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# **Understanding park-based activity: A quantitative case study of Lakkegata activity park in Oslo**

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## **Preface**

This 30-credit master thesis marks the end of two years of studying public health at the Norwegian University of Life Sciences. I chose this topic because I have an interest in studying human life in relation to the environment, which started with my bachelor's degree in human geography. In my master's, I wanted to acquire more knowledge on how the environment can influence the health and well-being of the population. Addressing public health issues through the local environment can affect the life of whole neighborhoods across all age and gender groups and socioeconomic status. Working to improve the well-being of all humans is what I find to be one of the most meaningful activities, both in my professional work and in my private life.

I would like to thank everyone that has given me professional and emotional support throughout this semester. I would like to thank my main supervisor Emma Charlott Andersson Nordbø, for providing excellent feedback and advice during my thesis. I would also like to thank my co-supervisor, Pavel Grabalov, for providing excellent advice based on his experiences from studying public life and for joining me during my last observation in the park. I would also like to thank my boyfriend and my parents for their emotional support. Finally, I would like to thank my lunch club and classmates for the good academic conversations, but most of all, a good time.

## Abstract

**Background:** The Norwegian society is facing public health challenges related to less physical activity, influencing both physical, mental, and social health and well-being in the population. The neighborhood's physical environment may contribute to counteracting these public health challenges by facilitating participation in various activities. Neighborhoods can provide opportunities for physical activity and social connectedness through different facilities, such as parks. There are very few studies looking at park use in Norway. Thus, the objective of this thesis was to explore the use of the physical environment in a neighborhood through the case of Lakkegata activity park in central Oslo.

**Methods:** To investigate the use of this park, I applied a quantitative case study research design and used systematic observations to collect the data. The observations were carried out using the “system for observing play and recreation in communities” (SOPARC), a protocol adapted for the research questions and the context of the study. I divided the park into nine zones to avoid crowding and to compare the zones. The observations were collected from November 2021 to March 2022, which provided 29 hours of observation. The data analysis was carried out quantitatively in the excel spreadsheet before I provided graphs to visualize the numbers. The theory of affordances served as an analytical framework to understand the use of the facilities and the activities in the park. I used a taxonomy to code the activities in the park to be able to use the theory on affordances to discuss the findings.

**Results:** My findings indicate that the park is mainly used by adults and children and less by teens and the elderly, and most of the park users were using it in company with someone else. There was a large difference in the use of the different zones and facilities in the park. Some were a lot used, while others were nearly used at all. The most used facilities were the spinner, swings, sitting group, and skating area, while the less used parts of the park had facilities that were usually fixed and standardized, and areas that were open spaces. The use of the zones and facilities in the park did also vary in use between the age and gender groups. Some activities were particular for the different age, and gender groups. Such as facilities associated with sedentary activities were more used by girls, female teens and male adults than the average use of these facilities in the park, or that children most often used the facilities that were associated with risk play.

**Conclusion:** To improve the use of parks and playgrounds for all groups in society, there should be a greater emphasis on evaluating projects to learn and further develop a good design. My results indicate that there should be fewer fixed and standardized objects in parks, more activities for risk play, and opportunities for retreating for teens. There should also be a greater emphasis on the Norwegian climate when designing parks in Norway. In general, there should be a higher focus on the function of facilities rather than the form-based characteristics. These parks should not only incorporate a variety of facilities but make sure that they provide something for all groups in society.

## Sammendrag

**Bakgrunn:** Det norske samfunnet står overfor en rekke folkehelseutfordringer knyttet til mindre fysisk aktivitet, som påvirker både fysisk, psykisk -og sosial helse og velvære i befolkningen. Nabolagets fysiske miljø kan bidra til å motvirke disse folkehelseutfordringene ved å legge til rette for deltakelse i ulike hverdagsaktiviteter. Nabolaget kan gi muligheter for fysisk aktivitet og sosial tilknytning gjennom ulike fasiliteter, slik som parker. Det er få studier som ser på parkbruk i Norge, og målet med denne oppgaven er derfor å undersøke bruken av det fysiske miljøet i et nabolag, gjennom en case studie av Lakkegata aktivitetspark i Oslo sentrum.

**Metoder:** For å undersøke bruken av denne parken, designet jeg en kvantitativ casestudie, og brukte systematisk observasjon for å samle inn dataene. Observasjonene ble utført ved å bruke en validert protokoll for å observere lek og rekreasjon i samfunn: «*system for observing play and recreation in communities*» (SOPARC). En protokoll jeg tilpasset forskningsspørsmålene og konteksten til studien. Jeg delte parken inn i ni soner for å unngå opphoping av mennesker og for å kunne sammenligne sonene. Observasjonene ble samlet inn fra november 2021 til mars 2022, noe som ga 29 timers observasjon. Dataanalysen ble utført kvantitativt i et excel-regneark før jeg lagde grafer for å visualisere tallene. Jeg brukte *affordance* teorien som et analytisk rammeverk for å forstå bruken av fasilitetene og aktivitetene i parken og diskutere de, og en taksonomi for å kode aktivitetene.

**Resultater:** Funnene mine tyder på at parken hovedsakelig brukes av voksne og barn, og i mindre grad av tenåringer og eldre, og de fleste av parkbrukerne brukte den sammen med noen andre. Det var stor forskjell i bruken av de ulike sonene og fasilitetene i parken. Noen var mye brukt, mens andre nesten ikke ble brukt i det hele tatt. De mest brukte fasilitetene var en spinner, to husker, en sittegruppe og et rulleområde, mens de mindre brukte fasilitetene vanligvis var fastsatte og relativt standardiserte, eller åpne områder. Bruken av sonene og fasilitetene i parken varierte også i bruk mellom alder og kjønn. Noen aktiviteter var særlig karakteristiske for visse aldre og kjønn. Fasiliteter assosiert med stillesittende aktiviteter ble mer brukt av jenter, tenåringsjenter og voksne menn enn gjennomsnittlig bruk i parken. Eller at barn særlig brukte de aktivitetene som var assosiert med risikabel lek.

**Konklusjon:** For å øke bruken av parker og lekeplasser for alle grupper i samfunnet bør det legges større vekt på å evaluere prosjekter for å lære og videreutvikle et godt design. Resultatene mine indikerer at det bør være færre fastsatte og standardiserte objekter i parker, flere aktiviteter for risikabel lek og muligheter for tenåringer å trekke seg tilbake. Det bør også legges større vekt på det norske klimaet når man utformer parker i Norge. Generelt bør det være et større fokus på funksjonen til anleggene fremfor de formbaserte egenskapene. Parker bør ikke bare inneholde en rekke ulike fasiliteter, men også sørge for at de tjener alle grupper i samfunnet.

## Abbreviations

NCD = Non-communicable diseases

WHO = World Health Organization

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# 1.0 Introduction

The health of the population is shaped by the interaction with the local environment, which is recognized as an essential factor for physical activity and mental well-being in the population. This is because the local environment has the possibility to influence our everyday decisions (Abraham, Sommerhalder, & Abel, 2010; Salazar, Crosby, & DiClemente, 2013; Sallis et al., 2006). The local environment contains facilities close to where we live that we visit and use regularly (Baran et al., 2014; Evenson, Williamson, Han, McKenzie, & Cohen, 2019; Floyd et al., 2011). These facilities, such as cafes, libraries, sports fields, and public parks, are places where people participate in various everyday activities. Examples of such activities are meeting a friend, walking the dog, taking the kids out to play, or watching life unfold. The local environment can impact a decision of walking to work instead of taking the car or being in company with others in a park instead of going home and lying on the couch (Frank & Engelke, 2001).

Accordingly, environmental facilities such as parks and playgrounds can serve as important assets for neighborhoods. They provide opportunities for different physical and leisure activities, play, and meeting people (Gao, Fu, Li, & Jia, 2015; Kaushal & Rhodes, 2014). Moreover, facilities, such as parks and playgrounds, are cost-free and publicly accessible, making them particularly important to children and youth's free play (Floyd et al., 2011; Gardsjord, Tveit, & Nordh, 2014). Therefore, parks are increasingly considered a critical resource for promoting good health for all inhabitants of a neighborhood (Derose, Wallace, Han, & Cohen, 2021; Gardsjord et al., 2014; Zhang, Wulff, Duan, & Wagner, 2019).

However, not all parks are being used as intended by planners and designers. Parks can be perceived as uninteresting or unsafe and, therefore, not attract the target groups or end up not being used at all (Banda et al., 2014; Baran et al., 2014; Zhang et al., 2019). Studies on parks have found that the park design influences behavior (Banda et al., 2014; Floyd et al., 2011; Park, Christensen, & Lee, 2020). For instance, Tester and Baker (2009) found an increase in park visitation when changing the park characteristics, such as adding lighting, picnic benches, permanent soccer goals, and restoring walkways. The park use increased among children, the elderly, and female adults but decreased among female teens. Thus, documenting how parks are used and by whom in relation to design and content could aid landscape architects, administrators,

and planners in understanding the different user groups, their activities, and how the activities relate to park facilities. To contribute to the research on park use, this study aims at providing an understanding of the facilities, user groups, and activities of a park in central Oslo.

The thesis is organized as follows. It will first provide a background on the current public health challenges, how these are related to the physical environment, and how it can take part in the solution to some of these challenges. Further, I will present a chapter on the affordances theory to use it as a theoretical framework for analyzing and discussing the findings. In the method chapter, I will first explain the study design, then present the case of Lakkegata activity park, describe the zones and the division of them, and the measurement tool for systematically observing play and recreation in communities (SOPARC) (McKenzie, Cohen, Sehgal, Williamson, & Golinelli, 2006). Further, I will explain the modifications made in the spreadsheet—then describe how the pilots, data collection, analysis, and ethical considerations were completed. Further, I will present my findings on the park use, zone use, and the activities before discussing my findings in relation to similar studies – then discussing the method before concluding the results. An appendix with the observation spreadsheet and descriptive tables will be provided at the end.

## 2.0 Background

### 2.1 Public health challenges and health-promoting factors

There is a worldwide concern on physical inactivity and mental ill-health in the population (Ding et al., 2020; Okely, Kontsevaya, Ng, & Abdeta, 2021; WHO, 2020), and the Norwegian government has expressed its concerns about increased physical inactivity and loneliness in Norway (Helse- og omsorgsdepartementet, 2019). A Norwegian national survey on physical activity shows that many adults and teens do not meet the weekly minimum recommendations of 150 minutes of moderate physical activity or 75 minutes of vigorous physical activity (Okely et al., 2021; Steene-Johannessen et al., 2019). In fact, only 32% of Norwegian adults are estimated to meet the recommendations (Steene-Johannessen et al., 2019).

Physical activity is defined by the world health organization (WHO) as any bodily movement produced by skeletal muscles that require energy expenditure. Vigorous physical activity is defined as an exertion level of 7 or 8 on a scale from 0 to 10 (Okely et al., 2021). It has multiple positive health effects, such as reducing the risk of non-communicable diseases (NCD), cardiovascular disease, type 2 diabetes, cancer, hypertension, and osteoporosis, in addition to improving mental health like reduced symptoms of depression, among other (Okely et al., 2021; Rethorst, Wipfli, & Landers, 2009; Tarp, Ståle, Blond, & Grøntved, 2019; Warburton, Nicol, & Bredin, 2006). A recent study found these improvements to be exponential, which means that more physical activity leads to a greater reduction in the risk of these NCD's (Bernard et al., 2018).

Moreover, promoting social inclusion is important in improving public health. Good social relationships improve mental and physical well-being, and the absence of social relations might cause stress in the individual due to evolutionary mechanisms (Getz, Kirkengen, & Ulvestad, 2011; McEwen, 2012). Stress over time is associated with NCDs, such as cardiovascular diseases. In fact, social relations are considered one of the most critical determinants of lifetime health (McEwen, 2012; Poplawski, Radmilovic, Montana, & Metz, 2020).

