?

8. **Wanneer (2 _ 0:25)**

- Wanneer zouden de cliënten kunnen bewegen? Is er een bepaald moment? Tijdens een andere activiteit?

9. **Waar (2 _ 0:27)**

- ❖ Waar kunnen de cliënten bewegen? (woning, dagbesteding, omgeving) Waar in huis? Waar in de buurt?

10. **Waarom (3 _ 0:30)**

- ❖ Waarom zouden de cliënten moeten bewegen? Waar is het goed voor? Waarom is die zelfstandigheid belangrijk? Waarom is het leuk om te bewegen?

11. **Hoe-vragen opstellen (4 _ 0:34)**

Nu hebben we bij elkaar een redelijk complete context gemaakt. Hier kun je op **terugkijken** gedurende de sessie, maar zie **het niet als criteria**. We missen alleen nog de Hoe en dat is eigenlijk de vraag waar we in het vervolg vooral mee bezig gaan. Ik wil jullie vragen om weer even te zitten bij de tafel en **voor jezelf twee of drie hoe-vragen** op te stellen die anders zijn dan de huidige vraag. Ik vind het belangrijk dat de **cliënten en bewegen** nog wel onderdeel zijn van de vraagstelling, maar je kunt bijvoorbeeld ook denken aan het betrekken van jullie als woningbegeleiders in de vraag. Iedereen schrijft vragen op.
Wat is volgens jullie een belangrijk onderdeel van de vraagstelling? Of voldoet de huidige vraag voor jullie?

12. **Idea gallery / één probleemstelling kiezen / samenstellen (8 _ 0:42)**

(revergeren en convergeren → luister eerst goed naar elkaar, dan kunnen jullie vervolgens een oordeel geven over de vragen)

- ❖ Op papier plakken

We gaan nu kijken naar welke opties er allemaal zijn. Ik wil vragen of jullie ze één voor één willen oplezen, je kunt degenen die op elkaar lijken even bij elkaar plakken en in gesprek gaan over welke vraag jullie zouden willen kiezen. Dingen combineren tot een nieuwe vraag is ook mogelijk.

13. **SPARK (3 _ 0:45)**

- ❖ Nu jullie een definitieve vraag hebben, kijken we nog even naar de formulering. Je kunt dit checken aan de hand van SPARK.
- ❖ Uitleg SPARK.
- ❖ Langs (laten) lopen.

14. **Purge (3 _ 0:48)**

Nu jullie een eigen versie hebben gemaakt van de vraagstelling gaan we weer even ‘purgen’. Schrijf ideeën of dingen op die in je opkomen als je de vraag leest. Het mag alles zijn!

15. **Break (12 _ 1:00)** ***(het liefst tot 11.00)***

Pauze van tien minuten. Pak een bakkie koffie, een koekje of ga even naar buiten. Na de pauze gaan we ideeën spuien.

16. **Energizer (3 _ 1:03)**

- Iedereen een voorwerp laten pakken uit het huis
- Naam + probleem dat je ervaart. Realistisch of complete onzin.
- Iemand anders lost het probleem op met zijn/haar product.
- *Voorbeeld: ik stoot continu mijn voet aan de krukken in mijn keuken. Als iemand dan een vork heeft, zeg je 'ik heb de perfecte oplossing, je bindt deze vork om je voet en dan voel je van tevoren al aankomen als er een kruk in de buurt is'*
- Als eigenaar van het probleem ben je de oplosser heel dankbaar en zeg je iets in de trant van 'Wow dat is echt een geweldig idee! Dat ik daar nooit aan gedacht heb!'.

17. **Uitleg ideeënfase + waar ben ik naar op zoek (1 _ 1:04)**

- Ideeënfase
- Idee = Antwoord op de vraag
- Uitgebreid of alleen aspect
- Meer = beter, schrijf alles op!
- Elkaar inspireren
- Elk idee is van iedereen
- Niet alleen op zoek naar fysiek product, kan ook activiteit zijn, of een methode, e.d.

18. **Random objects en visual stimulation (12 _ 1:16)**

Voordat we starten met ideeën opschrijven, gaan we even kort 'op excursie'. De volgende activiteit doen we om uiteindelijk meer originele ideeën te kunnen bedenken. Laat de huidige vraag even helemaal los.
Ik presenteer jullie hier een variatie aan producten en foto's. Kies er allemaal eentje die jullie aanspreekt of inspiratie geeft. Waarbij je denkt 'hee die is interessant of mooi' of misschien roept het wel veel ideeën of gedachten bij je op.

Nu gaan we ze één voor één even af en schrijven we de observaties over het product op post-its. Ik vraag het aan de persoon, maar de rest mag ook dingen opschrijven.

- Wat zie je in de foto of het product?
- Welke indruk of reactie krijg je ervan?
- Schrijf allemaal op, zeg het hardop

19. **Brainwriting on post-its icl. Scamper (15 _ 1:31)**

We gaan weer even terug naar de echte vraag van vandaag. Nogmaals:

- Meer = beter, schrijf alles op!
- Elkaar inspireren
- Elk idee is van iedereen
- Niet alleen op zoek naar fysiek product, kan ook activiteit zijn, of een methode, e.d.
- Probeer duidelijk te schrijven
- Kijk ook af en toe naar de post-its op dit vel
  Welke opties doet 'woord van stap 18' je aan denken voor deze vraag? Kun je iets bedenken waar 'woord van stap 18' een onderdeel van is?

SCAMPER-vragen die ik kan stellen:
Wat stimuleert jou zelf om te bewegen?
Wat als we jouw eigen beweging combineren met beweging voor de cliënt?
Wat als we de hobby's van de bewoners combineren met bewegen?
Wat als we een ritueel van de dag combineren met bewegen?
Wat als alles mogelijk was?
Wat als we het bewegen even helemaal loslaten? Hoe kun je de cliënten motiveren om iets te doen?
Hoe kun je cliënten laten bewegen zonder dat ze het door hebben?

20. Clusteren (options you would like to work on) (10 _ 1:41)

- Jullie hebben nu heel veel opties en ideeën bedacht
- Om daar wat structuur in te krijgen, gaan we clusteren: de ideeën groeperen, categorieën vinden, op die manier kun je ze ook allemaal even door je handen laten gaan
- Dat is vaak een wat chaotisch proces en dat hoort
- Begin met een optie pakken en probeer langzaam clusters te maken, ze vormen zich vanzelf als je begint
- Als je iets niet begrijpt, vraag het dan even, luister goed naar elkaar, probeer allemaal actief deel te nemen
- Na verloop van tijd namen laten geven aan de clusters
- Zou één van jullie de clusters kort willen samenvatten/presenteren?

