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Transitional architecture for intellectually disabled youth.

From formal education towards autonomous living.

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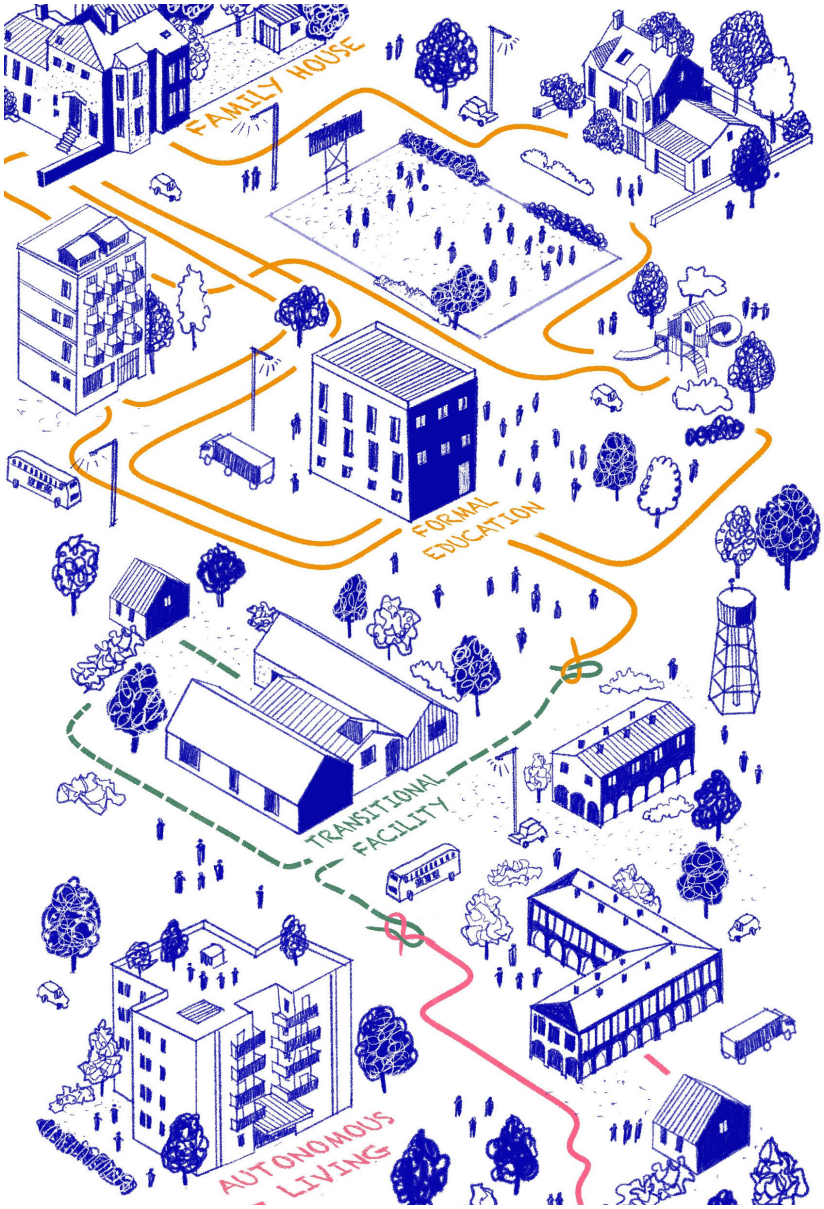

Transitional architecture for intellectually disabled youth.

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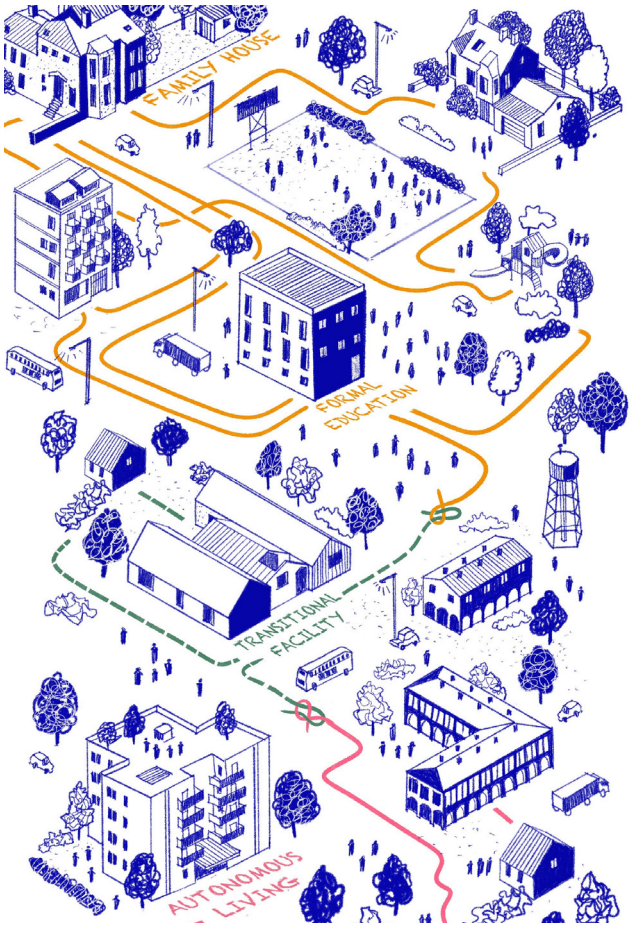
Contents



Acknowledgments

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Key definitions

Definitions of the relevant terminology.

Intellectual disability: a condition characterized by significant limitations in both intellectual functioning and adaptive behavior that originates before the age of 22 (American Association on Intellectual and Developmental Disabilities American Association on Intellectual and Developmental Disabilities).

Developmental disabilities: a group of conditions due to an impairment in physical, learning, language, or behavior areas that begin during the developmental period, and may impact day-to-day functioning (Centers for Disease Control and Prevention).

Young adults with Intellectual and/or Developmental Disabilities (YAIDD): young people with intellectual and (or) developmental disabilities aged between 18 and 30 years.

Formal education: structured education system that runs from primary (and nursery) school to university, and includes specialized programs for vocational, technical and professional training (Council of Europe).

Autonomy: the quality, or a state of being self-governing; when the ability to make personal choices does not collide with one's willing reliance on other people for support, guidance, or supplies (Van den Broeck et al., 2016).

Quality of Life: a multidimensional construct, composed of both objective and subjective dimensions, with an emphasis on the subjective evaluation of one's life circumstances, which is dynamic in nature and which can be influenced and enhanced by a variety of factors, implying a positive view on social services (Schalock et al., 2016).

Wellbeing: a combination of emotional and physical wellbeing, when a person is feeling safe, without worries, relaxed, feeling fit and having good eating habits (Schalock et al., 2016).

Independence: a combination of self-determination and personal development; the quality of personal control and the ability to make choices, set goals and choose values.; the ability to engage in education, or personal competence (Schalock et al., 2016).

Social participation: the opportunity of being included socially and perform community roles; building reciprocal relationships ad social supports (Schalock et al., 2016).

Figure 1 Collage: transitional phase of young adults with intellectual disability

Personal motivation

An encounter that proved the need for change.

The personal motivation behind my master thesis could be just as equally considered as a letter of acknowledgment to the person that had made me see the reality of life of intellectually disabled young adults and their persistence to grow, learn and adapt. Fatima* was one of the students in a day-care center for children with intellectual and developmental disabilities. She was a motivated student interested in art. As Fatima grew older, she developed the necessary skills to live on her own and sustain her own living, but it was challenging to find a job, residence, or even a higher education that would accept a young adult with intellectual disability. The day-care center saw potential in their former student and offered both residence and a job as a means for undisrupted transition towards autonomous adulthood. As a high school student, I attended a volunteering event at the day care center, where I learned the story of Fatima and saw her in-action: a happy woman teaching her students how to paint in different art media. This encounter has made me think about the flaws of the current educational and care systems (in the case of intellectually disabled clients) related to uninterruptedly responding to the multitude of the needs and wants of the neuro-diverse individuals. For a brighter and more inclusive future, there needs to be more success stories similar to Fatima, where education and care support the development of young individuals.

* *The name was changed for privacy reasons*

Figure 2 Personal motivation collage

Abstract

Families of young people with intellectual and/or developmental disabilities completing formal education compared the transitional period of their life to be equally stressful to when their child was initially diagnosed (Foley et al., 2012, p. 13). Poor safety, social skills training and the parents' unreadiness for their child's transition delays, or prevents, YAIDD from becoming autonomous adults. This research examines the role of architecture and the built environment in encouraging and preparing YAIDD to take a step towards autonomous adulthood after their completion of the formal education. The research combines the study of activity-based recommendations, that target Independence, Social participation and Wellbeing of the target group, and the design recommendations for disability-friendly environments specific to IDD. Incorporating data obtained from literature study, case studies, site visits)to the daycare centers, special care schools, and YAIDD residences), and interviews with YAIDD, their family members and the caretakers, this study demonstrates that by offering residences, communal kitchen, art workshops, work places, community center, classrooms, social clubs, gym and sport fields, medical rooms and snoezelen spaces YAIDD can choose to attend either of the facilities depending on their readiness and disability levels. In order to create a disability-friendly environment that stimulates Independence, Social participation and Wellbeing, the following design concepts are addressed in detail through literature study: Legibility and wayfinding, Prospect and refuge, Territoriality and control, Privacy and choice, Design for senses, Design for routine. The study offers a recommended framework that could prepare YAIDD for autonomous living, but the results are limited to the literature scope, the four case studies, and the interviews with the selected YAIDD and healthcare professionals. Nonetheless, the study could be useful to the architects in the field of design for intellectually disabled users, and the professionals in the education field that develop a transition plan for YAIDD and their families.

Keywords: intellectually disabled youth, transitional phase, autonomous adulthood, Quality of Life.

Introduction

Intellectual and developmental disabilities among young adults.

According to the definition provided by American Psychiatric Association, intellectual disability involves difficulties with general mental abilities in intellectual and adaptive functioning (Schaepper et al., 2021). The former case refers to learning, problem solving and judgment, while the latter defines activities of daily life, including communication and independent living. Independent living problems in the case of intellectual (and/or developmental) disability can mean lack of empathy, social judgment, communication, as well as inability to perform personal care and financial management.

Intellectual and developmental disabilities (IDD) are usually diagnosed before a child turns 18 years old. At the time of diagnosis, a parent's involvement in treatment and future-planning is the most cited predictor of a successful transition from childhood to adult life (Foley et al., 2012, p. 13). For parents to make a well-informed and conscious choice of a development strategy they must be provided with suitable options from their doctor, health organizations, community, or other public resources. According to the study of 45 parents of children with intellectual or developmental disabilities, 88.7% of the participants expressed their need in information of current and future services available in the society and intellectually disabled community (Sahay et al., 2013, p. 5).

Currently there are several tracks that parents can consider contributing to their child's development: home schooling, public schools (in case of mild intellectual disability), Charter and Magnet schools [1], Waldorf and Montessori schools [2], therapy, or disability-specific school, and most commonly schools for intellectually disabled children. However, as soon as a child outgrows the age of 22, the formal (i.e. primary and secondary) education system can no longer support the individual development and procession to independent living (Tortorello, 2013). In some cases, young adults start attending workshops (i.e., arts and crafts) or consider the jobs as a cashier, janitor, or shop assistant (Attitude, 2016). Despite that these options aim at providing activity and interactions in the life of disabled youth, some adults experience frustration as they compare a workshop to a jail, having to come there every day without their personal will or motivation (Hosche & Wilms, 2021). Hence a problem of individual's self-actualization arises, as intellectually disabled youth are rarely equipped to reach their full potential in the modern-day society.

[1] *public school with individualized attention to individual needs of the children with disabilities*

[2] *private schools that practice teaching students visually and kinesthetically*

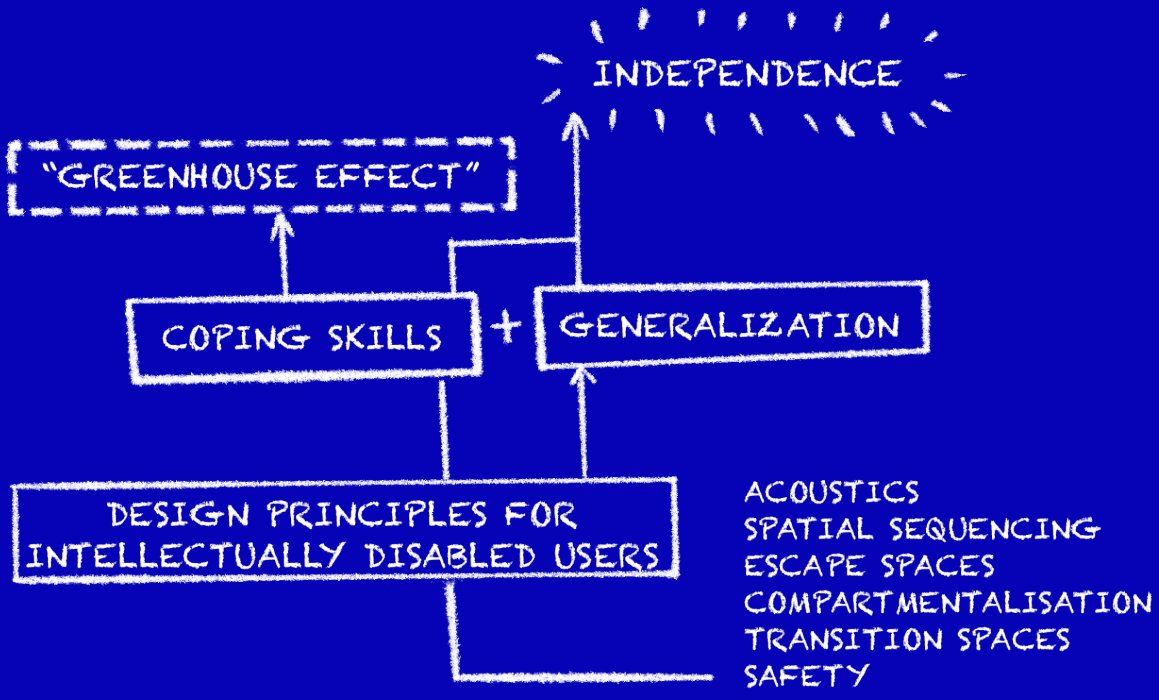

Figure 3 Pathway to Learning Concept: Children with ASD (Giles, 2020).

The "greenhouse effect" is reached when the facilities are strongly based on design principles for intellectually disabled users with generalizable design patterns. The coping skills of the students make YAID too used to the spatial configuration of the school, but mentally and physically uncomfortable in mainstream educational facilities (Giles, 2020).

Leaving school and proceeding with higher education, or work, while being a young adult is both mentally and physically complex. At this moment youngsters undergo a transition phase – the moment of moving from the protected life of a child to the autonomous life of an adult. In the case of intellectually disabled individuals this stage in life involves confusion and stress due to the unreadiness of the parents and YAIDD to move out and proceed with their personal development paths. Families of young people transitioning from school have compared this phase of life to the time when their child was initially diagnosed (Foley et al., 2012, p. 13). Moreover, due to the poor safety and social skills training, parents express unreadiness for their child's transition to adulthood. Safety and risk have been described as a major concern for the over-protectiveness of the families (Foley et al., 2012, p. 13).

The fear of parents regarding the unreadiness of their neurodiverse children can be resulted from "the greenhouse effect" in educational facilities (Figure 2). The term is used to describe the learning environments that are catered specifically to children with intellectual disabilities to the point that mainstream public spaces become unrecognizable to YAIDD. Such facilities negatively affect YAIDD's Quality-of-Life because these spaces limit their choice and dignity. To control the behavioral response of YAIDD the architectural spaces are usually tailored to feel sterile or inhuman (Roos et al., 2022, pp. 2-3).

Educational facilities should include spaces that help young adults with intellectual disabilities build tolerance to different environmental stimuli (Pearson et al., 2016).

The research problem is based on the Quality of Life of YAIDD during the period of leaving their parents' house. This phase carries many risks to the neurodiverse youth and their families, but this study is focused on encouraging YAIDD to take a step towards independent living after they are done with the formal education. Practical and generalizable knowledge is currently lacking in many secondary educational facilities, which later causes the problem of poor adaptation period or inability to live independently. Autonomy-stimulating architectural characteristics of the educational and living spaces (i.e., urban context, materialization, layout, programmatic organization) can be used to train YAIDD and prepare them to make a step towards independent living. To address the research problem the following question is stated:

How can an architectural design stimulate YAIDD to make a smooth transition towards autonomous adulthood after their completion of the formal education?

In addition to the main question, the following sub-questions are formed to guide the research and construct the further research methodology (Appendix A).

1. What are the recommended daily practices for YAIDD to encourage autonomy and develop independence, social participation, and wellbeing?
2. What are the design principles that encourage and discourage the use of public and private spaces?
3. How can a spatial design support the recommended daily practices for YAIDD's independence, social participation, and wellbeing?
4. How does the experience of the formal education facility designs contribute to YAIDD's development of independence, social participation, and wellbeing? How can these principles be used for those that graduate from the formal education facilities?

Literature review

The content of this master thesis was impacted by the existing sources on the topics of wellbeing recommendations and practices for YAIDD, inclusive learning and living environment, and architecture for intellectually disabled users.

The publication by Fleur-Michelle Coiffait and Alexandra Leedham *Psychological Well-being of Children and Adults with Severe and Profound Intellectual and Developmental Disabilities* (2016) presented evidence that YAIDD have higher levels of physical and mental health-related needs than the general population. Therefore, the authors analyzed environmental factors, emotions and physical health as a means to better understand and improve the wellbeing of YAIDD. *Health Guidelines for Adults with an Intellectual Disability* (2002) delivered by University of Hertfordshire summarizes the preventive and treatment strategies for the general health of patients with IDD. The document includes information and recommendations about daily nutrition, sensory impairment, and physical activity. The literature review *Young adults with intellectual disability transitioning from school to post-school: A literature review framed within the ICF* (2012) by Foley et al. described existing literature about the transition for young people with an intellectual disability and focused on the existing services of helping YAIDD undergo a transitional period, including healthcare, activities, participation and contextual factors. *A survey of dietary problems of adults with learning disabilities in the community* (1994) by Stewart et al. highlighted correlation of dietary problems among YAIDD and stressed the need for nutrition education programs for the target group. The need for education in dietary patterns was also addressed by Böhmer et al. (*The prevalence of gastro-oesophageal reflux disease in institutionalized intellectually disabled individuals*, 1999) and Waterman et al. (*Swallowing disorders in a population of children with cerebral palsy*, 1992).

The research *Enhancing social inclusion of young adults with intellectual disabilities: A systematic review of original empirical studies* (2018) by Louw et al. stressed the importance of social inclusion for the general health of YAIDD and proposed structured and organized social inclusion interventions to create opportunities for social interactions. The journal article *Community Involvement of Young Adults with Intellectual Disabilities: Their Experiences and Perspectives on Inclusion* (2016) by Sarah Hall addressed the community involvement of YAIDD and outlined various involvement strategies based on the interviews with fourteen YAIDD.

The topic of inclusive architecture for people with IDD was addressed in literature starting the early 2000s. *Cognitive impairment, access and the built environment* (2004) summarized conclusions related to the experiences of neurologically impaired patients in the built environment and translated into design recommendations applicable in architecture. The article by Magda Mostafa *An Architecture for Autism: Concepts for Design Intervention for the Autistic User* (2008) aimed at developing a preliminary architectural framework for the design guidelines for ASD patients. Lastly, the book *Designing for Autism Spectrum Disorders* (2016) describes the influence of environmental characteristics on individuals with ASD and other forms of intellectual or developmental disabilities. The book offers design recommendations to achieve healthy living for the selected demographics.

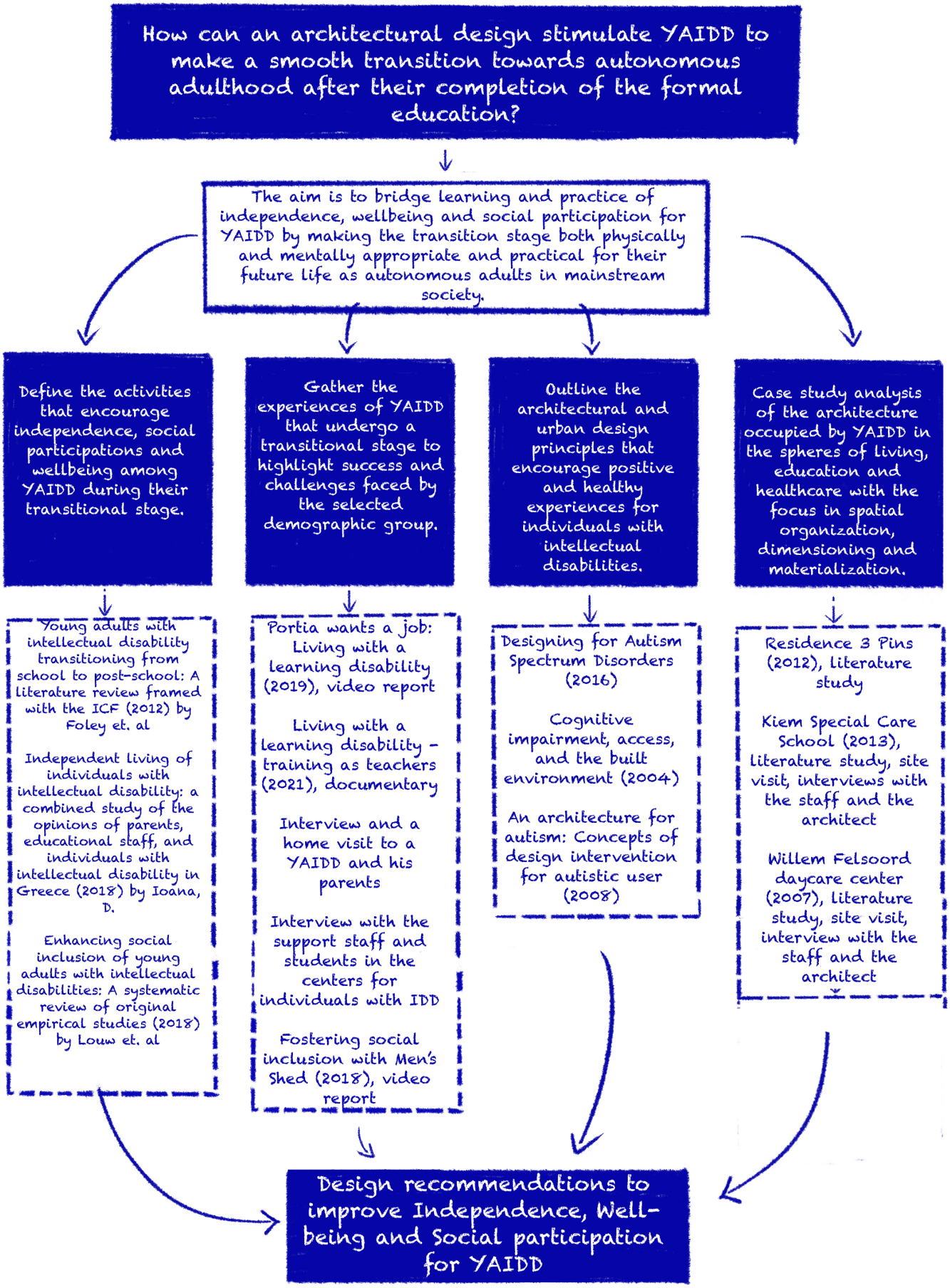

Figure 4 Research framework

Theoretical framework

Forming individual position for the research.

Within the selected literature list, scientific theories were used as the guiding principles for the research. The recurrent theories were developed in the fields of environmental psychology, medicine, and sociology. The theories are - Environmental Preference, Sensory Integration, Deinstitutionalization and Quality of Life Concept. This master thesis aims to accumulate the basis of the key theories and to translate the knowledge to the built environment.

The three Quality of Life domains – Independence, Social participation, and Wellbeing – act as the core principles for this master thesis research. The three objectives correlate with the ideals for YAIDD's ability to live autonomously in the modern-day society. With the deinstitutionalization movement paving the way for equality of opportunities for the intellectually disabled community, the built environment was seen as an equal playground of fostering the opportunities to perform individual care, participate in social activities, and take care of own physical and psychological health for the disabled and non-disabled individuals. In this way, the guiding principle for the thesis poses the hypothesis that by allowing YAIDD to practice activities related to independence, social participation, and wellbeing the target group can develop confidence in living autonomously.

The Environment and behavior theories are used as the secondary principles to be applied in the design of spaces relevant to Independence, Social participation and Wellbeing functions. In this way, environment and behavior statements form design principles that translate psychological and physical responses of the selected target group (YAIDD) into spatial preferences and safety measures within the architectural and urban realms.

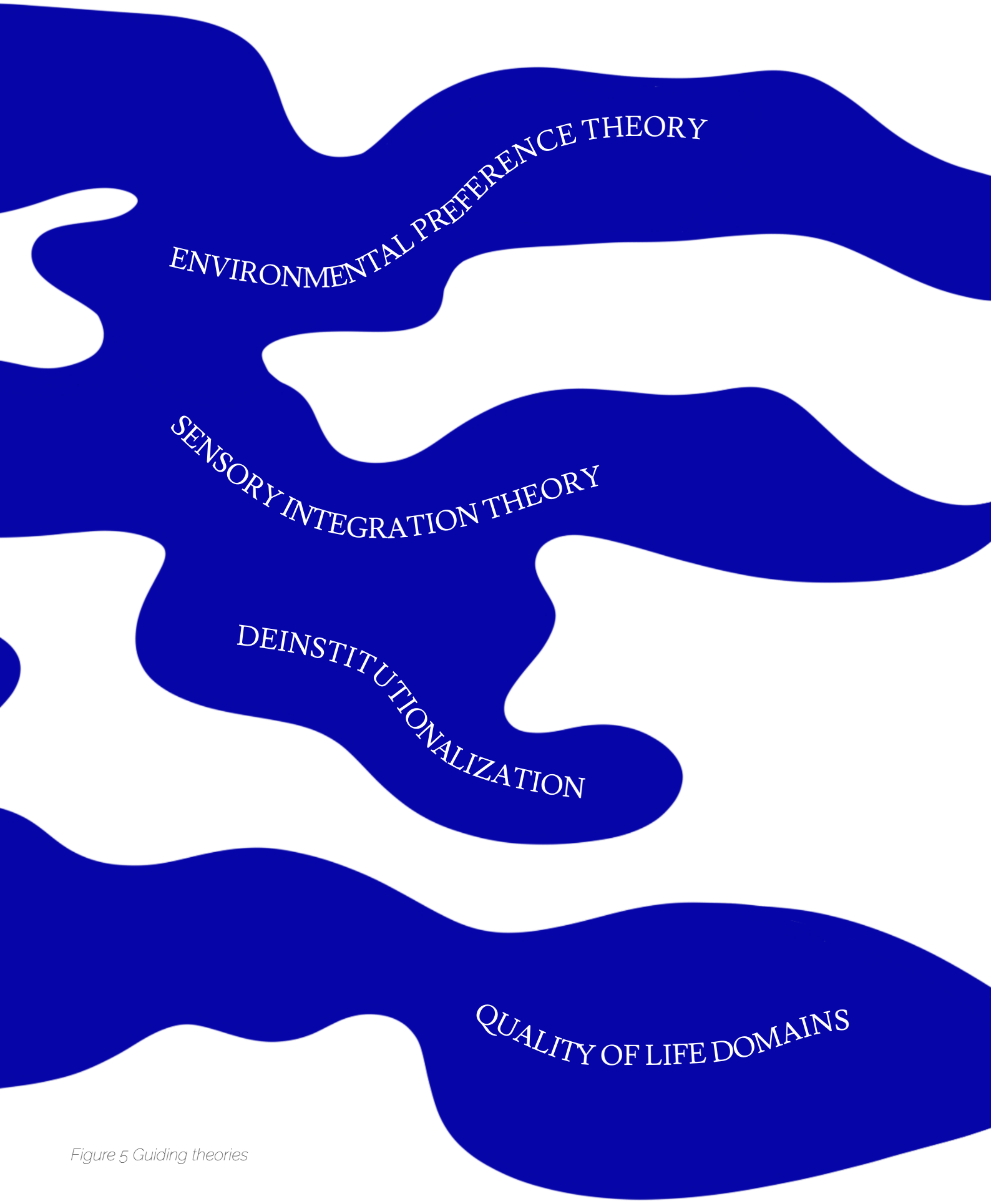

Figure 5 Guiding theories

Environment and behavior

According to a psychologist Kurt Lewin, human behavior is a function of the individual person and the environment. With this innovative concept in 1936, Lewin hypothesized that an individual's behavior is directly linked with the environment. The idea was further developed by M. Powell Lawton in 1982, who suggested that despite the objective environment, the formula must consider an individual's perception of the environment (Pearson et al., 2016, pp. 11-12). Thus, the role of architecture in understanding human behavior was discussed early in the field of human psychology without explicitly recalling the field of architecture and urbanism.

a) Environmental preference theory

When human perception of the environment became an acknowledged factor of general human behavior, environmental psychologists started speculating on the question of "How do people develop the feelings of spatial perceptions and preferences?". Environmental Preference Theory is based on the human preference of spaces that are engaging, rather than 'predictable'. It becomes an appropriate theory to study when addressing human self-actualization, because it offers design methods for engaging scenes to sustain skill-sets, talents and increase one's self-esteem. Complexity and mystery are the two factors that positively engage users and can be distinguished in the quantity and variety of architectural components in a scene, geometry, and composition (Pearson et al., 2016, p. 12). The four principles of Environmental Preference Theory - Complexity, Coherence, Legibility and Mystery - examine the relationship between people and their perception of spaces. This framework suggests methods to create "preferred environments" that stimulate and comfort specific user groups.

Environmental preference is based on the balance of our ability to make sense of the environment and our engagement with that same environment (Rachel and Stephen Kaplan, 1982).

b) Sensory Integration Theory

The theory refers to the detection, integration, organization, and use of the sensory information that helps a person interact with his environment. Due to sensory integrative dysfunction, neurodiverse individuals may feel confusion, irritation, or inability to participate and act in a way that the mainstream society can. The foundation of the Sensory Integration Theory is that proper integration of human sensory systems fosters the growth of language, attention, organization, motor skills, interpersonal relations, and academic learning (Pearson et al., 2016, p. 14).

Deinstitutionalization movement

Normalization was one of the early concepts that related to the individuals with intellectual disorders. In the early 1980s, the new concept advocated for the improved quality of life for people with developmental disabilities by offering a greater access to culturally typical activities and settings (Dieffenbach, 2012). The philosophy of normalization grew alongside the idea of a least restrictive environment. Initially it was seen as rather radical to the society since the individuals with disabilities were viewed as targets for pity. Over the time, normalization became a concrete framework that challenged society to provide for the intellectually disabled adults in a more humanizing way: "(adults with developmental disabilities) should have their desires and choices respected and should be able to live as non-disabled people do" (Parish, 2005, p. 219).

Throughout the process of deinstitutionalization, a significant number of people had relocated from institutional settings towards the new emerging architectural typologies. The new environments called for the new models of community living, such

The right to live independently in a place of one's own choosing reflects the guiding principles of the 2006 United Nations Convention on the Rights of Persons with Disabilities.

as group-homes and day-care centers. Unlike institutional care, which did not hinder participation in community life, the new forms of living aimed to express a disabled individual "as a full citizen".

Over the following years, residential services were further developed to host activities and education to support the development of the normalization principle. According to the Convention on the Rights of persons with Disabilities (CRPD) held in 2006, inclusive education is essential to realize without discrimination. Equal opportunities in education were addressed with the development of special guidelines for primary and secondary educational trajectories, and facilities that host these programs.

Quality of life measurement

As notions like "happiness" and "quality of life" are rather qualitative, there is no standard definition or an agreed form of measurement of the human Quality of Life. In 2005, Brown defined (a high) quality of life as being able to live successfully and happily within the environment. Before the social indicators movement of the 1960s and 1970s, Quality of Life was interpreted in terms of material goods and the GDP indicators. However, with the rise of social indicators, Quality of Life was understood through social sciences and the built environment with the rapid increase of publications in the 1990s.

The construct of QOL has been widely applied in the field of ID and implies principles of emancipation and inclusion (Morisse et. al, 2013).

Although there are multiple interpretations based on the researchers' perspectives, it is agreed that Quality of Life (QoL) is a multidimensional concept applicable on varying spatial levels. Different studies suggest different sets of QoL components depending on the purpose of the studies. The core elements in the framework are called domains, while details for each domain are called indicators.

In 2004, Robert Schalock suggested eight core QoL domains (and 19 indicators): emotional wellbeing, interpersonal relations, material well-being, personal development, physical wellbeing, self-determination, social inclusion, and rights. In 2010, Wil Buntix and Robert Schalock developed a conceptual model for QoL measurement for intellectually disabled people based on three factors: independence, social participation, and wellbeing (Buntinx & Schalock, 2010, p. 287).