Despite the multiple positive health effects of physical activity, it is estimated that the Norwegian adult population is spending 62% of their waking time on sedentary activities (Hansen, 2015). Sedentary activities are considered calm activities that require little energy expenditure, like sitting, reclining, or laying (Okely et al., 2021). Sedentary activities are associated with multiple NCDs. It raises the incidence of cancer and cardiovascular disease among adults and elderlies, which remains the leading cause of disease burden globally. Sedentary activity is also associated with cancer and all-cause mortality. In addition, it leads to poorer pro-social behaviors in children (Okely et al., 2021; Roth et al., 2020). Moreover, there are indicators that the COVID-19 pandemic has had a negative impact on the physical activity level and mental health of the Norwegian population (Bergsaker, 2021; Bonsaksen, Ekeberg, et al., 2021; Bonsaksen, Schoultz, et al., 2021; T. Hansen et al., 2021; Reme, Wörn, & Skirbekk, 2022). A recent study on adult women and men participating in the Norwegian mother, father, and child cohort study showed increased depressive symptoms during the COVID-19 pandemic. There was a particularly high increase in depressive symptoms in those with lower levels of depressive symptoms prior to COVID-19 (Reme et al., 2022).

### *2.1.1 Addressing public health issues in Norway*

In addressing these health issues, the municipalities in Norway have the legal responsibility to promote “health, well-being, good social and environmental conditions and contribute to the prevention of mental and somatic illness, injury or disorder in the population” (Folkehelseloven, 2011). In the 1990s, developing sustainable cities became the dominating discourse in urban planning (Andersen & Skrede, 2017). Sustainability encompasses economic, environmental, and social conditions. Lately, social sustainability has received more attention from the Norwegian government. Social sustainability concerns that all people have a good and fair base for a decent life (Helsedirektoratet, 2018). From an urban perspective, social sustainability aims to provide a right to the city, secure access to public places, and enable the development of human capabilities (Andersen & Skrede, 2017). This is also emphasized in the United Nations Sustainable Development Goal 11, which aims at creating sustainable cities by making them inclusive, safe, resilient, and sustainable (United Nations, 2019).

The importance of creating socially sustainable communities that promote health and well-being in the population is also expressed in the most recent Norwegian public health report (Helse- og omsorgsdepartementet, 2019). Accordingly, the Norwegian government has developed a national action plan aiming to enhance the physical activity levels in the population (Helse- og omsorgsdepartementet, 2020). This action plan has a chapter devoted to the importance of the local environment for health, well-being, and participation in activities. The importance of local environments has been particularly emphasized for children and the elderly that are less mobile and therefore depend on their neighborhoods for everyday physical activity and sociality. The next chapter will explain how the physical environment can promote the population's health (Norge Helse- og, 2020).

## 2.2 The impact of the physical environment on health

The impact of the physical environment on health has been widely investigated, and research shows that the physical environment can promote the health of the population through physical activity and opportunities for sociality (Abraham et al., 2010; Broekhuizen, Scholten, & de Vries, 2014; Carlin et al., 2017). To illustrate, a review by Baran et al. (2014) investigated how urban form and neighborhood characteristics affect the youth and adults' use of public spaces. They found that facilities such as parks, shelters, picnic areas, and the availability of sidewalks were positively associated with park use. At the same time, fear of crime, poverty, and racial heterogeneity of the surrounding neighborhoods was negatively associated with park use. A literature review on children by Davison and Lawson (2006) suggested that publicly provided recreation infrastructure, such as playgrounds, increased the children's participation in physical activity. These studies have investigated how the local environments promote various activities which might impact health.

The physical environment is the sum of the facilities in the environment, such as roads, buildings, and green areas (Helse- og omsorgsdepartementet, 2014). The physical environment close to our home constitutes our local environments, such as neighborhoods. The neighborhood consists of local facilities such as the local shop, bar, grocery store, community center, library, schools, and

park. Moreover, the local environment also consists of a psychosocial dimension, such as cultural activities, perceived safety, meeting places, and aesthetics in the environment, which affect our well-being. It is important to state that what is considered the local environment will vary from individual to individual, as some groups are more mobile (Helse- og omsorgsdepartementet, 2014); for example, teens are usually more mobile than children (Van Hecke et al., 2018).

According to Gehl, Svarre, and Steenhard (2013), the design and population composition determine how we use public spaces and how we go on about our daily activities. These activities are understood as leisure-domain physical activities. WHO defines them as an activity that is not required as an essential activity of daily living and is performed at the discretion of the individual. These activities can be walking, participating in sports, dancing, or gardening (Okely et al., 2021). This means that an activity does not only involve physical activity as a bodily movement (see chapter 2.1) but also behavior, which can be defined as anything an organism does, and the behaviors we can observe and record (Henriques & Michalski, 2019). This encompasses behaviors like drinking, looking at the phone, or praying.

The activities that are shaped by the facilities in the physical environment, such as benches that promote socialization or parks, paths, and workout facilities that promote physical activity, are known as social health determinants and are illustrated in figure 1, developed by Barton and Grant (2006). The model illustrates the different levels of determinants and how the interaction between the different levels affects the population.

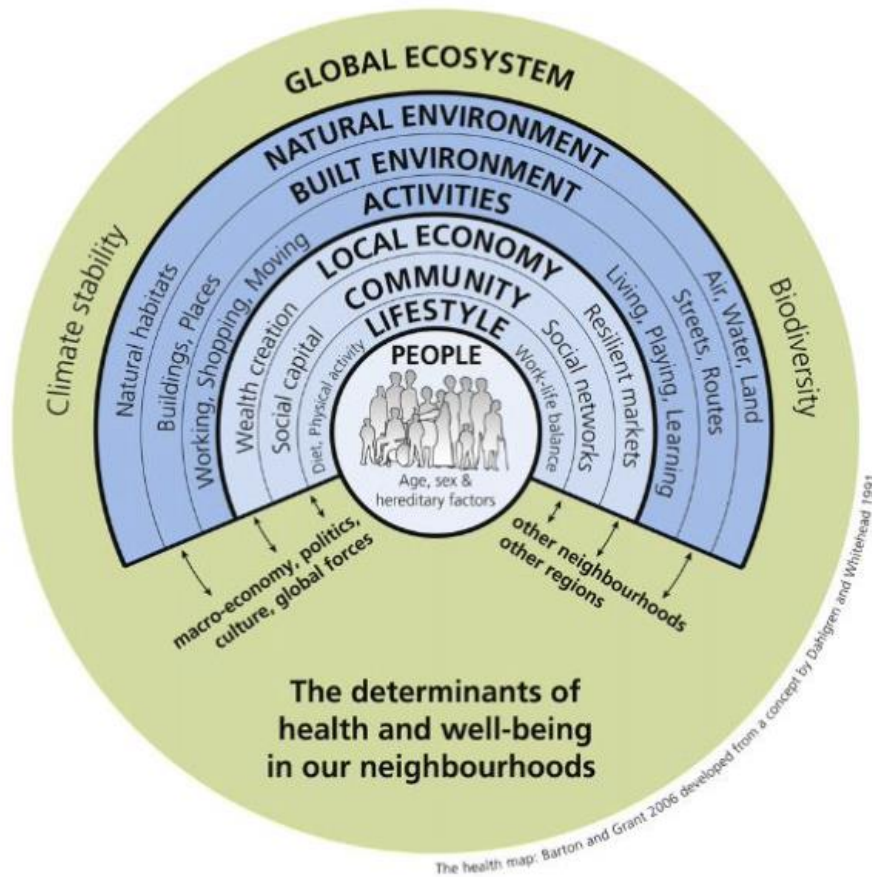


Figure 1. Figure 1 The health map (Barton & Grant, 2006)

### 2.3 Parks as health-promoting facilities in the neighborhood

Parks are open spaces in the physical environment that vary largely in size and shape. Some parks can be a hundred-meter wood, while smaller parks are so small that they give a complete overview of the people and facilities in the park. What most parks have in common is that they are designed to have some restorative and recreational purpose (Derose et al., 2021). Public parks have been promoted to address the physical inactivity level in the population, as they are available to all inhabitants of a neighborhood (Padial-Ruz, Puga-González, Céspedes-Jiménez, & Cabello-Manrique, 2021). Therefore, parks are considered important to low-income neighborhoods, as



everyone can benefit from the health-promoting facilities regardless of socioeconomic status (Vaughan, Colabianchi, Hunter, Beckman, & Dubowitz, 2018).

However, parks differ in how much and for what they are used due to their characteristics, such as whether there are lights in the park or if it is dirty or clean (Gardsjord et al., 2014; Park et al., 2020). The facilities in the park can also influence its use, such as swings or benches can invite a specific type of use (Baran et al., 2014). For instance, Park et al. (2020) investigated all park users of 30 neighborhood parks in the United States. They found that the use was positively associated with facilities such as playgrounds, ponds, quality maintenance, and large areas in the parks. Another study by Tester and Baker (2009) found an increase in park visitation when changing the park facilities, such as replacing field capacity with artificial turf, adding lighting and picnic benches, permanent soccer goals, and restoring walkways. They found a general increase in park use by children, the elderly, and female adults but decreased use by female teens. Thus, changing the facilities or characteristics of parks could change their use. However, findings from a study on interventions in parks by Tester and Baker (2009) illustrate how it can be challenging to design for all groups in society. However, this should be a concern, as parks are of particular importance to individuals with a lower social-economic status, being more dependent on public facilities and self-organized training (Rafoss, Tangen, Breivik, & Thorén, 2010).

### *2.3.1 Playgrounds*

Playgrounds are facilities often found in parks or could provide parks in themselves. They vary largely in size and the type of facilities they contain, but they should encourage play and other restorative activities aimed at children. Studies have associated playgrounds with higher park use and change in the behavior of the park users (Baran et al., 2014; Cohen et al., 2007; Nordbø, Raanaas, Nordh, & Aamodt, 2020). For example, one study found that playgrounds were the facilities in parks that attracted the most diverse user groups, such as different age and gender groups (Baran et al., 2014). A systematic review on park use found that well-designed playgrounds could increase the physical activity level of children (Padiar-Ruz et al., 2021), and a review on public open spaces found playgrounds to be one of the facilities that increase both visitation and the physical activity level in adolescents (Van Hecke et al., 2018)

## 2.4 How parks are being put into use

Although parks and playgrounds provide important facilities in the local environment, they can be challenging to design for all target groups. Parks are designed differently and are used differently by different groups, such as age and gender groups. Studies on park use often find that males are using parks more than females in all age groups and are observed being more physically active when using the parks (Baran et al., 2014; Cohen et al., 2007; Evenson et al., 2019; Gardsjord et al., 2014). In addition, teens and the elderly are often infrequently observed using the parks compared to other age groups (Evenson, Jones, Holliday, Cohen, & McKenzie, 2016; Evenson et al., 2019; Pleson et al., 2014; Salvo et al., 2017; Van Hecke et al., 2018).

### *2.4.1 Teen's park use*

There are a few efforts to investigate teens' use of parks (Marquet et al., 2019; Mertens, Van Cauwenberg, Veitch, Deforche, & Van Dyck, 2019; Ries et al., 2009). One study has found a particularly low number of female adolescents in the park and that the overall decline in park use among adolescent females was steeper than for males (Marquet et al., 2019). A longitudinal study on general park use indicated that the parks were an underused physical activity resource for adolescent girls (Evenson, Cho, Rodríguez, & Cohen, 2018). To increase the general park use by teens, studies have identified important facilities for teens' use, such as shelters, sitting groups, and picnic areas (Baran et al., 2014; Zhang et al., 2019). These findings are in line with what teens themselves have reported. Nissen et al. (2020) interviewed youths on their experience of public urban spaces, in which the youth responded that they wanted tables and benches to hang out on because these places were experienced as not prohibiting them from being loud and were, therefore, a place where they could hang out for longer. The youth also reported that they found green spaces important for a sense of freedom, as a place where they could do anything (Nissen et al., 2020). In line with these findings, a review on youths' physical activity by Gardsjord et al. (2014) found that access to green space was the most frequently reported predictor for park use and physical activity among youth. In addition, a review found that adolescents also reported that

sports- and adventurous playgrounds would encourage park visitation and physical activity (Van Hecke et al., 2018).