21. Hits and Dots (6 _ 1:47)

- Iedereen krijgt X aantal stickers (wortel van aantal ideeën).
- Kies de opties uit die voldoen aan de Hit criteria voor jou. Welke opties voelen voor jou goed?
- Twee stickers voor de originele ideeën, zodat ook de misschien op het eerste gezicht minder haalbare ideeën meegenomen worden

22. Ideeën bij elkaar plakken en discussie (8 _ 1:55)

Ik zie dat deze en deze opties veel stickers hebben. Kunnen jullie hier iets over vertellen? Hoe zien jullie dit verder uitgewerkt? (rondje afgaan)

23. Reflectie, wrap-up, sluiting en bedankje (5 _ 2:00)

Rondje: wat is jou het meest bijgebleven? Welke gedachte hou je over aan deze sessie? Wat neem je mee? Heb je nog tips voor mij?
Afrondende samenvatting vanuit mij, wat ga ik er mee doen? Kunnen zij mij nog helpen hiermee, vooral voor ideeën die meerdere dagen achter elkaar uitgetest moeten worden?
Bedankjes!

G. CLUSTER DESCRIPTIONS CREATIVE SESSIONS 6.1 AND 6.2

Descriptions of clusters session 1

'Taking care of something or someone, feeling responsible'
'Zorgen voor iets of iemand, zich verantwoordelijk voelen'
Taking care of a pet, a plant or the ducks outside the house in something that unconsciously can lead to more PA. Besides, the feeling of responsibility can be a trigger already for starting the 'activity' of giving water to the plants or food to the pet.

'Facilitating connection with the neighbourhood'
'Meer binding met de buurt'
There is already a sort off 'neighbours day' organized each year, but this contact with the neighbourhood could be expanded. Activities can be organized or the clients can help with cleaning the neighbourhood. Overall, more contact with neighbours could add to the PA of the clients and their motivation to go outside for a walk (and talk). Maybe the clients could even help a neighbour out by walking their dog.

'Integrating PA in the house(hold)'
'Bewegen integreren in het huis(houden)'
PA does not have to be a new activity, it could also be integrated in the current daily living. Getting their own coffee, helping with household tasks, and in general, wherever possible, letting them do the tasks by their self. But also the layout of the living room could be changed in a way that it is more stimulating to be active; for instance, the exercising bike could be turned a bit towards the television.

'Having fun as starting point, PA as an extra'
'Plezier voorop, bewegen als mooie bijkomstigheid'
A lot of options were mentioned that did not have PA as the main goal, but more as a means to get somewhere. This 'unconscious PA' is probably the way to go for people who are not so font of exercising. Each client will have other preferences, but activities can be things like dancing, painting, performing or making music. Triggering the imagination and curiosity, and above all, giving the clients a positive feeling, are valuable starting points.

'Referring to the old days'
'Net als vroeger'
Doing what you did as a child is often something that stays with you in your memory. In the sessions with the clients (chapter 4.3), it was striking that they often referred to the past, in which they did certain activities or possessed certain products. This cluster represents this 'youth sentiment', which can be a powerful trigger for the target group.

'Being reminded and encouraged'
'Herinnerd en aangemoedigd worden'
To continue doing PA it is helpful or even necessary to be reminded often, and to have a certain structure. The activity can take place at a fixed moment and can be planned in the agenda; a certain 'PA-day'. Another option is that the clients are reminded by something every once in a while, by a robot or avatar, by an activity supervisor who comes by every week, by their housemates or by Olga of Nederland in Beweging. A physical reminder like a 'game basket' that is put on the table could also be a trigger for activity.

'Receiving support'
'Helpende handjes en financiële steun'
Sometimes everything would be easier if there was more money. More money for an exercise agog or physiotherapist that can help all the clients. More money for caregivers, so they have more time to focus on PA with the clients. Money is limited, but getting help of families and friends for organizing certain activities would be useful too.

'Challenging each other in sports or games'
'Elkaar uitdagen in sport of spel'
Challenging each other could be a motivating factor to join PA. Tournaments or matches can be organized, for instance between the clients, the caregivers, residents from the other floors. Chair dance, table soccer, walker races, balloon volleyball, there are tons of options for sports or games.

'Playing together for fun'
'Samen spelen zonder druk'
This competitive element can be motivating, but could possibly be a bit deterrent to some people. Just playing together without any pressure is therefore another cluster that is promising. Clients can play games or sports together inside or outside. The activities can vary from things at the table like throwing an 'exercise dice' to games outside, like throwing a ball or playing on a swing.

'Going out'
'Eropuit'
To escape the daily routine and context, it is also an option to really go outside with the clients. Visiting someone or something, exploring the neighbourhood, going to the beach, going for a walk or hiring the duo-bikes.

‘Involving the residents, PA tailor-made’
‘Cliënt erbij betrekken, bewegen op maat’
Although it can be nice to let the clients be active together, there is also great value in 1v1 contact between client and caregiver. Especially because each client has different preferences, it is important to involve the clients in this process and ask them what activities they want to do. In the end, it is most valuable and successful if the clients do something that makes them happy and increases their level of activity.

Descriptions of clusters session 2

Making a party out of it: Applicable to all options is the aspect of making a party out of it, in other words, bringing each activity with great enthusiasm.

Getting assignments: Since the residents need an external stimulus, according to the physiotherapist (chapter 3), getting a simple assignment could be a trigger for them to start moving. This assignment could be given in all sorts of ways, for instance by a robot bear, a tear-off calendar, or a PA dice.

Searching for something: One way of being physically active as a means instead of a goal is to search for something. This could be implemented in a game where residents have to hide and seek certain objects, or there could be a table cover with Where’s Wally like illustrations.

Having a common goal: The residents might get motivated when they have a common goal they can all contribute to. For instance, they could earn points collectively by doing PA or fill out a large PA-book of the house in which each activity is reported.

Feeling responsibility: Feeling and/or getting responsibility for something could shift the mindset of the residents. This could be applied by giving household tasks, by giving a personal PA-booklet to each client and asking them to update it, or by giving each client a day on which they need to come up with a short PA, just like how they need to think of one dinner meal each week.

Interacting with a product: This large cluster is somewhat general, but contains a wide variety of options. Large versions of existing games, objects that are fascinating while you move them like fidget spinners, minigames, or a PA corner in the living room. A product in this case could either be one object or a collection of objects.