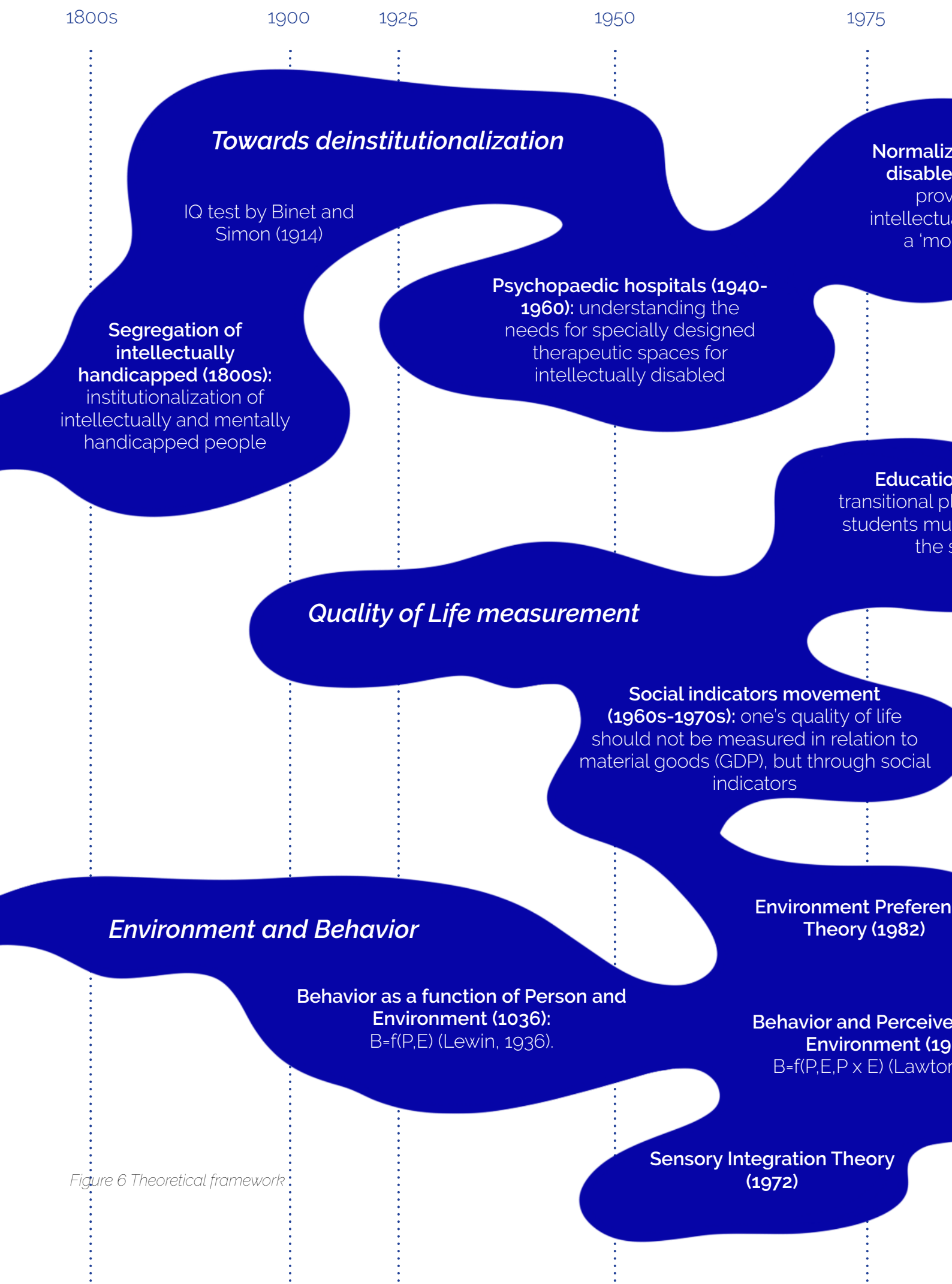

Figure 6 Theoretical framework


2000
2010
ation of intellectually
d individuals (1980):
viding services for
ally disabled people in
re humanized' way
New housing and care typologies for intellectually disabled people: assisted living, community homes, independent residences
Deinstitutionalization (1990s): transitions from hospitals to community-based living
n for all (1990): individual
lans for intellectually disabled
st be developed to help after
secondary education
QOL for intellectually disabled (2010): Independence, Social participation and Wellbeing (Buntix and Schalock, 2010)
Being, Belonging and Becoming QOL by Raphael et. al (2001); Being (who one truly is), Belonging (to one's social group), and Becoming (achievements and goals)
Schalock's QOL domains (2004)
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ed Human
82):
n, 1982).
Sensory Integration Premises (1991): Three postulates of sensory integration for intellectually disabled users
Design guidelines for intellectually disabled users (early 2000s):
Cognitive impairment, access and the built environment (2004)
An architecture for autism: concepts of design interventions for autistic user (2008)
Designing for Autism Spectrum Disorders (2016)

01 Autonomy-supportive experiences for YAIDD

Independence, Social Participation and Wellbeing.

The need for autonomy refers to the desire to self-organize, experience, and to feel that you are in control of your own life (Frielink, 2017, p. 14). People can feel autonomous not only by having the opportunity to make personal choices. In that sense, autonomy is often misinterpreted as the opposite of dependence. Self-determination theorists describe dependency as reliance on other people for support, guidance, or supplies. Hence, people can be autonomously dependent on others if they willingly trust their support.

Autonomy in taking care of one's own independence, social participation and wellbeing defines the Quality of Life of young individuals that wish to separate from their parents (or care-takers) and enter autonomous adulthood. In this chapter, each of the three factors of the Quality of Life is explained through definitions and examples of autonomy-supportive activities that YAIDD should practice to build independence, social participation and wellbeing. These activities and practices are the products of research conducted by medical staff, psychologists, researchers and anthropologists. Therefore the question that is addressed in this chapter is:

"What are the systematic practices that YAIDD should exercise to improve their Independence, Wellbeing and Social participation in the preparation and (or) during the transitional period?"

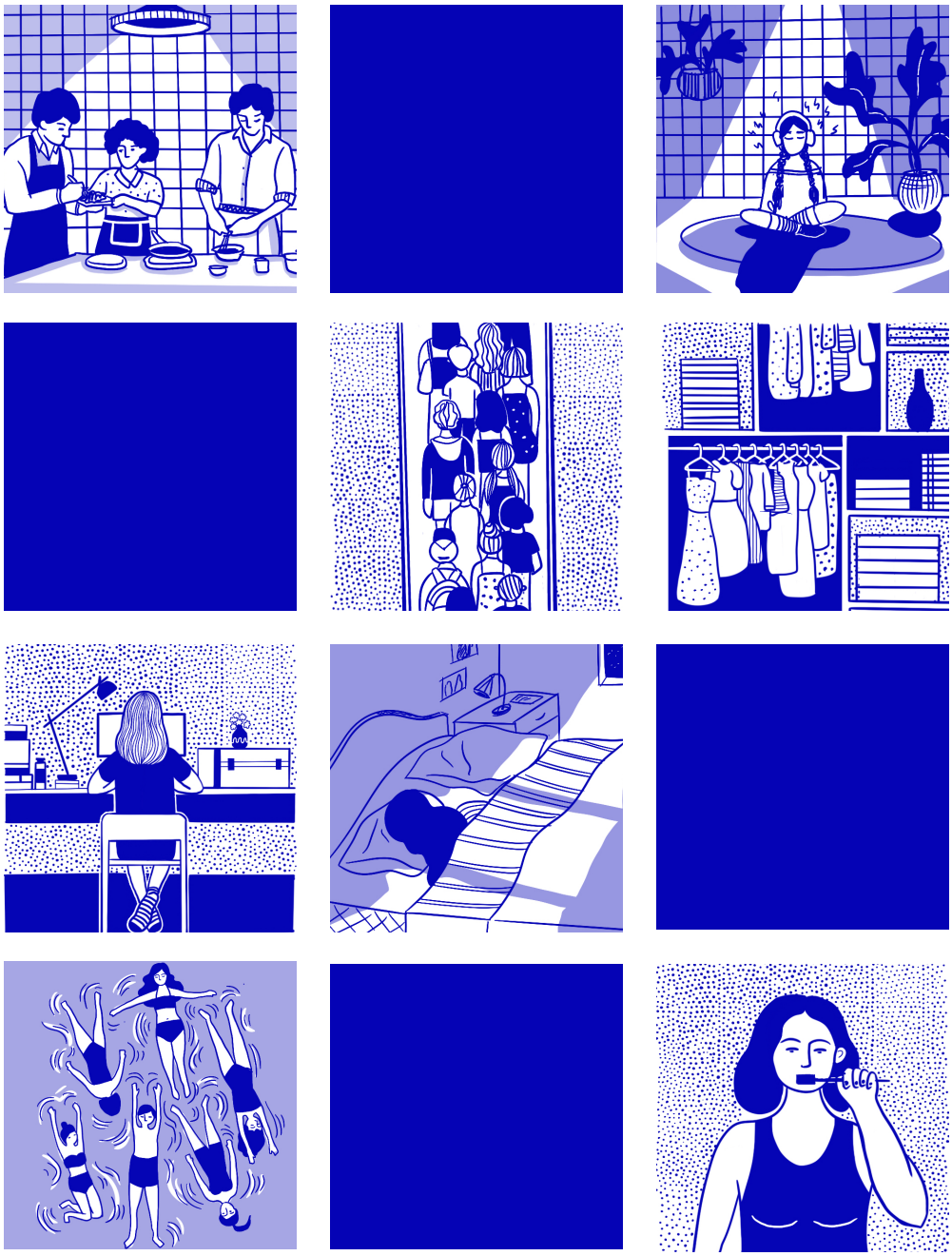


Figure 7 Autonomy supportive experiences - illustration / collage

Independence

a combination of self-determination and personal development; the quality of personal control and the ability to make choices, set goals and choose values.; the ability to engage in education, or personal competence (Schalock et al., 2016).

Figure 8 Independence-promoting activities (Illustration/ collage)

It is considered that the best predictor of one's future capacity for work among YAIDD is managing activities of daily living (Foley et al., 2012, p. 10). Being able to carry out the house chores is an important step towards one's development of autonomy.

Autonomy incorporates skills such as decision making, problem solving, and self-advocacy and has been found to have a significant link with quality of life (Foley et al., 2012, pp. 11-12). Research shows that the status of self determination is more impacted by environmental factors than by personal characteristics. Thus, people with intellectual and developmental disabilities are capable of learning to become self-determined. According to the study by Telethon institute for Child Health Research and School of Exercise and Health Sciences, self-determination training must be present in all transition focused education programs (Foley et al., 2012). In the same research, it was found that YAIDD with higher self-determination often have better outcomes across multiple life categories, including employment, access to health benefits, financial independence, and independent living; additionally, community-based environments have been reported to support and enhance self-determination; segregated environments, on the other hand, such as congregated living and sheltered employment may limit opportunities for choice and decision-making (Foley et al., 2012).

Employment brought positive outcomes for people with intellectual disabilities. Shelter and open employment offer some options to foster YAIDD's preparation into autonomous adulthood (Foley et al., 2012). In the cases of individuals that are unable to engage in employment due to their severe disabilities, the individuals may participate in "day services", where they can practice skill development, recreation, and community inclusion.

Ability to commute to desired destinations at any time is another factor that, in some cases, appears difficult to overcome by YAIDD to reach full independence. The majority of parental concerns about young adult's safety (related to commute experiences) are related to their child's capability and vulnerability to strangers, geographical location, and paucity of resources to assist with transport training. In many of the transitional planning routes for YAIDD, transportation training is left out from the program.

Autonomy-supportive environments encourage significant steps towards independence (Ioanna, 2018; Yıldız & Cavkaytar, 2020).These steps must be appropriate to the YAIDD's disability-specific conditions. In some cases, the Psychological and physiological barriers prevent young adults from moving to independent or group homes. In such cases, YAIDD living with parents can still continue taking responsibility for the household chores. While others may pick-up household tasks by watching their parents, YAIDD may require more step-by-step methods to aid in the learning process. Department for Communities and Social Inclusion in South Australia suggested the following list of daily activities that YAIDD may be expected to carry out independently: operating the washing machine, ironing, folding the clothes, cooking, shopping, mopping the floor, using ATM, and traveling by public transport (Intellectual Disability: promoting daily living skills in adults, 2013).

Among the recommended techniques for teaching independence, YAIDD can join an independent living skills group, and have a photo-sequence of the tasks with the steps written as a storyline. Learning the new tasks is preferable at the locations, where the task will usually be done.

Independence

Success stories of YAIDD.

During the fieldwork study of the YAIDD's needs, behavior and built environment as a part of the research methodology, I have encountered success stories that involved a boost in independence of the selected target group of the project. In this chapter, the stories of Robert and Florian represent the positive effects of employment and self-determination on the overall quality of life of young adults. Data collection methods varied for the two individuals. In the case of Robert, the information was obtained through an original interview conducted by the author. Moreover, additional data was collected by interviewing Robert's parents and through a visit to Robert's house. In the case of Florian, his story was studied through a video-report published by DW Documentary (Living with learning disabilities - training as teachers, 2021).

OWN CARE AND HOUSE CHORES

DAILY LIVING SKILLS TRAINING

SELF-DETERMINATION

EMPLOYMENT

EXPLORING OWN INTERESTS

COMMUTING TO DESIRED DESTINATIONS

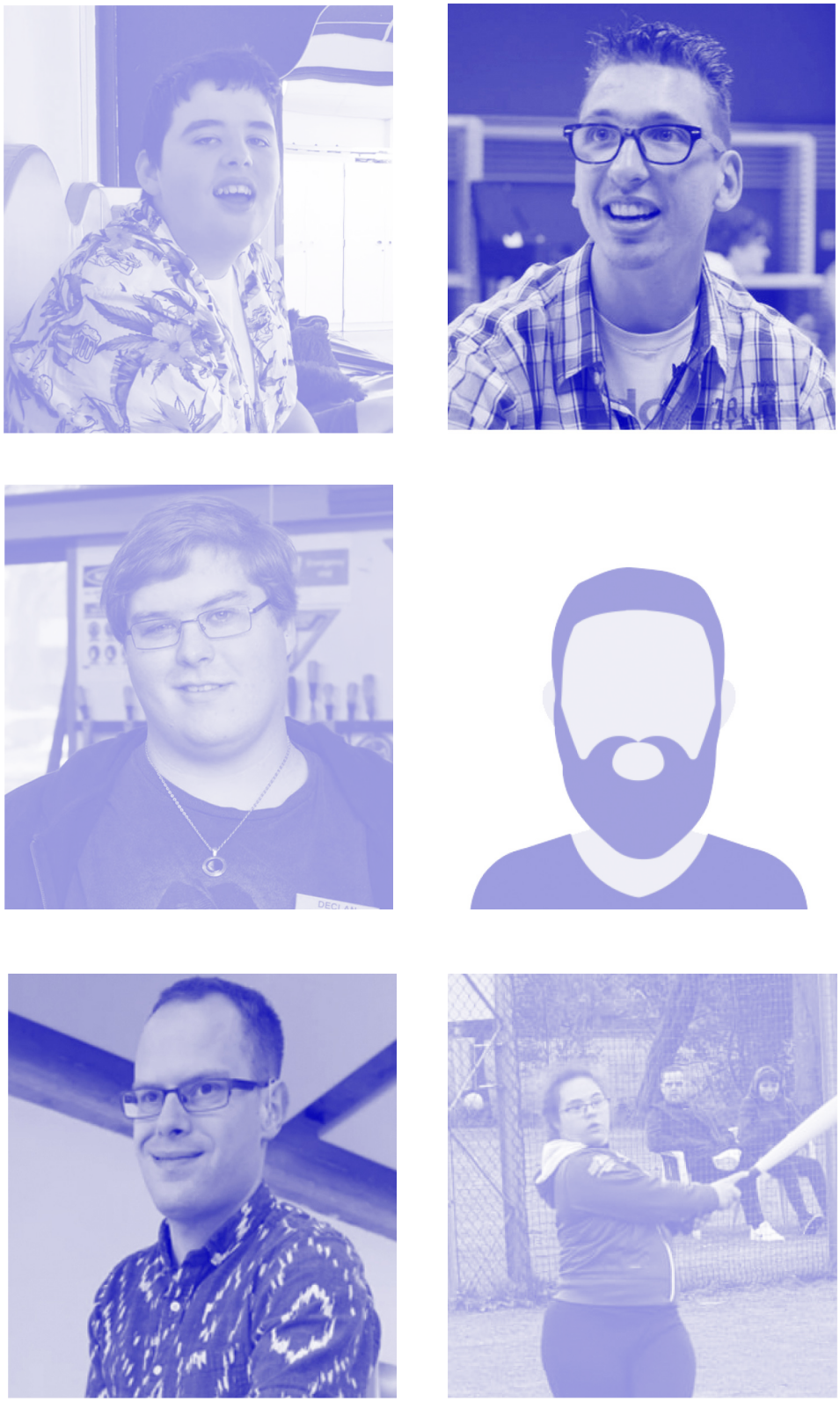


Figure 9 Independence: success stories.

"I think that meeting with people, and contact with his colleagues make Robert incredibly happy",
- Alies Hein (Pameijer advisor), interview

Robert

35 years old

Starting from the early childhood, Robert was taught daily chores at home by watching over his parents. He learned how to clean-up, cook and wash the dishes. As he grew older, his parents took the necessary steps to make his transition into independent living smoother. The gradual process began by leaving him at the family home for a day without any supervision. Next step would be leaving their child for a week, and soon he developed confidence and knew that he could do his own house chores, take care of himself, and commute to school and other desired locations.

During Robert's adolescence he attended the Special care school. However, due to his excellent grades throughout his education he was allowed to join an extra training program. With the given choice, Robert picked culinary school and successfully completed his training.

Today, Robert continues to develop his independence by working in the office. There, he follows his own schedule regarding the cleaning, watering the plants, loading and unloading laundry, and filling up the snacks bar. Besides his allocated tasks, he helps his international colleagues to learn Dutch language with short conversations.

With help of Pameijer organization, Robert was able to move to a transitional independent studio two years ago. The same organization is located nearby the house, so that Robert is welcome to come there and socialize with the staff and other Pameijer's clients.

Figure 10 Robert's profile

Florian

28 years old

Florian was been selected as one of the seven candidates to participate in a three-year training program at Cologne University of Applied Sciences aimed at integrating disabled individuals in the academic world of higher education. At birth, he suffered from oxygen deficiency that led to a destruction of brain cells. Before the program at Cologne University, Florian used to work at a post-office while sorting parcels. However, similarly to many other locations adapted for people with disabilities, the job did not foster growth and development as desired by Florian and his mother.

"The students talked to us openly and that is impressive. I think we were a little shy at first, but then they started talking to us", - Florian, interview to DW Documentary

During the training program, Florian and six other candidates learned valuable communication skills and practiced hosting seminars with the university students. Working at the university gave new responsibilities to Florian that offer him a new purpose and motivation: "My top priority now is my career. And once you get a job and figure out how to do it, and this can be a lot of fun". (Hosche & Wilms, 2021)

Figure 11 Florian's profile

Social participation

the opportunity of being included socially and perform community roles; building reciprocal relationships ad social supports (Schalock et al., 2016).

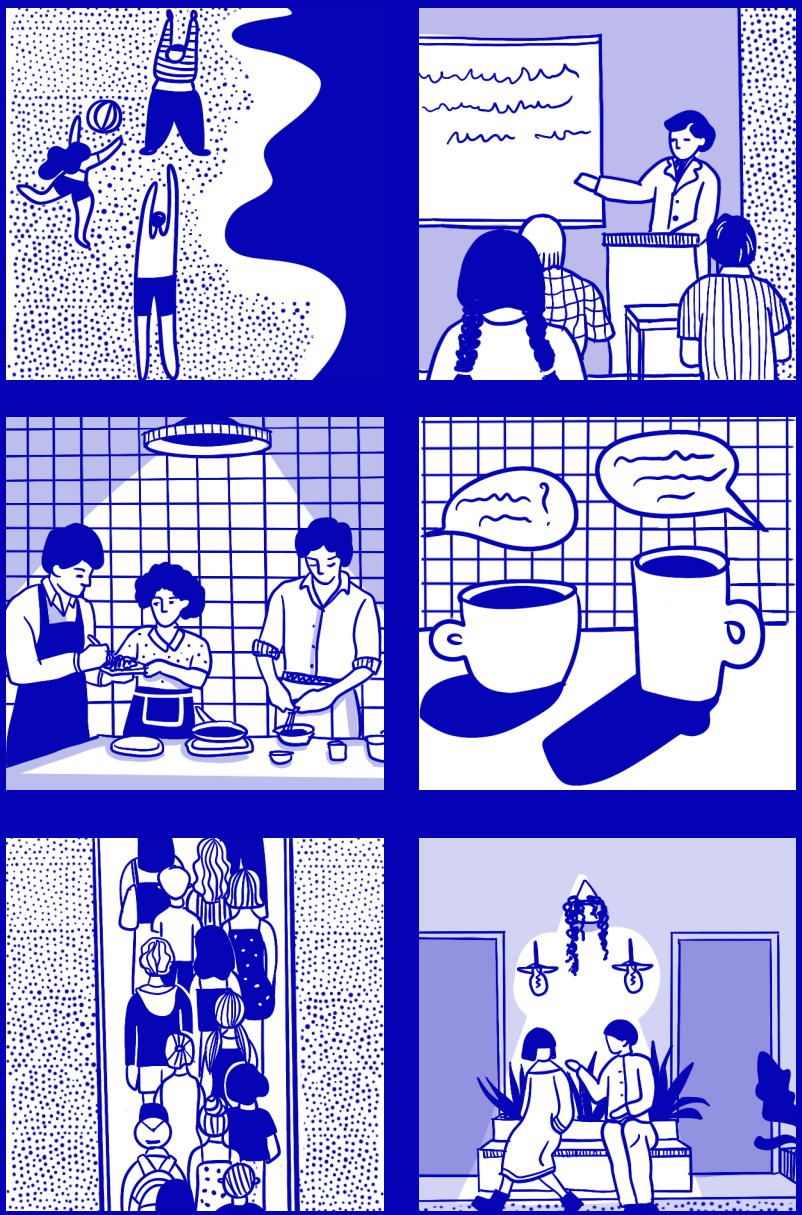


Figure 12 Social-participation-promoting activities (Illustration/ collage)

Research from Australia discovered that friendships appear to decline for YAIDD once they leave the formal support of school. Then, new social networks are formed primarily through employment and involvement in day activities. For many, the immediate period post transition from school can be a very isolated and lonely time (Foley et al., 2012, p. 11).

One of the most crucial factors that influences wellbeing and behavior in YAIDD is the ability to communicate the world around them and express themselves. Communication problems are strongly associated with challenging behavior and mental health. Support interventions that enhance the communication of the person with IDD facilitate their further integration into the society. Emphasis in social skills training and programs should be focused on gestures, vocalization, nature and quality of interactions, and control over the environment (Intellectual Disability: promoting daily living skills in adults, 2013).

In 2018, literature review by Julia S. Louw provided a structured and organized social inclusion interventions overview with particular attention put on improving social skills of YAIDD. Literature studies proposed interventions that varied from implementing a training module on personal development, to using social media for networking, to leisure participation, and employment (Louw et al., 2018). The researchers concluded that activities that involve sports in a mixed group setting (together with non-disabled individuals) have the potential to help young people understand the constructs of acceptance, self-confidence, sharing and friendship.

The research of Wilson et al. (2017) addressed the case where members of a structured social group met weekly for 2 hours based on their activities of interest. The follow-up interviews of the participants revealed an increase in their wellbeing and a sense of belonging. Hence, staff-supported gatherings help with the coordination of activities and increase social participation of YAIDD. Similarly, supported dog-walking programs and peer-network intervention were found to facilitate encounters with other community members (Louw et al., 2018, pp. 9-10). In 2016, a study made by Sarah Hall described the personal experiences and community involvement of YAIDD through interviews. Participants reported to have connections through their jobs, volunteering, recreational events, and leisure activities (Hall, 2016). Day care centers could form YAIDD friendships and acquaintances, but such spaces should not limit the options of available activities to the stigmatized views on YAIDD's interests (i.e., arts, crafts, mosaic). To encourage the mix of users, a greater variation of leisure activities could be offered. For instance, VR booths and gaming centers could be used to bring positive goal-oriented experiences among the YAIDD (Foley et al., 2012, p. 12).

Social interventions that focus on social skills often relate to the interactions within school settings or in a preparation for employment. These locations form connections with peers. Some of these connections extend beyond the school or workplace as they have an element of reciprocity that has been valued by YAIDD (Louw et al., 2018, p. 12).
Encountering people from within communities where YAIDD reside contribute to a general sense of belonging, and fear of negativity or harm led to feelings of exclusion. Specific location or setting was found to affect the social exclusion or disadvantage for YAIDD. Even though those YAIDD living in rural areas found employment quicker than the ones that live in urban areas, the quality of friendships and the regularity of social interactions took place more often among the young people in urbanized settings (Louw et al., 2018, p. 10).

Social participation

Success stories of YAIDD.

In the context of social participation, the stories of Declan and Emilia were collected through the secondary sources. Declan's success was shared by Curtis University as an exemplary case of a mentoring program for YAIDD in Australia intended to expand the social network of the target group. The profile of Declan's success story was collected through the publications in news articles (Perth: Men's Shed mentoring program gives 18 intellectually disabled men important skills, 2018) and video report (An Intergenerational mentoring program at the Western Australian Men's Shed Association: Declan Prince, 2018). The story of Emilia was based on the article "Introducing: Elly de Waard" shared at the platform of ASC Hilversum Hurricanes in 2021. The publishing organization is the sports club for baseball , softball and American football in Hilversum and Wijdemeren (Netherlands). As a part of the inclusion strategy, the club has introduced training for people with intellectual disabilities, where Elly de Waard performed as a volunteer teacher and Emilia was one of the students that attended the training.

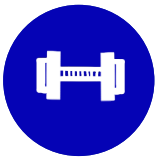
STRUCTURED GROUP ACTIVITIES

PEERS WITHOUT DISABILITIES

INTERACTIONS WITHIN A WORK/SCHOOL SETTING

EMPLOYMENT

EXPLORING OWN INTERESTS



PARTICIPATION IN GROUP SPORTS

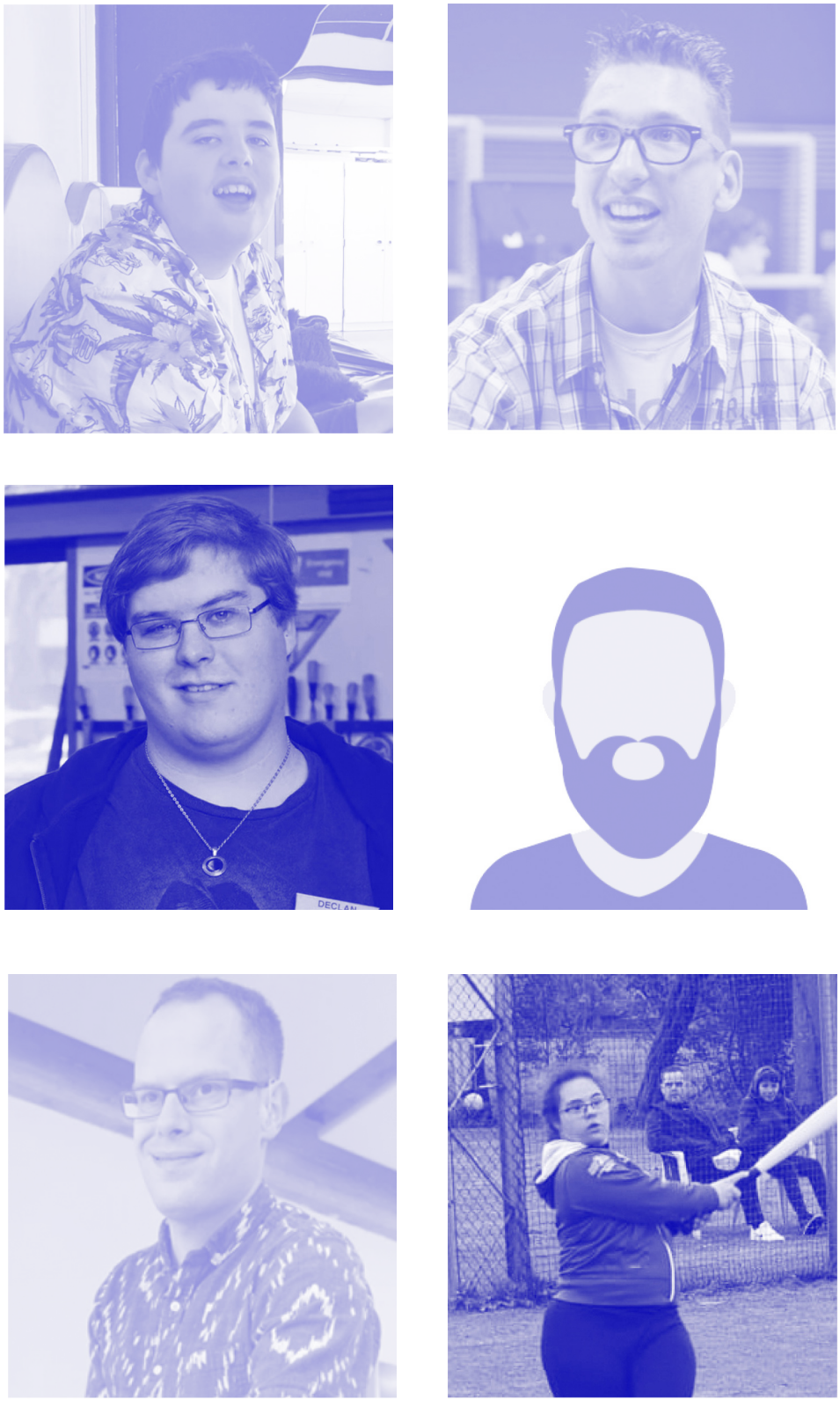


Figure 13 Social participation: success stories.

"Once you get through this wall that he has, you are okay... You treat him with respect, so he treats you with just as much respect", - Bernie Dierks (Declan's mentor), interview for Curtin University

Declan

20 years old

Declan Prince is a young adult with intellectual disability living in Australia. Declan used to be a delivery driver for a restaurant, but eventually managers let some staff go including Declan himself (Curtin University, 2019).

Although the process of being laid off work was challenging at first, soon Declan joined the program at Men's Shed across Western Australia. The initiative was a part of Curtain University and Western Sydney University's collaborative research into the benefits of integrated mentoring. Along with Declan, several young men between 17 and 24 years old have joined Men Shed's to assist in the development of work and social skills. Here the employment at the workshop implied the opportunities to participate socially, meet people, gain income, and develop set of skills.

Through this occupational therapy of learning the carpentry skills, Declan eventually overcame his difficulty in social participation with his co-workers and his mentor.

Figure 14 Declan's profile

"The training sessions are adapted to the level of the players. The players radiate with pleasure and pride during all training sessions when they have thrown or hit well.", - Elly de Waard (volunteer at ASC Hilversum Hurricanes), interview

Emilia

<18 years old

Emilia has found herself interested in joining Hilversum Hurricanes – an inclusive baseball sports club. She started along with five other enthusiasts with intellectual or developmental disabilities. Despite starting in a smaller group, the goal is to bring all the new members to play baseball in the full team within the club (de Waard, 2021).

In her first training, six players (and their parents or caretakers) were introduced to the new equipment – the glove – and how to put it in easily. Training to use the new equipment with safety was preceding the throwing, hitting, and running after the ball. Competitions during the trainings are most appreciated by Emilia and other members. In the summer, she trains outside on the fields, while in winter the whole club moves indoors inside a gymnasium. During the outdoor seasons, there are friendly tournaments with other associations.

Figure 15 Emilia's profile

Wellbeing

a combination of emotional and physical wellbeing, when a person is feeling safe, without worries, relaxed, feeling fit and having good eating habits (Schalock et al., 2016).

Figure 16 Wellbeing-promoting activities (Illustration/ collage)

As the construct of wellbeing is multi-dimensional, the indicators of physical and psychological health can be applied for addressing the topic.