#### *2.4.2 Elderlies park use*

Other efforts have been made to study elderly people's use of parks (Duan, Wagner, Zhang, Wulff, & Brehm, 2018; Hung & Crompton, 2006; Parra, Gomez, Fleischer, & David Pinzon, 2010; Perry et al., 2021). One study interviewed the elderly regarding their environmental preferences and found that the elderly would like to use the various types of equipment in the park, like swings and slides, but they were afraid of what other people might think. They also found that the elderly felt like the place was not designed for them (Perry et al., 2021), while another study found that weather conditions affected the elderly's wish to go outdoors because of darkness and bad weather and reported being less active in the winter months (Boulton, Horne, & Todd, 2018). Despite these efforts, the literature on teens and the elderly does remain scarce.

#### *2.4.3 Adults' park use*

The studies that include adults' park use have found that parks are important for adults' physical activity. However, there is a difference between the genders, as female adults are generally less physically active than male adults (Evenson et al., 2019). Veitch, Biggs, Deforche, and Timperio (2022) interviewed adults walking through a park in Melbourne, Australia, about their preferences in park use. The adults reported that the facilities that would encourage their physical activity were trails with slopes and curves that were more exciting to walk on. Playgrounds and basket courts were also reported to increase physical activity, while the adults also reported that they would have liked more fitness equipment in the park. When adults were asked what would encourage them to be more social, they responded that facilities such as barbeques, coffee shops close by, and a great variety of facilities that would attract people would encourage them to be more social. In addition, Baran et al. (2014) found park facilities such as trails, benches, and picnic areas to be the most used park facilities among adults.

#### *2.4.4 Children's park use*

Studies on children have found that certain facilities in parks are particularly important for their physical activity level and well-being. A study by Nordbø, Raanaas, et al. (2020) investigated the environment's effect on eight-year-old children and found that the children living in the places with the highest number of facilities, such as playgrounds and sports fields in densely populated areas, were more likely to participate in organized and social activities. Having playgrounds in the neighborhood had the strongest correlation with leisure activities, which was linked to socialization with friends. Incorporating natural and play-focused elements into outdoor spaces, such as playgrounds, could enhance physical activity and social connectedness among children (Wray et al., 2020).

In addition, several studies have investigated children's activities in parks and playgrounds in relation to risk play (Kleppe, 2018; Obee, Sandseter, Gerlach, & Harper, 2020; Obee, Sandseter, & Harper, 2021; Sandseter, 2010). Risk play can be defined as a thrilling and exciting form of physical play that involves uncertainty and risk of physical injury (Sandseter, 2010). Kleppe (2018) has identified six categories of risky play: (1) Play with great heights (danger of injury from falling), (2) play with high speed (the uncontrolled speed that can lead to collision), (3) play with dangerous tools (that can lead to injuries), (4) play near dangerous elements (such as fire, water, or heights), (5) rough-and-tumble play (where children can harm each other), and (6) play where the children can get lost. Additionally, Obee et al. (2020) also identified loose objects as an asset for risk play. A review by Brussoni et al. (2015) found multiple positive effects on children's health when involved in risk play, such as increased physical activity, social interaction, and creativity. In addition, risk play has been considered important for physical development in children. Therefore, it is suggested that parks should be shaped and provide facilities that involve some risk (Padiar-Ruz et al., 2021). These risk-taking activities can typically be found in the natural environment, providing the facilities related to risk play (Brussoni et al., 2015). The natural environment offers multiple loose objects, which are associated with increased physical activity (Obee et al., 2020). Therefore, Othman and Said (2012) argues that children should be encouraged to play outdoors in unstructured nature play and not to be discouraged by the safety issues.

## 2.5 Knowledge gaps

There is limited research on parks that investigates general activity among different age groups (Broekhuizen et al., 2014; Van Hecke et al., 2018). Moreover, previous research suggests that future studies should investigate how smaller parks are used (Evenson et al., 2019). There is also a need to investigate park characteristics and which characteristics are beneficial for park use and physical activity (Mertens et al., 2019). Particularly, there is insufficient knowledge from the Norwegian context, and more research considering the physical environment in Norway is needed to better understand its health-promoting potential (Nordbø, Nordh, Raanaas, & Aamodt, 2020). Therefore, I will investigate how the physical environment and its facilities are being used through a case study of a small park in Oslo to better understand how the environment can be designed to promote use and activities.

## 2.6 Aim and research question

The overall aim of this master thesis is to examine the use of a park in central Oslo to provide an understanding of the facilities, user groups, and activities in the park. The following research questions will contribute to addressing the overall aim:

1. What characterizes the park users?
2. How are the park facilities used?
3. What activities take place in the park?

## 3.0 Analytical and theoretical approach

I will be using the environmental, psychological theory of affordances as an analytical tool to understand park use. This chapter will define affordances, the different levels of affordances, and how the theory has developed to encompass the social and cultural dimensions. Moreover, I will provide some examples of how the theory has been applied in previous research to study human behavior and how it can be used to study public parks.

### 3.1 Studies on affordances

Most studies to my knowledge on affordances have examined children's use and perception of the physical environment and have found it to be of high importance to child development (Bjørngen, 2016; Ergler, Freeman, & Guiney, 2021; Kleppe, 2018; Kyttä, 2004; Larrea, Muela, Miranda, & Barandiaran, 2019; Obee et al., 2020; Othman & Said, 2012; Rutkauskaite et al., 2021). For example, Larrea et al. (2019) found that low availability of affordances in preschool outdoor environments had a negative impact on children's social play. Moreover, Kyttä (2004) found affordances in the immediate surroundings to be important to children's outdoor play.

Although most studies on affordances relate to children, there are a few efforts to investigate teens, young, and older adults' affordances. These studies had been looking at trainability in older adults, transport and green area use among adolescents, and schoolyard affordances for 7 to 18 year old's (Finkel, Engler, & Randerath, 2019; Nissen et al., 2020; Rutkauskaite et al., 2021). Rutkauskaite et al. (2021) documented physical activity in schoolyards by using geographical mapping and group interviews. Interviewing has also been used in several other studies to collect data on affordances (Ergler et al., 2021; Kyttä, 2002, 2004; Nissen et al., 2020; Othman & Said, 2012). Additionally, observation has also been frequently used in studies on affordances. Studies have used observation to examine young children's affordances in relation to risk play (Obee et al., 2020; Obee et al., 2021), and affordances for physical activity in young children (Bjørngen, 2016). Larrea et al. (2019) investigated preschool children's affordances in Spain through observation, using a play observation scale to measure social participation and cognitive quality. Thus, studies on affordances are mostly used on children, all though there are efforts to investigate affordances among teens and adults. Many different methods are appropriate for studying the

affordances in the local environments and neighborhoods. This study has used systematic observations to conduct the data on all age categories, which will be further described in the method chapter.

### 3.2 Affordances

The theory of affordances is one of the core theories in ecological psychology. It concerns the relationship between humans and the environment and the interaction with the facilities in our environments. Affordances were first described by the psychologist James J. Gibson (1979), who, during his career, sought to challenge the perception of the world as solely subjective. He provided an understanding of human behavior in relation to the physical environment and that we require knowledge about the world by interacting with the environment (Costall, 1995). This presupposes an understanding that action will necessarily constitute a reaction and that the world consists of causal mechanisms. Thus, one can explain human behavior as triggered by mechanisms in the environment (Heft, 1989).

Affordances are both the actions of an individual encouraged by the objects of the environment and the potential actions in the environment (Heft, 2010). The difference between actions and potential actions will be described in chapter 2.3. To illustrate how our actions can be shaped by physical objects in the environment, a bench can be used to run on, fall off, bump into, climb on, sit on, lay on, and so on (Greeno, 1994). Thus, the bench affords all of these activities, as one object holds multiple affordances that could enable various actions by an individual (Heft 1989). Needless to say, affordances stand in relation to humans, as an interaction with objects could not exist without the object nor the individual (Gibson, 1979).

Nevertheless, it is important to state that an object can afford different actions for different individuals. For example, affordances depend on an individual's capability, as the affordances follow an individual's development over a life course. Thus, the objects of the environment could both limit and enable action (Heft, 1989). Some examples could illustrate this. First, an affordance could be determined by body scale. For a toddler, a bench might afford to hold on to or lean on to

provide support, whereas the same bench might afford sitting for an adult. Second, affordances are also determined by an individual's physical limitations. An old lady might not consider that a tree affords climbing, but it might afford her to lean on. This example illustrates what an object affords an old lady determined by her capability related to strength, flexibility, and health condition. However, the older woman might know that climbing in a tree is a potential affordance, but due to the abovementioned factors, she is not able to utilize it. Thus, understanding how the environment is causing behavior cannot be solely understood by the individual's physical capabilities (Heft, 1988).

### 3.3 Levels of affordances

There are different levels of affordances, which are illustrated in figure 2. First, the physical environment holds what is called "potential affordances". These affordances are latent in the environment and does always holds potential for action. However, a potential affordance does not mean it will be utilized. The second level illustrates that affordances need to be perceived by an individual, calling them "perceived affordances". The third level includes the social and cultural context that might shape the perceptions of the affordances, calling them "shaped affordances" (Kyttä, 2002). To provide further explanation of this level, Costall (1995) argues that we experience an object in relation to the social environment we live in. This is because we are usually introduced to things in a social context rather than simply stumble upon an object without prejudice. However, we usually learn how to use objects by observing other people interacting with them rather than being explicitly taught how to use them. Thus, shaped affordances presuppose that an object would usually afford some preferred activity intended by social and cultural norms, also known as "promoted action". However, affordances could also be constrained by the social environment, called "constrained action". To illustrate, a child might see the affordance of climbing a tree, and the parents could either promote the action or constrain it by telling the child not to climb and therefore, not utilize the affordance (Kyttä, 2002). If not constrained, the affordance can finally be utilized. Thus, the utilized affordances are the actions we perform, and the activities we can observe in the environment.



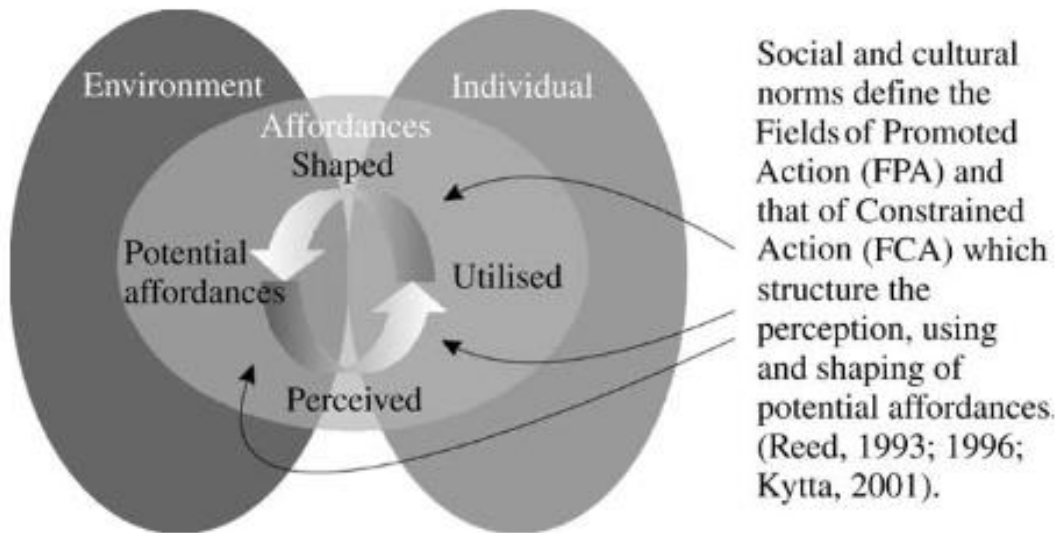


Figure 2. The different levels of affordances. (Kyttä, 2002)

In short, an individual constantly perceives the environment and evaluates the potential affordances, which might be utilized based on body scaling, action capabilities, and cultural context. Thus, an affordance does not necessarily need to be utilized. If a perceived affordance is followed by an action, it has been utilized (Kyttä, 2002).