Having contact with the outside world: Connecting the older adults with youngsters or organizing a walking buddy system increases the world of the residents. However, this cluster overlaps a bit with a cluster of previous session and seems to be hard to test within this project.

Organizing activities: Organizing activities, such as morning gymnastics or registering for an organized walk and training for it, could be a motivation to be more physically active. However, also this category is hard to test and will be left out accordingly.

Evoking PA with music: Music can be a trigger to move, for instance in products that only make music when you are moving like the Moofie. Besides listening to music, the residents could also be encouraged to make music themselves.

Immersing yourself in a story: Wanting to know how a story continues could be a motivator for the client to perform a certain action. For instance, the client needs to turn a large wheel in order to let the audio book continue or to see more illustrations. If residents like to, they could also be part of a story by acting and dressing up.

Inspiring or helping each other: The residents could help or inspire each other by teaching things they are good at. In this case, P1 could explain a dance to his fellow housemates. But less challenging could be to all prepare a move and imitate each other.

Creating together: When something is self-made it could cause a certain proudness and thereby motivation to be active. The residents, who are quite creative, could create something together. They could make a story, a large painting or a play or they could create their own sports shirts.

H. COMPLETE ANSWERS TO QUESTIONS 6.3 - 6.6

Answers to research questions 6.3

1. What degree of freedom in the interaction with the product ensures the most involvement/ interaction? Total freedom, a general assignment, a specific assignment, a challenge?

• The first tasks given to the residents were too difficult, and therefore did not evoke (a lot of) PA.

• The more the assignment was specified, the more the residents tended to check with the researcher whether they did well. Once the researcher confirmed, their PA was more active

• The challenging assignment (#9) brought along too much pressure for the resident.

In other words, a specific assignment is preferred, with the requirements that the assignment is clear and some sort of reassuring feedback if given to the resident.

2. What is the effect of someone else joining the activity on the effort and motivation of the client to be active? What is the effect of showing an activity to someone else? And of imitating someone else?

Both residents clearly preferred to move together with someone else. Showing the other person what she needs to do, made P5 more active. When P4 is asked to show what move the other person has to do, it quickly switched to her imitating the other person. Imitating someone else clearly was easier and increased the level of PA. Literally seeing someone do activities and imitating them is probably the most clear instruction for the residents and therefore also causes the highest level of PA, assumably because the residents experienced no doubt about what is right or wrong. On a later day, the video was also presented to P3, who was less enthusiastic about the activity.

3. What is the effect of moving with a physical product on the effort or motivation of the client to be active, as opposed to moving without a product?

Just moving together with an object, in this case a simple ball, did not make a lot of difference, assumably also due to the vagueness of the task. However, the residents started to get more enthusiastic and active once they played with the object together with another person.

4. What is the effect of bringing the assignment wrapped in a story on the effort or motivation of the client to be active?

Although P5 tried hard to help the bird fly, P4 needed an example before she started to move. It seemed hard to keep the attention to the story. Since this story was quite short, it did not promise to be the right direction for most of the residents.

Answers to research questions 6.4

1. What triggers the clients to start interacting with something? What makes them curious?

P5 grabbed mainly objects that enabled her to create something, foremost music, but also a drawing or an act. When P3 was introduced to a book, a dice, and a xylophone, he immediately grabbed the xylophone and showed what he could do with it. The rain maker was also a hit, “shell I teach it to you?”, he offered to the caregiver. The motivator of showing something to someone else came out clearly.

2. How does this open way of testing and trying out together with the clients work?

In the first try with two residents, all the products were placed before them. For P4 this was too overwhelming. For P5 this worked quite okay although the amount of products should have been halved, since some products were so far away, it severely decrease the reliability of the test. P3 had a different test set-up where he alternately received one or few products at the same time while he was being told he could do anything with it. This worked well, because he was not overwhelmed by all the different products and it was easier to observe his first reaction for each of the products. The structuredness also caused more opportunity to have a small conversation about one of the products. However, P3 was asked what he liked most, he mentioned the last thing he did, although this did not seem to be the activity he had most fun with. This corresponds with the literature on communication of paragraph 2.4.

Answers to research questions 6.5

1. How does moving and playing together with housemates work out? Are they able to encourage or even help each other? Where do they need help from a caregiver or other supervisor?
Although sometimes the residents encourage each other, there were also some small quarrels, especially when they tried to give each other tips. While throwing dice, the residents needed guidance at thinking of a movement and at switching turns to the next player. Once the music video had started and each individual had an instrument, they were quite engaged in the activity and they needed less guidance, although giving some compliments and cheering was still necessary to keep them going.