In the case of physical health of YAIDD, nutritional wellbeing is considered as a factor for maintaining health and improving longevity. Education and behavioral interventions ensure that appropriate dietary habits are developed, and oral hygiene practices are made a part of one's daily routine. Nutrition-related health problems, such as obesity and chronic constipation, are more common among the population with intellectual disabilities (Stewart et al 1994). People with severe disabilities (i.e., cerebral palsy) have a high high-risk for under-nutrition (Böhmer et al 1996; Waterman et al 1992). Hence, nutrition screening should involve a systematic assessment of nutritional status, physical examination, and provision of basic nutrition educational materials (Health Guidelines for Adults with an Intellectual Disability, 2002). Besides eating habits, movement and exercise can target both the physical and mental health states of YAIDD. Hydrotherapy, dancing, mobility games, or even varying positions throughout the day gives opportunities to build confidence and satisfy certain sensory needs. Dancing exercises are often used as the levels of complexity can be easily modified and become useful even to those with limited mobility. As for encouraging motion in daily life, the use of padding, mats, cushions and soft play equipment persuades YAIDD to get out of the bed, stretch arms, or relocate from the desk (Coiffait & Leedham, 2016, p. 15).

Sleep-related problems are common among YAIDD, which influences their psychological wellbeing in the long run. Although there are numerous potential factors that can impact on sleep and its quality, environmental factors are the easiest and quickest to be resolved. Within YAIDD's bedroom setting, some changes about the surroundings of the household may disrupt the sleep or influence adaptation of the person. For instance, change in the layout of the bedroom, a different bedding material, or sensory difficulties (excessive light, noise, smell). Sensory triggers must be addressed in the general psychological assessment of YAIDD as these refer to any impairments, sensitivities, and sensations. Optimizing the environment to the desired stimuli can minimize psychological distress. Stimuli can be limited and controlled to positively influence psychological wellness of YAIDD. For that matter, the provision of a rich variety of sensory experiences using multi-sensory techniques (i.e., Snoezelen) is suggested to enrich the lives of people with IDD (Coiffait & Leedham, 2016, p. 8). Additional sensory activities that promote wellbeing include access to foods and flavors, playing music instruments, listening to music or enjoyable sounds.

With several activities and objects that YAIDD enjoys, it is important that YAIDD can make an informed choice. Sensible judgment is a requirement to support the wellbeing of individuals with IDD. In the daily life setting, having control over one's own environment is crucial to the general psychological wellbeing. Hence, any interventions that support positive person-environment interactions, such as touch switches, have an opportunity to benefit YAIDD. Interactions with the environment can be further addressed with the movement-promotive spaces to elevate the mood of YAIDD. Neurodiverse individuals often spend long periods of time in one position (frequently lying down in bed). Staying at the same spot and position can eventually lead to a low mood, which is why creative ways of engaging users in physical activity and movement should be addressed in the home environment to boost the mood of YAIDD (Coiffait & Leedham, 2016, p. 6).

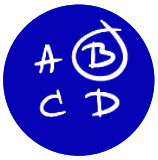
Wellbeing

Success stories of YAIDD.

The wellbeing-related success stories reflect the demand of YAIDD for specialized services and spaces as preventive measures against the complications that might arise due to intellectual and/or developmental disabilities. The story of Chris was based on the secondary source – a publication and a website initiated by Chris's mother. The family had noticed that a daily use of snoezle-rooms can prevent the unpredictable and self-harming behavior of Chris. Since their child lives in an assisted group home without a snoezle-space, the website was used as a tool for fundraising. The information, however, highlighted the need for snoezle-rooms in the residential spaces for YAIDD with severe disabilities and the high-expenses related to implementation of the necessary equipment.

The profile and the story of Scott was written based on the publication by Brighton & Hove Food Partnership. Scott had attended an inclusive Healthy Hearts course at the Community Kitchen, where the participants were taught to cook according to healthy dietary requirements. The blog entries have shaped the information on the success story of Scott and reflected the positive feedback of the YAIDD.

FOLLOW A HEALTHY NUTRITIONAL PLAN



ABILITY TO MAKE INFORMED CHOICES

CONTROL THE TRIGGERING STIMULI

UNDISTURBED SLEEP

MOBILITY

ACCESS TO MEDICAL HELP

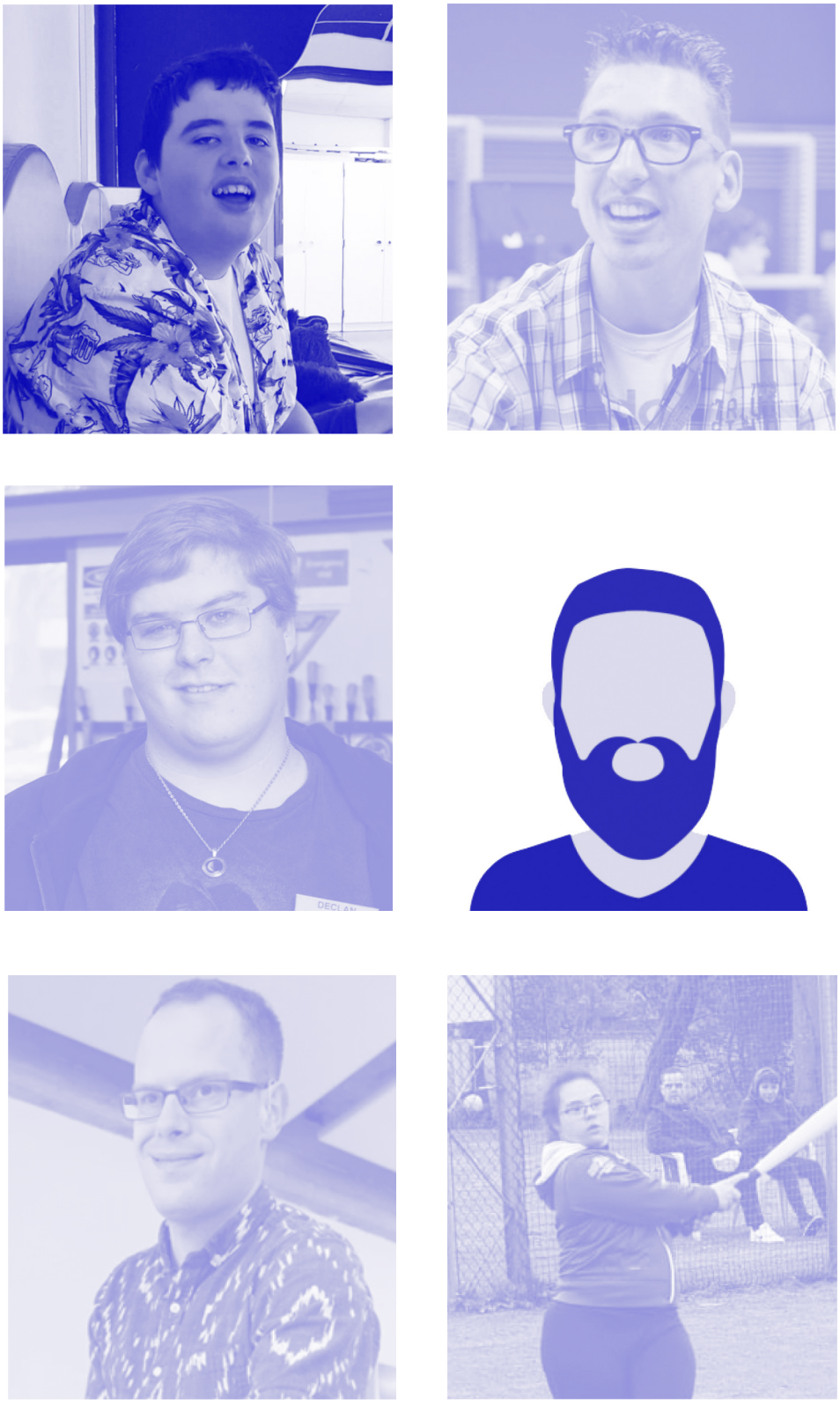


Figure 17 Wellbeing: success stories.

"Snoezelen is an important daytime activity for Chris", - Christel (Chris's mentor), extract from Snoezelen-for-Chris crowd-funding

Chris

14 years old

When growing up in a family of five children, Chris developed certain difficulties such as a delay in talking and walking. After many years of investigation, a serious developmental disorder was found. At home, the diagnoses started to manifest with an unpredictable behavior and emotions. Sometimes, his violent actions could be dangerous to himself and to others as he could bite or scratch people.

A decision was made to move Chris into a supported living house. There, Chris made friends with his house-mates and the staff. He goes to the day care center during the weekdays, and his family often visits him weekly to do shopping, take walks and dine out. Most importantly, Chris's parents-initiated crowd-funding has turned one of the rooms in the group home into a Snoezleruimte, which is an effective way of relaxation and de-stimulation of senses. The room combines a colorful collection of atmospheric material to stimulate touch, visual, and auditory senses in a controlled manner. These stimuli regulate Chris's alertness and gives a safe feeling to him through subdued lights, soft music, scents, colored lamps, movements of the light projector, tubes with bubbles, bean bad and a water bag. Difficult behavior of Chris was prevented by implementing 30-60 minutes of Snoezleruimte in his daily schedule.

Figure 18 Chris's profile

"I make healthy choices now – salads from Aldi, not crisps any more", - Scott after he completed a Healthy Hearts course at the Community Kitchen.

Scott

>18 years old

Since the day when Community Kitchen opened, 3000 meals were prepared by individuals during the range of 18 community cookery courses. When the school has initiated community cookery for those with disability and low incomes, Chris joined the program. He wanted to learn about healthy eating habits and new recipes in a safe environment within a friendly group of people. The comfortable, informal, fun, and supportive atmosphere of the class has led to the benefits of his overall wellbeing and career. After he attended Healthy Hearts course for people with learning disabilities, he started to look for a part-time job in a restaurant kitchen or a bar:

"I liked everything about the course – the food and learning skills, but also meeting new people. I really liked the staff and colleagues. I learned knife skills and really enjoyed chopping the vegetables. I've made the muffins and the pizzas many times since the course. I make healthy choices now – salads from Aldi, not crisps any more. I feel more confident in myself and less depressed. My confidence has rocketed! I'm now doing a 'back to work' scheme. I want a part-time kitchen or bar job" (Marks, 2019).

Sue, Chris's caretaker, has noticed a confidence boost of her client as he learned to use the kitchen equipment and has a good awareness of safety. She also commented that the recipes taught in the course were easy to follow and supported with visual aids for going shopping for the ingredients.

Figure 19 Scott's profile

Summary of the findings

Certain criteria can fall under one or more parameters of Independence, Social participation and Wellbeing. In this manner, participation in group sports benefits social development of YAIDD and their physical health; similarly, employment expands social network of an individual and contributes to one's independence.

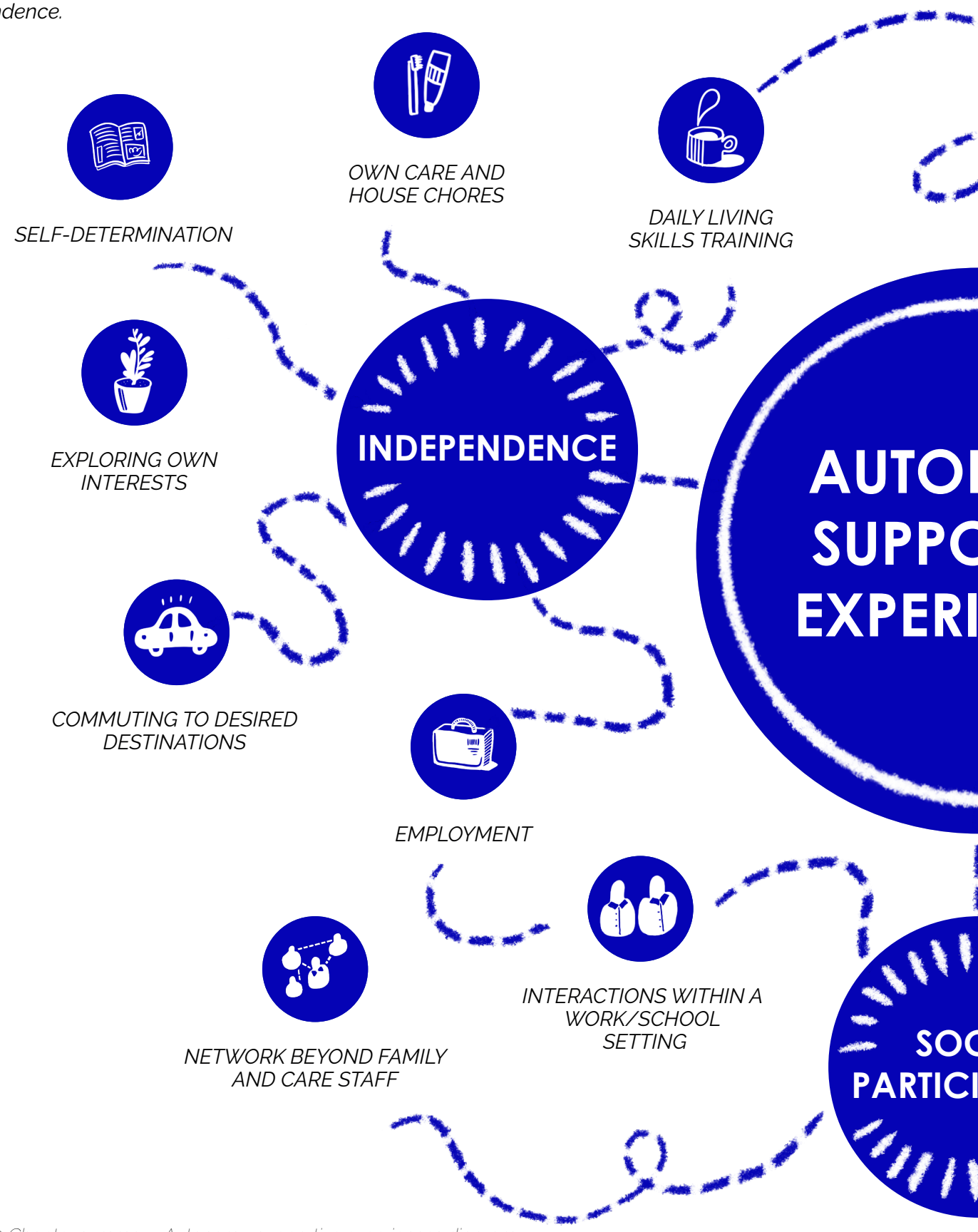


Figure 20 Chapter summary: Autonomy-supportive experiences diagram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WELLBEING
NUTRITIONAL PLAN
ABILITY TO MAKE INFORMED CHOICES
CONTROLLING THE STIMULI
ACCESS TO MEDICAL HELP
UNDISTURBED SLEEP
MOBILITY
OPPORTUNITY TO RETREAT/ESCAPE
PARTICIPATION IN GROUP SPORTS
STRUCTURED GROUP ACTIVITIES
PEERS WITHOUT DISABILITIES

02 Autonomy-supportive spaces for YAIDD

Interior design, Architecture and Urbanism

The subject of an autonomy-supportive environment is addressed through the lens of architecture and user's experience of spaces. The concluding diagram of the previous chapter (Autonomy-supportive experiences for YAIDD) was used to select the scope of spatial design interventions relevant for the three parameters: Independence, Wellbeing and Social Participation of YAIDD. As a bridge towards an architectural solution, autonomy supportive experiences concluded in the diagram of the previous chapter were translated into the spaces that accommodate these experiences. In this manner, employment is represented with workspaces, undisturbed sleep with an individual bedroom and access to medical help with medical rooms.. As a result, preliminary program for Autonomy Supportive Experiences should include:

- Residences
- Communal kitchen and laundry
- Art workshops
- Work places: shops, cafes
- Community cafe and meeting areas
- Classrooms
- Social clubs
- Gym and sport fields
- Medical rooms
- Snoezelen spaces

Design recommendations for enhancing experiences of YAIDD are studied through literature and applied to the preliminary program of functions. The book Designing for Autism Spectrum Disorders (2016) explained the influence of the natural and man-made environments on individuals with autism spectrum disorders (ASD) and some forms of intellectual disabilities based on the research in the fields of environmental psychology and education (Pearson et al., 2016). The influences of color, lighting, space organization, textures, acoustics, and ventilation are explored to encourage positive influence of spaces on the target group. The research performed by Magda Mostafa in 2008 is used to understand the general architectural design guidelines tailored to the needs of autistic users (Mostafa, 2008). In the publication, the researcher aims to create an inclusive built environment that positively influences behavior of individuals with autism as well as inclusive experiences. In addition, the report Cognitive impairment, access and the built environment (2004) gave an insight into the ways in which people of all ages with severe neurological impairment navigate and experience the built environment (Tuckett et al., 2004).

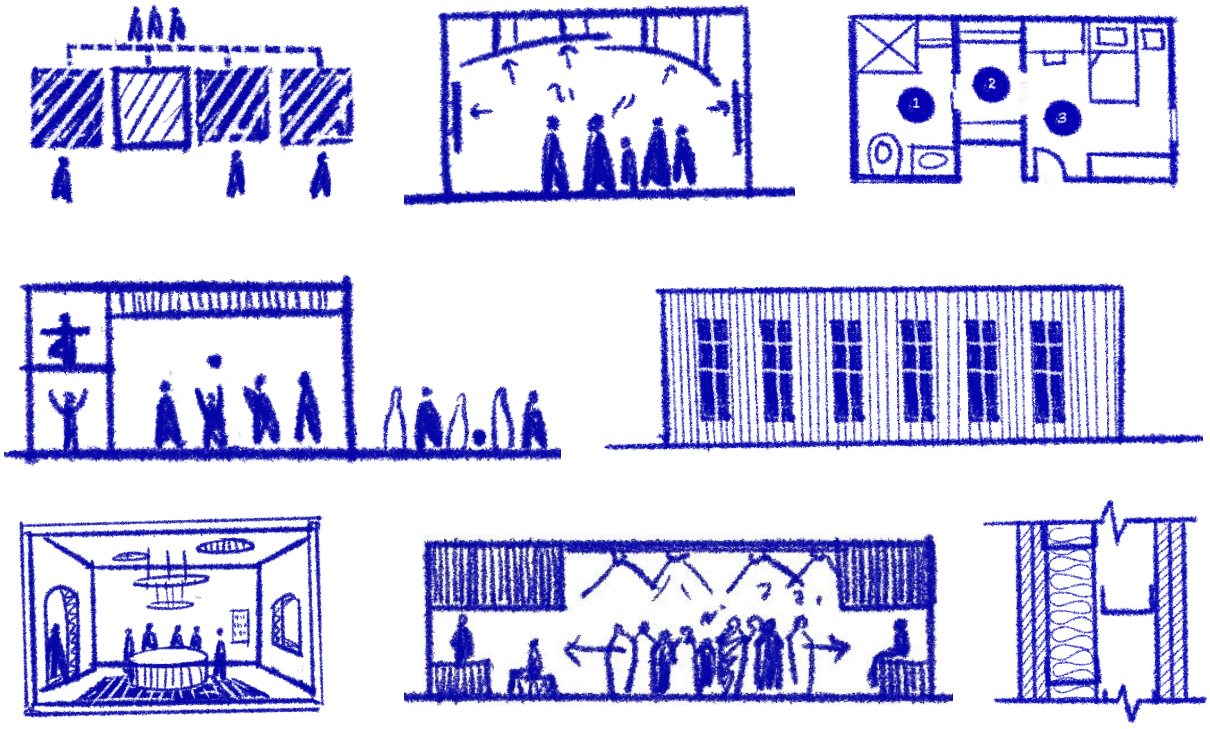


Figure 21 Design recommendation illustrations

Certain criteria can fall under one or more parameters of Independence, Social participation and Wellbeing. In this manner, participation in group sports benefits social development of YAIDD and their physical health; similarly, employment expands social network of an individual and contributes to one's independence.

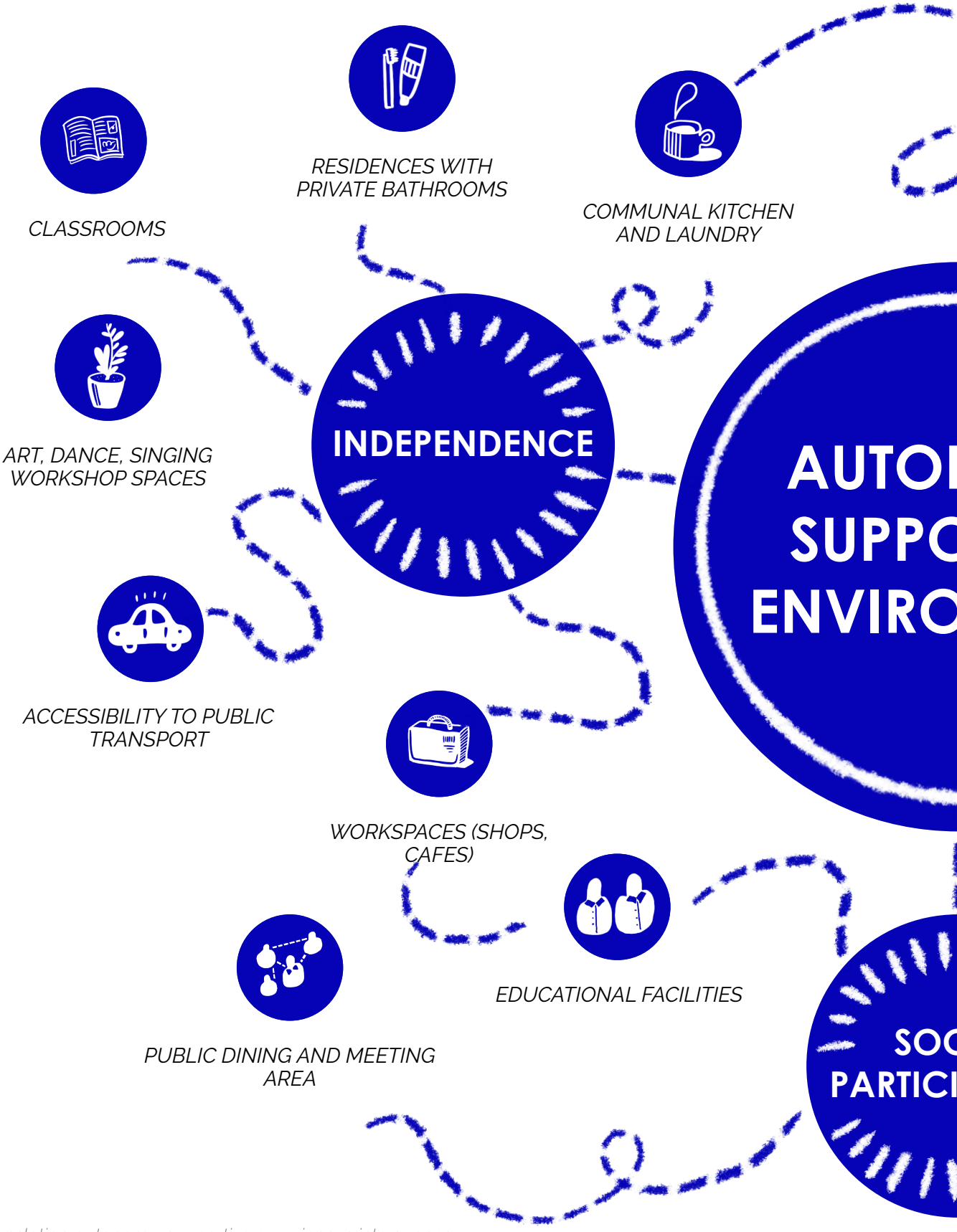
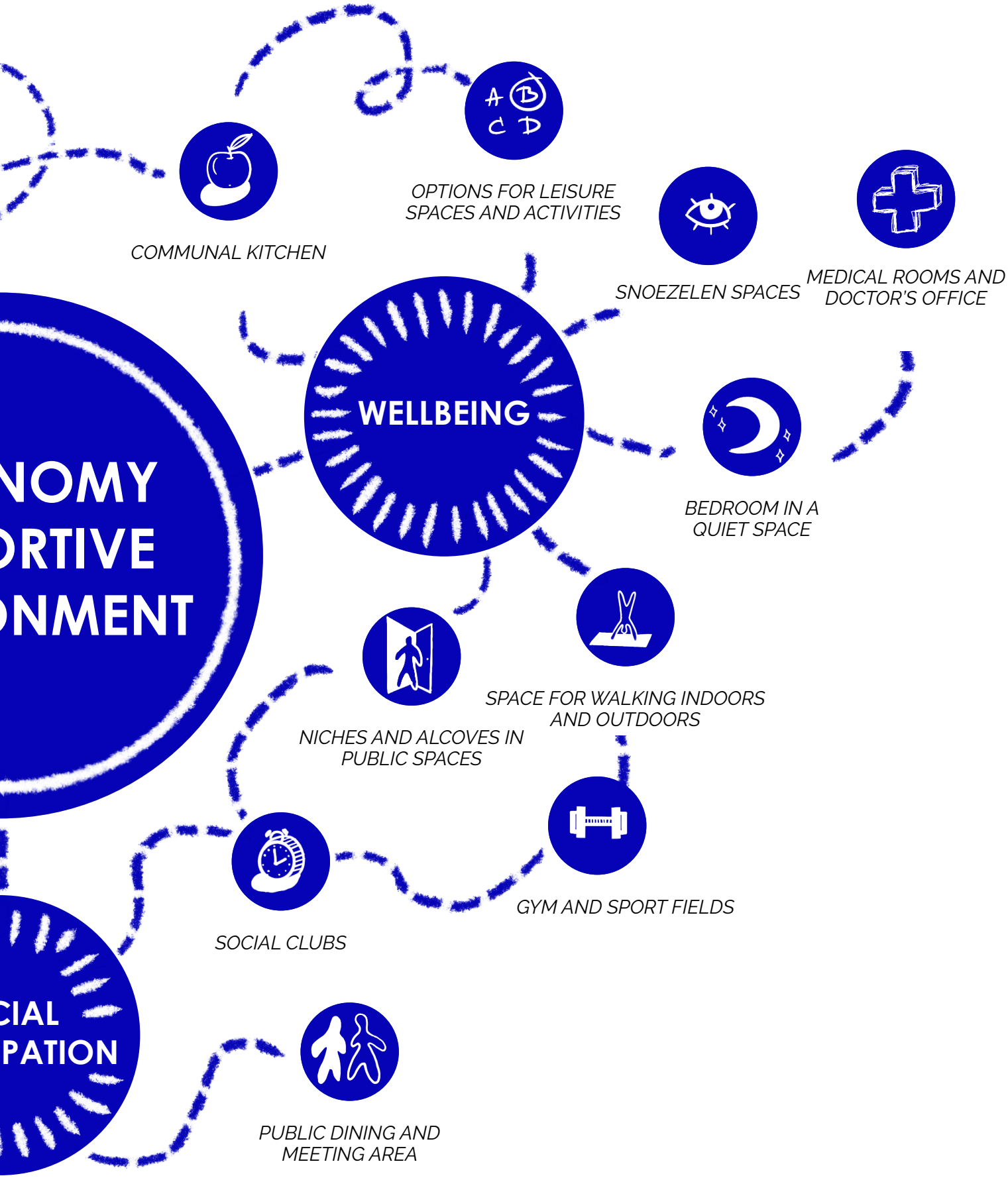


Figure 22 Translation autonomy-supportive experiences into spaces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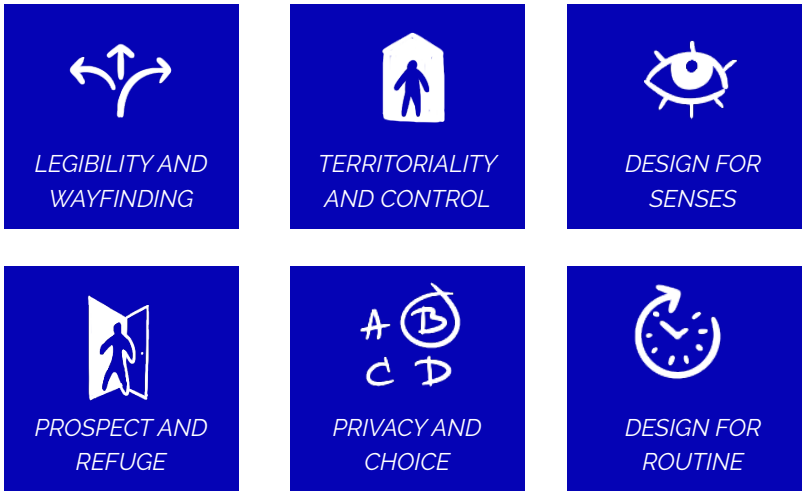
COMMUNAL KITCHEN
OPTIONS FOR LEISURE SPACES AND ACTIVITIES
SNOEZELEN SPACES
MEDICAL ROOMS AND DOCTOR'S OFFICE
BEDROOM IN A QUIET SPACE
SPACE FOR WALKING INDOORS AND OUTDOORS
NICHES AND ALCOVES IN PUBLIC SPACES
GYM AND SPORT FIELDS
SOCIAL CLUBS
PUBLIC DINING AND MEETING AREA

Design recommendations

Six core design principles.



Six core design principles were present across the selected literature that are addressed as the guiding principles of this research:

Legibility and wayfinding

Wayfinding is the process of organizing environmental information to help users find their way. To avoid user's frustration, designers must consider paths, edges, districts, nodes, and landmarks (Pearson et al., 2016, p. 14). Although in his research Kevin Lynch addressed these concepts in the scale of a city, the approach could be applied in the building interiors: corridors, corners, building wings, junctions, and landmarks. Paths are the channels that people use for traveling from one point to another, i.e., walkways, roads, transit lines. They should be defined clearly and run continuously. The strongest form of a path clearly indicates the start and the end points. Edges preclude travel and act as boundaries, which should also be viewed as constant and continuous. Districts have a particular character that people can identify quickly, such as commercial, residential, artistic, and recreational. Nodes are the well-known points in-between the districts where paths converge. For instance, within a building node could be the elevators or staircases. Lastly, landmarks signify a particular location orientation for their distinct character, whether that is due to the size, color, smell, or texture.

Prospect and refuge

Prospect refers to the ability to survey the environment and have an uninterrupted view of the space before entering. Refuge describes the opportunity to hide inside the space or take necessary escape routes. Both of the concepts ensure confidence of individuals with IDD when entering public spaces. Spaces that allow prospect and refuge encourage social interactions and active participation. Previewing of spaces can be achieved by sidelights, windows in doors, and sub-dividing spaces so one has a view from a distance. Exits that are made highly visible by sidelights help individuals to escape in case of stressful social situations or emergencies. Refuge, on the other hand, can be designed in large areas divided into smaller spaces, or areas with lower ceilings.

This design allows peeking into more open space from a more compact and thus more "protected" zone (Pearson et al., 2016, pp. 13-15). In addition, a spatial design that is laid out as an open-concept space can enable the view from one space to another. Multi-level spaces can also let people to overview rooms from above. Other design features that allow previewing include incorporating architectural elements, such as balcony with open-style railing, floor-to-ceiling windows, sidelights beside doors and others (Appendix B).

Territoriality and control

The concept of territory can vary from extremely large areas to small personal spaces. Regardless of its size, individuals with IDD wish to have control over an area. Personal space construct can vary between cultures and beliefs. According to Robert Sommer, intimate distance is approximately less than 15 to 45 centimeters, while personal distance for interactions with close friends could vary from 40 to 120 centimeters. These measures differ among YAIDD as body boundaries are complex to experience and learn for the target group. For instance, for individuals with Autism Spectrum Disorders (ASD) personal and intimate space is larger compared to mainstream society. In many cases, limited social interactions among YAIDD ensure that individuals do not learn appropriate distances to keep from others. Hence, ensuring a safe space for interactions may bring more knowledge regarding the territoriality for YAIDD. Primary territory, unlike personal space, has a set location and refers to one's place of refuge. For example, this could be one's home or bedroom. These spaces must reflect security and identity (Pearson et al., 2016, pp. 23-24). Spaces that allow YAIDD to claim to be their own provide a sense of autonomy and significance. Hence, personalization is essential in primary territories. For people with ASD, primary territory is based on material goods they own, such as technology, toys, or magazines. A systematic arrangement (often by size, shape, or color) and display of personal items provides comfort to YAIDD. Secondary territories, such as workplaces or education facilities, can be personalized to some degree to ensure a sense of belonging and ownership among YAIDD. For instance, permanent artwork installed in school corridors was found to be more effective in creating students' sense of ownership compared to a temporary display of art and bulletins (Killeen et al., 2003).

Privacy and choice

Neurodiverse individuals should be given an opportunity to choose the desired level of privacy: solitude, intimacy, or anonymity. The choice provides personal autonomy, emotional release, and protected communication (Pearson et al., 2016, p. 25). During childhood, infants with IDD most frequently spend time either at home or at school; these locations should be appropriate for the privacy needs of neuro-typical and neurodiverse youth. At home, they should have a separate bedroom as an escape to personalized retreat from stress. Similar strategy could be applied to the classrooms having children with IDD. This could refer to a separate, isolated area where students can have some privacy at times of sensory overload. To ensure privacy in residential settings, acoustical and visual impacts can be applied. Modular and repetitive units offer an opportunity for personalization of surfaces and spaces to distinguish ownership. Moreover, the ability to have control over a personal space ensures privacy and safety. For instance, adjusting natural lights with window treatments allows for a comfortable ambiance inside a space.