### 3.4 Hefts functional taxonomy of children's outdoor environments

For analyzing affordances, Heft (1988) created a taxonomy to code children's affordances in outdoor environments. When coding the activities, he focuses on the function rather than the form of objects. This offers a way of thinking about the environment to understand the individuals' activities and behaviors. The taxonomy provides a column with several categories that describe the different environmental qualities. For example, the category of a flat, relatively smooth surfaces, and the category of fixed objects. The second column provides a description of what the different environmental qualities afford. For example, the form of a flat, relatively smooth surface affords walking, running, cycling, and skateboarding. Or a fixed object affords sitting on, jumping over, and down from. Thus, the taxonomy projects what the environment can afford. This

taxonomy is among others used by Kyttä (2002) to examine children's affordances in different environments, in which she has added the dimension of social affordances. Other studies have adjusted Heft's taxonomy to what risk activities the environment affords children (Obee et al., 2020; Obee et al., 2021). I will be using Heft's (1988) taxonomy to code my data and identify which affordances the environmental facilities utilize.

### 3.5 Relevance of the theory for studying park use

Finally, are affordances appropriate to explain human behavior? Heft (1989) argues that it might be misleading to suppose that the environment alone causes all behavior. He concluded that it might be difficult to hold the environment responsible for any influence at a specific point in time but that the environment does have some invasive impact on our behavior.

Looking at how an object in a park is used tells us something about what the park provides for its users. Affordances tell us something about how a park is perceived through its use by people. Actions are an essential part of perceiving, that is, being able to turn, touch or throw an object (Heft, 2010). Thus, affordance could help us understand why a park might work well for teens who skate, or why one swing is more used than another slightly differently shaped swing. It could also provide information on how to make a place or a facility provide an older woman with the correct objects for sitting and resting (Heft 2010).

In addition, affordances provide an alternative to the form-based descriptive language by describing the environment by how it functions. Therefore, the focus is not solely on the form of an object but rather the type of action an object affords. This provides a way of understanding individuals' behavior in relation to the environment (Heft, 1988). Thus, the theory is appropriate to study the use of the physical environment (Gaver, 1996). I will be using the affordance theory as an analytical tool to describe park use.

## 4.0 Methods

In this chapter, I will explain the study design, present the case on Lakkegata activity park, explain how I divided the park into zones, and describe each zone. Then, I will present the observation tool (SOPARC) that I used to collect the data and how I modified the observation spreadsheet to suit my study. Two pilots were provided prior to the study, and I will explain the changes made in the study succeeding the pilots. Further, I will describe the data I collected during the observations, how I analyzed the data, and at last, explain the ethical considerations.

### 4.1 Study design

This study is designed as a quantitative, observational case study. A case study is focusing on a single phenomenon with an in depth focus, and in its real life context (Yin, 2018). I selected a case study to acquire and in-depth understanding of how a park is used. According to Yin (2018), case studies can be used to describe phenomena in real life settings, and are considered well suited for collecting data on the physical environment. Therefore, I used observation to collect data on the park use (Sussman, 2016). The details from the observations are described later in chapter 3.8.

### 4.2 The case: Lakkegata activity park

Lakkegata activity park is located in Grünerløkka borough in Oslo, the capital city of Norway (see figure 3 and 4). The park was designed by Asplan Viak and was finished in 2019. The park has a total size of 2800 m<sup>2</sup> (Asplan Viak, n.d.). Since the park opened in 2019, it has been nominated for Oslo architecture price in 2020 (Plan- og bygningsetaten, 2020), and is currently nominated for EU Mies Awards in 2022 (Asplan Viak, 2021, n.d.). The park is located right beside Lakkegata primary school and Slurpen community house, which is also used as an assembly hall (Oslo kommune, n.d-b). There is housing on the other sides of the park, and across the road lies the botanical garden, as shown on the map in figure 3.

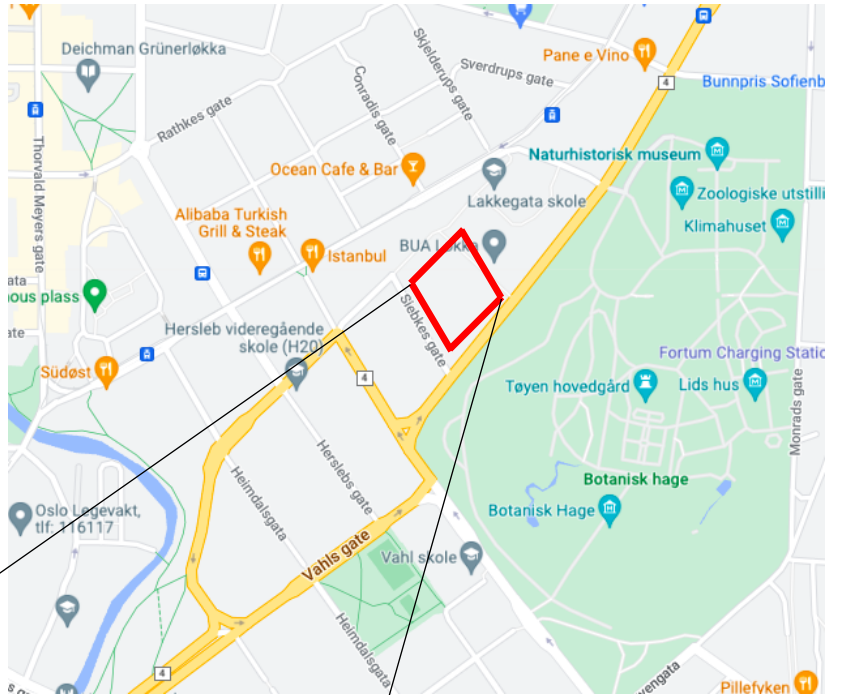


Figure 3. Map of Lakkegata activity park and surroundings

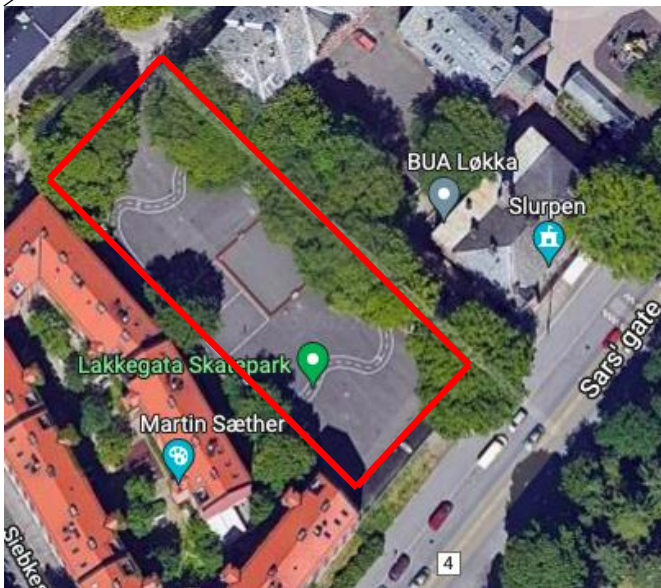


Figure 4. Zoomed in map of Lakkegata activity park

The majority of the inhabitants in Grünerløkka borough are between 20 and 30 years old, a relatively young population compared to other boroughs in Oslo. There is also a relatively high share of immigrants (Oslo kommune, n.d-a). The borough has multiple social challenges. It has a relatively high share of persons with persistent low income. The inhabitants also have a lower physical activity level and lower perceived safety than other city boroughs in Oslo (Folkehelseinstituttet, 2021; Oslo kommune, n.d-a).

The location of Lakkegata activity park was previously a very simple playground with an asphalt surface, and a couple of basketball nets. In addition, a lot of crime and illegalities were observed in this place, and the area felt unsafe to the pupils (Tverga, 2020). The creation of Lakkegata activity park was initiated by the parents at Lakkegata primary school. They observed a need to expand the schoolyard, as the schoolyard at Lakkegata school is one of Oslo's smallest schoolyards and needed more space with the growing number of pupils (Tverga, 2020). The parents collected money from various funds and grants and was designed Asplan Viak (Asplan Viak, n.d.). Asplan Viak intended the park to be a play and recreational place for kids and youth, providing different activities. In addition to being a local quality accessible for the school, the park is intended to serve the residents by providing an accessible public space. The idea was that attracting more people would make the area safer. Therefore, they designed the park to provide multiple places to gather, among others, a seating area with a roof (Asplan Viak, n.d.; Tverga, 2020). According to Asplan Viak (n.d.), a special facility in this park is the skating area made of soft concrete slopes devoted to beginner and advanced skaters and other rolling activities (Asplan Viak, n.d.; Tverga, 2020).

One of the main aims of the designers of this park was to make it appealing to girls (Asplan Viak, n.d.). They did this by creating a wide range of facilities that were not competition-based, such as soccer or basket fields, but rather creating facilities for unorganized activities. They also created multiple places to be in company with others and get an overview of what is going on in the park. Thus, the park should be a place for both vigorous and sedentary activities.

### 4.3 Systematic observations as a method using SOPARC

To collect the data on the park use of Lakkegata activity park, I used the system for observing play and recreation in communities (SOPARC) (McKenzie et al., 2006). This system was developed to collect direct information on the user groups, the type of use, and the characteristics of places (McKenzie et al., 2006).

The SOPARC protocol is a method with evidence for validity and reliability in collecting information on the environment through observations (Cohen et al., 2011; McKenzie & Cohen, 2006). The protocol recommends 12 to 16 hours of observation for a valid result, preferably observing through all times of the day and all seasons to increase the validity (Cohen et al., 2011).

The protocol suggests identifying one or multiple target areas prior to the data collection and collecting at specific time periods on random days (McKenzie & Cohen, 2006). During observation, the park should be observed using a sampling technique on systematic and periodic scans of each target area, collecting data on the categories “age”, “gender”, “ethnicity”, “activity type” and “physical activity level”. In addition to collecting information on the time of the day the observations are conducted, darkness, the general conditions of the park, “accessibility”, “organized activities”, and if it is “usable”. The activity categories should be coded in predetermined categories, such as “laying down”, “sitting”, “throwing”, “walking”, and “jumping” (McKenzie & Cohen, 2006).

SOPARC is a commonly used tool when studying parks because it collects data on different user groups and park characteristics (Baran et al., 2014; Cohen, Marsh, Williamson, Golinelli, & McKenzie, 2012; Evenson et al., 2016; Salvo et al., 2017). In addition, it safeguards the validity and reliability of the information, and was considered an appropriate tool for investigating the use of Lakkegata activity park.

#### 4.4 Preparing for observation – dividing the park into zones

Prior to the study, I divided the park into nine zones (see figure 5). This was to avoid too much crowding while observing and to compare the zone use in terms of number of persons using the park and the utilized affordances in the zones. I used a map of the park made by Asplan Viak to divide the park into zones (see figure 5) (Tverga, 2020). Dividing the park into zones makes it easier to observe when it is too crowded in the park. Zones are also recommended to obtain valid data because it provides snapshots of an environment. The snapshot provides a picture of a place at one moment in time, and multiple of these would increase the validity of the SOPARC measure (McKenzie et al., 2006). The excel spreadsheet had a separate spreadsheet for each zone (see figures 27, 28, 29, ad 30 in the appendix). This was to separate the data of the zones from each other (see more details in chapter 4.5).