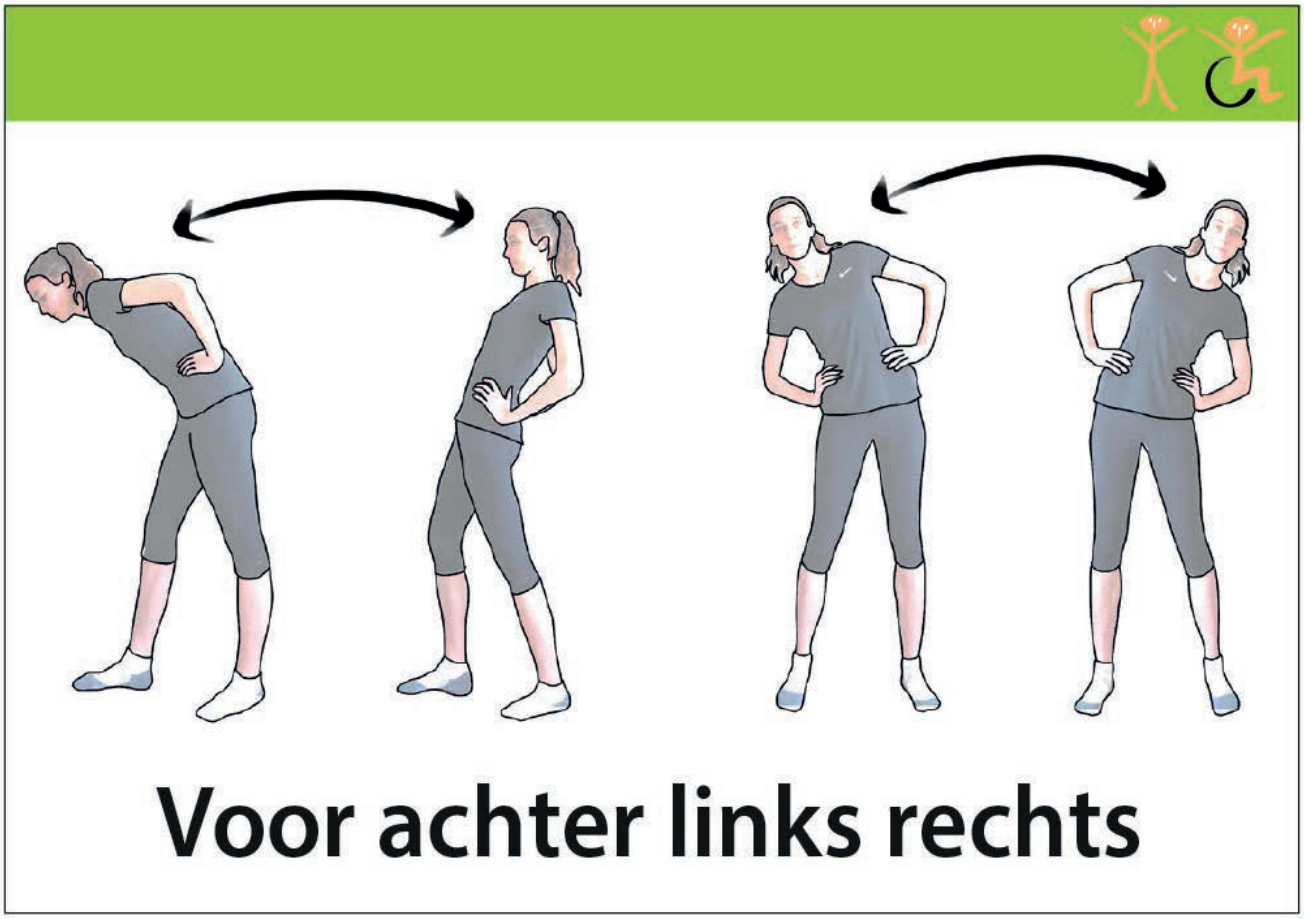
2. What is the effect of a 'game of chance' like playing with a dice on the engagement of the residents?
What number the residents threw with the dice did not seem very interesting or exciting for them.

3. To what extent does the combination of music and play resonate with the residents?
The clients are quite absorbed in the game and take it seriously when they are allowed to play and when they are not. The game element however caused that they were only allowed to play the instrument a few times each song, while it might be desirable to let them play as much as they want. For P1 this game seemed to be less interesting, mainly because he is a drummer and this might have been too easy or boring for him. It was striking however that at one point he started playing drums together with P5 and he was complimenting her on how she did it and started to teach her. Assumably, the amount of people made it too chaotic for P1, and being only with two made him more engaged.

Answers to research questions 6.6

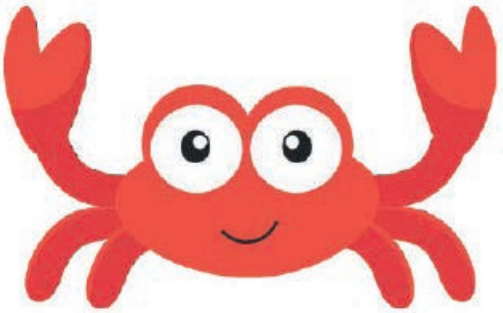
1. How could there be more PA integrated in the activities?
As became clear from the last activity, it seemed to help to think about one specific movement, in this case standing up and sitting down, and how the resident could be motivated to execute this movement in a game like way, in this case by rolling a ball to the other player. Furthermore, with the most simple objects, a simple game can be created, taking into account the physical abilities and safety of the client.

2. To what extent is the resident motivated to perform the PA integrated in the game?
The resident said he liked the games, which was also reflected in his dedication in the various games and the laughing to one of his house mates. The PA part was not a barrier, although he sometimes had to take a break due to a sore back.


Voor achter links rechts


Heen en weer draaien

Heen en weer lopen



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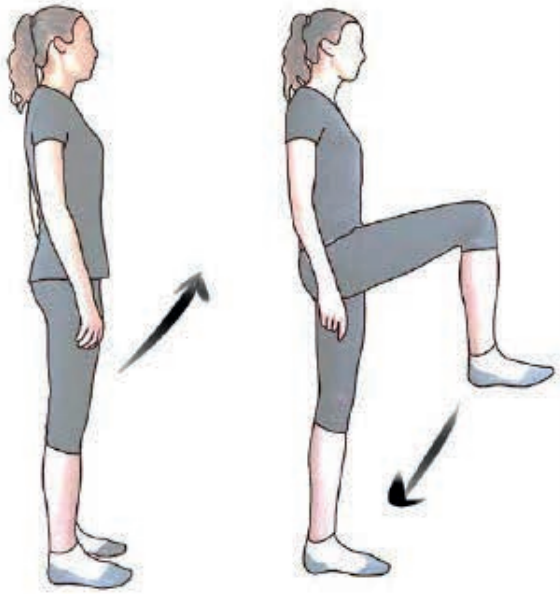

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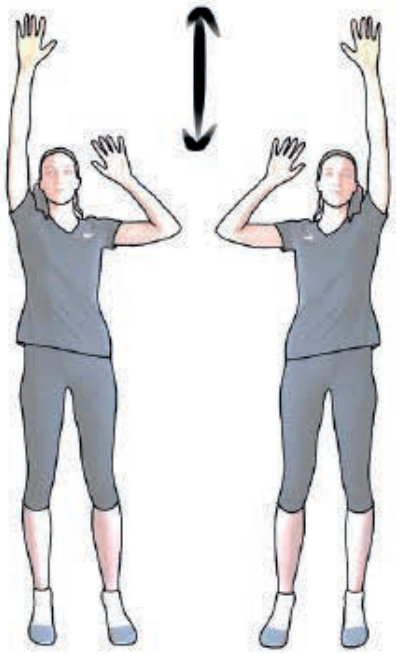
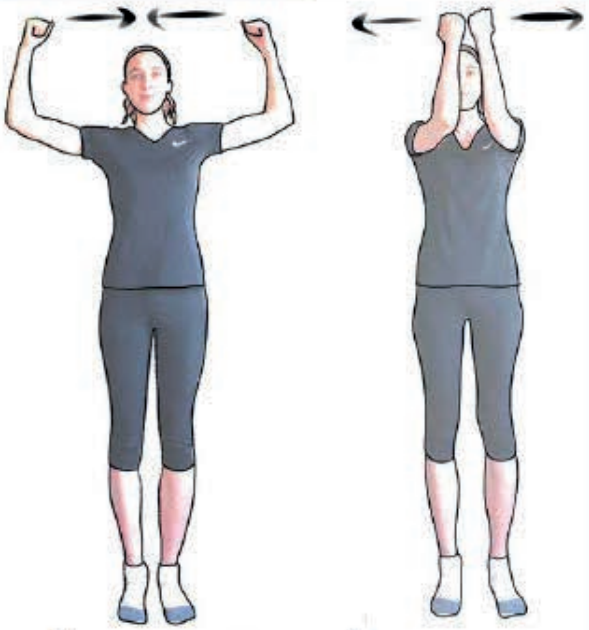