Design for senses

The two conditions present across people with IDD differ on their interference with sensory stimulations. Hypo-sensitive cases of IDD are sensory-seeking referring to the need to generate sensory experiences for pleasure, or blocking other unpleasant stimuli. On the contrary, hyper-sensitive people are easily overwhelmed with sensory stimuli. For instance, loud sudden noises feel painful, bright light is disorienting, and textures are irritating. Often individuals with ASD experience difficulty relying on more than one sense at a time, resulting in sensory overload. In such cases, hyper-sensitive individuals require an "anchor" in space so that they can "feel something that stood still, in a world that had suddenly become unpredictable" (Pearson et al., 2016, p. 4). For the scope of this research, visual, auditory, and tactile senses were studied in depth due to the dominant presence of literature focused on these experiences in the context of design for people with IDD.

a) Visual

The visual experiences of YAIDD can be studied through the two most appearing factors in literature - lighting and color. Lighting influences the immediate perception of spaces for individuals with IDD. Environments that rely on artificial illumination and lack natural light increase stress and personal discomfort. Despite natural light having a positive effect on users, the views should be carefully selected. For instance, in classrooms – playground views could act as a distraction. Clerestory windows, or draperies could be added to reduce distraction and provide natural light. In residential settings, YAIDD are often irritated by brightly lit spaces and choose to keep their blinds closed. Moreover, a variety of light sources within a living space (e.g., overhead, natural, task, softer lamp) allows better control over lighting conditions. Glare should be considered and minimized when choosing for building materials. For instance, matte paint, carpets, wall coverings and wall-mounted white boards can aid glare reduction.

Another attribute of visual means of design is color. Various emotional responses appear among individuals with IDD to different shades. In the case of IDD purity and contrast were found to be far more influential. Large amounts of color overstimulate individuals despite the color temperature or illumination. Most research indicates that light, warm, neutral,
and natural colors are best performing. For visually hypo-sensitive students, color can be used for wayfinding as a tool to locate objects. For instance, colored flooring can be used to delineate pathways around the room. Overall, walls, floors and decorative elements could be colored for spatial emphasis. Bold patterns and colors could be perceived as distracting or painful, which is why neutral colors, subtle patterns and textures must be considered. In particular, colors found in nature were found to be most soothing (Pearson et al., 2016, p. 61). Together color and light are valuable tools to create a wayfinding experience for YAIDD. In this way, "color-coded" architecture with different floors corresponding to different color schemes could aid navigation for users with IDD.

b) Auditory

Materials affect the overall design and could perform sound absorbing functions. Hard surfaces on walls, floors and ceilings should be avoided to reduce sound reverberation. As an alternative, sound absorbing panels can be installed over drywall or suspended from the ceiling. Using carpet instead of vinyl tiles can add to decreasing noise in spaces. Additionally, curtains and wall-mounted cork-boards could reduce sound reverberation in rooms. From the building construction perspective, walls could have more sound-insulating properties by constructing them with two layers of staggered

studs, one layer sound absorbing insulation and the airspace, with two sheets of drywall on the outer boundaries. Building services, such as heating, ventilation, and air conditioning, appear to be a common auditory irritation for individuals with IDD. Hence, natural ventilation, or cooling, and quiet heating methods should be prioritized. When planning the spatial layout, large and open rooms cause excess reverberation and hence should be advanced with soundproofing tools. The optimal ceiling high for good acoustical conditions is between 2.7 to 3.6 meters (Pearson et al., 2016, p. 77).

c) Tactile

Tactile preferences among individuals with IDD varied individually. However, as observed by Dr. Angela Bourne, children with ASD preferred their personal spaces to be decorated with soft objects like stuffed animals, pillows, blankets, or minimally decorated bedding. Soft textures are generally seen as more pleasant over hard ones. Smooth metallic surfaces also evoke lively, modern and elegant emotional response from YAIDD; meanwhile rough metallic surfaces are perceived strongly negatively: dull, traditional, ugly, uncomfortable.

Design for routine

Sequencing of activities and spaces could be used to promote routine for YAIDD. A less stressful response develops as users take predictable transitions, or routines across the building. A function could be assigned to a particular spot in a building or in a room, so that YAIDD begin to associate an activity with a specific area or zone and with the allocated timing (Pearson et al., 2016, p. 56). Thus, compartmentalization of spaces for specific activities could be used for associating rooms with particular tasks. These spaces limit the sensory inputs and encourage concentration on a task.

Further steps

To bridge the program with the core design principles, each design strategy was applied to the categories of functions. The categories include: residences, communal (Public) spaces, classrooms, sport-halls, snoezleruimte, medical facilities and circulation. In the case of communal and public spaces, the category summarizes the environments that involve active social contact, such as restaurants, reception halls, communal kitchens, social clubs, and even workspaces (i.e. shops, offices). Circulation was added as an additional category to the list of functions, as it is an integral part of the space in-between the programs.

RESIDENCES

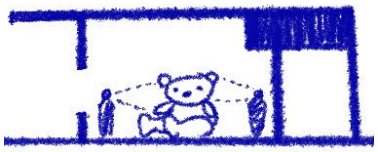
COMMUNAL/PUBLIC

CLASSROOMS

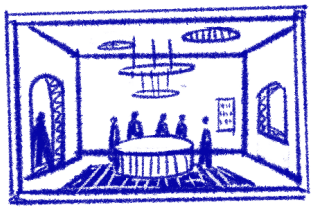
SPORTHALLS

LEGIBILITY AND WAYFINDING

Visual clues of domesticity for residential spaces



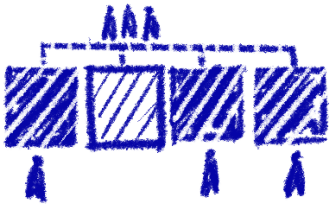
Landmarks inside the building through smell, sculpture, color, scale.



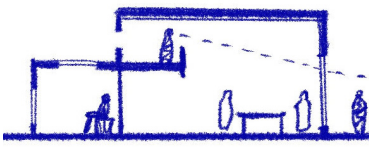
To avoid repetitiveness special character can be assigned to each classroom with color and layout.

Sport halls can be recognized as separate standing structures or zones inside the building.

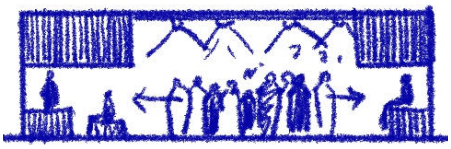
PROSPECT AND REFUGE



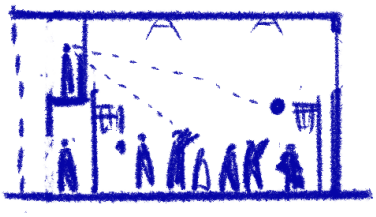
Accessibility of residences within the reach from shared facilities for immediate refuge



Preview through side openings, balconies or glass doors.

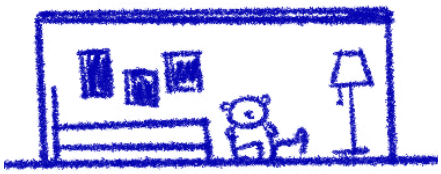


Previewing classrooms through windows and glass doors. Alcove seats for refuge.



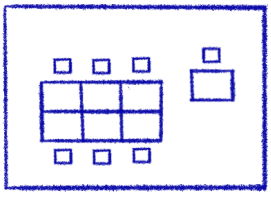
Preview of the sport halls or exercise rooms should be possible with balconies, glass windows and doors.

TERRITORIALITY AND CONTROL



Personalization of residences with own furniture + lighting control.

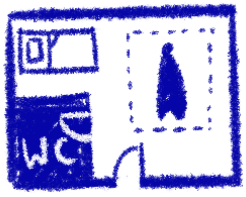
Distance between the seats at the tables with clearance at least 90 cm to respect personal space.



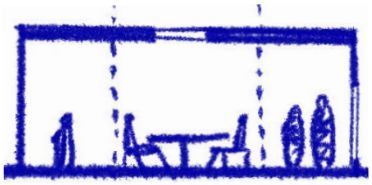
Individual desks and chairs as identificators of personal space. Moveability of individual furniture for better control.

Subdivision of exercise rooms to reduce social pressure

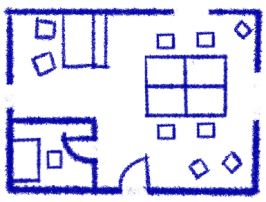
PRIVACY AND CHOICE



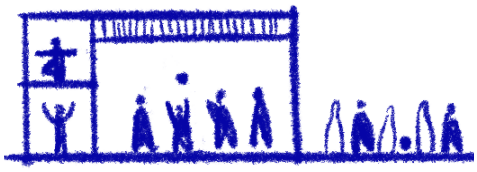
Residences with own bedroom and bathroom for improved privacy



Options of individual and group seatings in public areas.

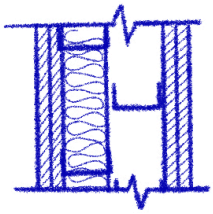


Classroom layouts should accommodate spots for group work and individual work stations.



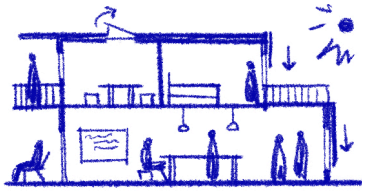
A choice of public, group and private exercising spaces

DESIGN FOR SENSES



High quality noise insulation between the dwellings.

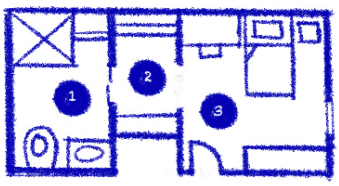
Sound-absorbing ceiling and wall panels, rugs and cork boards to reduce noise.



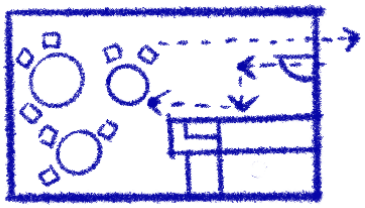
Natural ventilation and natural daylight to increase productivity and reduce noise disturbances.

Sensory gym for physiotherapy

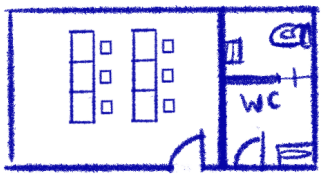
DESIGN FOR ROUTINE



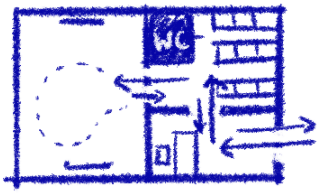
Morning routine (bedroom - bathroom - closet)



Visibility of reception, cashier and medical zones.



Wheelchair-accessible bathrooms close to the classroooms.



Routine of: reception - changing room - storage - sport hall.

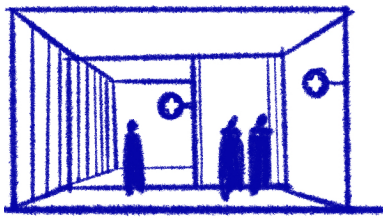
SNOEZLERUIMTE

MEDICAL FACILITIES

CIRCULATION

LEGIBILITY AND WAYFINDING

Present nearby the sensory overloaded functions like classrooms or communal areas.

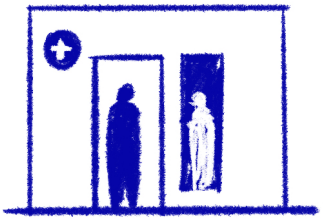


Shortest route to the medical room must be visible in the walkways and common areas.

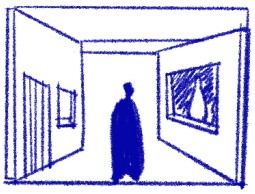
Wayfinding in circulation areas should be supported by signs that aid navigation, including the bathrooms, communal spaces, reception, restaurant and classrooms. Linear uninterrupted circulation through corridors is the preferred method to maximize comprehension and reduce the stress of choosing "the right turn"

PROSPECT AND REFUGE

Allow to preview for teachers and staff at all times.



Previewing windows may limit privacy of the patients and hence should be limited or controlled.

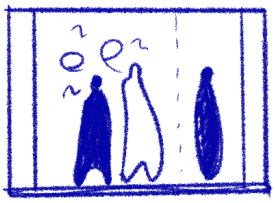


Opportunity to escape linear routes into alcoves and niches.

TERRITORIALITY AND CONTROL

Students can control the preferred stimuli and have a choice in equipment to regulate light and noise.

Respect the minimum 90 cm personal space in seating.

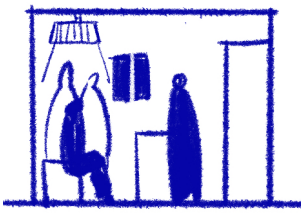


The minimum width of corridors should be 2 meters wide to allow for informal conversations to take place.

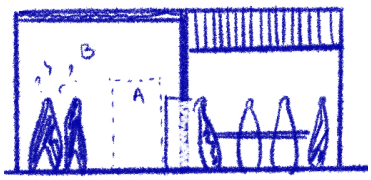
Figure 23-24 Design recommendations per program based on the literature review

PRIVACY AND CHOICE

No locks should be placed in the room to allow for the use of snoezelen by choice.

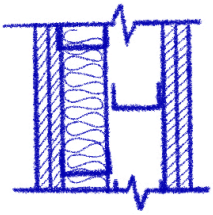


Personal seat for the patients and the family members should be present in doctor's office.



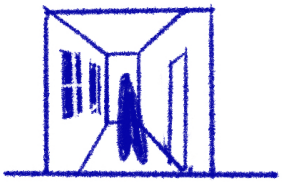
Corridoors should provide a choice of either engaging in social interactions or walking to the desired location.

DESIGN FOR SENSES



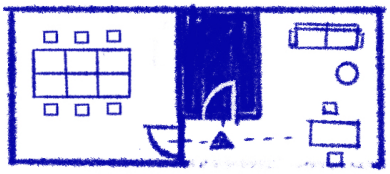
High level of sound insulation.

Visibility of the rooms through previewing openings engages viewers in the corridors.

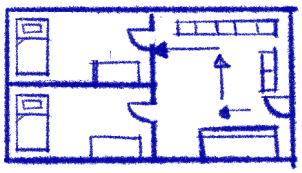


Lighting must stay consistent. Noise absorbing panels could reduce the auditory impact of the corridor conversations, and other sounds.

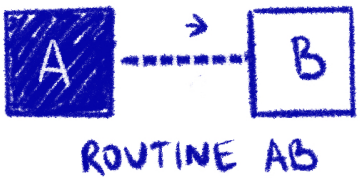
DESIGN FOR ROUTINE



The space must be conveniently placed for access from classrooms and common areas.



The routine to consider: reception - waiting room - doctor's office/ physiotherapy.



ROUTINE AB

Circulation spaces accommodate clarity of spatial organization of functions according to their noise levels, social interaction levels etc.

03 Reference projects catalogue

Catalogue of reference projects to study spatial organization, layouts and dimensioning.

Besides literature studies, design guidelines were explored through case studies. The selection of the cases related to the relevance of the spaces to the selected target group - young adults with intellectual and/or developmental disabilities (YAIDD). For that matter, the projects varied from residential, educational, medical, and day-care services. These functions relate to the spaces that contribute to the individuals' development of Independence, Social participation and Wellbeing according to the data presented in Chapter 1. The case studies that were selected for this chapter were analyzed through architectural drawings, site visits and interviews with the buildings' users. Design recommendations are derived from the analyses made on urban, neighborhood, building and interior scales.

The first case study - Residence 3 Pins by Onze04 - is a residence and a daycare center for intellectually disabled adults in Barcelona, Spain. The center combines the functions of studios, staff residences, communal kitchens and bathrooms, laundry, events spaces and education rooms. Additionally, medical staff is present in the non-residential zones. The project was selected due to the unique organization of the several programmatic zones - education, rehabilitation, living and socializing, which follow the programmatic requirements for this master thesis. Residence 3 Pins was primarily studied through secondary literature. The second case presented in this chapter is the special needs school located in Dordrecht, Netherlands. Kiem school, designed by Mecanoo architects, positions itself as a space, where students can simply be children and engage in normality of education. Here, special needs of the students are covered nonetheless, but in a subtle manner. For instance, physiotherapy space is not a sterile and medical zone, but a playground-like environment. The project was analyzed through secondary literature material, as well as interview with the architect - Ron van Logchem (Associate Architect, Mecanoo), site visit, and interview with Kiem school's staff. Next, Willem Felsoord reference project is a transformation project carried out by René Bouman and Andrea Möhn. The daycare center is open to individuals of various levels of intellectual disabilities, including the severe cases. Hence, the architecture carefully considers safety and legibility of the space. The project was studied through secondary literature, interview with the architect Andrea Möhn, site visit and interview with the staff. Lastly, Kinderwoonvorm Dawesweg group home for children between 13 and 18 years old was used as a study of assisted living through a site visit, and interviews with the staff.

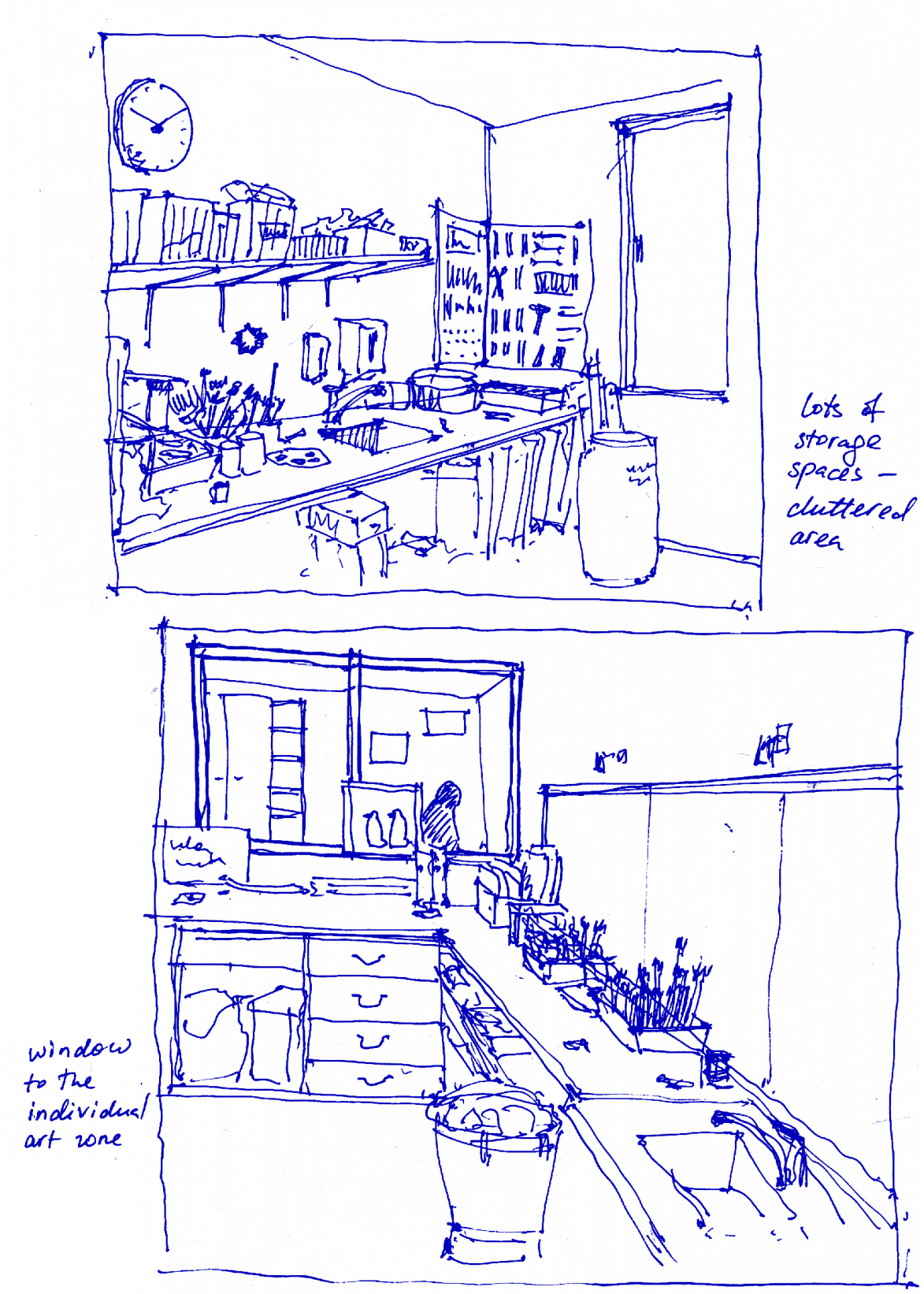


Figure 25 Fieldwork notes from Willem Felsoord Daycare center

Residence 3 Pins

Date of completion: *2012*
Architect: *Onze04*
Location: *Montjuic, Barcelona, Spain*

Figure 26 Context map (Residence 3 Pins)

Category: Residence for 27 people, day center for 8 people
Building area: 2,307 m²
Program details: 27 places for permanent residences are divided into 3 modules and 8 posts for daily stay. The program is divided on three floors, both visually and functionally into two wings each. Hallways, communication centers and nurseries are located in the center of the volume to provide clear circulation patterns, short, allowing control for the nurses over all connections and movements around the building.

Public transport
Cultural facilities
Sport facilities
Education

PARTICIPATION IN GROUP SPORTS

EXPLORING OWN INTERESTS

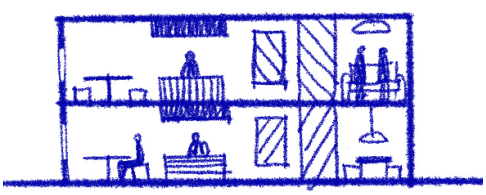
NETWORK BEYOND FAMILY AND CARE STAFF

OWN CARE AND HOUSE CHORES

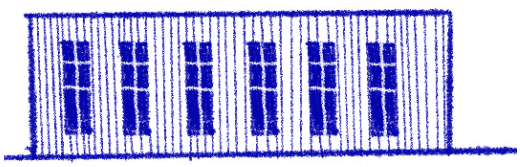
STRUCTURED GROUP ACTIVITIES

INTERACTIONS WITHIN A SCHOOL SETTING

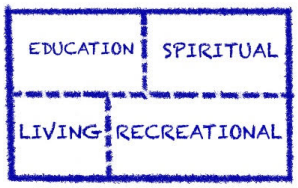
Figure 27 Exterior view (Residence 3 Pins)



HARMONY CAN BE ACHIEVED THROUGH UNITY AND VARIETY IN COLOR SCHEMES, FURNITURE STYLE AND TEXTURES. VARIETY IS DONE CAREFULLY TO PREVENT CONFUSION IN SPACE.



REPETITIONS OF COLORS, PATTERNS, DOORS, WINDOWS ETC.



PROMOTE CHOICE BY GIVING AVAILABILITY OF VARIOUS FUNCTIONS

Figure 28 Relevant design concepts (Residence 3 Pins)

Figure 29 Ground floor functions (Residence 3 Pins)

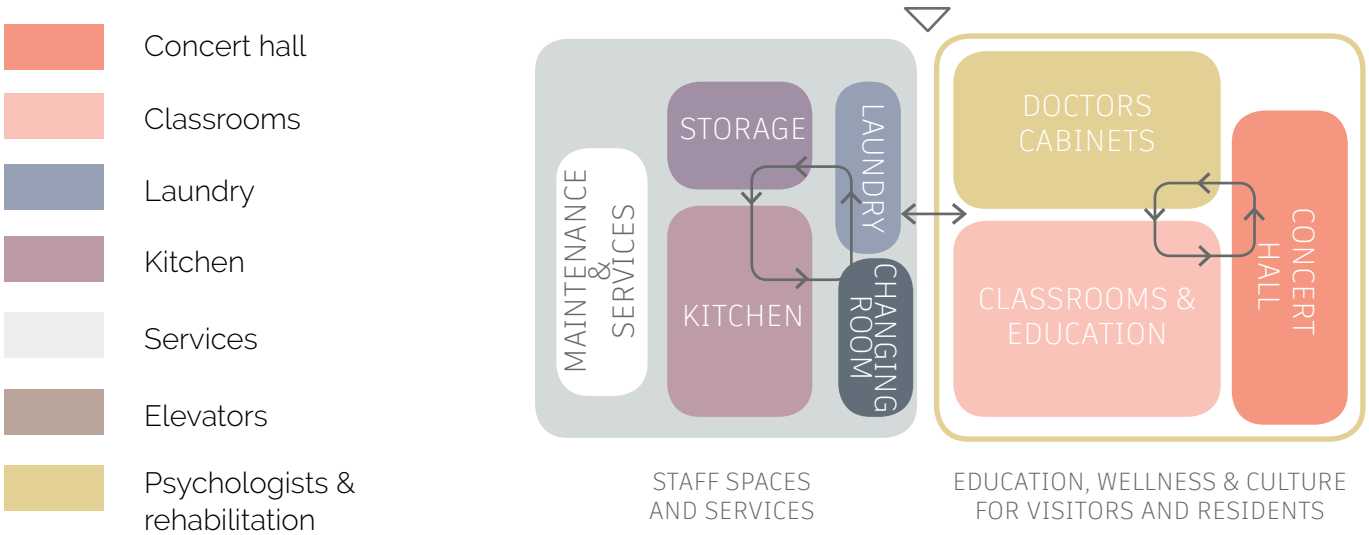


Figure 30 Ground floor spatial organization diagram

The two wings of the building allow for the ground floor to split the users: the staff versus the visitors/ clients. By placing kitchen in the predominantly authorized space, cooking is not as accessible and inviting for the target group, which is seen as a limitation. The public program is organized along a single corridor, splitting medical and learning functions on either side of the circulation line.

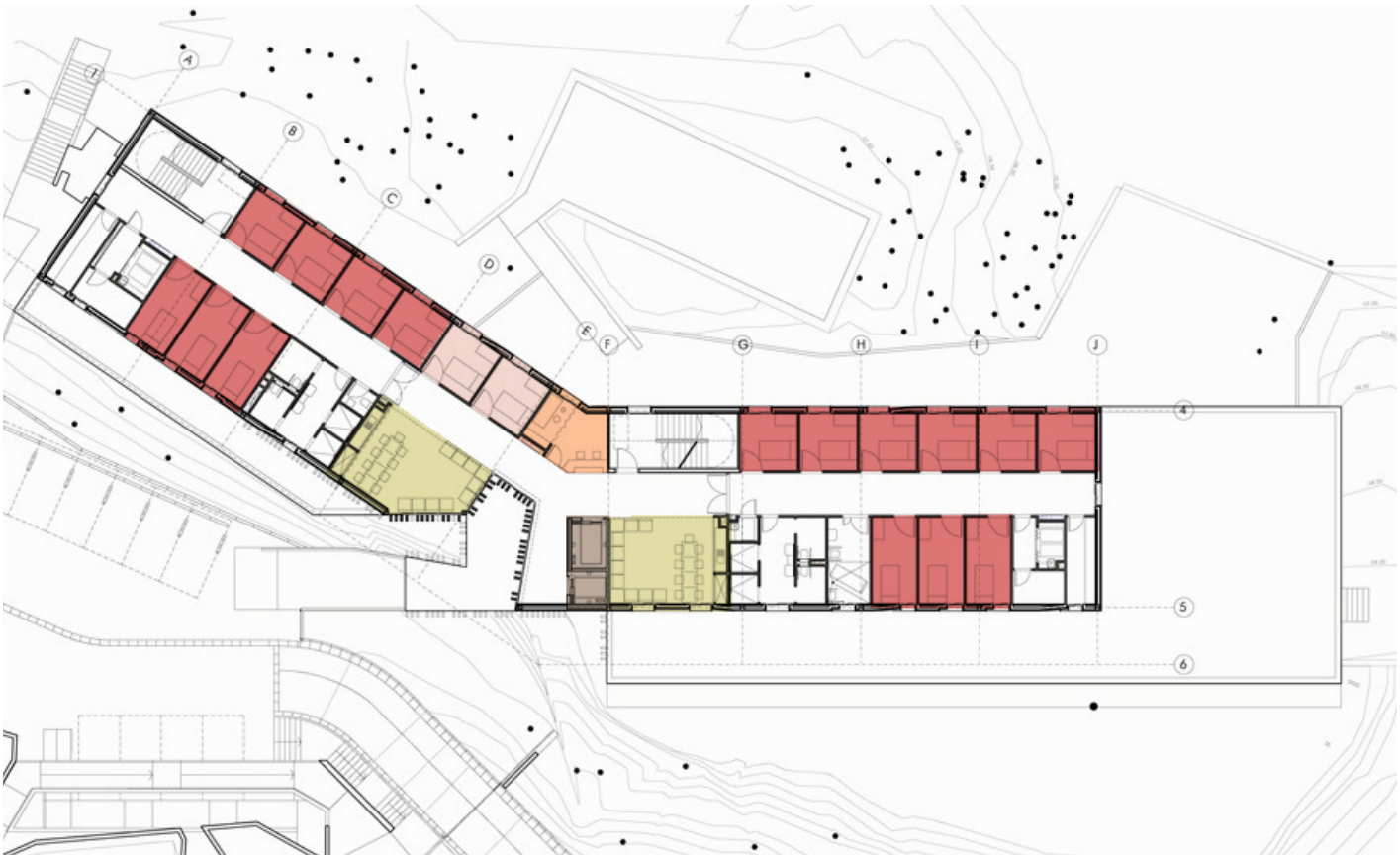


Figure 31 Second floor functions (Residence 3 Pins)

Private bedrooms

Kitchen, dining, living room

Staff bedrooms

Staff help-desk

Elevators

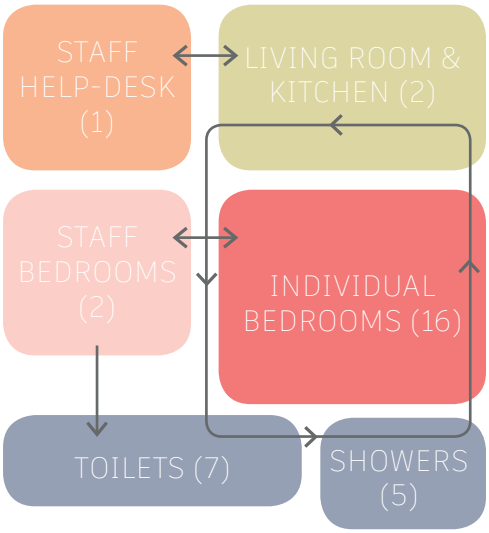
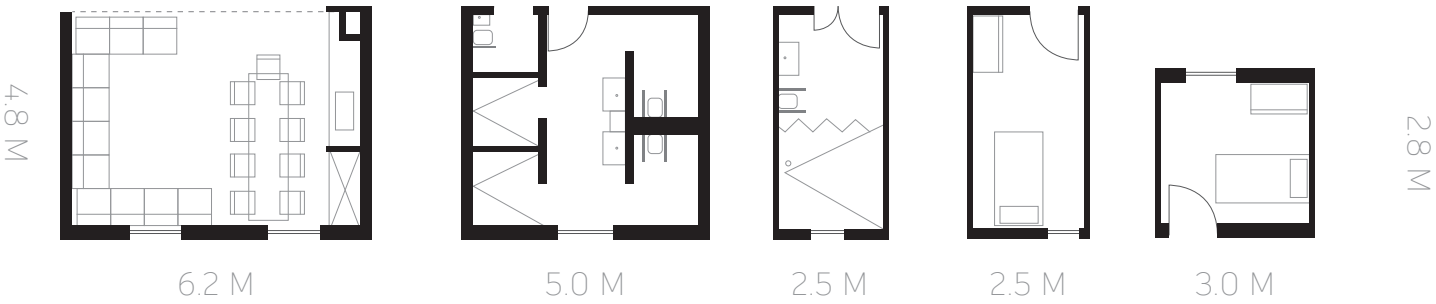


Figure 32 Second floor spatial organization diagram

Per 16 individual residential units, there are two staff bedrooms placed on a single wing of the building. The location of staff rooms is close to the help-desk and common areas (living rooms). However, the placement creates stronger supervision in the left wing of the building, leaving the residents of the right wing more independent. Circulation across the floors is located in the center (close by the help-desks) and at one of the wings' end.