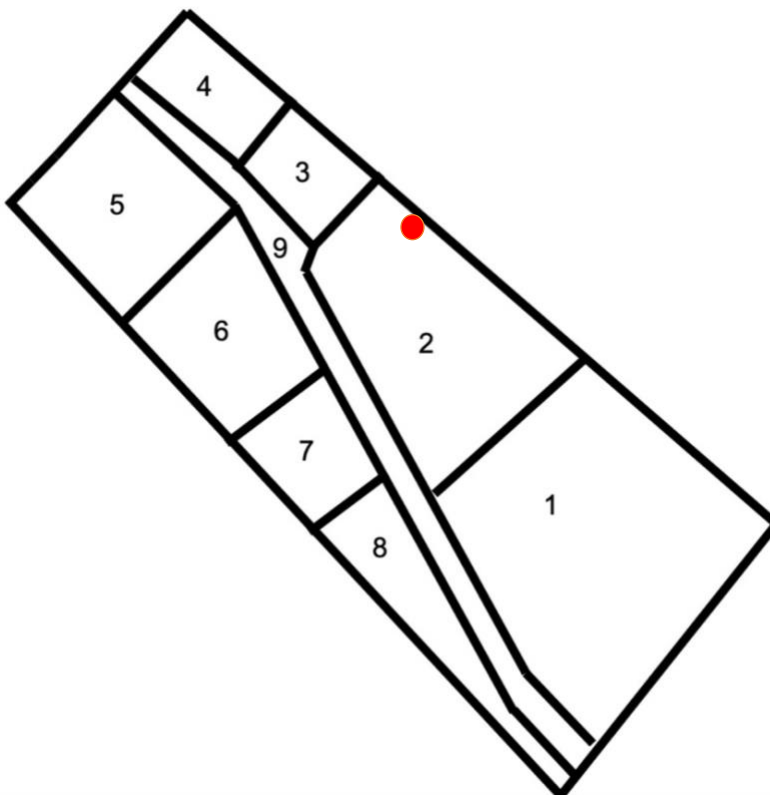


Figure 5. Map of the zones in Lakkegata activity park and observation spot by (Gina Gjermundsen, 2022)



Figure 6. Map of Lakkegata activity park made by Asplan Viak (Tverga, 2020)

#### 4.4.1 Description of the zones

Figures 5 – 13 project each zone and its facilities. Zone 1 has a skating area made of concrete, with low edges, soft curves, and slopes, which is supposed to provide a good skating park for both beginners and advanced skaters (see Figure 7) (Asplan Viak, n.d.). A flat lawn surrounds the skating park, and three lampposts are placed in this zone. Zone 2 lies beside zone 1 and consists of concrete steps, which continue the concrete skating area, with some spots of wooden surfaces (see Figure 8). In the middle of the stairs is a concrete floor. Behind the concrete floor, there is a relatively large surface with a lawn, which slopes slightly to the left. There are two small boulders on the lawn, and in the back, there are two lampposts and trees surrounding the park.





Figure 7. Picture of zone 1



Figure 8. Picture of zone 2

Zone 3 consists of a large glass roof that lets the light through (see figure 9). Six white painted metal cylinders hold up the glass roof. The zone has a concrete floor and two fixed tables under the roof, with two fixed sitting groups. In the back, there is a concrete block with a wooden cover. On the right side of the tables, there is a fixed grill, a small drinking fountain, and one lamppost on the right side of the tables. Beside zone 3 lies zone 4 (see figure 10). This zone has a rubbered surface. There are two trampolines built into two square holes in the ground on the right and a steel-based facility with a round, flat head that spins around its own axes. This is the zone that lies closest to the other part of the schoolyard and entrance to the school.



Figure 9. Picture of zone 3



Figure 10. Picture of zone 4

On the opposite side of zone 4 lies zone 5 (see Figure 11). This zone consists of only a concrete floor, with a human proportioned ludo game painted on the ground. There are two lampposts diagonally placed on each side, bicycle racks, and a shed made of bricks on the right side. Beside zone 5 lies zone 6 (see Figure 12), which also has a rubbered surface, two swings, a slackline, and one lamppost on the right side. The swings are round with a rubber net in the middle. There are three stone blocks on the left side and six planted trees with a gravel surface.



Figure 11. Picture of zone 5



Figure 12. Picture of zone 6

Zone 7 lies beside zone 6 and is followed by zone 8. Zone 7 has a rubbered surface and a large concrete block in front with a wooden surface on its left side (see Figure 13). There are two objects in this area, and both are bars in white painted steel. The facility on the right side has vertical bars with ropes attached from the top of the poles to the ground, and in between the ropes, there are rubber seats that are loosely attached to the ropes. On the left side, the zone has vertical bars and horizontal bars placed on two levels with a rope net in the middle. In zone 8, the surface consists of sand, and there is one lamppost and three separate concrete walls of slightly different heights (see figure 14). Two of the concrete walls have large holes in them, and all walls have a flat surface on the top. All the walls have a lot of climbing holds on both sides. Both the metal bars and the concrete walls were meant to sit on to give the children an overview of the park (Asplan Viak, n.d.)





Figure 13. Picture of zone 7



Figure 14. Picture of zone 8

The last zone is zone 9, or the transit zone (see Figure 15). This is a concrete road that curves through the whole park and is supposed to shape the park (Asplan Viak, n.d.).



Figure 15. Picture of zone 9 (transit)

## 4.5 Observation spreadsheet

I used the SOPARC observation protocol to collect the data (McKenzie & Cohen, 2006).

However, I made my own spreadsheet in Excel to adjust the protocol to the current study. This chapter will describe the changes made in the SOPARC spreadsheet (Figures 26, 27, 28, and 29 in the appendix). I will also explain how the activities were collected and how I categorized the age and gender groups.

First, I excluded the categories of “ethnicity” and “physical activity level” and added the categories “alone or with others”, “with who” and “how many”, these were all made into checkpoints in the spreadsheet. I also added the categories on “physical structure” and “use of physical structure”, which were described in words. “Ethnicity” and “physical activity” were left out because it is difficult to obtain exact information about ethnicity from observations. Making assumptions about ethnicity might be easier in areas with a large share of homogenous groups, for example, mostly Hispanics, since it has been accounted for in other studies (Marquet et al., 2019; Schultz, Wilhelm Stanis, Sayers, Thombs, & Thomas, 2017).

The category “with others” was limited to when a person was observed in company with another person, either a child under supervision, playing with other children, or someone walking, talking, or doing other activities together. Further, I excluded the category on “physical activity level” and replaced it with the two categories on “type of use” and “type of activity”. These categories were added because I wanted to acquire knowledge on the type of use and activities in the park, and the “physical activity level” was excluded because it would be difficult to collect data on all the categories. In collecting data on the general observation day, I added the categories “temperature” and “weather conditions”. The age groups were divided into the following categories in line with the protocol: child (0-12), teen (13-20), adult (21-59), and senior (60 and older) (McKenzie & Cohen, 2006). While the age categories were made as checkpoints in the protocol, I provided one spreadsheet for children, one for teens, one for adults, and one for the elderly. This made it easier to divide the genders from each other while observing and made it easier to categorize the data in the analysis.

## 4.6 Pilot testing of the spreadsheet

After modifying the SOPARC protocol, I completed two pilot studies before the data collection commenced. The pilots were undertaken to adjust the observation spreadsheet. First, I tested multiple observation spots in the park before selecting one observation spot that gave a good overview of the whole park (see red spot in figure 5). I sat in this spot throughout the study, although I would move if something was difficult to see. I found that sitting in one spot would not disturb or intrude on the environment as much as if I would move around in the park. Evenson et al. (2016) suggest that the observer should stay in the least visible area to the park users, and this was also accounted for when I chose the final observation spot.

Succeeding the pilots, I changed the categories “play”, “sedentary”, “socialization” and “workout” from being numeric checkpoints in the form to describing the activities in words. I then made a few adjustments in line with the protocol. I changed the transit zone from being observed for the same time as the other zones to writing down every time a person was transiting the park. This was done because I found it manageable to collect the data while observing the other zones, and this provided more data on how the park was used for transit. During the pilots, I observed for 10 minutes in each zone and only for one round (zone 1 to 8) (see figures 7 - 15). The observing time was changed to 5 minutes in each zone, and instead, I observed through all the zones in two rounds to make sure I observed for the recommended amount of time (Cohen et al., 2011). This was changed because more time would pass before I came back to each zone, which increased the chance that there would be a change of people in the zone. Thus, observing in two rounds would provide more snapshots of the environment and increase the validity (see chapter 4.3) (Cohen et al., 2011)

## 4.7 Data collection

The Excel spreadsheet made it possible to tailor the SOPARC protocol to the study, which has also been done in most other studies using SOPARC (Evenson et al., 2016). The data was conducted passively during the observations, which means that I did not change or interfere with the environment, as this way of observing provides better validity (Sussman, 2016).

Table 1. Overview of observation days

Date	Time	Temperature	Weather	Darkness
NOVEMBER				
13.11.2021	16.:15 – 17:50	2 C°	Cloudy	Yes
14.11.2021	11:40 – 13:10	0 C°	Cloudy	No
15.11.2021	14:38 – 16:00	3 C°	Cloudy	No
18.11.2021	15:40 – 17:10	2 C°	Light Cloudy	No
24.11.2021	16:15 – 17:45	6 C°	Light Cloudy	Yes
27.11.2021	15:00 - 6:30	-4 C°	Light Cloudy	Yes
28.11.2021	12:47 – 14:30	-4 C°	Sun	No
30.11.2021	16:48 – 18:20	-7 C°	Sun, Snow	Yes
DECEMBER				
14.12.2021	15:40 – 17:05	-1 C°	Rain, Ice	Yes
17.12.2021	16:15 – 17:50	0 C°	Sun, frost	No
18.12.2021	13.10 – 14.40	-4 C°	Light cloudy, frost	No
19.12.2021	11:40 – 13.10	2 C°	Sun, frost	No
JANUARY				
10.01.2022	13:45 – 15:15	-3 C°	Cloudy, snow	No
11.01.2022	17:39 – 19:10	2 C°	Rain	Yes
15.01.2022	09:45 – 11:45	-4 C°	Light cloudy	No
16.01.2022	11.40 – 13.10	0 C°	Cloudy	No
FEBRUARY				
13.02.2022	17:45 – 19:15	4 C°	Cloudy, wet	Yes
15.02.2022	14:38 – 16:08	1 C°	Sun	No
16.02.2022	13:35 – 15:05	1 C°	Sun	No
26.02.2022	17:40 – 19:10	2 C°	Light cloudy	No
MARCH				
12.03.2022	13:45 – 15:15	0 C°	Sun	No
13.03.2022	09:45 – 11:45	-4 C°	Sun	No
14.03.2022	16:48 – 18:20	5 C°	Sun	No
15.03.2022	15:00 – 16:30	5 C°	Sun	No

The observations were conducted from November to March, for four days each month, apart from November, which had eight days of observation. I observed for 1 hour and 20 minutes each observation, which made a total of 29 hours of observation (see table 1), and on two weekdays and weekends each month, as suggested by (Cohen et al., 2011). In addition, I made sure to observe at different days and times of the day to improve the validity of my study (McKenzie et al., 2006; Sussman, 2016). The observations started at 09:45 at the earliest and ended at 19:15 at the latest. I recorded information on the timespan, weather, and temperature. Data was collected during the cooler months of the year, and the temperature neither exceeded 6 C° nor dropped below -7 C°. The weather was quite varied, with sunny, cloudy, and rainy days in addition to snow and frost when it was cooler. Table 1 provides information on what the observation days looked like.