Klimmen



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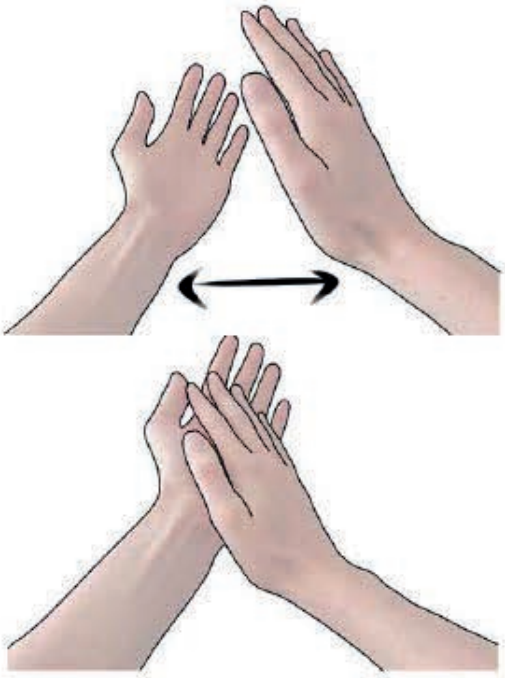

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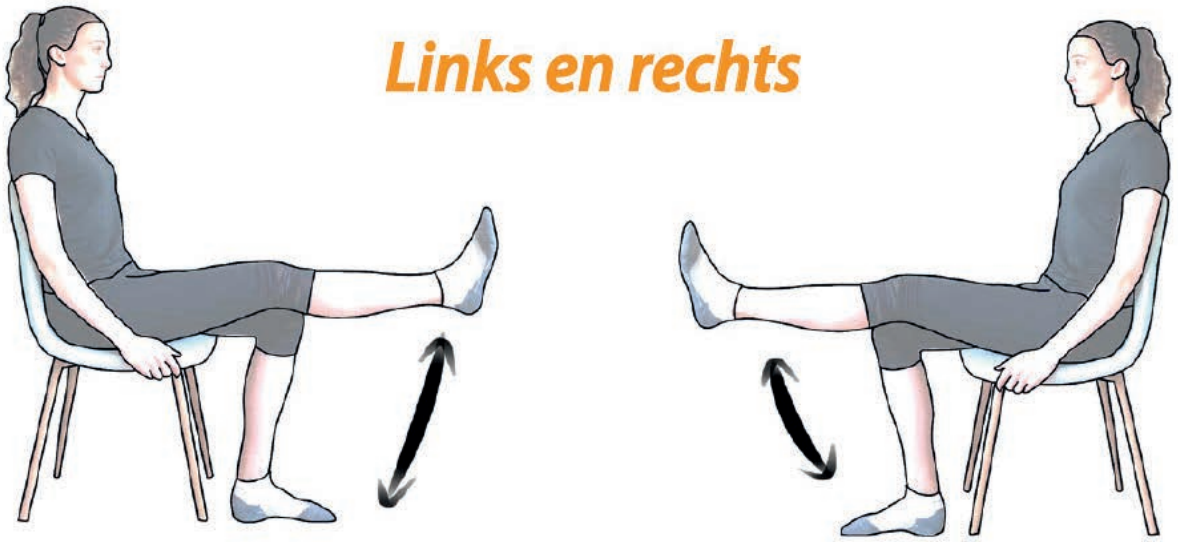

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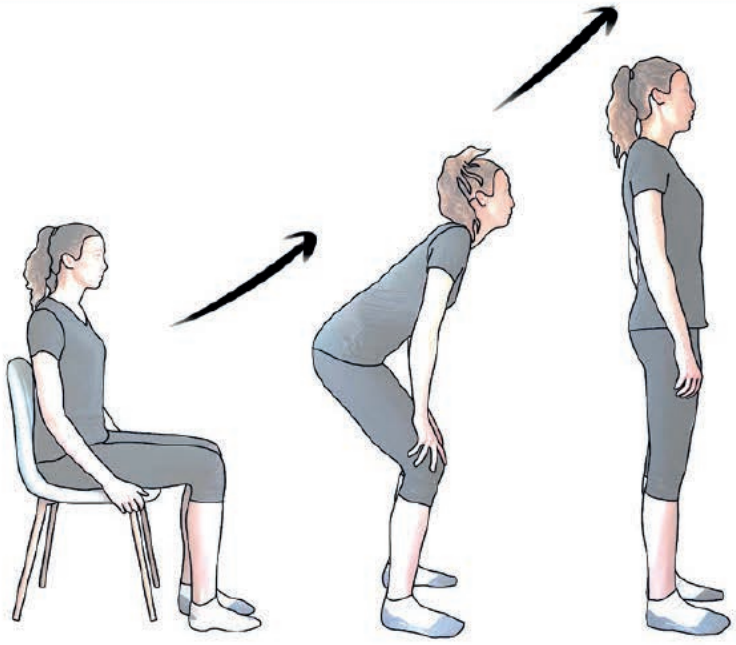