- **Residents**



Living room & kitchen

per 9 people

Two living rooms are allocated per one floor, where each is placed in either of the building's wings. 30 m2 common area is used by 9 people (either 7 patients and 2 staff, or 9 patients)

Toilets + Showers

4 toilets and 3 showers per 9 people

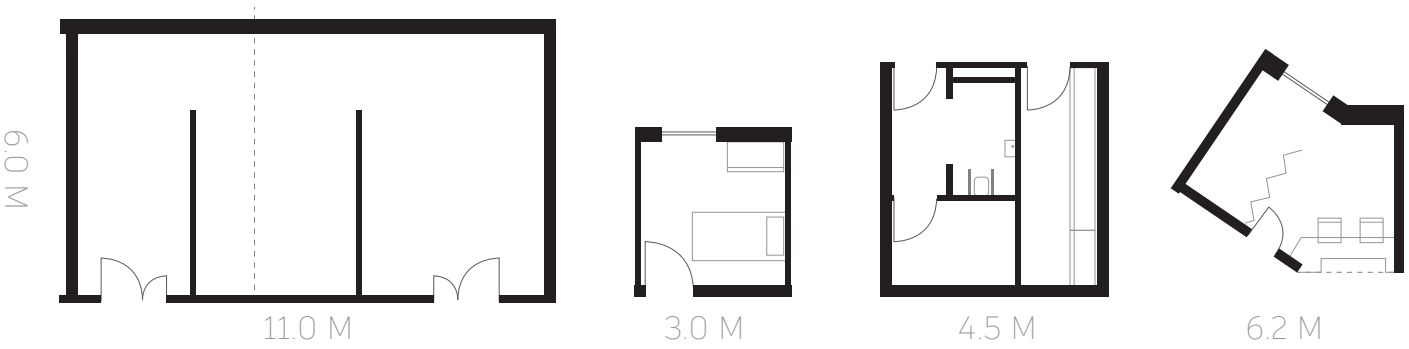
Variations of toilets and showers typologies accounts for the users of different needs. A special typology of toilet and shower combined in one room is dedicated for the wheelchair users. Shared toilet and shower space (24 m2) contains two toilets and two shower cabins.

Bedroom types

9 bedrooms per wing

Two patients' bedroom typologies accommodate a bed and a cabinet. Little room for additional furniture and decorations is left for the users. The areas of the two types equal to 12 m2 and 8.4 m2.

- **Caretakers and staff**



Laundry and dryers

For the whole facility

Laundry and dryers are located on the ground floor nearby the kitchen area within the wing dedicated for the stuff and social workers. This is the only space that is shared among all the residents and the staff.

Bedrooms

2 per 16 clients

Two bedrooms are located at one of the wings. The staff shares the bathrooms, showers and living room with 7 clients.

Storage

Per 7-9 residents

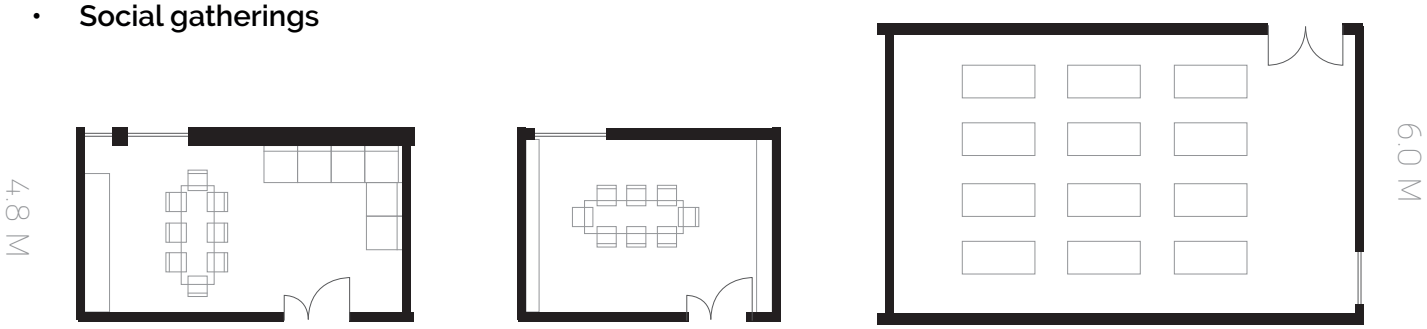
Storage space contains medical and hygiene equipment for the clients. Two storages per floor, one per each wing.

Help desk

Per 16 residents

Staff's help-desk and medical storage (11.6 m2) is present at each floor and reachable by 16 clients.

- **Social gatherings**



Daycare room

per 8 people

Daycare space includes an open area with the workshop table setup. Additionally, a kitchenette and sitting area is available in the space.

Activities room

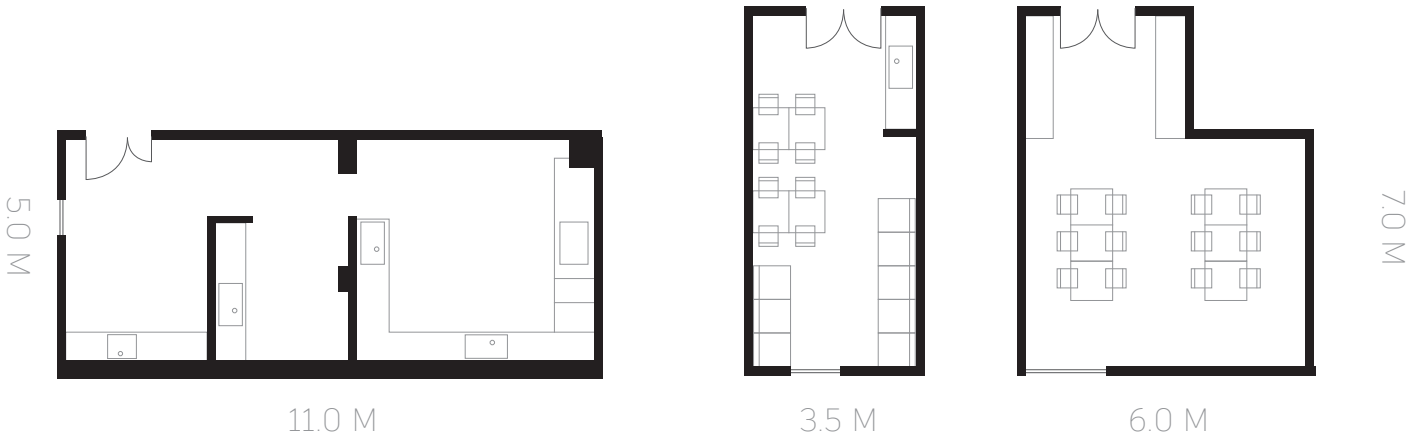
per 8 people

Space available for group workshops and other activities. The space is reachable for the daycare group, the staff, visitors and residents.

Concert hall

for visitors, staff and clients

The open hall is used for social workers' workshops, music performances, sports activities and other group gatherings.



Kitchen and food storage

For the whole facility

Kitchen is located in the wing dedicated for the staff, but it is operated by the social workers when activities and celebrations are held at the facility. Residents rarely occupy this space.

Classrooms

5 classrooms per 48 students

Classes are held for visitors and residents in rooms for small groups of 8 students.

Figure 33 Dimensions catalogue (Residence 3 Pins)

- ***Exterior materialization***

Figure 34 Exterior impression (Residence 3 Pins)

White plaster

White aluminum battens

Concrete floor

Off-form concrete wall

Black steel railing

The exterior of the building is sober and clean, with abundance of white or light-gray tones. True textures of building materials are revealed, but are barely noticeable due to the predominantly monochrome palette. The contrasting black steel railing along the main paths and stairs defines the movement and aids visitors with way-finding.

- *Exterior materialization*

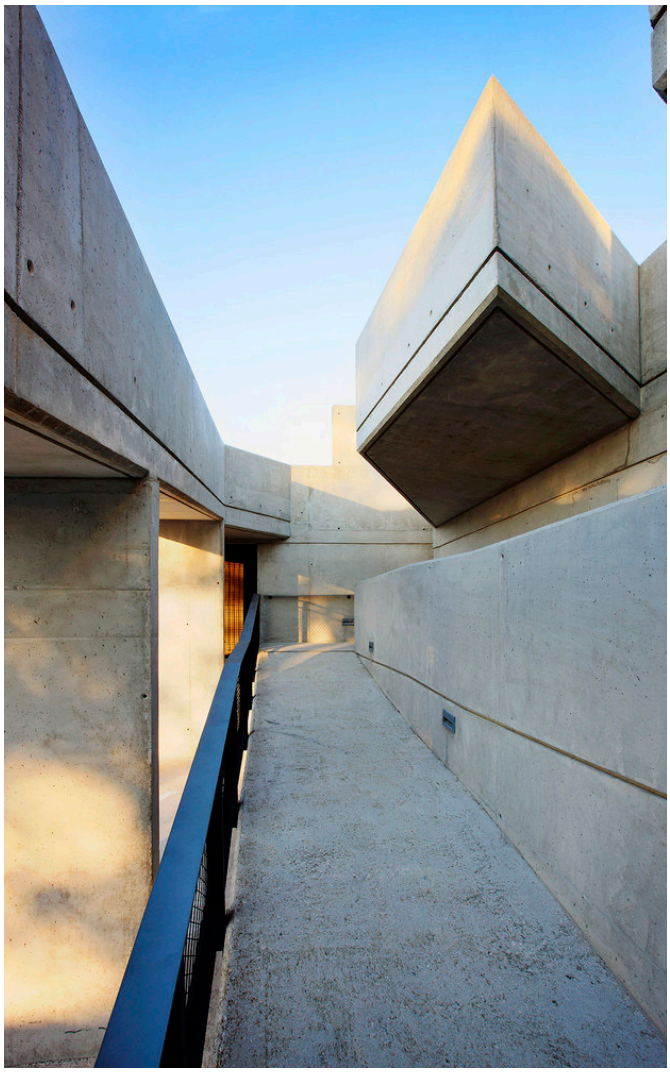
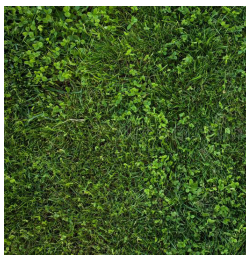
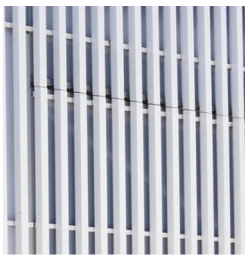


Figure 35-36 Exterior impression (Residence 3 Pins)



Greenery walls



White aluminum battens

Concrete floor

Off-form concrete wall

Some contrasts between natural landscape elements, such as greenery, earth and rocks, against the predominantly white facade is made to highlight the boundaries of the building volume. Inner outdoor corridors are made in two types of concrete, where the volumes are accentuated through light and shadow, rather than a difference in color.

Kiem Special Care School

Date of completion: *2013*
Architect: *Mecanoo*
Location: *Dordrecht, Netherlands*

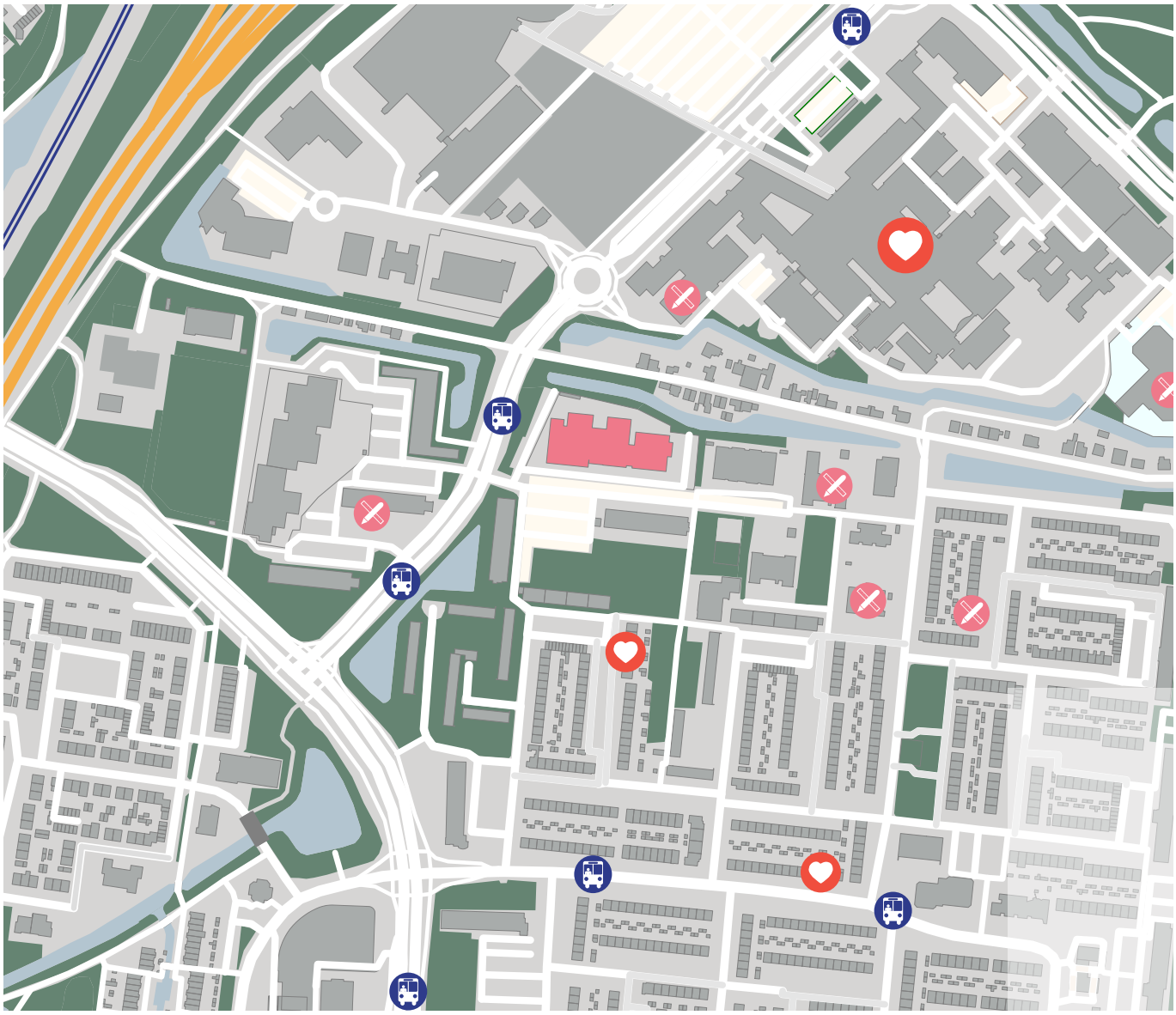


Figure 37 Context map (Kiem Special Care school)

Category: School for students with special needs (270 students), rehabilitation center for children with various disabilities
Building area: 5,322 m^2
Program details: The school includes education for students of various ages and mental capacities. The classrooms are used for teaching a group of 12 students by 2 teachers. Learning as a process is extended beyond conventional classrooms, as corridors and in-between areas are actively used as play-areas and obstacle courses.

Healthcare
Public transport
Education
Main road

PARTICIPATION IN GROUP SPORTS

INTERACTIONS WITHIN A SCHOOL SETTING

CONTROLLING THE STIMULI TRIGGERS

SELF-DETERMINATION TRAINING

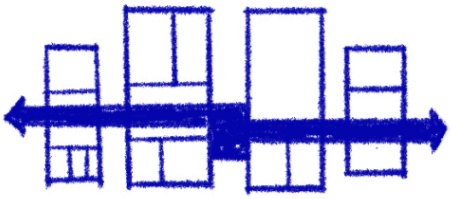
STRUCTURED GROUP ACTIVITIES

MOVEMENT / MOBILITY EXERCISES

Figure 38 Exterior view (Kiem Special Care school)

SNOEZELEN ROOM TO STIMULATE SENSES IN A CONTROLLED AND RELAXED ENVIRONMENT

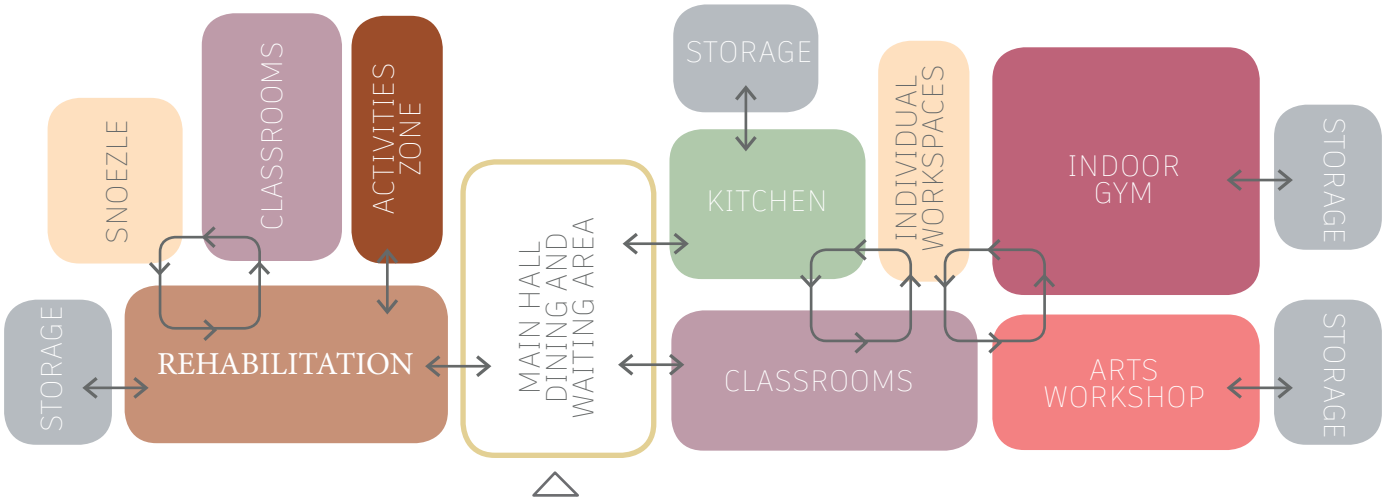
RECOGNIZABLE AND ICONOGRAPHIC IMAGE OF THE EXTERIOR



INNER STREET FOR OVERVIEWING ALL ACTVITIES AND SPACES

Figure 39 Relevant design concepts (Kiem Special Care school)

Figure 40 Ground floor functions (Kiem Special Care school)



Main staircase for more classrooms

Staircase (closed/not in use)

Individual/meeting room

Classrooms

Arts workshop

Snoezle rooms

Changing rooms

Activities room

Indoor gym

Rehabilitation center

Reception desk

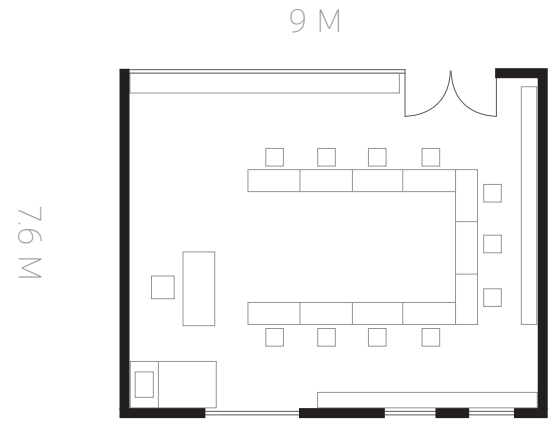
Storage

Kitchen

Elevators

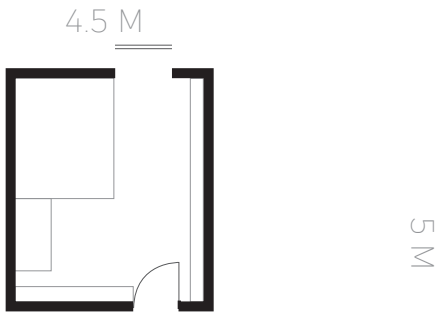
Figure 41 Ground floor spatial organization diagram

Dimensions catalogue



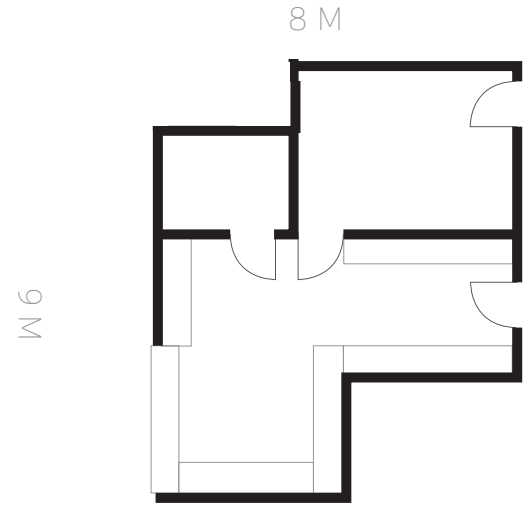
Classroom

The desks closer to the door are optimized for children with special physical needs. Each classroom has many shelves around the perimeter, with the exception of the wall with the teaching board. Next to the teacher's desk, there is a single bed for students that wish to relax and stay on their own under the teacher's supervision.



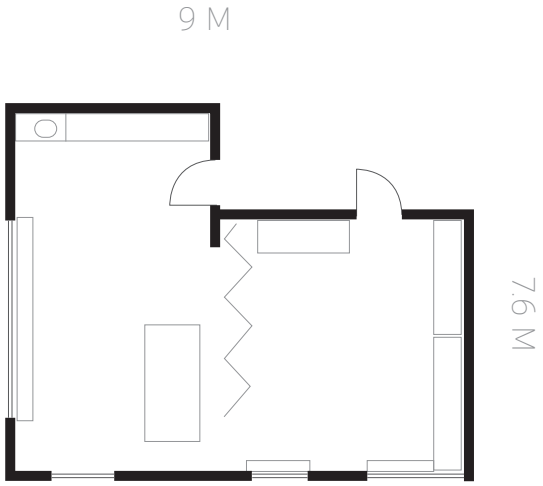
Snoezelen room

The snoezelen spaces are often located nearby the classrooms, so the teachers can let the children go to relax at any time. The stay varies between 15-30 minutes per student. Children can choose their own experiences, which can vary from using a colorful projector, water mattress, tactile experiences, bubbles tube or led lights.



Kitchen

Kitchen is made to be used by the staff and the students to learn kitchen equipment and the cooking process. The large window opens up the kitchen to the main hall with the dining space. In this manner, passing by students can also visually engage in the process of learning. Additional to the cooking area, sufficient storage space for food and equipment is necessary. To avoid crammed space, storage is kept in a separate room behind the door.



Rehabilitation space

Several typologies of rehabilitation spaces are present across Kiem. The largest room typology involves two main zones separated with a movable paper-wall to increase privacy in the space with the bed. Each rehabilitation office has a water crane and plenty of storage. There is also sufficient open space in the center of the room for the clients' family members to join rehabilitation appointments.

Figure 42 Dimensions catalogue (Kiem School)

- **Exterior materialization**

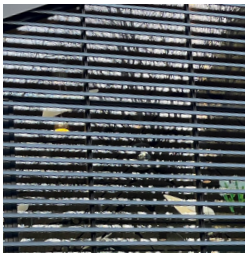
Figure 43 Exterior impression (Kiem Special Care school)

White plaster

White aluminum battens

Black aluminum window frames

Green roof



Black aluminum louvers

A variation of warm colors is seen at the exterior of Kiem school to symbolize a vibrant and welcoming environment for children. Unity of the primary facade material is seen through veneer bricks; the differentiation in the shade of bricks is made to separate different "home-bases" depending on the age of the children. Despite the changing colors, there is a strong horizontal axis in the building's facade.

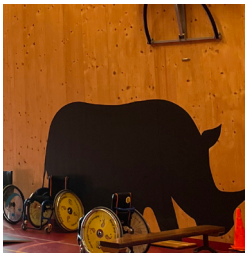
- **Interior materialization**

Figure 44-45 Interior impressions (Kiem Special Care school)

CLT interior and structure

Wooden safety railing painted

Grey linoleum floor



Black animal sticker accents

Interior walls reveal the CLT structure of the building and create a warm atmosphere with soft light. Accents within the space help navigation and also create playful experiences for the children. For instance, the main staircase is highlighted with neon-green railing; bigger walls that occupy activity-rich zones are market with animal stickers; and the seats (furniture) is colored in bright red colors and patterns.

Willem Felsoord daycare center

Date of completion: *2007*
Architect: René Bouman, Andrea Möhn
Location: *Delft, Netherlands*

Figure 46 Context map (Willem Felsoord Daycare center)

Healthcare

Public transport

Education

Petting farm

Ikea

Category: Daycare center Felsoord (Ipse de Bruggen) for four groups of 7 students and personnel
Building area: 1.780 m^2
Program details: The daycare center allows students to be assigned to classrooms for daily activities. Everyday the groups can go outdoors for a play or for a walk to the nearby shopping mall (Ikea), and a session at the indoor gym. Gardening is offered here as a group activity to learn and to relax.

PARTICIPATION IN GROUP SPORTS

INTERACTIONS WITHIN A SCHOOL SETTING

CONTROLLING THE STIMULI TRIGGERS

EXPLORING OWN INTERESTS

STRUCTURED GROUP ACTIVITIES

NETWORK BEYOND FAMILY AND CARE STAFF

Figure 47 Exterior view (Willem Felsoord Daycare center)

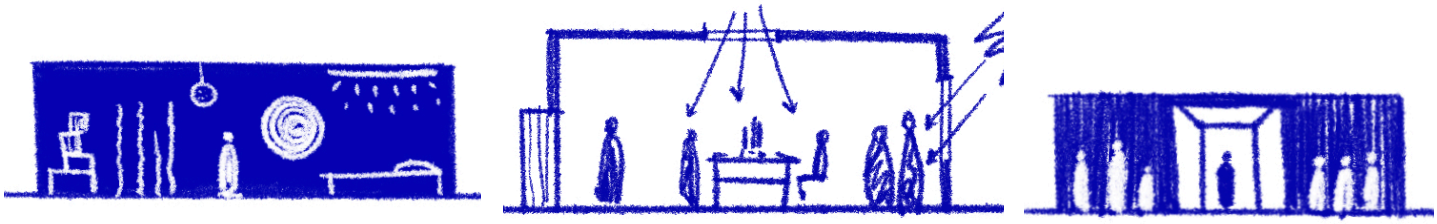


Figure 48 Relevant design concepts (Willem Felsoord Daycare center)

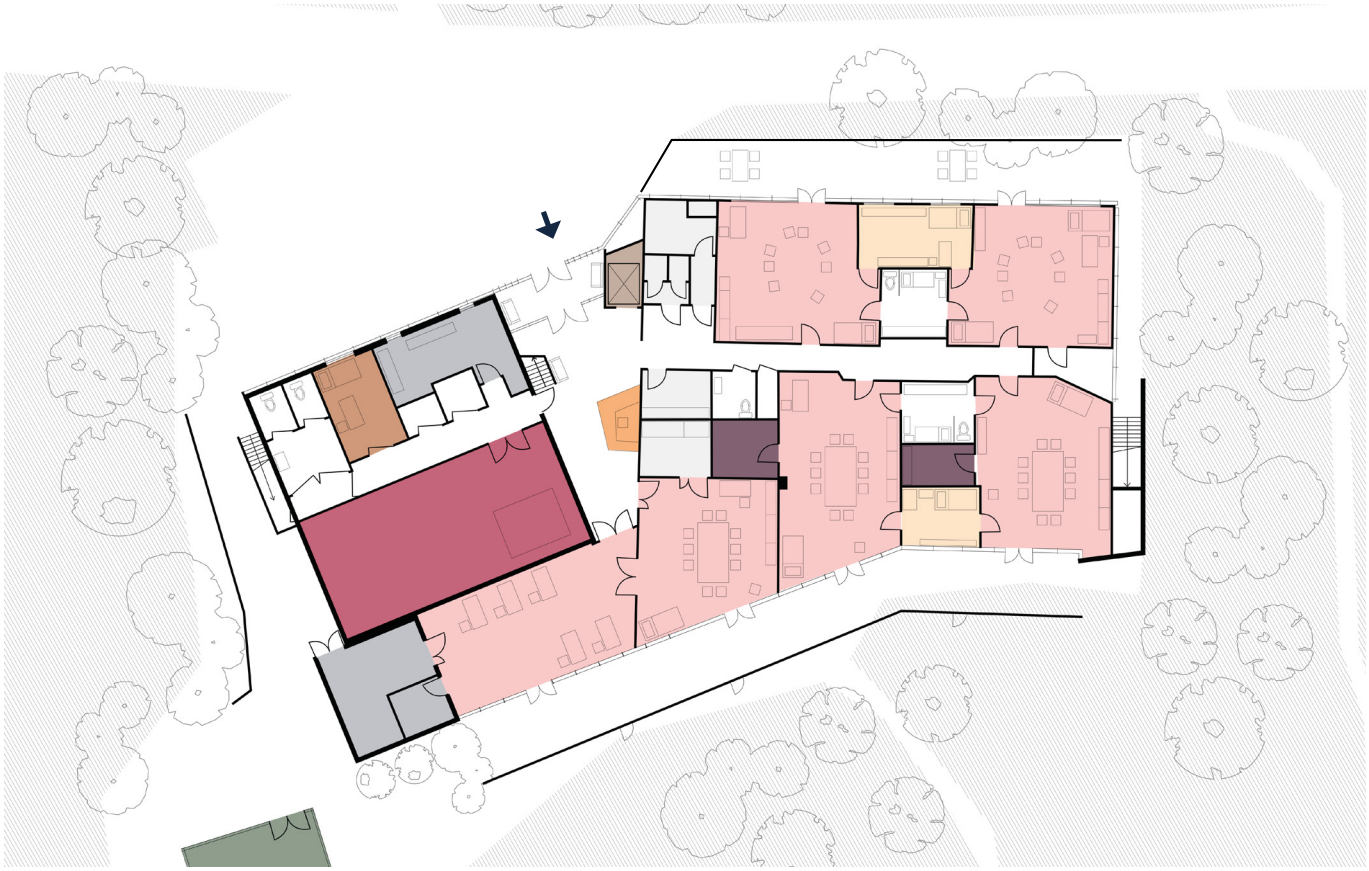
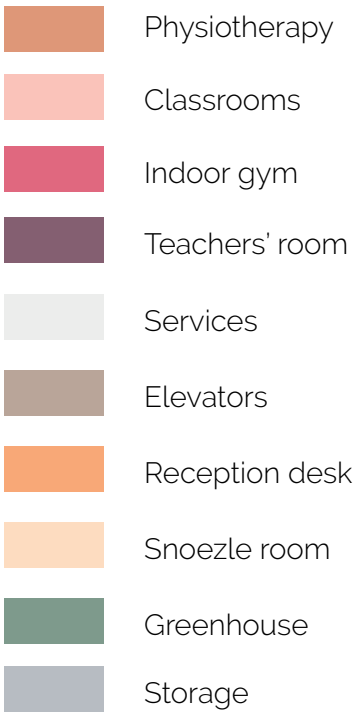


Figure 49 Ground floor functions (Willem Felsoord Daycare)



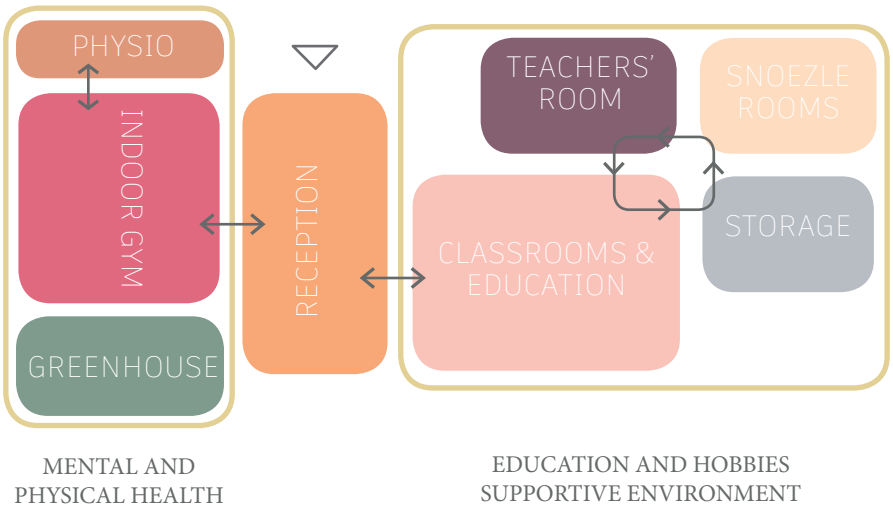


Figure 50 Ground floor spatial organization diagram

Most of the time, students based at the ground level classrooms spend time in their own space shared among 7 students and supervised by two teachers. Two classrooms share one snoezelen space which is located in-between the two groups. The tables are arranged in a semi-circle as it is more effective for supervision and safety. Bedrooms are in the corners of each classrooms to let overstimulated children have naps. Besides the classrooms, ground floor has a large indoor gym, which also performs as a gathering location for celebrations and parties.