## 4.8 Analysis

In the analysis, I wanted to investigate how much each group was using the park and in what way they were using it. During the observations, the data was continually moved from the spreadsheet used during observations to a second spreadsheet used to categorize the data. The spreadsheet used for categorizing contained the same categories as the spreadsheet used in the observations. This second spreadsheet divided the categories by the different zones on the column axis and the age categories on the row axis, as previously described in chapter 3.6 (Figures 27, 28, and 29 in the appendix). I also divided the categories differently in this spreadsheet by providing one column for the following categories: “number of persons,” “males,” “females” “in company”, and “alone”. I then counted the number of times these categories occurred.

I structured my data after some main categories, which were the number of park users and the age and gender of the park users. I then provided figures to illustrate the differences and similarities between these categories. Regarding the activities, I categorized this data based on Hefts’ (1988) taxonomy. I sorted the various activities based on the categories of environmental qualities and added an additional column for the facilities to analyze the activities in relation to the park facilities. I did not divide the activities by age and gender but analyzed the data by looking at the facilities in the zones in relation to how much the different age and gender groups used the zones.

Additional modifications to the taxonomy were to change the title from “affordances” to “utilized affordances”, as this is what I provided information of. I also removed two rows from the taxonomy because the first row that described the environmental quality “climbing” overlapped with the fixed objects that afforded “climbing”. “Climbing” was therefore considered a utilized affordance by itself and not an environmental quality. The second row removed was “moldable materials” because it did not utilize any affordances in the park.

The data from the pilots are not included in the analysis as they were found to be too different from the final observation spreadsheet. The elderly were left out from the analysis on zone use because they were only observed transiting the park. Categories that were left out from the analysis was the category on “interaction”, as it did not provide much information on interaction

because it was not always clear if a person was interacting or not. For example, the interaction does not need to be verbal, as happens especially often between children. A second category left out from the analysis was the category of “with whom” and “how many” an individual was together with, and was primarily due to limited time.

#### 4.9 Ethical considerations

I respected the ethical principles of the Helsinki declaration throughout the study (World Medical Association, 2013). No participants were described or depicted, and they remained fully anonymous throughout the study. Hence, no collected data could be used to identify an individual or use the data to track back an individual (NSD, n.d). Therefore, there was no need to notify the *Norsk senter for forskningsdata* for approval of the study, as the method of the study falls under the exemption of §11 (NSD, n.d; Personopplysningsloven, 2018).

### 5.0 Findings

In this chapter, I will present the findings of the study that illustrate how the park is used in general, how the park is used by the age and gender groups, how the different zones are used, and lastly, the activities in the park. In the findings on activities, I will first present the number of activities that occurred in each zone and then present the types of activities.

#### 5.1 General park use

Figure 16 displays the use of Lakkegata activity park by age and gender without the transit zone. A total of 317 individuals were observed using the park during the observation period. Children were most frequently observed using the park (n=183; 57,7%). Across both age and gender, girls were the most frequently observed group using the park (n=100; 31.5%), contrary to the elderly who were not observed using the park at all (n=0). Although teens visited the park, fewer teen users were observed using the park (females n=16; 5.1%, males n=30; 9.5%) compared to children and adults, with female teens being the least observed (n=16, 5.1%). When also counting the transit zone, there were 494 individuals observed in the park during the observation period in total, which means that 177 persons only used the park for transit. A few elderly males (n=3; 0.6%) and females (n=2; 0.4%) were observed using the park for transit only.



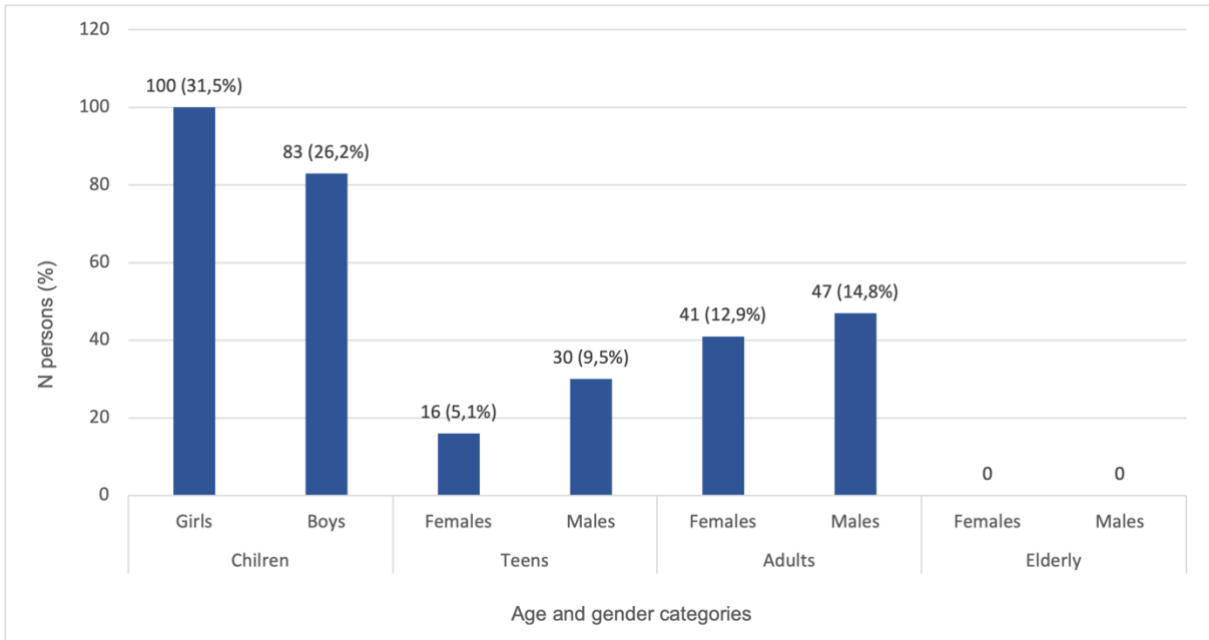


Figure 16. Park users by age and gender. Without transit zone, N = 317

The numbers and proportions of park users who visited the park in company with others or alone are displayed for each age group in Figures 17, 18, and 19. Across all age groups, the majority of the users visited the park in company with others (93.5% of children, 73.9% of teens, and 89.1% of adults). A somewhat higher proportion of teen boys (15.2%) used the park alone compared to the other groups.

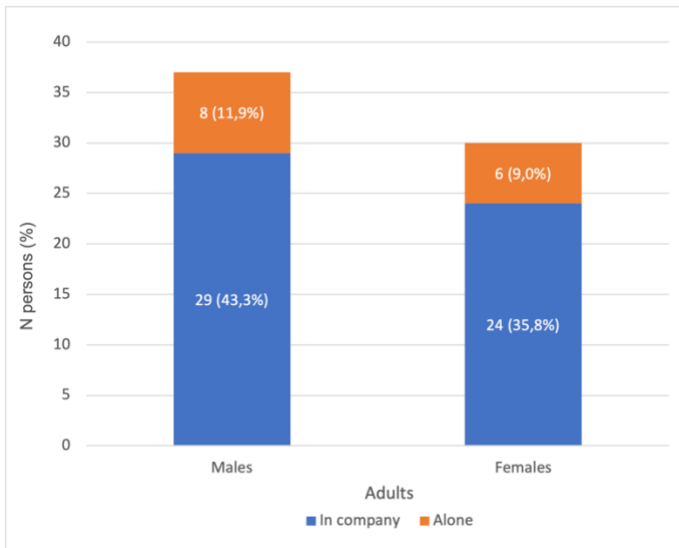


Figure 17. Children that are in company or alone in zone 1 – 8, by gender, (n = 183)

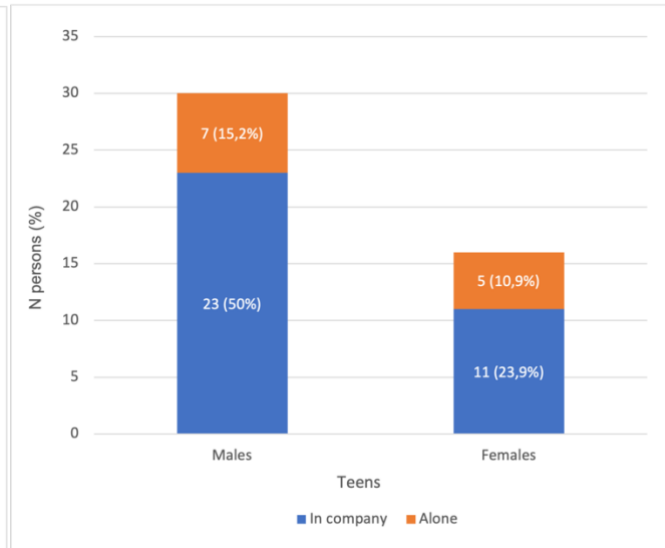


Figure 18. Teens that are in company or alone in zone 1 – 8, by gender, (n=46)

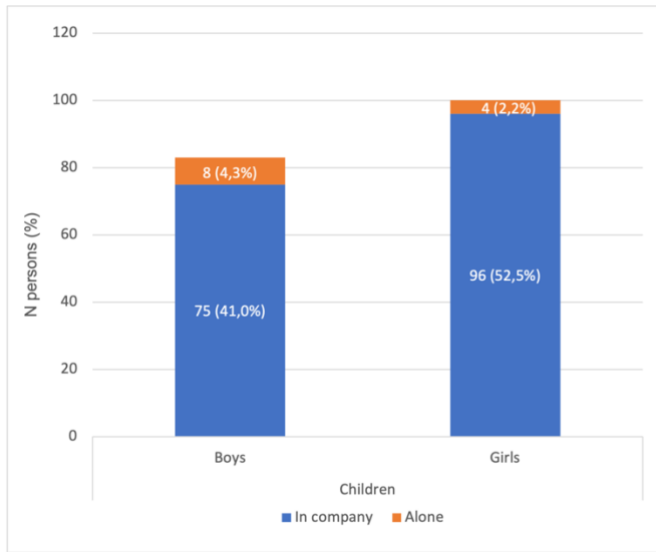


Figure 19. Adults that are in company or alone in zone 1 – 8, by gender, (n=67)

## 5.2 Zone use

In this chapter, I describe the general zone use, not considering age and gender (figure 20); then, I will present the most used zones (zone 1, 3, 4, and 6) for children, teens, and adults by gender (figure 21, 22, 23).

Figure 20 displays the use of the different zones in Lakkegata activity park. In the figure, the zones are ordered from most to least used. The transit zone is clearly the most used zone (n = 177; 35,8% of all users). In the zones where people stay for longer periods, zone 4 is the most used (n = 86; 17,4%), followed by zone 1 (n = 72; 14,6%), zone 6 (n = 55; 11,1%), and zone 3 (n = 46; 9,3%). The remaining zones have nearly the same number of users, but zone 5 is the least used zone (n = 11; 2,2%).