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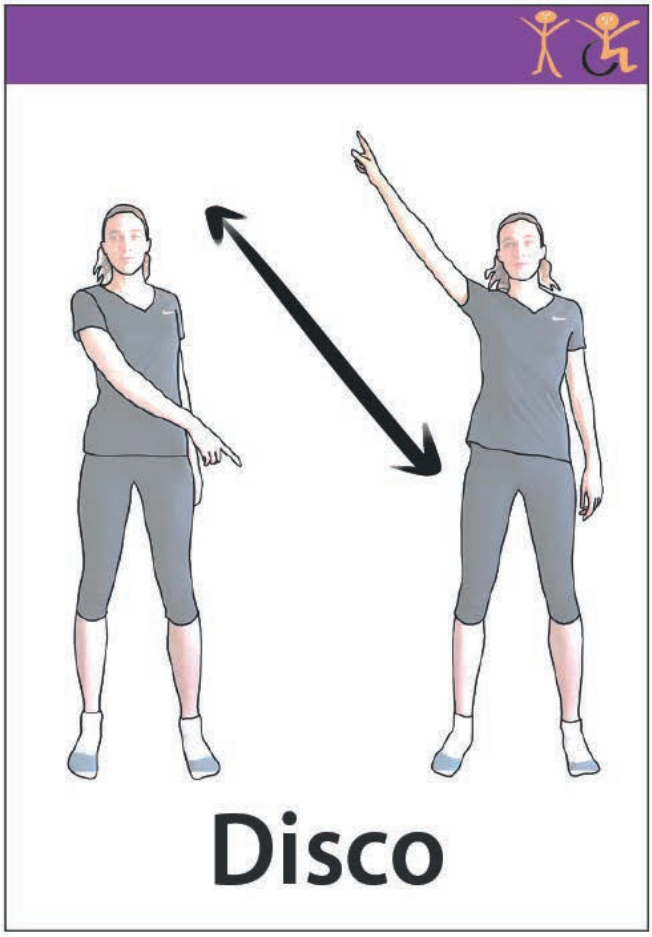
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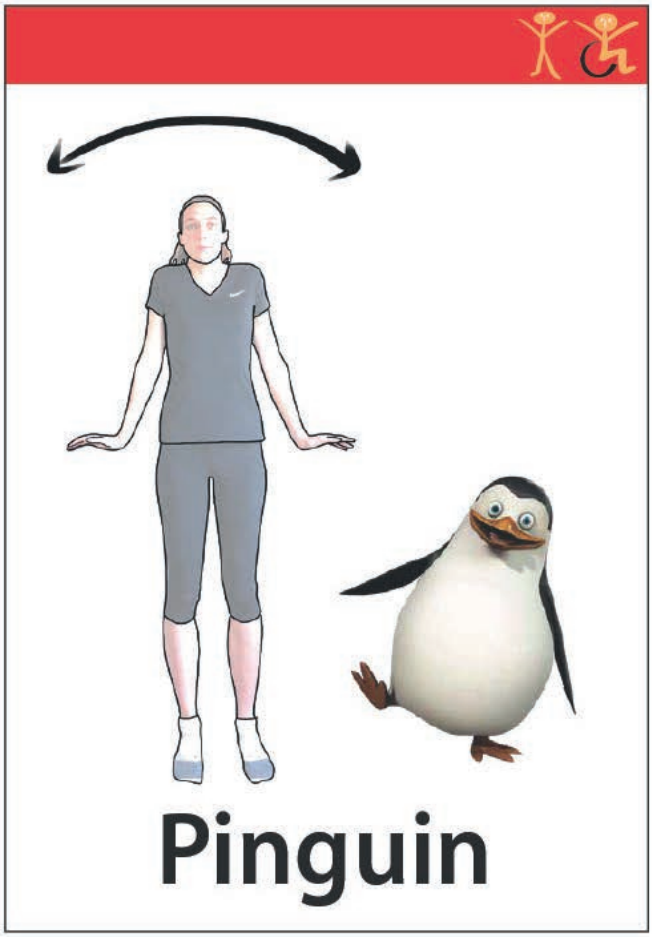
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J. HOW TO TEST THE QUESTIONS OF CHAPTER 7.2.2

1. How much do the residents enjoy performing the activity?
Tested by observations (smiles, general expression, quotes) and a question asked afterwards.

2. How well can the activity be understood and/or carried out by the residents?
Tested by observations (do they perform the intended action, expressions, questions asked by the resident) and a question asked afterwards about the experienced clarity.

3. To what extent can the residents carry out the activity independently?
a. What can they do themselves?
Tested by initially (or after a while) waiting and observing how they perform the activity without help.
b. What do they need help with? How much time and effort does it require from the supervisors?
Tested by observing where they need help to reach the intended interaction (or at least, an interaction that provides PA). Then try to give that help and reflect to what extent this needs to be done by the caregiver or by the concept itself.

4. To what extent can the residents keep their focus to the activity?
Tested by observing their behaviour and expressions.

5. To what extent can residents motivate each other to participate in an activity? To what extent can they help or motivate each other during the activity?
Tested by letting residents to the activities together in duos and observing their interaction, such as verbal communication, expressions and other behaviour towards each other. Afterwards comparing this to the individual sessions.

6. To what extent does physical activity take place while performing the activity?
Tested by observing the amount of physical activity that is taking place.

7. To what extent can the activity be adapted to the individual resident with their interests and abilities?
The answer to this question will be partially based on the answers to other research questions. It is namely tested by observing how clear the concept is for the individuals, if any physical limitations of the residents make the activity inaccessible, and to what extent the activities resonate with (the interests of) the residents. This last point is also tested by displaying them the four activities and asking which activity they would like to do. Besides observations, questions are asked that help to give an answer to this research question.

8. To what extent does the concept remain interesting for residents in the long term?
Tested by asking the residents questions such as 'Would you like to do it again sometime?' and observing them when they do the activity a second time. Also, the caregivers are asked to report when the residents are talking about the activity afterwards. Lastly, the researcher will stay for a while after the test, observing whether the residents still mention something about it. This research question is less measurable because of the limited time of the project.

9. To what extent does the client feel motivated to interact with the concept?
a. Do they initiate it themselves or does the facilitator have to do this?
Tested by observing the resident when the prototype is in the room before introducing it. Hard to test in first use, since the resident does not yet know what the activity is about, so they have no experience to base their possible motivation on.
b. Are they motivated to start the activity?
Tested by observing their posture and asking whether they want to do an(other) activity.
c. Do they remain motivated during the activity?
Tested by observing their attitude and behaviour and asking questions about whether they still like it or not.

10. How curious do the residents feel before or during the interaction?
Tested by observing at the start or otherwise asking questions at the start that gauge their curiosity, such as 'What do you think it is? Would you like to play with it?'. During the activity, it is tested by observing their behaviour and (verbal) expressions.

11. How proud do the residents feel during or after the interaction?
Tested by observing them and by asking the question afterwards.

12. How energetic do the residents feel during or after the interaction?
Tested by observing their attitude/posture during the activity and by asking them afterwards how tired they are and how physically active they were.

K. ANSWERS TO THE QUESTIONS FOR TESTING THE FINAL CONCEPT

The answers per activity are not included.