Figure 51 First floor functions (Willem Felsoord Daycare)

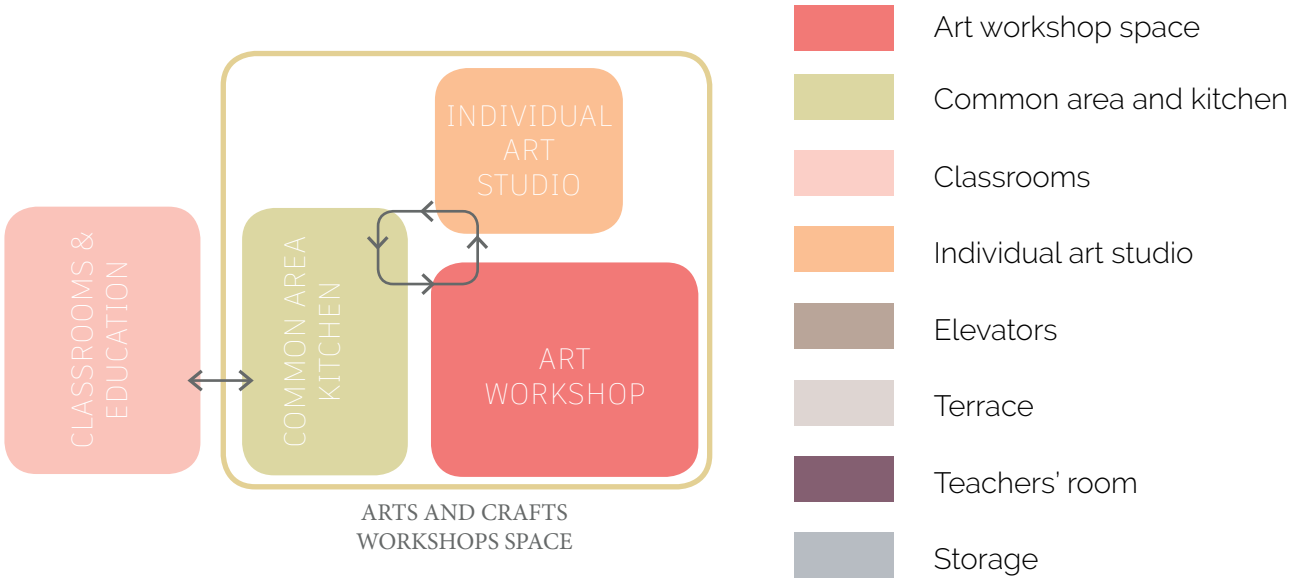
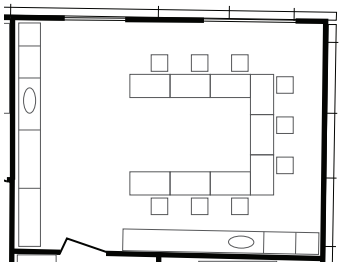


Figure 52 First floor spatial organization diagram

The first floor is dedicated to the groups with a higher mental capacity, therefore these pupils can go from one room to another without supervision. Arts and crafts workshops can be performed in a group setting, or in a special concentration room. Upon individual requests, students can book the room to sit alone and draw. Aside from this space, one student was dedicated her own studio space with the reason being to prevent aggression and over-stimulation.

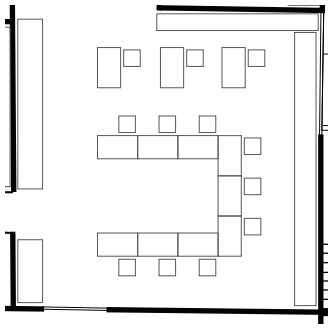
- **Arts and crafts**



Group workshop (A)

per 9 people + 1 staff

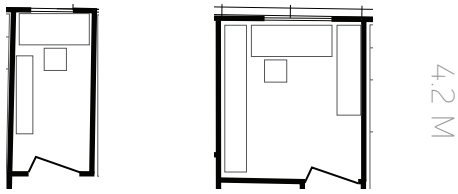
Art and paper-mâché workshop with a sink, storage cabinets along the walls, art equipment and individual student desks and chairs.



Group workshop (B)

4 toilets and 3 showers per 9 people

Individual desks arrangements can be altered according to the students preferences. Those painting on canvas tend to sit individually, while some can sit besides each other. The space has a sink, drying rack, and cabinets with art supplies.

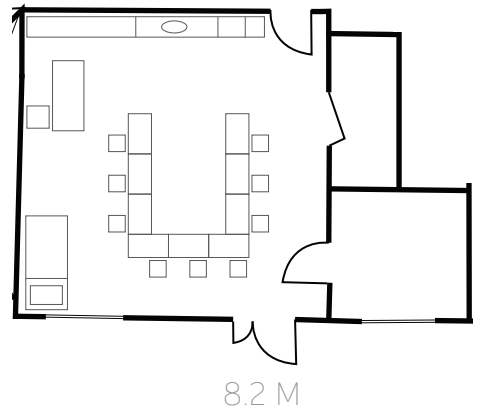


Individual workspaces

Shared (left), designated (right_

To prevent aggressive behavior, over-stimulation and stress, students are allowed to "book" individual workspace which is located within the common art workshop space. One student got an independent studio, to reduce the recurring outbursts. However, everyone is free to occupy the common area.

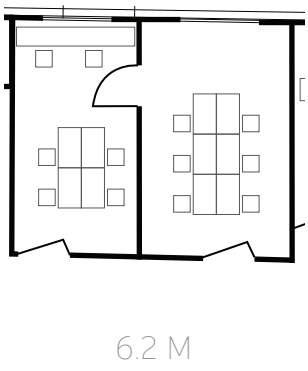
· Classrooms



Classroom type A

7 students and 2 teachers

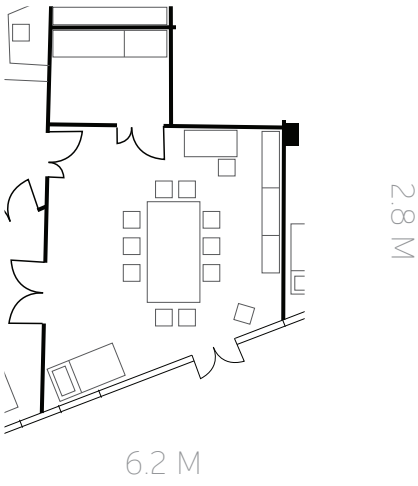
Classrooms, where students spend most of their time indoors and within the same room often have a bed located in the corner for sleep or relaxation. A separate staff room is used for personal goods and equipment. A snoezelen space is directly connected to the classroom.



Classroom type B

per 8 students and 1 teacher

Short-term activities, like gardening classes, can be performed in smaller rooms.

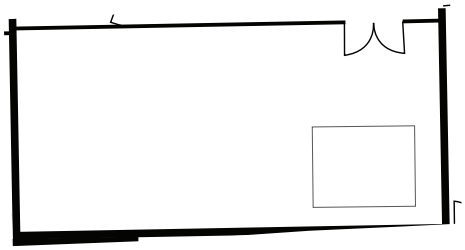


Classroom type C

7 students and 1-2 teachers

Most of the classrooms have plenty of daylight and direct access to the outdoors: either a terrace or a balcony. In addition, laundry room is attached to this classroom typology.

- **Social gatherings**



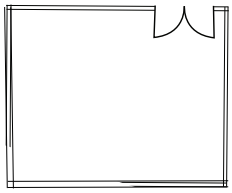
4.5 M

8 M

Gymnasium

flexible group sizes

The gym often hosts workshops and celebrations for all clients of the day center. Moreover, daily PE classes are performed here, where students enjoy basketball, a swing, and dancing sessions.



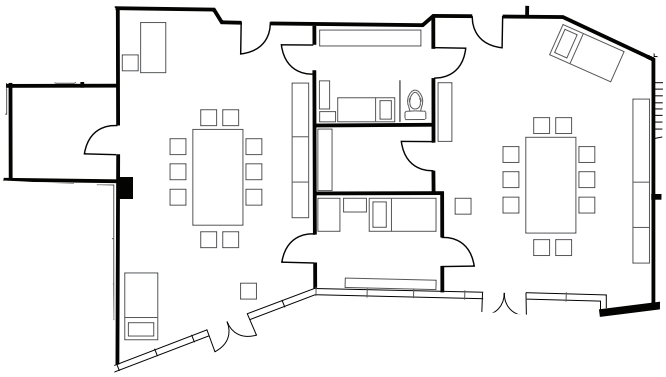
2.2 M

3 M

Greenhouse

flexible group size

Although up-keeping the garden was primarily the task of the staff, YAIDD enjoyed the experience of seeing the plants and interacting with them, rather than performing care correctly.

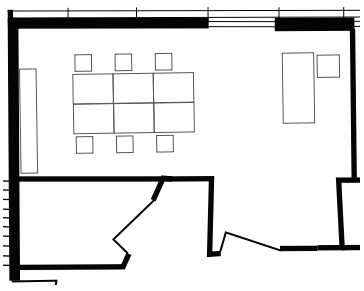


Classroom type D

14 students and 4 teachers

A cluster of two classrooms shared one snoezelen room located in-between. Interior layouts of the classrooms are identical: both containing a sink, small kitchen area, teacher's desk, one bed placed in the corner, and a centrally placed table. More seating spaces (bean bags and chairs) are available across the classrooms, especially closer to the windows.

6 M



4.5 M

Classroom type E

6 students and 1-2 teachers

Smaller classroom arrangements are available for younger children with intellectual and developmental disabilities.

Figure 53 Dimensions catalogue (Willem Felsoord Daycare)

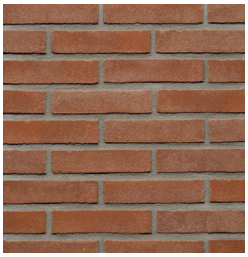
Exterior materialization

Figure 54 Exterior impression (Willem Felsoord Daycare)

Thatch

Frosted glass

Wooden planks



Brown-red brick

Since the project involves transformation of the existing building, facade elements are seen as a shell to merge the interior of the originally brown-red brick buildings. Frosted glass is added in the main entrance side to protect the clients' privacy while allowing daylight into the common spaces. Although thatch is not noticeable from the front facade, the exterior cladding penetrates the building envelope.

- **Interior materialization**

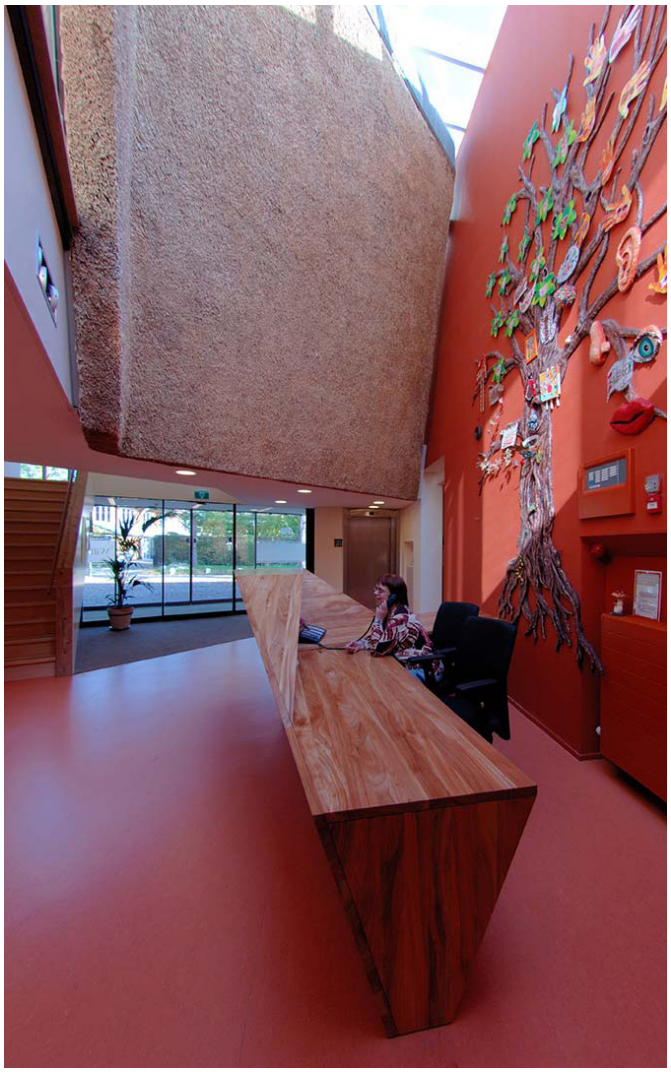


Figure 55-56 Interior impressions (Willem Felsoord Daycare)

Red rubber flooring

Thatch

Natural timber texture

Red brick of the exterior cladding is reflected in the red walls of the reception area, while similarly the exterior thatch elements is visible on the ceiling of the entrance hall too. Allusion to the outdoor character is further created with the sculptures of the tree and the flying swans. Natural textures of wood are found on stairwells and the reception desk.

Kinderwoonvorm Pameijer Dawesweg

Date of completion: *1993 (operating since 2017)*
Architect: N/A
Location: *Rotterdam, Netherlands*

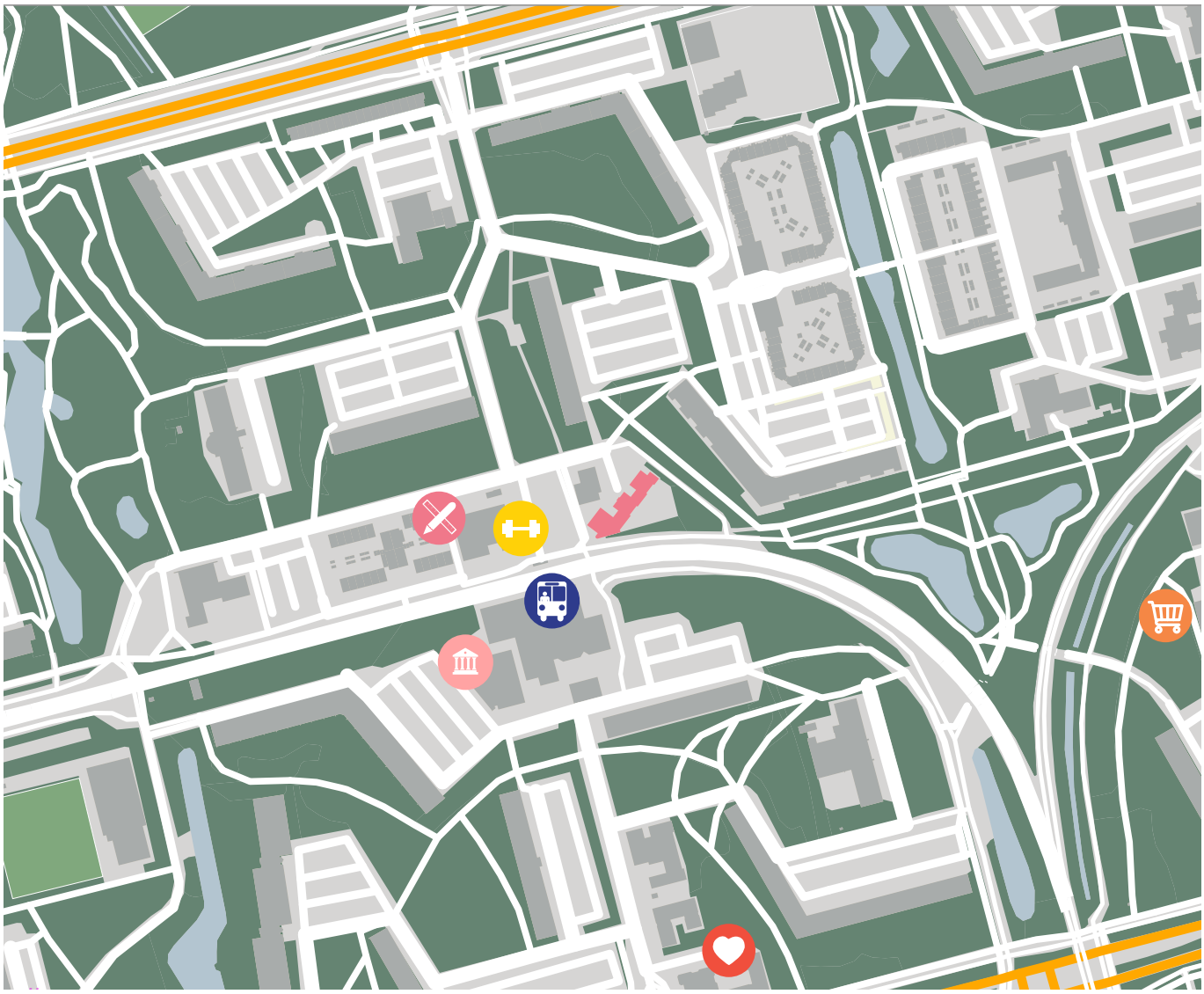


Figure 57 Context map (Kinderwoonvorm Dawesweg)

Healthcare

Public transport

Education

Cultural center

Supermarket

Category: Assisted group living for children in two groups: under 13 and 13-18 years old
Building area: ca 1100 m^2
Program details: The two joint houses allow children with various IDDs to live without parents under the supervision of staff. Children get assigned to live in a group home by their own choice, the choice of the parents, or by the court's judgment. One house can have a maximum of 8 people including one staff living on site. The residents have individual bedrooms, but share the bathroom, kitchen and the living room.

OWN CARE AND HOUSE CHORES

INTERACTIONS WITHIN A SCHOOL SETTING

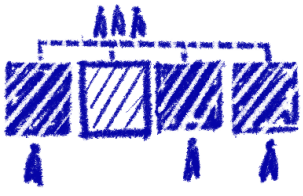
CONTROLLING THE STIMULI TRIGGERS

EXPLORING OWN INTERESTS

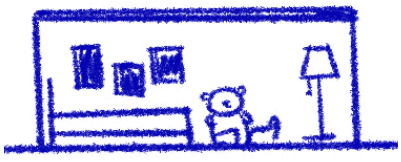
STRUCTURED GROUP ACTIVITIES

NETWORK BEYOND FAMILY AND CARE STAFF

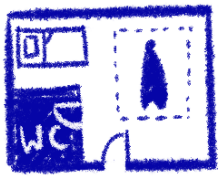
Figure 58 Exterior view (Kinderwoonvorm Dawesweg)



Accessibility of residences within the reach from shared facilities for immediate refuge



Personalization of residences with own furniture + lighting control.



Residences with own bedroom and bathroom for improved privacy

Figure 59 Relevant design concepts (Kinderwoonvorm Dawesweg)

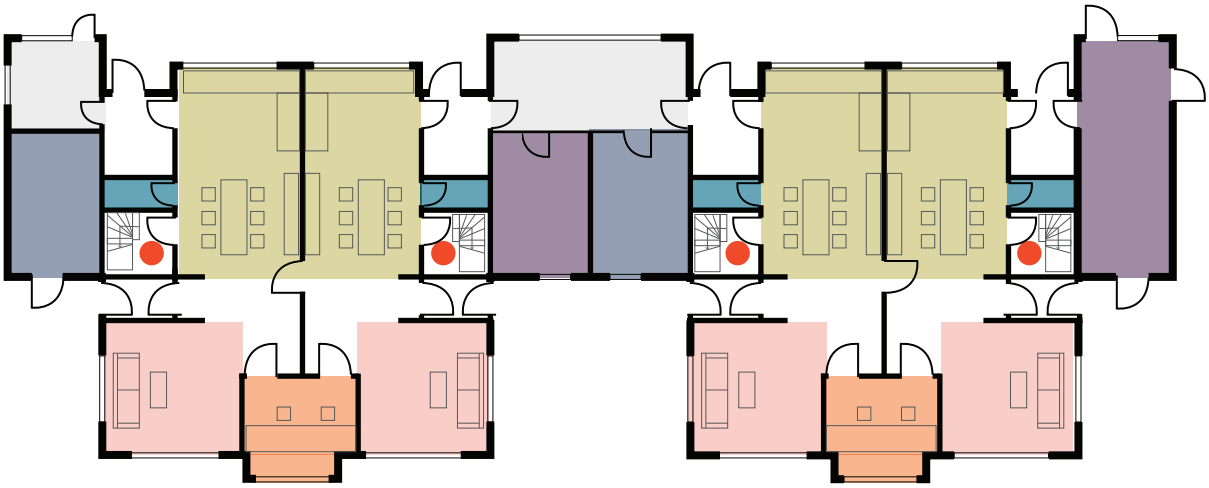


Figure 60 Ground floor functions (Kinderwoonvorm Dawesweg)

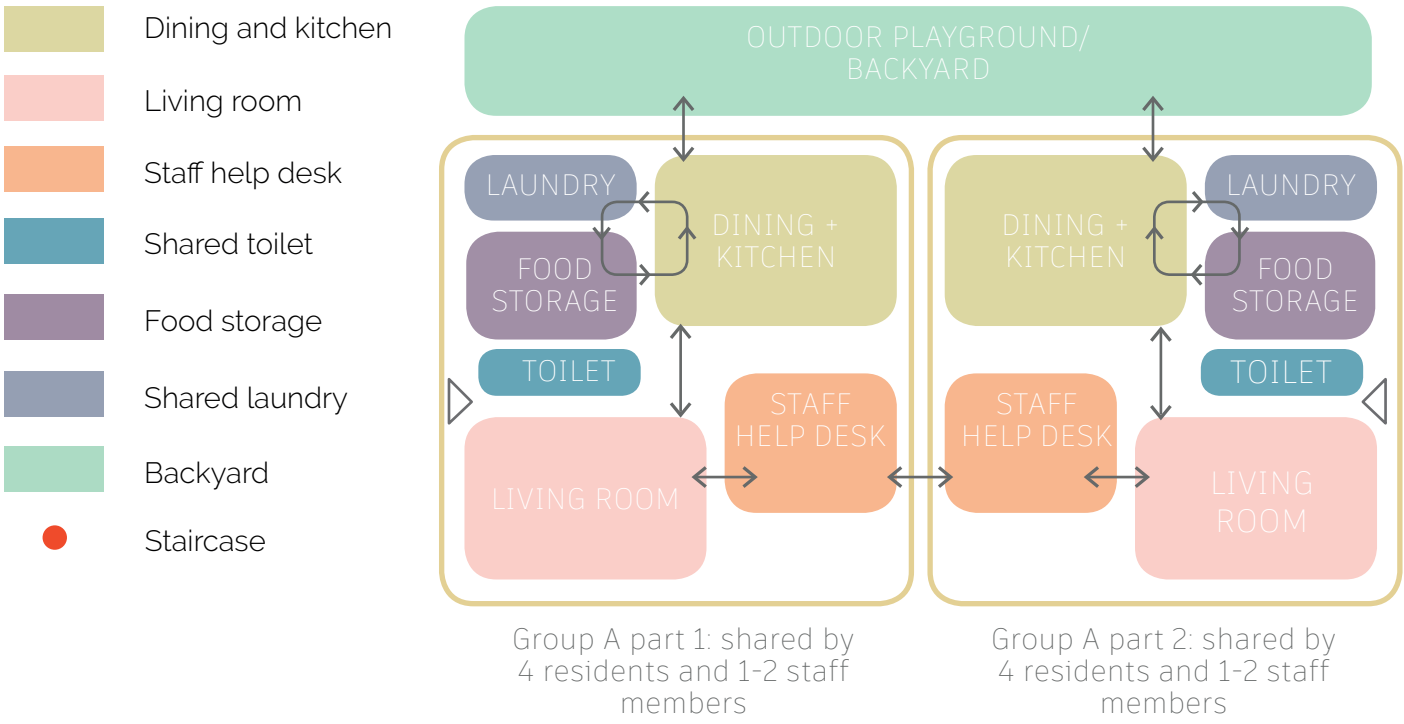


Figure 61 Ground floor spatial organization diagram

The two houses - Group A and Group B - host the different age groups to allow residents establish friendships with peers. Group A (under 13 years old) contains 7 residents in total, with one bedroom dedicated to the staff. Extra bedrooms (2) are available at the attic in case other clients of Pameijer wish to stay outside of their homes temporarily. The ground level contains shared dining/kitchen and living room spaces. Each group home is split into two sub-groups. Hence, kitchen, living room and dining areas are usually taken by five people (clients and one or two staff members). Kitchen space has the direct connection with the food storage and laundry areas, and faces the backyard.

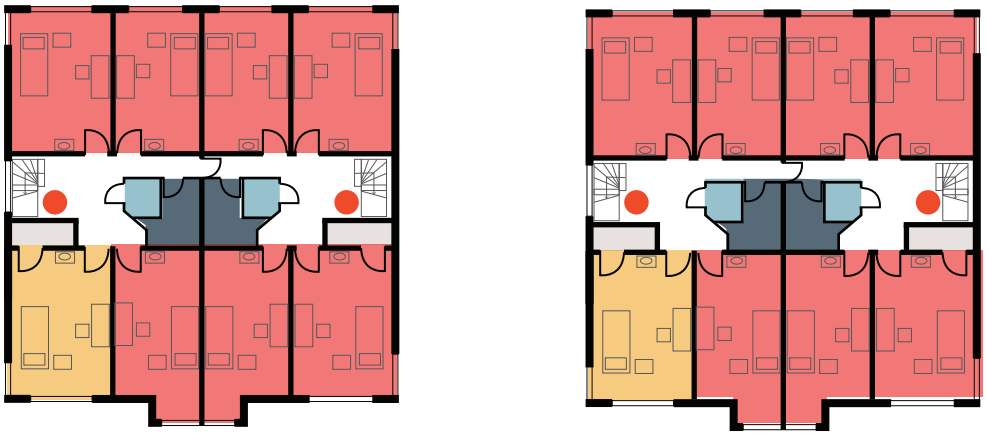
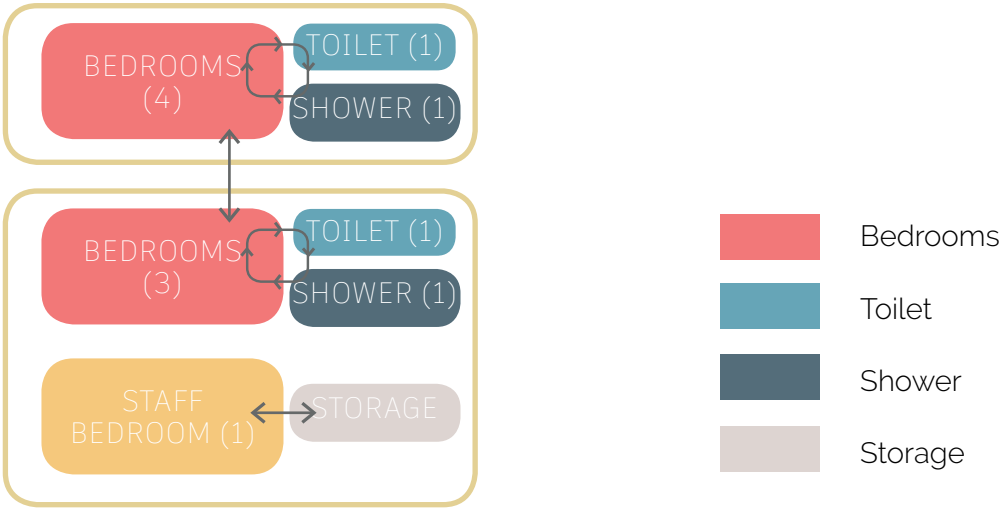


Figure 62 First floor functions (Kinderwoonvorm Dawesweg)



Group A part 2: shared by 4 residents
and 1-2 staff members

Figure 63 First floor spatial organization diagram

The layouts of Group A and Group B are identical to each other in every floor. Although they are connected at the ground level, the residential floors are disconnected between house A and B. Within each group house, the area is split into two sub-groups. One sub-group consisting of four clients (or three clients and one staff member) shares one toilet and one shower. Individual residences contain a bed, a sink, shelves and cabinets, and a desk as a workstation. Here, children prefer to do homework on their own or watch videos after school. Children tend to become less socially-active after their classes, so they spend more time in private.

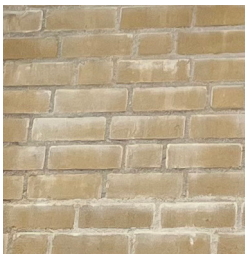
Expression of normality

Figure 64-65 Interior and exterior impressions of domesticity (Kinderwoonvorm Dawesweg)

Soft toys

Parquet floor

Clay roof tiles



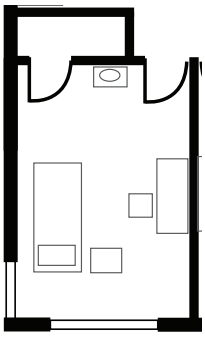
Yellow brick

Materialization of the interior and exterior spaces represents the familiar signs of domesticity through the use of brick facades, roof tiles, wooden parquet floors and the abundance of plush-toys and soft blankets in the private bedrooms. Together, the elements re-enforce the ideas of normalization regarding the views of assisted group homes.

Dimensions catalogue

3 M

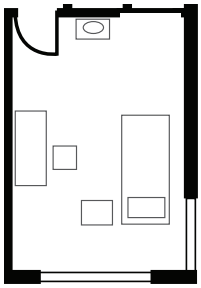
6 M



Staff bedroom

There is one staff bedroom assigned in each group house, where the residence is identical to the clients', but contains a storage space usable for medication and the first aid box.

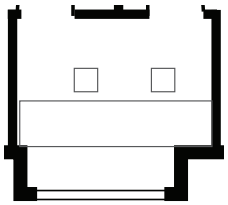
3 M



Private bedroom

Private bedrooms contain a bed, a night-stand, a desk, a chair, a sink and cabinets (or shelves). Residents are also allowed to open and close windows for natural ventilation.

3 M



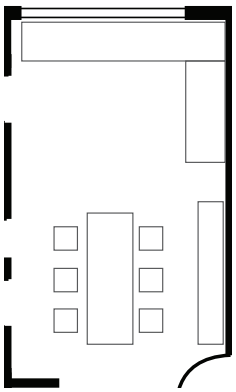
3 M

Staff room / Help-desk

In the ground floor, staff room contains medications and the first-aid box, along with leisure equipment that the residents are allowed to use upon the staff's approval.

4 M

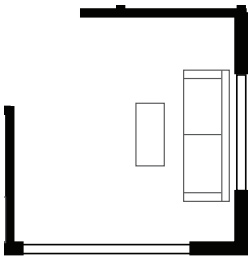
9 M



Kitchen and dining area

The space is often used in the free time by the students that wish to paint, or assemble Lego, in the common area rather than alone in the bedrooms. Children are allowed to cook independently under the supervision of the staff.

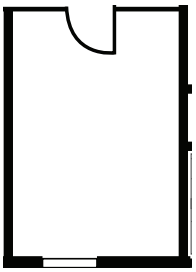
4.5 M



Staff bedroom

Living room is used for watching TV or playing board games by the children, families and friends.

3 M



Laundry / Storage

To accommodate a total of 16-20 people, shared laundry and food storage are necessary in the center, and at each ends of the building. The space is mainly operated by the staff, however accessible by the residents too.

Figure 66 Dimensions catalogue (Kinderwoonvorm Dawesweg)

04 Discussion

The results of the study focus on the role of Independence, Social participation and Wellbeing as the key autonomy-supportive factors for YAIDD undergoing a transitional phase in life. The analysis supports the theory of self-determination, where autonomous individuals can have a dependency on others if they willingly trust the support. The data suggests systematic daily practices that YAIDD should carry out in order to elevate their Quality of Life and take a step towards an autonomous adulthood.

According to Foley et al. (2012), employment brought positive outcomes to the level of YAIDD's independence. Open employment, shelter employment, and day services allow individuals to practice skill development, recreation, and community inclusion. The same research suggests that the best predictor to YAIDD's capacity for employment is the ability to carry out the mundane chores. According to the Department for Communities and Social Inclusion in South Australia (2013) the household chores that YAIDD can carry out independently include operating a washing machine, ironing, cooking, grocery shopping, mopping the floor, using an ATM machine and traveling by public transport. To aid the independence-learning process, YAIDD can join a living-skills-group, or have a photo-sequence of the tasks available in their own homes at the locations, where the tasks are usually done.

When analyzing the topic of Social Participation among YAIDD, the concepts of physical and mental wellbeing often appeared throughout the literature, stressing the importance of communication towards one's general health. Social participation tends to decline for young adults undergoing a transition phase. According to Foley et al. (2012), new social networks are created through employment and daily activities. Moreover, social skills training programs can be used to help YAIDD learn gestures, vocalization, nature and quality of social interactions to give a confidence boost to the young adults forming new networks (Intellectual Disability: promoting daily living skills in adults, 2013). Other social interaction practices include: attending sports in a mixed group setting with non-disabled individuals (Louw et al., 2018), participation in a structured interest-based social group on a weekly basis (Wilson et al., 2017), supported dog-walking programs (Louw et al., 2018), and peer-network intervention (Louw et al., 2018). According to Louw et al. (2018), school and employment settings were referred to as the connection-forming locations that have an element of reciprocity that is valued by YAIDD. Throughout the found literature, the positive outcomes of social participation for YAIDD include: an improved sense of belonging, self-confidence, acceptance and new friendships.