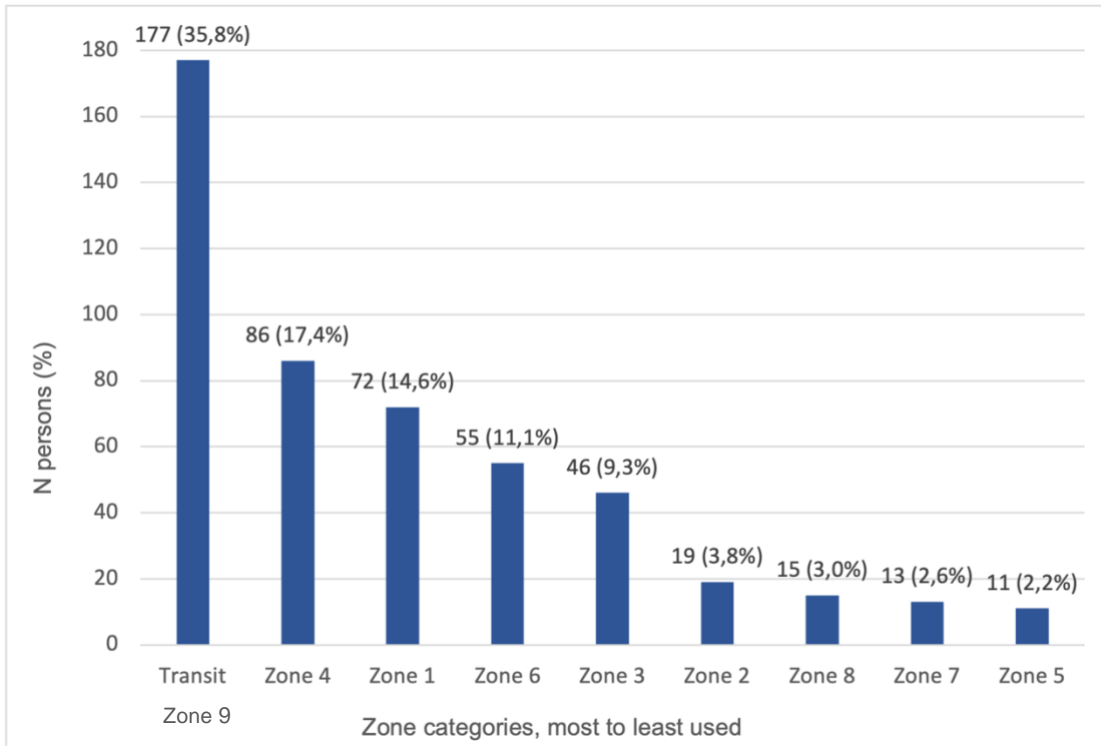


Figure 20. Use of each zone. N = 494

Figure 21 displays children's zone use. When comparing the zones, children are using zone 4 most (girls n=28; 19.3%, boys n=34; 23.5%), and zone 3 least (girls n=6; 4.1%, boys n=6; 4. Zone 6 differs from the other zones with a large difference in use between the genders. Contrary to the other most used zones, girls use this zone twice as much (n=24; 16.6%) as boys (n=12; 8.3%).

Figure 22 displays teens' zone use. Overall, zone 3 is most frequently used by teens (females n=7; 16.3%, males n=9; 20.9%), which stands in contrast to the other age groups (see figures 21 and 23) and the order of the most used zones (see figure 20). The use of zone 3 is almost equally distributed between the male (n=9; 20.9%) and female (n=7; 16.3%) teens, despite male teens being observed much more frequently in the park compared to female teens (see figure 16). The figure illustrates a clear difference in zone use for female teens, as they are using zone 3 (n=7; 16.3%) a lot more than all the other zones.

Figure 23 displays adults zone use. Male adults are using zone 1 (n=15; 20,5%) and 3 (n=14, 19,2%) most, and female adults are using zone 1 most (n=15; 20.5%). The other zones are used nearly the same but zone 3 is the least used by female adults (n=4; 5,5%).

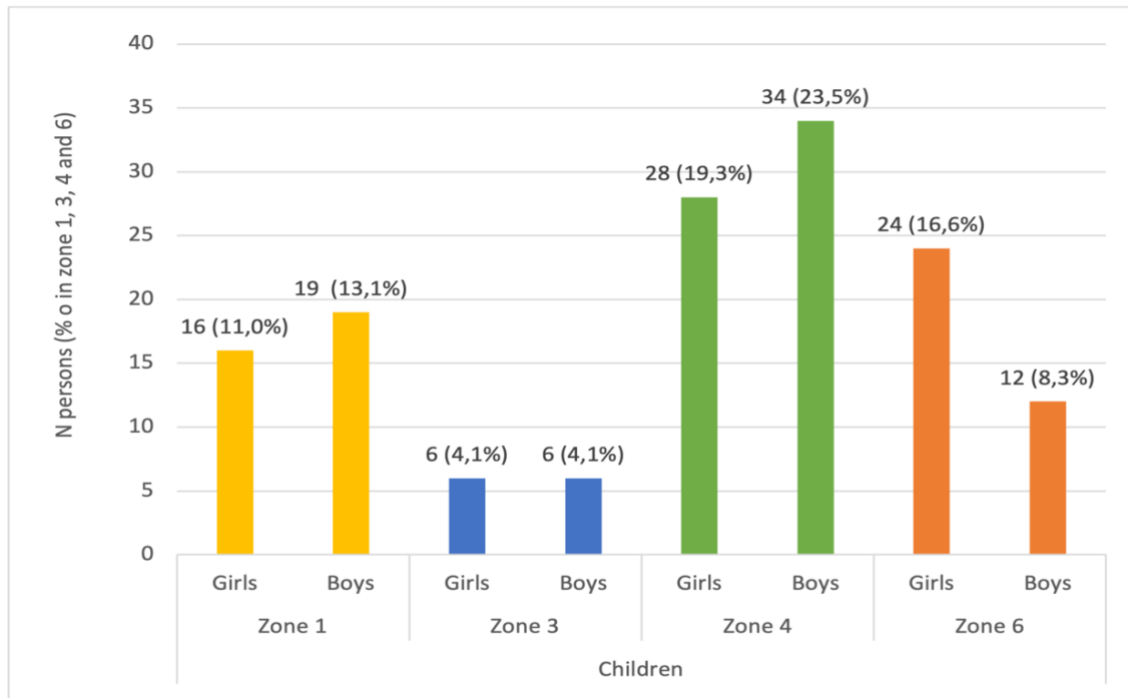


Figure 21. Children's use of zone 1, 3, 4, and 6 by gender, N=145

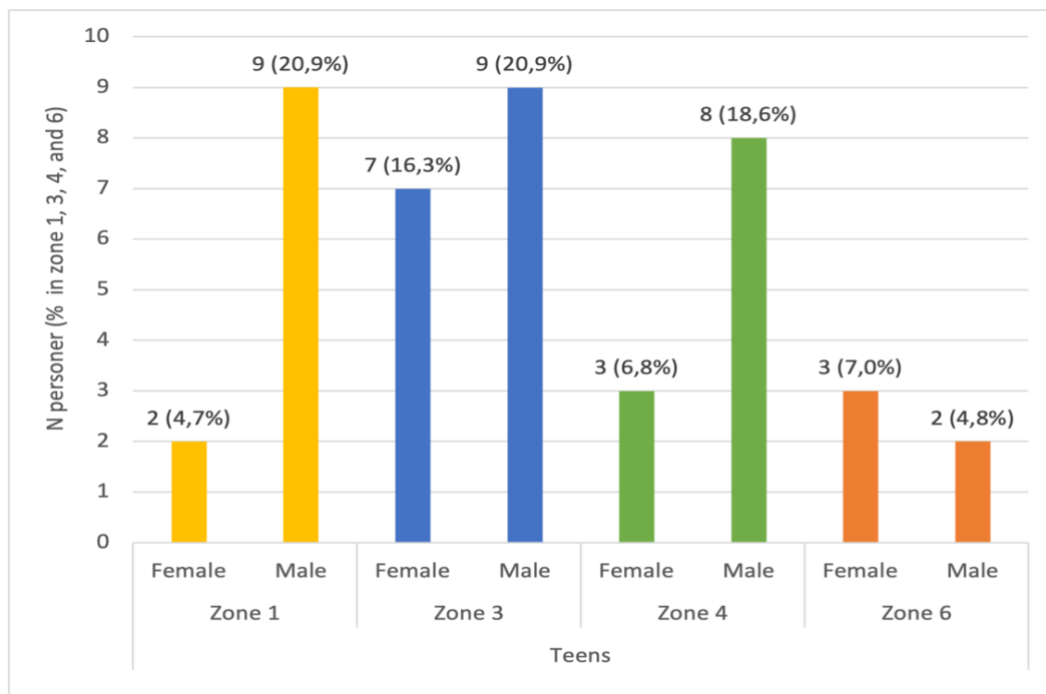


Figure 22. Teens use zone 1, 3, 4, and 6 by gender, N=43

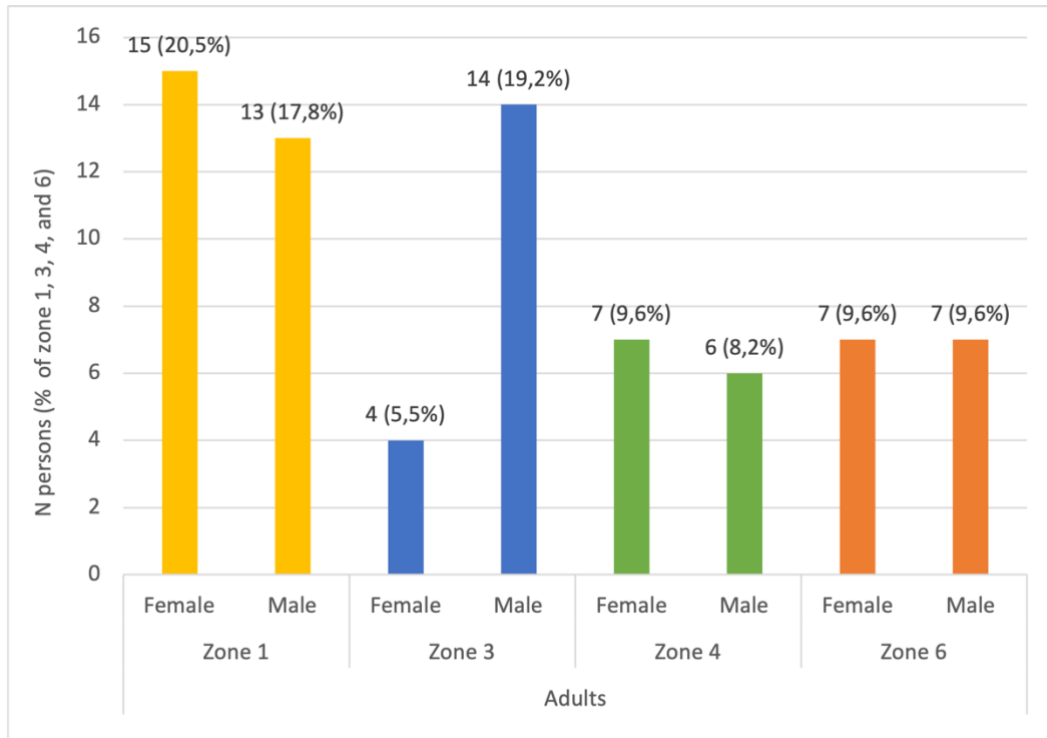


Figure 23. Adults use zone 1, 3, 4, and 6 by gender, N = 73

### 5.3 Activities

In this chapter, I will present the activities that were observed in the park. First, I will present a taxonomy (see table 2) that illustrates what the different facilities in the park afford. Then I will present the total number of activities that transpired in each zone by age and gender in figures 24, 25, and 16.

Table 2 displays the utilized affordances in relation to environmental qualities and objects. Zone 4 has non-rigid, fixed objects, and most of these affordances were connected to speed, like running on, hanging on to, laying, and standing on while spinning. This zone also has a flat, relatively smooth surface made of rubbered material that affords to pray.

Zone 1 has graspable/detached objects, primarily of natural loose materials, such as sticks, stones, canes, and logs. In addition, the skating area that are relatively smooth slopes has a large variety of affordances connected to speed with different rolling activities.

Zone 6 has a non-rigid fixed object, like the swing and slackline, that mostly affords calm activities, such as sitting, lying, and standing. The zone has a rubbered surface that also affords praying.