RQ 1. How much do the residents enjoy performing the activity?
In general, the extent to which the resident enjoys the activity is clearly dependent on the extent to which the activity matches with their abilities (cognitive and physical). The more it matches, the more they seemed to enjoy the activity. This also meant that the enthusiasm of the residents during the tests often decreased with the duration of the test, because they grew less able to perform the activity. This all corresponds with the Fogg Behavioural Model that is explained in chapter 2.3.

RQ 2. How well can the activity be understood and/or carried out by the residents?
Overall, most residents were able to understand and carry out most activities. The straightforward activity of throwing the ball was easier to carry out, possibly because the required action stayed the same. Other activities were a bit more difficult, assumably because they had more changes in the required action, such as the different movements on the cards, or because more attention to detail was required, such as distinguishing the pieces.

RQ 3. To what extent can the residents carry out the activity independently? What can they do themselves? What do they need help with? How much time and effort does it require from the supervisors?
Most residents are able to perform the activities on their own as long as the required action stays the same. Once this action changes, for instance when all the balls are thrown or when the drawing is finished, the resident needs some assistance. This means that the caregiver should be close by, but is not continuously necessary. However, the caregiver is needed while setting up and putting away the product. These actions should be clear and simple for the caregiver. Also, the residents are more committed and engaged when they get encouraged, this was a must during the tests. The concept itself could perhaps take on that role. This research question can be answered more reliably once the residents are already familiar with the activities.

RQ 4. To what extent can the residents keep their focus to the activity?
Corresponding with the answers to the second and third research question, the residents were more able to keep focus during the time when they had to perform the same action continuously. Extending the time in which they perform that action could be a way of letting them focus for a longer time. The concept could also help in some way to get back the focus by sending triggers.

RQ 5. To what extent can residents motivate each other to participate in an activity? To what extent can they help or motivate each other during the activity?
The residents can help or motivate each other, for example by showing fellow residents that they have fun in doing an activity, which is even strengthened when there is a tangible end result like a drawing. At least two residents were also able to help each other during the third activity. In a test, the right example of P5 enabled P4 to join the activity, and so they helped each other. However, P4 still needed to be reminded that she could look at P5.
Also, the residents (and their caregiver as an observer) indicated that they liked to do the activities together. However, this will differ for each duo. According to a caregiver of the house, these residents cannot really do activities in a group because of their large cognitive and social-emotional differences, but also their difference in age and interests.

RQ 6. To what extent does physical activity take place while performing the activity?
The tests showed that the PA should not be optional, but rather the only way to participate in the activity. When a resident is able to sit, he often wants to sit. In other words, some residents will perform the least amount of PA necessary to reach the goal. It depends however on the resident whether this option of, for example, sitting should be given or not. Of course, safety is the most important element that should always be taken into account.

Assumably, the residents also perform more PA when it is clearer for them what movement they exactly have to make. In the third activity, the cards contain visual examples of the movements, which lead to more clarity for the residents about what they exactly needed to do. This in term might have led to more confidence and more energetic execution of the movements.

RQ 7. To what extent can the activity be adapted to the individual resident with their interests and abilities?
More attention should be given to the accessibility of the board for people who are in a wheelchair and for people who have a higher risk of falling. Besides, there are many possibilities to adapt these activities to the residents' abilities and interests. These adaptations are often reflected in having different categories to adapt to the interests, different levels to adapt to the cognitive or physical abilities, and adjustability of the scaffold or concept itself to adapt to the physical abilities of the residents.

RQ 8. To what extent does the concept remain interesting for residents in the long term?
This is hard to test due to the limited time in the project. However, some residents played several times with the concept in a period of a few weeks. They stayed motivated during the last time as well, possibly because they got more acquainted with and capable in performing the activities. More tests over a longer period of time should be executed before this question can be answered.

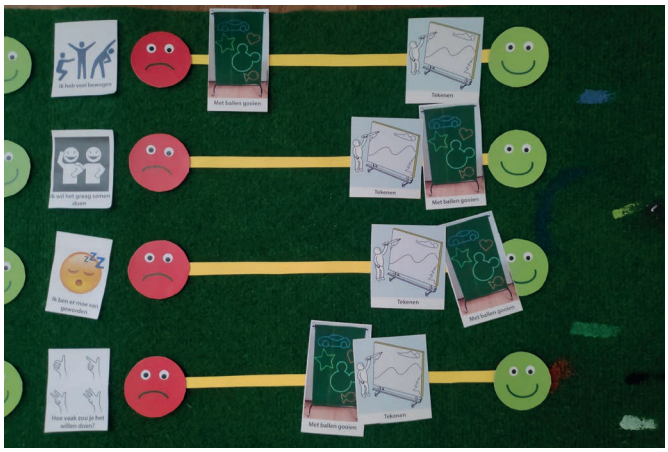
RQ 9. To what extent does the client feel motivated to interact with the concept?
a. Do they initiate it themselves or does the facilitator have to do this?
b. Are they motivated to start the activity?
c. Do they remain motivated during the activity?
The motivation of the residents to start the activity depended on the trust they had in how they would like or be able to perform the activity. During the activities, the motivation increased when the residents were successful and when they were encouraged or complimented. It decreased when they became tired or when it did not go the way they wanted it to go. The right timing and duration of the activities should be defined. To increase the motivation to initiate or do the activity, a clear and attractive starting point and overall appearance should be created.

RQ 10. How curious do the residents feel before or during the interaction?
In general, the residents were all curious about the exact activities, because they had never done it before. However, taking into account that this novelty will fade away, most activities would not have evoked this curious feeling. However, the drawing activity is really built around this feeling of curiosity, which seemed to work well as a way of keeping the focus of the residents.

RQ 11. How proud do the residents feel during or after the interaction?
Obviously, feeling proud often only arises when someone succeeds in performing an action. However, when something is too easy or even childish, this decreases a proud feeling too. That is why the activities should be well adapted to the individual's abilities. The activities that were well adapted to most residents, meaning the first three activities, cause a proud feeling, while the puzzle activity that was too difficult did not. Additionally, a tangible or visible end result like a drawing or an amount of points, helps in feeling proud. The encouragement in the form of compliments or high fives also strengthened this.

RQ 12. How energetic do the residents feel during or after the interaction?
Most residents often felt they moved a lot, even if they did not, for instance while puzzling or drawing. This answer could be explained by them wanting to give the socially desirable answer, or because they really felt they moved a lot. It was clear that the mood of the residents also influenced their experienced tiredness. Seeing how different the answers are, their own experienced PA and tiredness are not a reliable indicator of the actual PA that took place. However, the tone of their voice when they talk about how tired they became says something about whether they enjoyed the activity or not.