Multiple dimensions of the Wellbeing factor were addressed in the study. According to Stewart et al (1994), a pattern was established between the nutrition-related problems and the population with intellectual disabilities. Hence, education and behavioral interventions to assure appropriate diet were recommended. Health Guidelines for Adults with an Intellectual Disability (2002) suggested frequent nutrition screening and provision of basic nutrition educational materials to YAIDD. Besides the eating habits,

physical exercising was referred to as a way to address physical and mental healthcare, i.e. dancing, mobility games, and hydrotherapy. To encourage motion, cushions, soft play equipment and padding should be available throughout the occupied space (Coiffait & Leedham, 2016). To ensure good rest, YAIDD's bedrooms should support undisturbed sleep through the limitation of sensory triggers, such as light, heat, cold, or noise (Coiffait & Leedham, 2016). Snoezleruimte is another option to control the sensory stimuli in a day setting and enhance one's psychological state. According to Coiffait and Leedham (2016), it is important to offer a choice for YAIDD through the means of control over their own environment. For instance, the authors suggested person-environment-supportive interventions, like availability of switches for light or temperature control.

The effects of some daily practices were discussed in-person with YAIDD as a part of the fieldwork study for this research. The results of the literature studies and fieldwork activities show that there is a need for education and counseling in the spheres of nutrition, social participation and daily living skills for YAIDD transitioning into adulthood. Moreover, structured activities should be offered to the chosen demographic to strengthen their sense of belonging and expand the current network. The impact of sensory stimuli should be taken with greater care as inability to escape or reduce the triggering factors could cause pain (psychologically and physically) to YAIDD and discourage their willingness to become autonomous.

As a bridge of activity-based recommendations into the field of architecture and urbanism, the recommended activities were translated into programmatic requirements. In this manner, the recommendation for "group sports participation" is aligned with "outdoor or indoor sport venues". Autonomy-supportive environments were summarized by ten key functions in-line with the literature research: 1) residences, 2) communal kitchen and laundry, 3) art workshops, 4) work places, 5) community cafe and meeting areas, 6) classrooms, 7) social clubs, 8) gym and sport fields, 9) medical rooms, 10) snoezelen spaces.

To address design requirements of the outlined program, literature study was used to arrive at the six core design principles relevant to the selected user group. The following core principles can act as the anchors in the design process of an autonomy-supportive facility: a) Legibility and wayfinding, b) Prospect and refuge, c) Territoriality and control, d) Privacy and choice, e) Design for senses , f) Design for routine.

Pearson et al. (2016) stated that wayfinding should be designed considering paths, edges, districts, nodes and landmarks to ensure legibility and avoid user's frustration. This design consideration supports the autonomy-supportive factor of Independence, since clarity and continuity in the built environment gives the opportunity for YAIDD to move across the buildings and the city independently. Legibility tackles the factor of Wellbeing too, as it reduces psychological stress on the young adults. According to Pearson et al. (2016), the concepts of prospect (ability to survey the information regarding the space before entering) and refuge (ability to escape or hide within the public spaces), ensure confidence of YAIDD and address the Social Interactions factor. Design methods of ensuring prospect and refuge could include availability of sidelights, doors equipped with windows, "pockets" in public areas, open-plan public zones to ensure sight-lines, open-style railings etc. When researching territoriality and control, the data suggests that providing personal space for YAIDD is important to reflect security and identity through ownership and personalization (Pearson et al., 2016). To some extent, the factor reflects the ideas of Independence as a way to express and explore one's own interests. Privacy and choice design recommendation can be seen as a combination of prospect and refuge and territoriality and control, where YAIDD are offered a choice in the levels of social interactions: solitude, intimacy and

anonymity. Design for senses is the principle that appeared most frequently throughout the literature on the topic of design for intellectually disabled users. Therefore, this part was elaborated in the most detail and was split into the three relevant human senses: vision, hearing and touch. However, the limitation of this selection leaves behind other sensory factors that could potentially impact design for YAIDD, such as smell and taste. Light and color were discussed as the main parameters for the visual sensory information; recommendations for natural light (daylight) and natural materials with neutral colors were discussed by Pearson et al. (2016). To reduce auditory overload sound absorbing panels, suspended ceiling, carpets (instead of tiles) and wall-mounted cork boards are advised to be installed. When discussing tactile senses, soft textures are generally perceived as more pleasant stimuli when compared to rough metallic surfaces, although preferences vary among YAIDD and different diagnoses (Pearson et al., 2016).

Another method that was addressed in this thesis is case studies. The data for the case studies chapter was obtained through secondary literature, interviews with the architects, users and the staff, as well as the site visits. The four case studies served as the examples of residential, educational, and healthcare practices for YAIDD. Integrated into the context, the buildings are placed in the vicinity of medical facilities (such as hospitals and general practitioner offices), leisure spots (sport fields, parks, petting farms, shops) and public transport. Such location encourages Independence of YAIDD by letting them commute to the locations autonomously. Interior organization of the case studies resembles clusters, where students of one or two groups are clustered into a single base, or residents are clustered in subdivided houses or floors. Compartmentalization of the layout creates smaller communities within the larger context of a building, aiding legibility and wayfinding too. In the context of education, snoezleruimte are shared among two or more student groups, along with shared bathrooms and teacher rooms. Sport-halls within the daycare and education buildings were found to host the functions beyond just sports. During the celebrations and other events, teachers, families and YAIDD assemble together in the gym hall and appropriate the space for concerts, dancing etc. Finally, the exterior and interior materialization of the facilities tend to communicate the familiar signs of normality: regular bedrooms with soft toys and posters, wooden parquet and regular table seatings. Medical equipment, although made available, is “hidden” in the rooms (placed in the storage, or moved to the side of the wall) to create a space that would not stress one’s disability. These results of the case studies fit the theory of deinstitutionalization and normalization, which were the guiding theories of the study. Selected case studies represented the methods in which the built environment can accommodate ‘regular’ daily life of YAIDD outside of the closed institutions as integrated members of the society. The limitation of the case studies should be assessed too, as the data was only assessed for four locations (all within the EU). For further investigation, more case studies should be acknowledged including the cases outside of Europe. Moreover, the structure of the case studies could be expanded towards daylight analysis (to compare the natural light availability at different zones), building materials and noise cancellation (to study detailing and structure), and circulation diagrams (including fire escape and emergency exits).

05 Conclusion

This thesis addressed the ways in which an architectural design can encourage YAIDD for a smooth transition towards an autonomous adulthood by analyzing literature on activity-based recommendations to target Independence, Social participation and Wellbeing, design recommendations for intellectually-disabled users, fieldwork activities (i.e., interviews and site visits) and case studies. The selected three Quality of Life domains (Independence, Social participation and Wellbeing) are seen as the goals associated with YAIDD's autonomous adulthood.

The study concluded daily practices that prepare YAIDD for an autonomous adulthood by targeting one or more Quality of Life domains. When associating each activity with a spatial program, the study offers a cluster of functions necessary to boost Independence, Social participation and Wellbeing of YAIDD and prepare for an autonomous adulthood. Based on the literature study, to target Independence, YAIDD should practice daily living skills, explore their own interests, commute independently to desired locations, perform their own care and house chores and develop self-determination habits through learning or employment. Hence, the architectural program responsive to the mentioned activities can contain classrooms, residences with their own bathrooms, artistic workshops, workspaces (such as shops and restaurants). For Social participation, YAIDD should engage in interactions in employment, educational, group activities and community settings; the associated functions include: education and working facilities, public dining and meeting areas, social clubs and gyms and sport locations. Lastly, Wellbeing can be approached by having a choice, following a healthy nutrition plan, controlling the sensory stimuli, exercising (outdoors or indoors), having an undisturbed sleep and access to medical help. So, the functions that improve wellbeing are: communal kitchen, snoezleruimte, medical room (or doctor's office), and physical exercising locations. Although the data provides a framework of functions that could facilitate the transition period for YAIDD, due to the differences subjected to individual wellness and the severity of disabilities, some YAIDD may choose to attend a limited selection of functions. For instance, YAIDD may choose to continue living with the family, but attend daily living skills training, or social interaction workshops. In this manner, the mentioned facilities should be made available for the users to choose for or against participation. Certain functions, such as public dining and meeting areas, imply the greater variety of users by integrating the nearby community into the facility. The mix of users supports the idea of social inclusion and is aimed at creating a sense of belonging for YAIDD.

Besides the programmatic requirements for the autonomy-supportive facility for YAIDD, this thesis analyzed design recommendations to create a disability-friendly environment. The concepts of Legibility and wayfinding, Prospect and refuge, Territoriality and control, Privacy and choice, Design for senses, and Design for routine were the most common strategies referred by designers and architects. The concepts were applied to the recommended functions and presented in a catalogue format. Each design recommendation is concluded with an icon and a short description of the strategy. The

catalogue can be used, challenged or extended by the architects designing spaces for intellectually and/or developmentally disabled users. The catalogue could also inform the further studies of disability-friendly architecture designs and serve as the inspiration for design concepts in this field.

The research was supported by four case studies - Residence 3 Pins by Onze04, Kiem Special Care school by Mecanoo, Willem Felsoord Daycare center by René Bouman and Andrea Möhn, and Kinderwoonvorm Pameijer Dawesweg. Although tackling different scales and hosting different functions, all locations are occupied by YAIDD. The case studies findings can be useful for the researchers and architects designing educational, healthcare, daycare and residential facilities for intellectually-disabled users. The chapter provides a catalogue of rooms with dimensions (e.g. classroom layouts and sizes, wheelchair-accessible public bathrooms), finish materialization catalogue and provides an insight into the placement of the architecture in the urban context.

The data of this master thesis could potentially be used for the organizations responsible for the transition planning routes for the families with intellectually and/or developmentally disabled children. To ensure the complete and successful transition into an autonomous adulthood, educational and practical performances must be aligned, where specialized architecture could assist the spatial requirements of both.

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List of figures

Figure 60 Ground floor functions (Kinderwoonvorm Dawesweg) (own work)

Figure 61 Ground floor spatial organization diagram (Kinderwoonvorm Dawesweg) (own work)

Figure 62 First floor functions (Kinderwoonvorm Dawesweg) (own work)

Figure 63 First floor spatial organization diagram (Kinderwoonvorm Dawesweg) (own work)

Figure 64-65 Interior and exterior impressions of domesticity (Kinderwoonvorm Dawesweg) (own photograph)

Figure 66 Dimensions catalogue (Kinderwoonvorm Dawesweg) (own work)

Appendix

Appendix A

Research objective	Outputs
Research objective 1. Understand the physical and emotional responses of intellectually disabled individuals to the different characteristics of architectural spaces. Outline the architectural and urban design principles to encourage positive and healthy spatial experiences	Design recommendations with conceptual sketches and written descriptions based on the literature study of Designing for Autism Spectrum Disorders (2016), Cognitive impairment, access, and the built environment (2004) and An architecture for autism: Concepts of design intervention for autistic user (2008).
Research objective 2. Define methods that formal education facility designs use to encourage YAIDD independent behavior. Outline the limitations, strengths, and opportunities to learning of independent living skills at educational facilities for intellectually disabled students.	Design toolkit with conceptual sketches and written descriptions based on the interviews with three architects: Andrea Möhn and Ron van Logchem. Each of the professionals has designed an educational or care facility for disabled youth in the past, namely Willem Felsoord Daycare center, and Kiem Special Care school.
Research objective 3. Determine the goals and personal values of YAIDD regarding the architecture of transitional phase. How do YAIDD envision their ideal adulthood?	A list of requirements and wishes from the urban and architectural environments for YAIDD, composed from the documentaries, scientific articles, and interviews. The perspective of YAIDD, their parents and caretakers is acknowledged to provide the overview of the needs and wishes.
Research objective 4. Outline the problems associated with transition phase faced by YAIDD that have already graduated from a formal facility. Analyze the options of the facilities that are currently accessible for graduated YAIDD.	A list of requirements based on the findings from the existing residential and learning typologies for YAIDD. The quality of life of the individuals is investigated through interviews and visual discoveries. Individual studio, group home and a day care for intellectually disabled individuals are attended for the fieldwork study too. YAIDD, teachers, study coaches and counselors are interviewed. The activities are documented in terms of YAIDD behavioral habits and interactions with spaces.

Diagram A1 *Research objectives and methods*

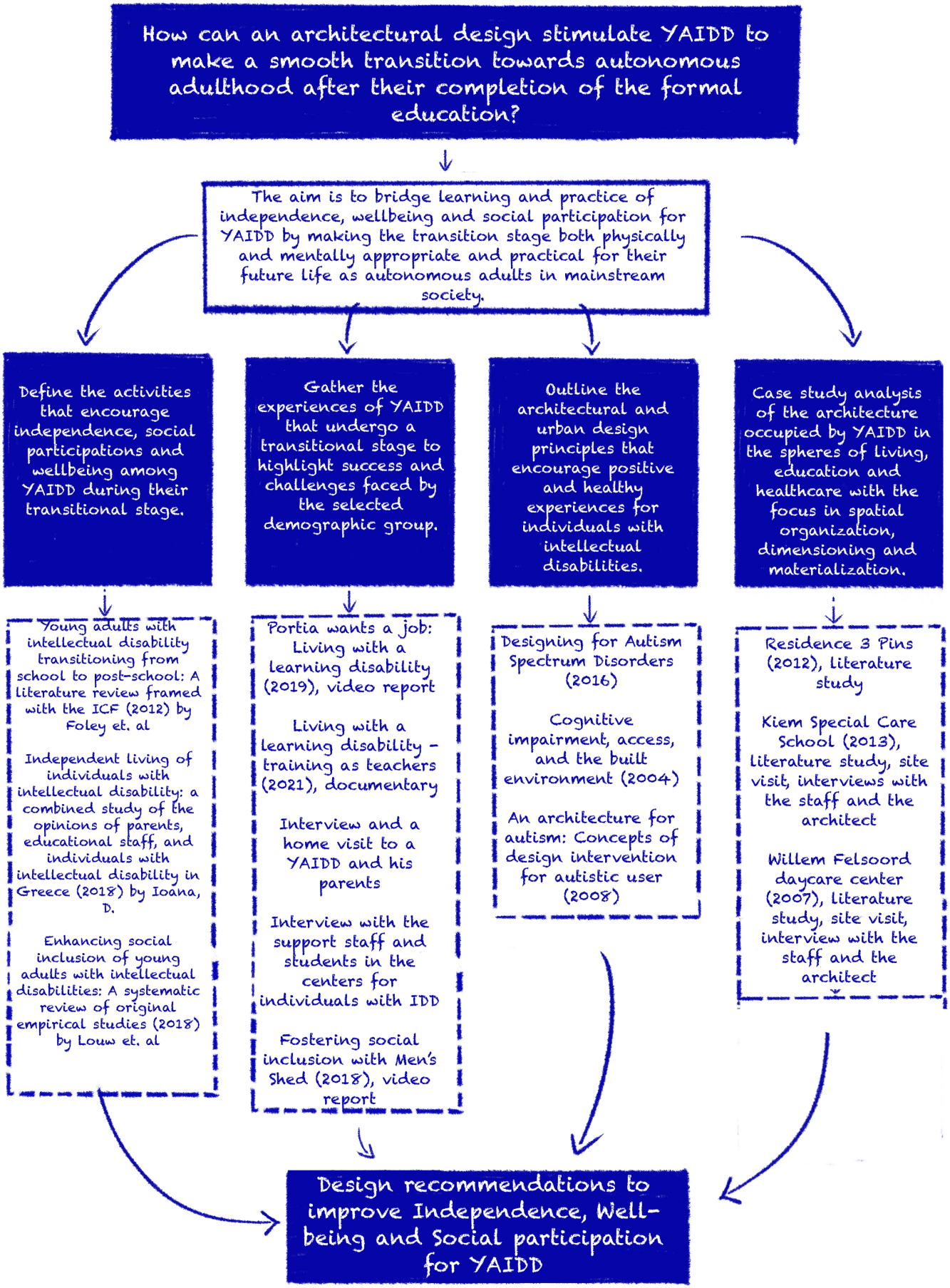


Diagram A2 *Research diagram*

Research question - research aim - objectives - methods - outcomes

Appendix B

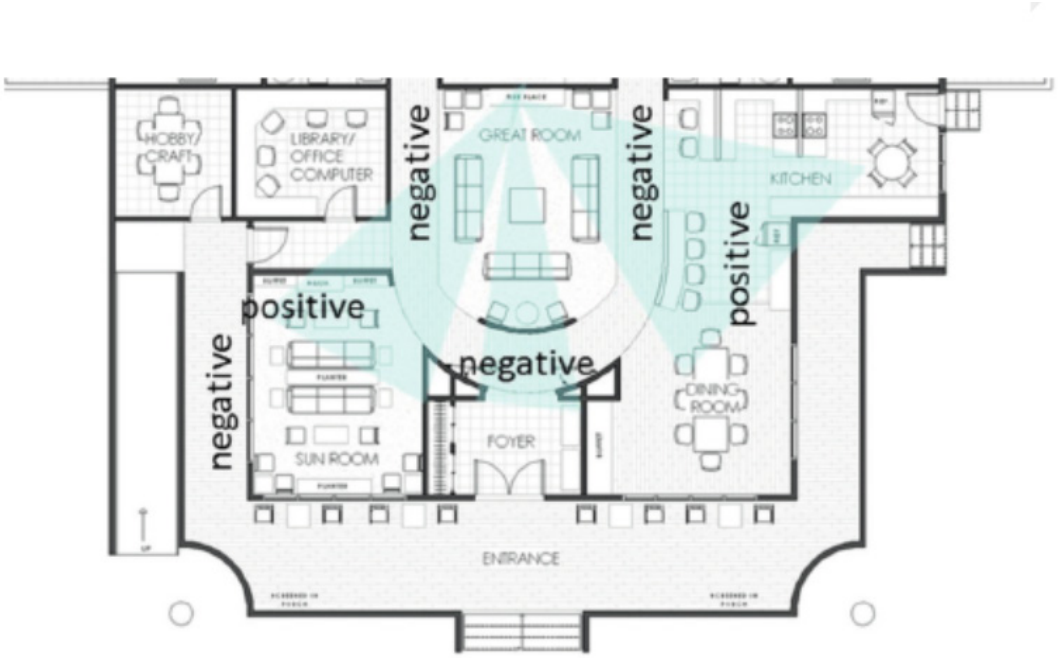


Diagram B1 *Previewing strategies to promote social interactions (Pearson et al., 2016, p. 105)*

Appendix C

When arranging a classroom, teachers are given the following checklist:

Is there space for individual and group work?
Are work areas located in the least distract-able settings?
Are work areas market so that a student can find his or her own way?
Does the teacher have a visual overview to all work areas?
Are there places for students to put completed work?
Are work materials in a centralized area and close to work areas?
Are boundaries of the areas clear?

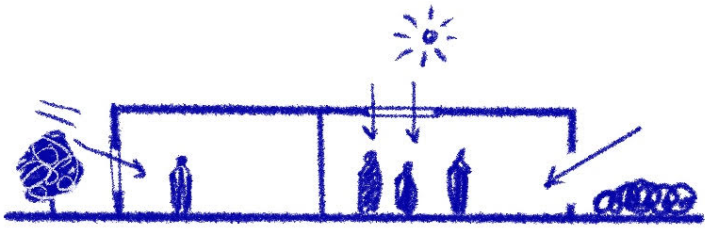
Appendix D

The following illustration include design concepts and recommendations based on the literature review of Designing for Autism Spectrum Disorders (2016) by Kristi Gaines, Angela Bourne, Michelle Pearson, and Mesha Kleibrink. All visual illustrations are original work of the author.

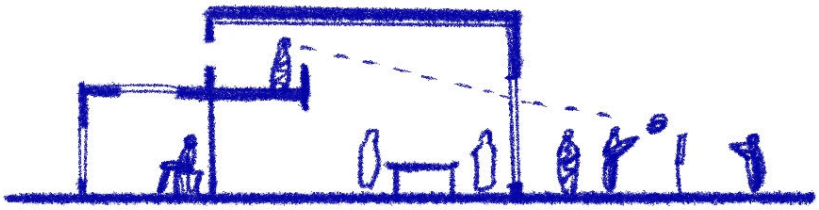
LANDMARKS WITHIN THE BUILDING HELP WAYFINDING THROUGH TEXTURES AND SCALE

LANDMARKS WITHIN THE BUILDING HELP WAYFINDING THROUGH SMELL

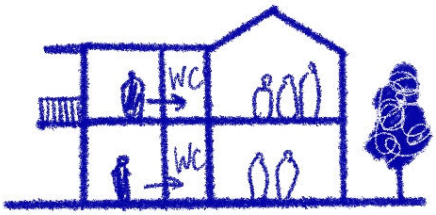
OPPORTUNITY TO ESCAPE AND OBSERVE THE SPACES WITH A LOT OF SOUND AND VISUAL STIMULI



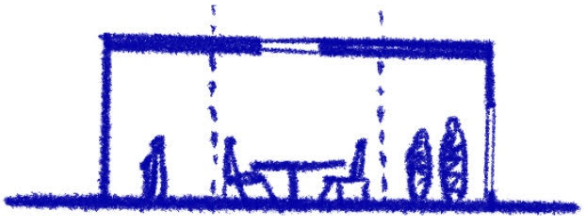
IMPLEMENT DAYLIGHT AS MUCH AS POSSIBLE AND BE CAUTIOUS OF THE VIEWS TO REACH THERAPEUTIC EFFECT



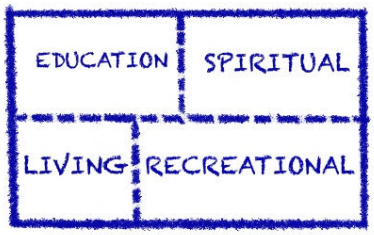
CLEAR SIGHTLINES IN SPATIAL SEQUENCES AND ZONING



PREDICTABILITY IN LAYOUT IN MULTISTOREY BUILDINGS; POSITION SAME SERVICES ABOVE EACH OTHER

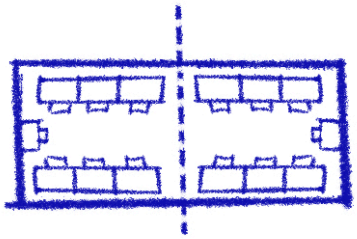


LARGE OPEN SPACES SHOULD BE OPTIMIZED WITH PARTITIONS TO OPTIMIZE AND ENCOURAGE ACCESS FOR INTELLECTUALLY DISABLED

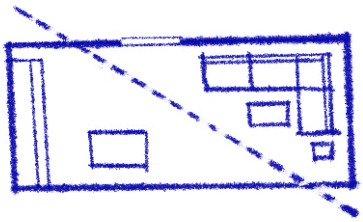


PROMOTE CHOICE BY GIVING AVAILABILITY OF VARIOUS FUNCTIONS

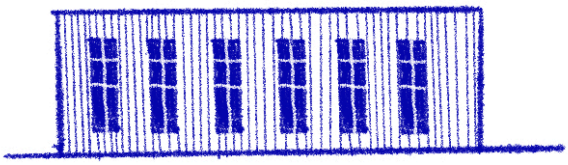
Diagram D1 Preliminary design recommendations



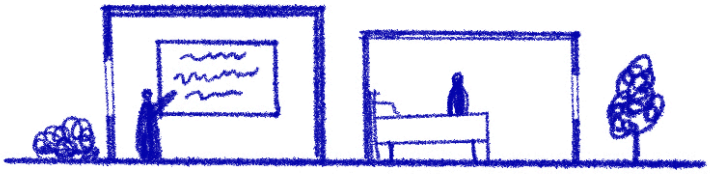
SYMMETRICAL BALACE WITH PLACEMENT OF FURNITURE AS A MIRROR IMAGE ON BOTH SIDES OF THE ROOM



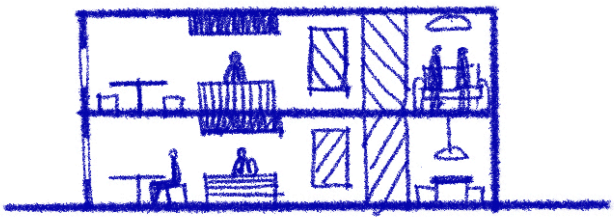
ASYMMETRICAL BALACE WITH OBJECTS OF SIMILAR VISUAL WEIGHT BALANCED FROM A CENTRAL DIVIDING LINE



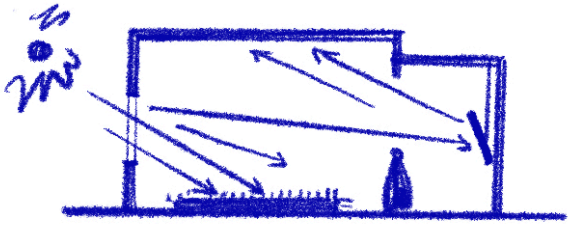
REPETITIONS OF COLORS, PATTERNS, DOORS, WINDOWS ETC.



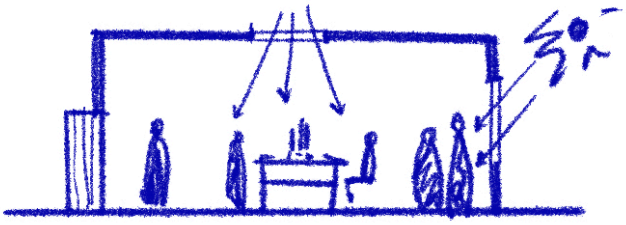
EMPASIS OF THE SPACE IS PUT ON A TEACHING BOARD, WORKSTATIONS, FIREPLACE, OR BED



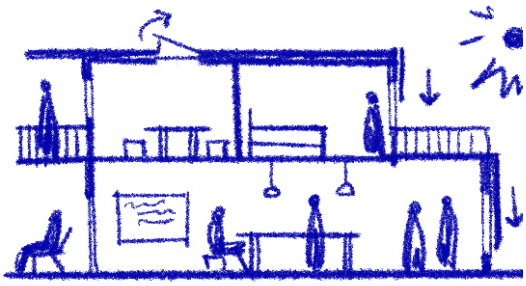
HARMONY CAN BE ACHIEVED THROUGH UNITY AND VARIETY IN COLOR SCHEMES, FURNITURE STYLE AND TEXTURES. VARIETY IS DONE CAREFULLY TO PREVENT CONFUSION IN SPACE.



FINISHES THAT REFLECT LIGHT SHOULD BE AVOIDED WITH THE USE OF CARPETS, MATTE PAINT AND WALL COVERINGS

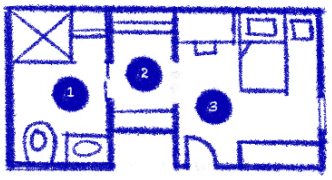


WINDOWS AND SKYLIGHTS TO PREVENT SOLAR HEATGAIN AND VISUAL DISCOMFORT

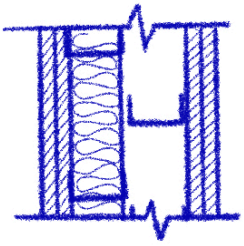


LIGHTING SHOULD BE FLEXIBLE WITH OPERABLE WINDOW COVERINGS, SWITCHES, DIMMERS

Diagram D2 Preliminary design recommendations



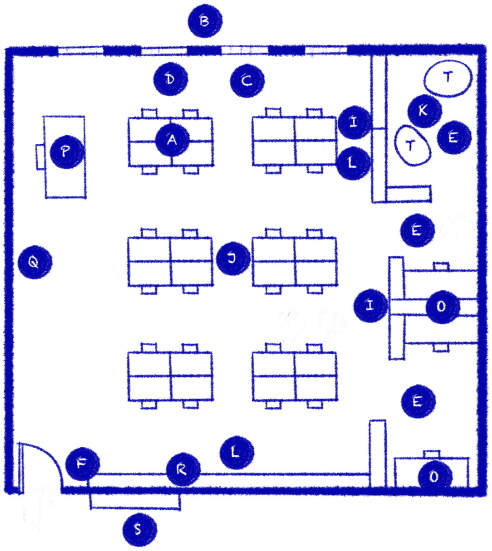
SPATIAL SEQUENCING TO ENSURE PERSONAL ROUTINE AND IMPROVE INDEPENDENCE



ENHANCED SOUND-INSULATING PROPERTIES WITH TWO-LAYER STUDS

SNOEZELEN ROOM TO STIMULATE SENSES IN A CONTROLLED AND RELAXED ENVIRONMENT

ALLOW FOR MAXIMUM PERSONALIZATION OF PRIMARY TERRITORIES TO ENSURE AUTONOMY AND SAFETY



A = students with sever IDD should sit near the teacher's desk
B = daylighting is preferred
C = cover the bottom part of windows with an item to reduce distraction
D = include window blinds for better lighting control
E = use floor lamps as supplementary lights
F = flexible switching for overhead light
I = use boundary markers with tape, furniture arrangements and screens
J = provide informal seating arrangements
K = provide breakout spaces next to the main learning space
L = keep distracting objects hidden
O = independent work stations
P = teachers desk
Q = white board, chalk board
R = lockers
S = display area of student works
T = soft furnishing (I.e., bean bags)

The following material was gathered as a part of the fieldwork conducted at Kiem Special care school Dordrecht and during the interview with Ron van Logchem, associate architect at Mecanoo.

Kiem Special Care school

Architectural vision

Ron van Logchem, Associate Architect at Mecanoo, was a part of the team that designed Kiem Special Care school in Dordrecht as requested by SPON.

The building of Kiem currently offers education for children with intellectual and behavioral disabilities of moderate and severe levels. Currently, there are about 270 students that study in the primary education system. The request that Mecanoo architects obtained prior they began designing was to provide a Dream School for the students.

One of the key concepts that Mecanoo architects relied upon is designing for all senses. A building had to be easily understood with all the senses, but remain fun and playful to engage the young audience.

To incorporate clarity, symbolism was used in the design of Kiem's facade and volumes. The team designed the school as a row of typical houses as a child would imagine these to be: a gabled roof, big facade openings and a chimney on top. Each variation in the brick color would simplify the process of identifying one's own classroom building, and hence develop a sense of belonging to the particular school 'base'.

Interior materialization intended to reduce the sensory stimuli with the use of natural texture - CLT. The warm and minimalist texture of wood did not require ceiling and wall finishing, but some active zones in the interior were enlivened with some brightly painted walls.

Sightliness were important to consider too, as this requirement emphasized safety in the classrooms and in the corridors. Teachers should be able to overlook the class, the space outside of the class and the common areas to ensure that the children interact in a safe manner. Ability to supervise from afar allows for students to act independently too.

Aside from the sightliness, daylight is important to ensure sufficient visibility of the interior spaces. With the use of skylights in the inner street of the school, the space has no dark corners and it is illuminated with the soft mix of natural and artificial lighting.

The client of SPON, although asking for a special care education facilities, needed a school that would be 'just a school'. The kids that study here do not want to be considered disabled, thus the building does not expose special equipment. Instead it is equipped with the necessary services, but gives off an impression of a beautiful school building.

"The identity of the different houses gives the pupils a feeling of ownership, recognition and belonging. They have their own place and group to which they belong, which give them certainty and confidence," - Ron van Logchem

Figure E1 *Kiem: preliminary floor plan*

Figure E2 *Kiem: preliminary section*

"Children feel safe here and can really be themselves," - Amanda Dorresteijn

Daily activities and the use of space

On Friday (November 25), I have visited Kiem School and observed a regular day of the students and the staff. Two employees - Amanda Dorresteijn and Marco van der Velden gave a tour around the building and shared their experience of working at Kiem.

When describing the school, Amanda referred to students being free to be themselves. Having children with multiple disabilities, the staff and the students have learned to communicate and help each other based on their own needs. Those that wish to be independent are allowed to perform tasks in their own way, but always with the supervision for their own safety.

Besides teaching students mathematics, natural sciences and other school subjects, the students get the learn daily life skills too. For instance, some groups organize the trips around the city by public transport. This way children can observe and experience the process of taking the bus, the tram or the metro themselves, so the experience will be familiar and less-stressful in the future. In addition, students are allowed to cook together in the kitchen. They help cutting the vegetables and cleaning around. Circulation around the building is accessible for all too: the elevator is actively used by the students on the wheelchair. In case of emergency, this special elevator is also allowed to be operated at all times. The bathrooms vary from the regular stalls, to individual bathrooms adapted for a wheelchair use and operated with an automatic door. The choice encourages students with physical disabilities to use the toilet independently. One of the specially equipped toilets for the younger group of students is a larger space that contains storage for the diapers, medicines, as well as the toilet and a daybed.
Every classroom in Kiem has around 12 students and two teachers. Some students require special chairs and desks, but some occupy the regular school seats. In each of the classrooms, there is a bed standing against the glass facade and close to the teacher's desk. When a student gets overwhelmed during the lesson, they are free to use the spot, but during the visit none of the beds were occupied. Instead, students were busy with their paintings as they were sitting at their desks, on the floor, or walking around the area.