Answers of three clients on the conversation map:




Met ballen gooien
Bewegen op muziek
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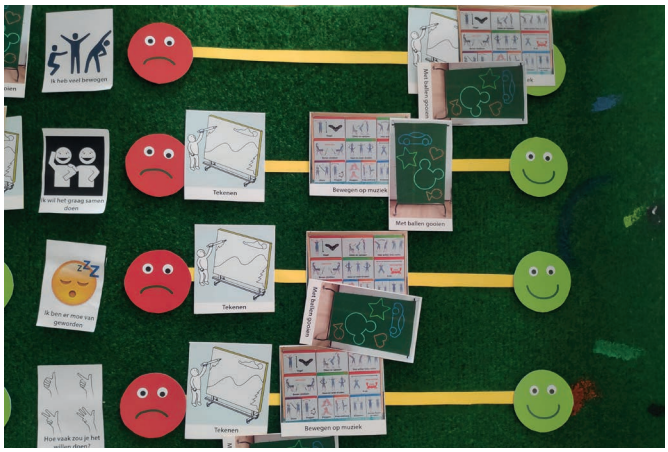
Tekenen
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Bewegen op muziek

L. SET-UP METHOD STORY CHAPTER 8

Format and text by Hendriks & Slegers & Duysburgh (2015):

- The positioning of the participants' impairment in the codesign project.

o What was the project's view on the impairment? How was the impairment addressed in the interactions during the codesign process? Were the participants involved in the configuration of the codesign process itself?

- The aim for equivalence

o How were equal contributions and collaboration supported? Was a shared language used? To what extent did the project result in a meaningful, valuable experience for all participants?

- The balancing of viewpoints

o Did the viewpoint of the proxies differ from those of the persons with an impairment? How were these differences dealt with? Did the limited knowledge of the impairment on behalf of the researcher affect the process?

- Dealing with ethical challenges

o What practical and legal challenges (informed consent) were encountered and how were they dealt with? Did any ethical issues emerge that the researchers and designers did not anticipate? What was the impact of participation in the project on both the participants living with impairments as well as the researchers?

- The adjustment of codesign techniques

o What characteristics of the project and of the participants were taken into account in the adjustments? Which adjustments worked well and which failed (and why)? What level of flexibility regarding approach and material was required?

- The data collection, analysis and interpretation

o What data were collected and how were they collected? How did the collected data differ from data researchers and designers usually work with? What challenges were encountered regarding data analysis and interpretation and how did they deal with these challenges?

Beweegdiploma

van

Voor het meehelpen aan een creatief onderzoek,
waarin we samen op zoek zijn gegaan naar leuke
manieren om meer te bewegen.

ONDERZOEKER: KIM

19 NOVEMBER 2022

N. EXAMPLE OF A NEWSLETTER

WEEK 6
6/05/22

Terug Blik Vooruit

Hoi allemaal,

Jullie hebben vorige week even niets van mij gehoord, maar bij dezen weer een verse update over waar ik me deze week mee bezig heb gehouden.

Eerste sessie met cliënt
Afgelopen dinsdag heb ik samen met één van de bewoners een spelletje gedaan met als doel inzicht te krijgen in wat de specifieke cliënt wel en niet leuk vindt om te doen. Zo hoopte ik de bewoner nog wat beter te leren kennen en inspiratie op te doen voor leuke manieren van bewegen die aansluiten bij haar interesses. In onderstaande foto's en onderschriften wordt uitgelegd hoe het spelletje in zijn werk ging.

De bewoner grabbelt één van de 40 kaartjes uit de hoge bloemenhoed. Op de kaartjes staan diverse activiteiten, van lezen tot fietsen en van dansen tot schoonmaken.

Samen kijken we wat er op het kaartje staat. We hebben er een gesprekje over en soms voeren we de activiteit op het plaatje even uit! Bijvoorbeeld door even te dansen.

Voor de cliënt staan drie smileys. Een groene voor de leuke activiteiten, een rode voor de activiteiten waar de cliënt geen fan van is. De cliënt loopt of reikt naar de relevante smiley en stopt daar het plaatje in.

Vervolgens wilde ik samen een poster maken van de plaatjes en dingen erbij tekenen of versieren, zodat de cliënt daar nog eens naar kan kijken. Hier was helaas geen tijd meer voor.

Inzichten
De activiteit gaf me inzichten in de interesses van de cliënt, die voornamelijk enthousiast was over theater, dansen, muziek luisteren, buikspieroefeningen doen, meedoen met Nederland in Beweging en tekenen/knutselen. Tijdens de activiteit leek de houding tegenover bewegen positief. Conclusies trekken is nog te vroeg, maar vooralsnog lijken de volgende factoren interessant of motiverend voor de cliënt:

- Een spannings- of verrassingselement, zoals een verhaallijn of grabbelen uit een hoed
- Iemand nadoen, zoals bij Nederland in Beweging, of juist iets voor mogen doen
- Samen met anderen bewegen
- Muziek luisteren, dit zet aan tot dansen en bewegen
- Sterker worden, zoals met buikspieroefeningen –> voortgang zien
- Zelf iets maken --> eerst iets knutselen en daar dan mee bewegen (we kwamen samen op het idee om een keer paaseieren te schilderen en die dan te verstoppen en te zoeken)

Vooruitblik

Dagbesteding
Volgende week of de week erna zal ik kennismaken met een begeleider die werkzaam is op de dagbesteding. Omdat de bewoners overdag vaak naar de dagbesteding gaan, is het leuk om te zien hoe het er daar aan toe gaat! Bovendien zal ik dan misschien daar af en toe een sessie kunnen doen.

Volgende sessies en contactpersoon woning
Komende dinsdag en woensdag zal ik langsgaan bij de woning om met verschillende cliënten te praten en (mogelijk) een soortgelijk spelletje te doen als eerder beschreven in deze update. Ook heb ik sinds deze week een vast contactpersoon binnen de begeleidersgroep waarmee ik wekelijks even contact zal hebben, bijvoorbeeld over wanneer ik langskom. Dit vind ik nu al erg fijn!

Workshop Sociale Innovatie
Door de innovatieafdeling ben ik uitgenodigd om op donderdag deel te nemen aan een workshop Sociale Innovatie door de Fysiek Fabriek in Eindhoven. FysiekFabriek is een project waarin veel wordt samengewerkt en samen ontworpen met mensen met een fysieke beperking. Ik vermoed dat dit heel inspirerend kan zijn voor mijn project.

Ik wens jullie allemaal weer een heel fijn weekend toe!

Groetjes, Kim