Nearby the classrooms in each of the 'homes' of Kiem there is a 'snoezleruimte' - a space for relaxation and de-stimulation. Although the room has a large window, the light was completely sealed with thick black-out curtains. Here, students lay on a water bed, watch projected images of colors and play with sensory objects. Usually they stay here for no more than 45 minutes. Another space in Kiem that is used to de-stimulate the student (and sometimes the staff) is the sleeping room. Once the space was designed to be a time-out space - a room where students think about their bad behavior. However, with the current vision of the school they focus on prevention of the behavior more. In case the unwanted behavior does happen the staff takes the students for a walk and asks to do some small chores around the building. The mind of the students gets rested and relaxed.

Another change that took place recently in the building is the sealing of the heating system located close by to one of the classrooms. Students were getting irritated with the humming noise of the machine, which is why an additional casing was built around it. Besides the heating system, the building does not require other means, such as air conditioning. Hence, no additional noise is produced throughout the day.

Program - *5,322 m2 space*

- *Reception and waiting space*
- *Classrooms*
- *Snoezleruimte*
- *Sleeping rooms*
- *Individual rooms*
- *Conference rooms*
- *PE gym hall + Equipment storage*
- *Changing rooms with bathrooms*
- *Physiotherapy gym*
- *Physiotherapy session rooms*
- Library
- Dancing room
- Music room
- Kitchen
- Dining space
- Hallways (with seating and active zones)
- Arts room
- Staff offices
- Bathrooms (visitors, students, staff)
- Semi-outdoor and outdoor play area

Figure E3 *Exterior look of Kiem*
Kiem school is located in a green neighborhood Sterrenburg 1-Oost, which offers many schools, open green spaces, and is easily accessible by public transport

Figure E4,E5,E6 *The kitchen of Kiem*

In the kitchen, the cook organizes workshops together with the children. Those that cannot participate can still see the tasks through the window connected to the hall. Each cabinet was marked with some pictures of the contents, so that it is easier to find and preview the objects.

Every group of students goes to their playground once or twice per school day. In a protected territory bounded by a short fence and greenery, children have plenty of options for playing. Recently, the playgrounds were equipped with the additional pavement symbols that mimic a regular street. Sometimes children learn through play about how to act on the streets for their own safety. It was important to ave a physical barrier to separate younger and older groups of children to prevent unsafe behavior and bullying; but visual connection is enforced between the playgrounds so the children are able to overlook the whole space. In addition, outdoor space contains a basketball field that hosts team sports among the older groups of students. In case of bad weather, physical education classes take place indoors in the gym. The space provides a large amount of options to stay active for children of different disability levels. Some go through a special obstacle course for the wheelchairs, and others pick to stay in the large swings. Students are also encouraged to play with each other and hence develop inter-personal connections.

Creative classes take place in the art workshop. During the tour, Amanda and Marco mentioned that this space was turned into a museum just a few days ago. Students organized their own exhibition with arts and crafts and were proud to bring their parents here. Events like 'open family nights' take place regularly at Kiem, where children are encouraged to give a tour around the school to their own guests - parents, relatives and friends. Otherwise, the family is welcome to visit the rehabilitation center located inside of the school too. Raandam Rehabilitation center is a frequent destination for the whole family to come and have some physical exercises or consultation sessions with the doctors.

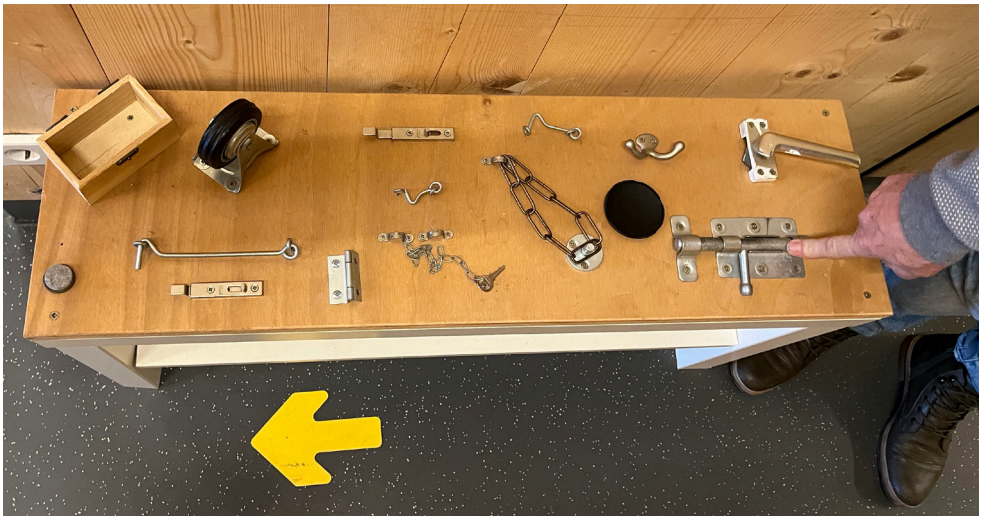
Besides educational and rehabilitation services, the building allows children to stay after-school (until 6 pm) and performs as a day-care space. During these hours, students are free to do their own activities and the support staff is always reachable to all.

Overall, the impression of Kiem appeared to be a safe and welcoming environment for a child's upbringing. Despite the availability of stairs, which tend to be dangerous to younger individuals, the behavior of all students was cautious and well-aware of the surroundings. Children were happy to be independent, but also eager to help those that struggle to go about the space

Figure E7 *The outdoor play area*
The pavement mimicking the regular street signs to teach safety and rules of the traffic

Figure E8,E9,E10 *Physiotherapy and gym spaces*
Opportunities for leisure and health-driven sports

Figure E11 *Variety of functions at Kiem: art roo*
"You name it - we have it!"



m, music room, snoezleruimte...

Appendix F

The following material was gathered as a part of the fieldwork conducted with a YAIDD that volunteered to show his studio and talk about his living experience as an independent young adult.

Studio of an independent YAID

R is a 35 year old neuro-diverse adult that was happy to share his experience living independently and earning his own money in a sheltered employment. He moved out from his parents house three years ago, but he has been working for the past 8 years. R is a client of Pameijer, an organization specializing in the development of individuals with various disabilities, such as behavioral, intellectual and multiple.

Home visit to R.'s apartment

R.'s studio is located in front of a tram station. The supermarket and a park with a lake are within the walking distance too. Although the building is not proclaimed as an assisted living, it is located close to the Pameijer community building with the staff availabe 24 hours a day. The community center and the nearby Salvation army provide free meals throughout the week and organize social events for people in the area. Most of R.'s circle in the communities are not his close friends and the people that he meets there have various disabilities too.

R. lives on the ground floor, which is a shame because he loves taking elevators. Nonetheless, his building has an elevator that he uses when he meets with a Syrian family on the top floor. The ground floor was originally used as a kindergarten space, but later repurposed for additional living units. In between the individual studios, interior walls lack sufficient noise insulation, which poses issues to R. Several times per week his neighbor makes a lot of noise in the evening. R. is extremely sensitive to noises, which is why this was a big concern to him and his family. After bearing with the noise for some time, R. and his dad reached out to the neighbor to address the issue. Unfortunately, the conversation did not lead anywhere, so the noise complaints continued to happen regularly, nonetheless. The poorly insulated walls prevent R. from playing Dart too. Although he set up the aiming plate on the wall, hitting noise is too annoying to R. which is why he chooses not to play anymore.

The interactions with the other neighbor, Monica, appear often in the buffer corridor shared by the two apartments. Sometimes, it is the banging of the entrance door that triggers the conversation of R. and Monica. Other times, it is the storage room that they share among each other. Also, receiving guests poses much confusion when the guests ring the wrong apartment.

The rental agreement for the studio was arranged via Pameijer organization and it is estimated for a maximum 5-year period. According to Pameijer ideology, this duration is sufficient time to get disabled young adults adapted for independent living. After the 5-year period, the individuals are obliged to leave to a new "normal" place. The parents of R. express their worries regarding the day that R. will need to move to a different place. The location of his current house is convenient, as he can easily reach his parents, sister, community, and friends. They believe it will be challenging for R. to move somewhere much further than here. An ideal scenario according to the parents and R. himself is that he will move to the apartments above in the same building as he is living now.

Pameijer has provided the apartment with some furniture: two medium couches, a bookshelf, an expandable table and three chairs. It appears that R. does not enjoy the furniture to be chosen for him. This is also visible in a different style of the furniture that he bought for himself: a PC station, bed, and the cabinet. When I came inside the studio, the expandable table was pushed against the wall and placed

exactly next to the entrance door. The position appeared absurd to me as an outsider, but as I asked R. and his parents why this specific place was chosen the answer was: "Because it was already there when he moved in!". Since the apartment is rented, R. was not allowed to drill holes in the walls, which made it difficult to install the shelves that he bought for his video games. Instead, he keeps the shelf hidden behind the couch.
The bedroom of R. has a thermostat. The temperature that is most comfortable for him is around 20 degrees. During summer, the bedroom space was overheated so R. could not stay in his apartment and chose to sleep at his parents'. There is no airflow nor natural ventilation in the apartment. The bedroom is pushed to the rear and does not have a window. There is a heater placed in the bedroom right now because the radiator in the space is not working.

The main objects that are used to decorate R.'s space are soft toys of small size, a framed image of Mickey Mouse, figurines of dinosaurs, sculptures, and vases. He loves the images of London and New York.

"I like my life, my work, and my home. I enjoy everything. I can go alone with the metro, I do my ironing, laundry, cleaning up the office and my room," - R., 35 y.o.

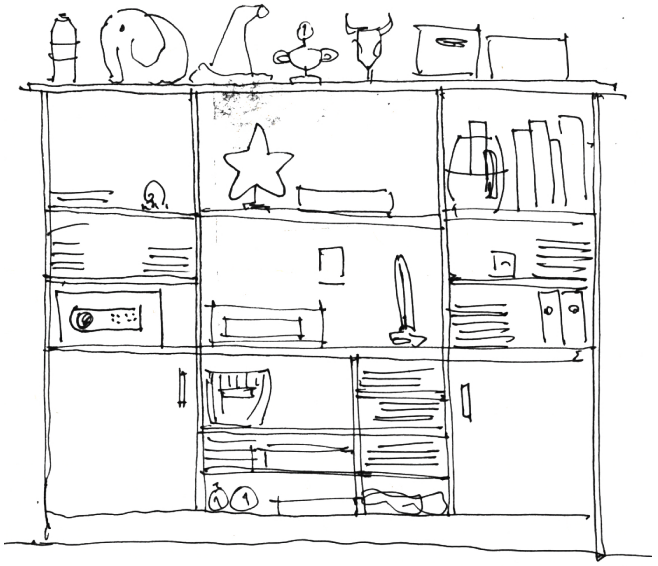


Figure F1 *The bookshelf of R.*
R.'s bookshelf displays the toys, the awards, some documents and a safe.

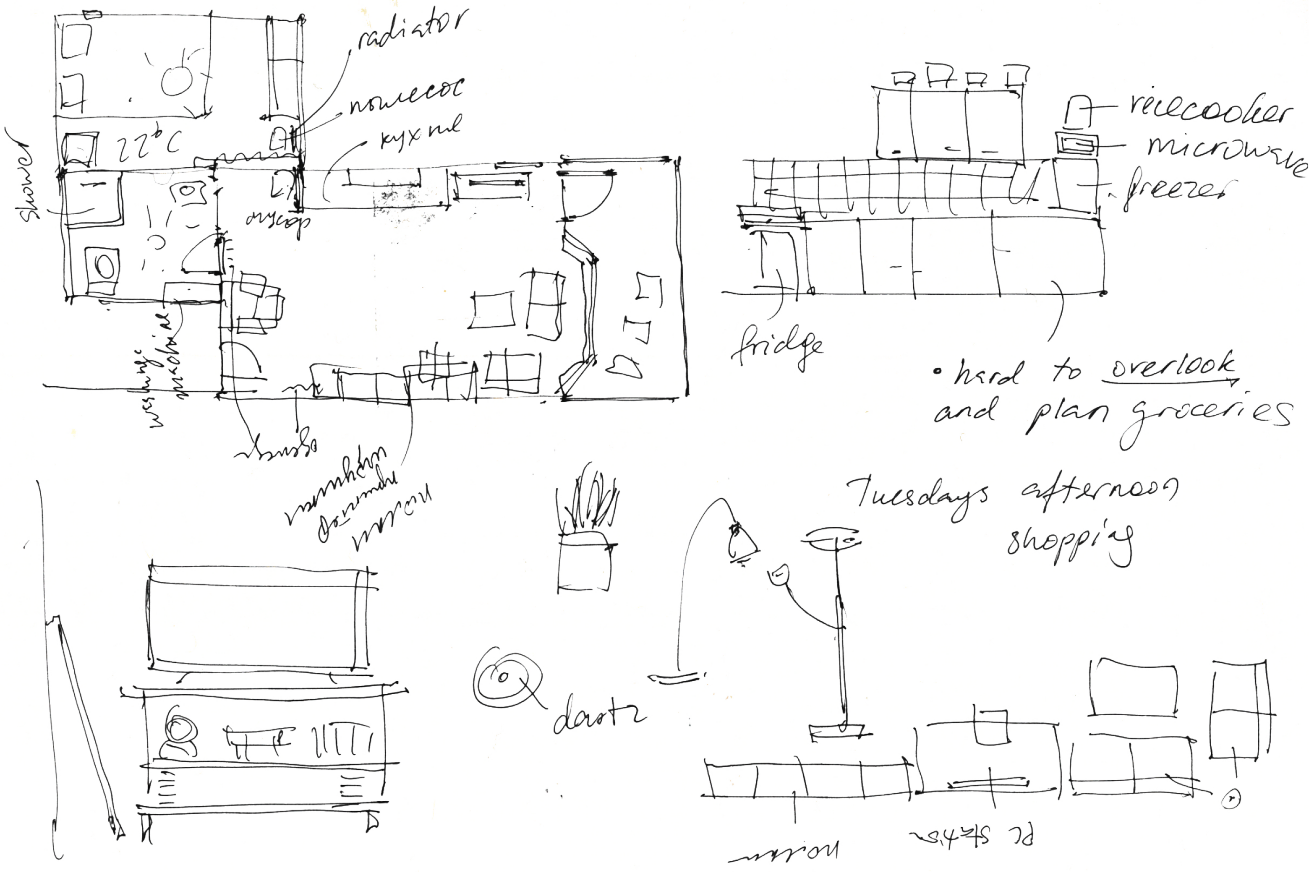


Figure F2 *Sketch of R.'s studio*

Q: Do you like your apartment?

A: I live in the smallest apartment in the Netherlands. It is very very small.

Q: How do you usually spend time after work?

A: I come and I play PC or watch Netflix on my TV

Q: Could you give me a tour around your place?

A: One day I bought the fake camera so that if burglars break in my place they get scared. Also, people from my building want to fix something when I am not home so I don't let them in. When the weather is good, I sit on the terrace. I water my plants every Wednesday and Friday.

Q: How do you spend your money?

A: I do groceries every Tuesday and I receive 60 euro from Pameijer every week. I buy fruits and vegetables. Last time I cooked chicken with rice and vegetables, and I also added curry sauce to it. I keep my money in different piggy banks, so I always have separate money for rent, taxes, and savings. Last time I managed to save some money to get an iPad. I like to take vacations too, especially I enjoy going to Efteling. (The next trip to Efteling is already planned for September 12 (2023) together with my friend). In my rent there is heating already included, so I shouldn't worry about gas prices going up. But when I will move to a different place it might be a problem.

Q: What have you changed in the apartment?

A: My parents have added a rail and a curtain between the bedroom and the living room because Robert values privacy.
Many additional standing lamps were put in the living room and in the bedroom.

Q: What do you wish you could change in this place?

A: I want to put more posters with London metro. I want to have three separate rooms: kitchen, living room and bedroom. I want to live higher so that I could have a good view and I could use the elevator.

Q: Where would you like to live?

A: Red Apple Rotterdam

Q: What do you want to put in your ideal apartment?

A: I want all furniture to be modern and colorful.

Dialogue extract with R.

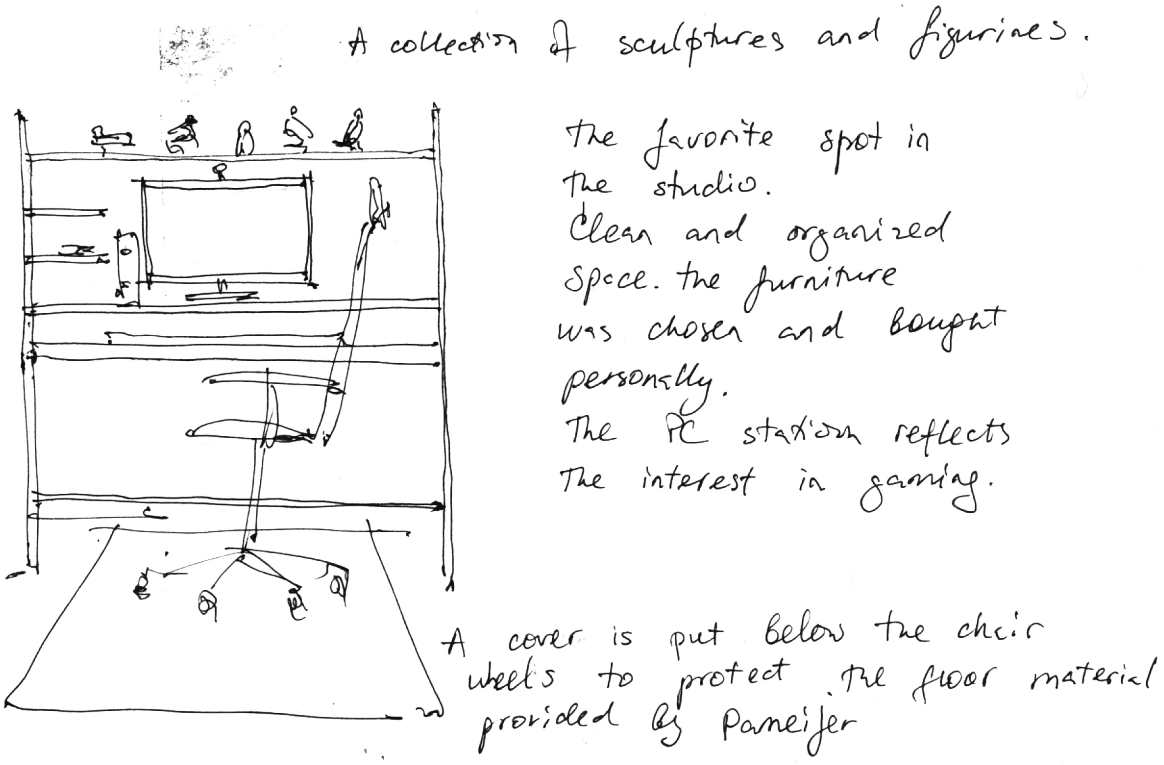


Figure F3 *R.'s favorite spot - the PC desk*

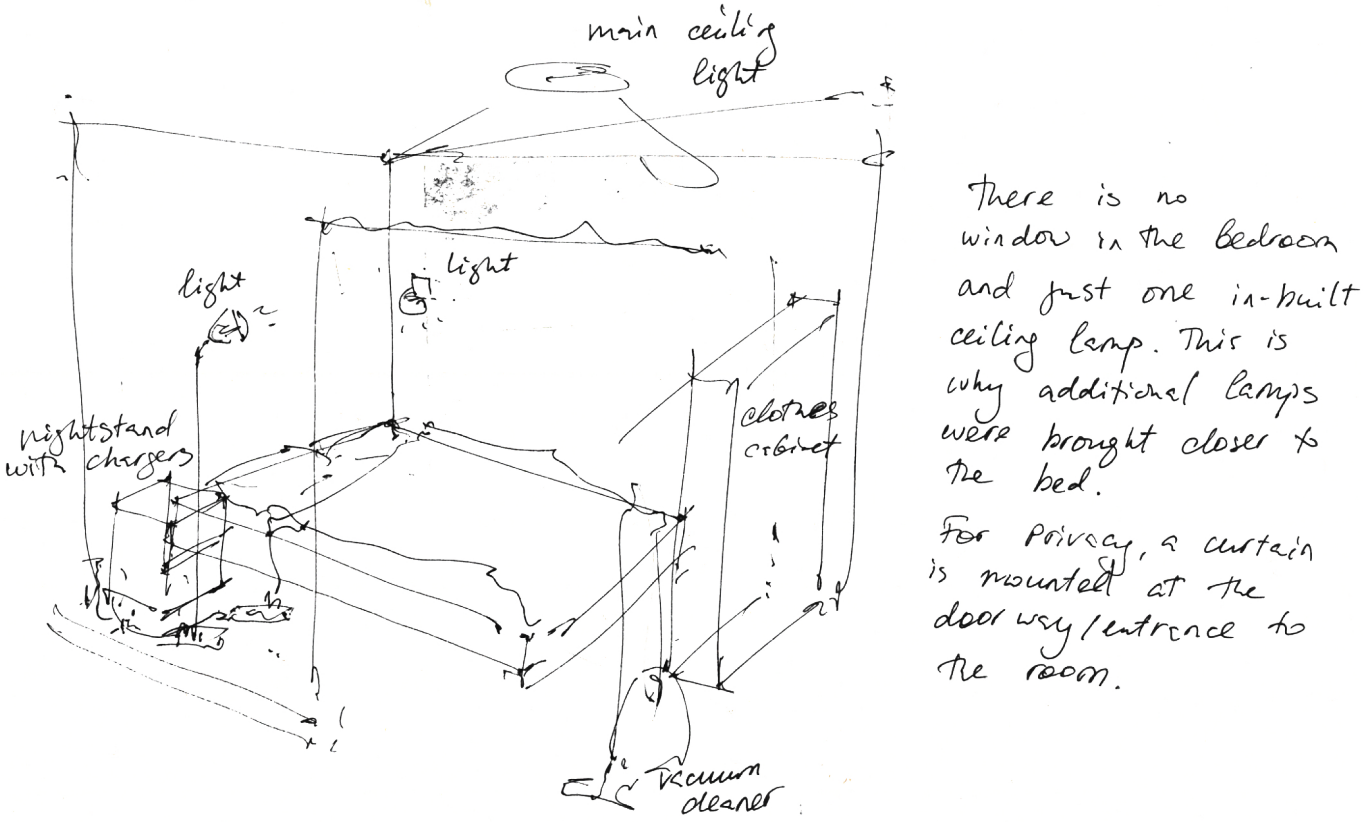


Figure F4 *R.'s bedroom*

"He was the best in class together with one other boy. The school was proud of him and we were also proud of our son," - the father of R.

Interviewing R.'s parents and visiting R.'s family house

For the interview, R.'s parents that will be addressed further as W. and A. have offered to host the interview in the family house - in the living room. While sitting in the room, where R. has spent most of his life, the parents revoked their memories about their child's development, the struggles they've been through as a family, and their aspirations for R.'s independent future.

During R.'s early childhood development, the parents had to bond with their child in a different way. Sports and games that were common to 'normal' children, would not always bring joy to R. Instead, the family noticed that he enjoyed the elevators, so he would often build his own elevator with his sister or dad.

The education of R. was difficult to arrange, because of the little amount of schools that provide special education. When he was three years old, R. was picked up by a taxi provided by the government, and driven to his primary school. During his secondary school, W. and A started teaching their son on using the metro. Firstly, they did a couple of trips all together and leading R. Then the parents were silently observing R. and he was the lead. And lastly, R. was allowed to take the metro all by himself. A similar step-by-step learning process took place in R.'s training to stay alone in the house. His parents would leave for one or two days for the weekend somewhere in the same city, so that in case of stress or emergency R. can always reach W. and A. and ask to come home. When everyone became comfortable with staying apart for two days, the stay of the parents would extend to a week or two, at a destination outside of the Netherlands. According to W. and A., this experience had made R. comfortable to live in his own studio today.

"At some point they (Pameijer organization) told us there is an apartment for R. He cried the night we moved him, I cried too. We moved R. as soon as possible. We didn't want him to be here, and let the apartment be over there and see when he will be ready. No, it's there now so he had to go there now. He would ask if he can go back to us, and we replied that he can always come but not tonight," - said R.'s mother about the day R. moved to his new apartment. The parents had to encourage their son in taking a step to live independently. Although it was hard at first, daily visits to the parents' house made the process of transition easier for R.

When discussing R.'s experience of the studio, W. and A. referred to the noises and sounds being the most important factor for their son. The new place had a new noise - the humming - which irritated Robert at first. Besides that noise, the neighbor was especially noisy at night and the thin walls in-between the apartments didn't offer enough sound-insulating properties.

To make the apartment more comfortable for R., his father A. helps around to replace the light bulbs. More light sources (standing lamps) were placed around the living room and bedroom.

Today, the parents only express their concerns about the future living situation for R. Since the current apartment only allows for a five-year stay, soon R. will need to move elsewhere. The current location became very convenient for the parents and their son, which increases the stress levels for all.

Figure F5-7 *R.'s family house bedroom*

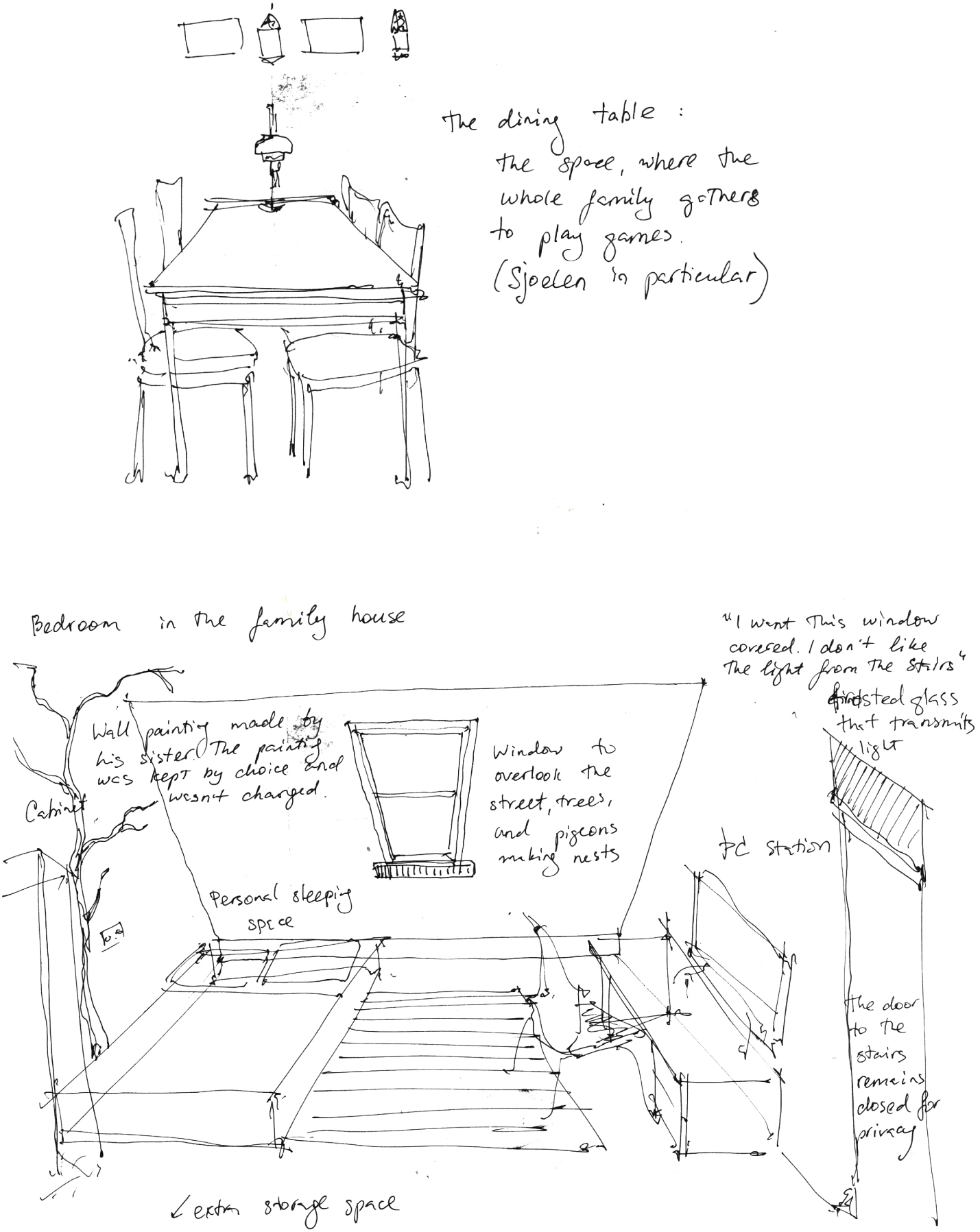


Figure F8 *Sketches from R.'s family house*

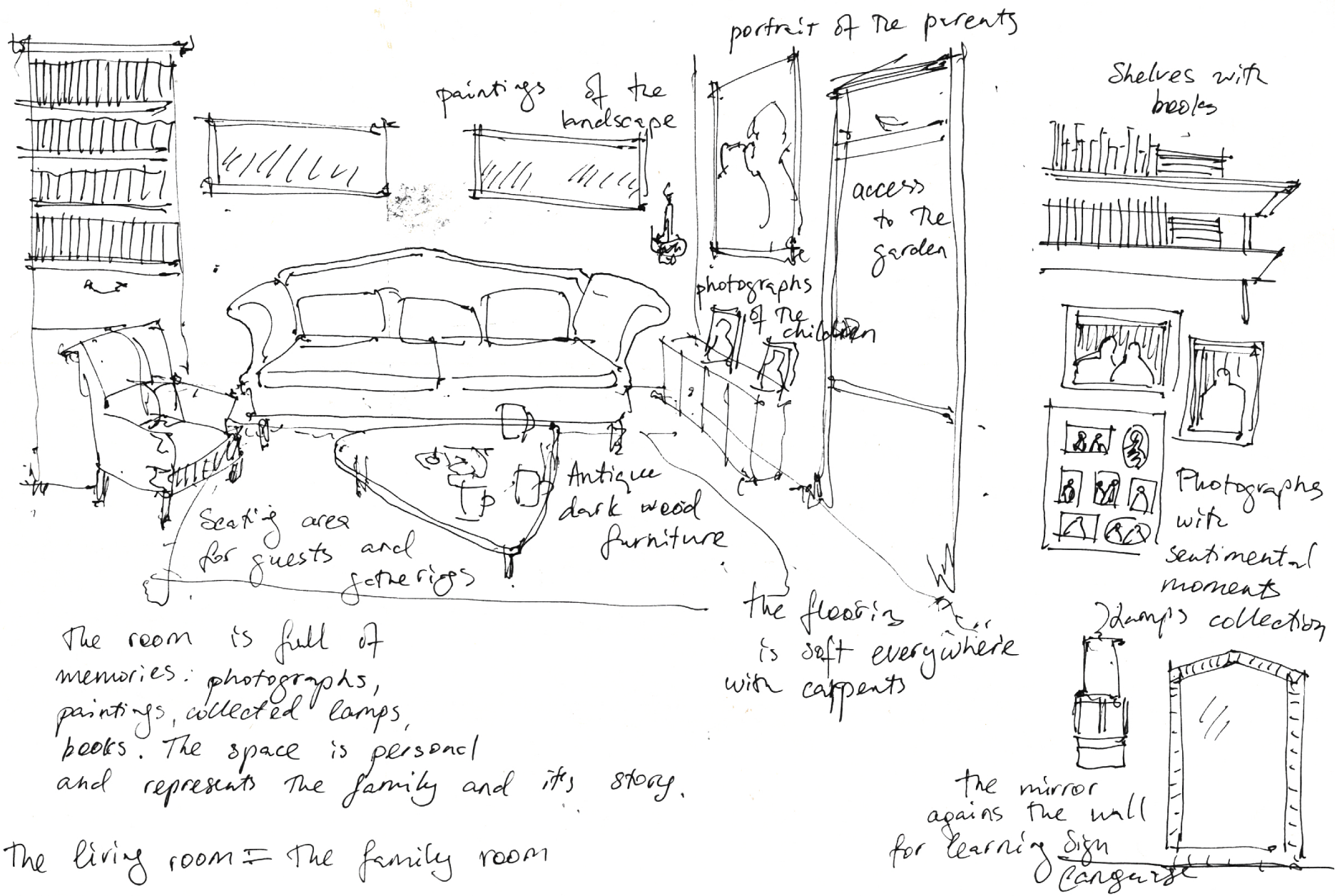


Figure F9 *Sketches from R.'s family house*