Zone 3 has fixed objects, like the sitting group and roof, that mostly afford calm activities, like sitting, lying, leaning, and stretching. This sitting group is located under a roof, which was found to afford smoking, drinking, and doing pullups.

The less used zones are zone 2, 5, 7, and 8 (see table 20). Of these, zones 5, 7, and 8 have fixed objects like the climbing wall and shed that afford climbing. Zone 2 has concrete that affords mostly calm activities like sitting, standing, laying, and walking.

Table 2. A functional taxonomy of the utilized affordances in the study (adopted from. Heft, 1988)

Environmental qualities that support certain affordances	Objects in the environment	Utilized affordances
Flat, relatively smooth surfaces	Concrete (zone 2, 3 and 9)	Affords: standing, running, sitting laying on, eating, looking at the phone, walking, skating, scooter riding
	Asphalt (zone 5)	Affords: scooter riding, walking, standing, running, jumping, standing
	Rubbered surface (zone 4 and 6)	Affords: praying, running
Relatively smooth slopes	Skating area (zone 1)	Affords: running, standing, walking, sitting, ball play, skating, driving scooter, biking, jumping from, kicking, driving electrical scooter, chopping ice
Loose/detached object	Cane (zone 1)	Affords: climbing, holding
	Stick (zone 1)	Affords: painting with water
	Stone (zone 1)	Affords: lifting, rolling
	Ball (zone 1)	Affords: rolling, kicking
	Log (zone 5)	Affords: throwing
Fixed object	Benches (zone 2 and 3)	Affords: sitting, standing
	Table (zone 3)	Affords: laying skies on, leaning on
	Cylinder (zone 3)	Affords: stretching
	Roof (zone 3)	Affords: doing pullups
	Fountain (zone 3)	Affords: pushing
	Lamppost (zone 5)	Affords: sliding down from
	Trees (zone 6)	Affords: touching, smoking, peeing on
	Bars (zone 7)	Affords: climbing on, hanging from, sitting on
	Shed (zone 5)	Affords: climbing on, throwing cub on
	Climbing wall (zone 8)	Affords: Climbing, sitting on top of
Non-rigid, fixed object	Spinner (zone 4)	Affords: walking, running, laying, sitting, standing, balancing, jumping from, hanging from, looking at the phone, driving a toy car on, pushing, laying under and kicking
	Swings (zone 6)	Affords: sitting, laying, pushing, standing, wagging, flipping, looking at the looking at the phone
	Slackline (zone 6)	Affords: balancing on
	Trampoline (zone 4)	Affords: jumping, long jump over, standing on
	Attached swings (zone 7)	Affords: attempts to swing on, sitting, standing, climbing, smoking, looking at the phone
Shelter	Roof (zone 3)	Affords: eating, looking at the phone, drinking, smoking
Water	Water pit (zone 1)	Affords: jumping into

Figure 24 displays the number of activities by children. In general, zone 1 has the greatest number of activities by children (girls n=11, boys n=10). However, there is a large difference in number of activities between the genders in zone 4, with boys having a much larger number of activities (n=14) than girls (n=6). In all other zones, the share of activities is relatively similar, but zone 8 has the least number of activities by both boys (n=2) and girls (n=2).

Figure 25 displays the number of activities by teens. It displays that most activities transpired in zone 3 among both male (n=6) and female (n=7) teens. Female teens have more activities in zone 4 (n=5) than male teens (n=2), while zone 1 has more activities by male teens (n=5) than female teens (n=2).

Figure 26 displays the number of activities by adults. There is a relatively large difference in the number of activities between the genders. For males, the greatest number of activities are in zone 3 (n=8) and 6 (n=7), while for women, the greatest number of activities is in zone 1 (n=8).

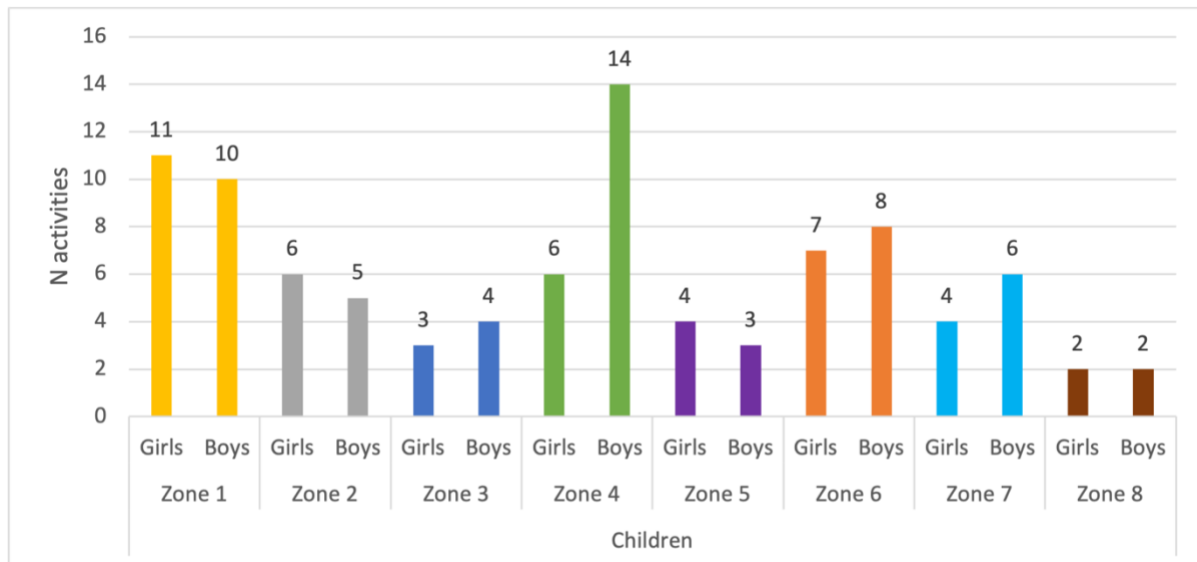


Figure 24. Number of children's activities in each zone by gender



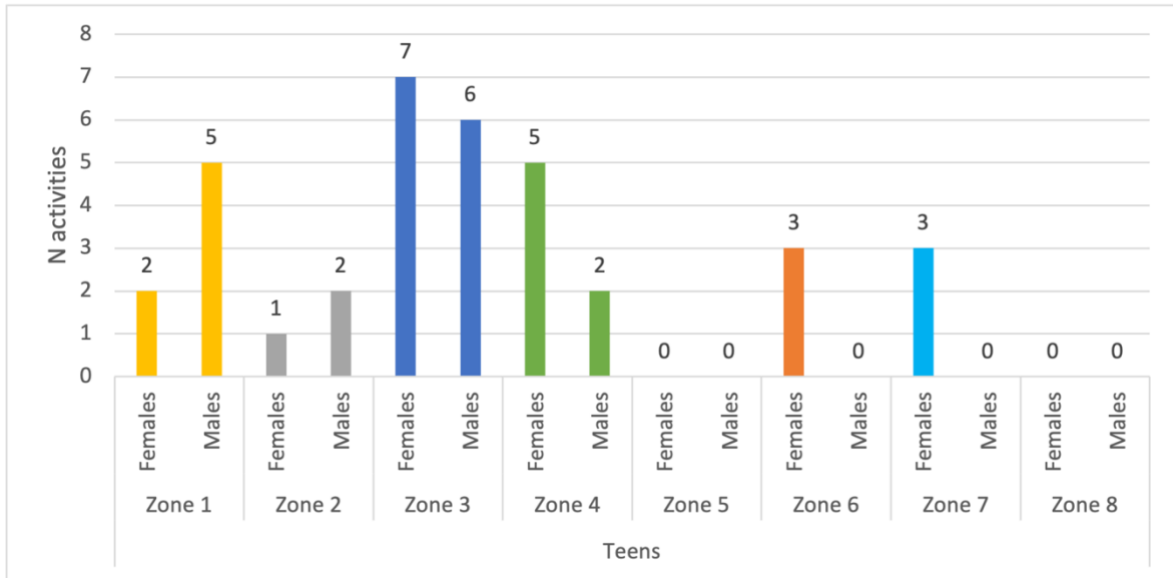


Figure 25. Number of teens' activities in each zone by gender

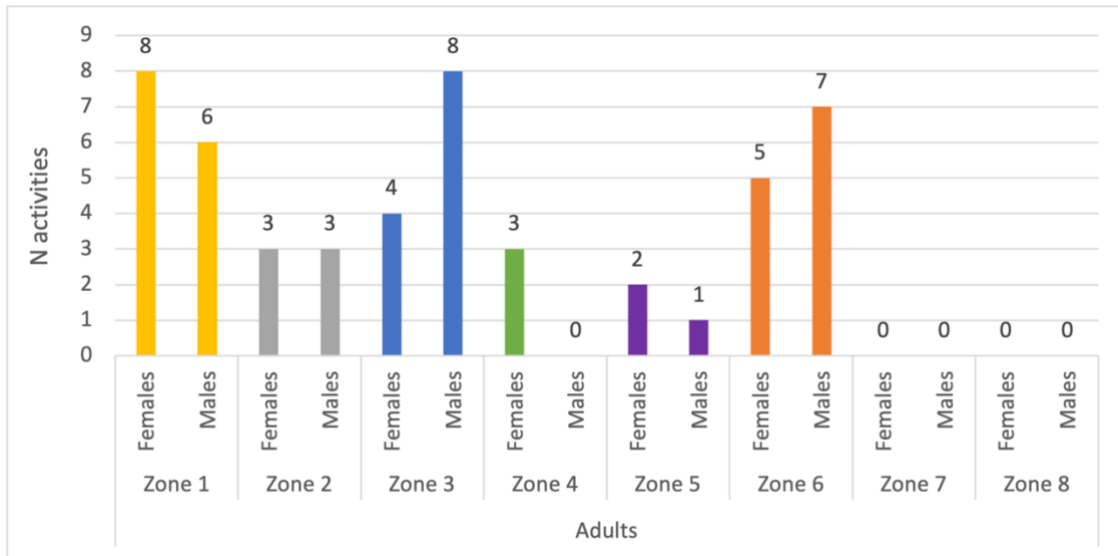


Figure 26. Number of adults activities in each zone by gender

## 6.0 Discussion

The overall aim of the thesis was to acquire knowledge on the user groups, activities, and facilities in Lakkegata activity park to understand how the park is used. In this chapter, I will discuss the findings on the characteristics of the park users, how they used the facilities, and what kind of activities took place in the park. I will discuss this in relation to existing literature on park use and the affordances theory. I will describe what characterizes the park users, how the park facilities are used, and what activities take place in the park. Finally, I will discuss the strengths and weaknesses of the method.

### 6.1 The park users

#### *6.1.1 Less frequent user groups - Teens and elderly*

My findings indicate that teenagers use the park less frequently, particularly girls. The elderly were only observed using the park for transit, implying that they did not stay in the park. A contributing factor to this could be weather and temperature conditions. A previous study interviewing the elderly about their participation in physical activity found that they would go less outdoors during wintertime (Boulton et al., 2018), which was the time of the year when my observations were conducted. Another possible reason for the high absence of the elderly could be the general population composition in Grünerløkka, which is relatively young. However, the elderly living in this neighborhood might also choose to go to other places than this park. I will discuss this in more detail in chapter 6.2.4.

Considering the teens, a review by Van Hecke et al. (2018) found that adolescents generally lack age-appropriate facilities in the environments, which could be why so few teens were observed. However, the roof with the sitting group did attract teens, but not as much as the other groups. Assuming that the little use by teens was due to the facilities, this could be explained by that teens prefer sitting groups to hang out on (Nissen et al., 2020). Teens have also reported that they want to be in places where they can be loud, which means that the park might not be a place where teens can utilize their perceived affordances due to social constraints (Nissen et al., 2020). These social constraints might be due to the school and public housing close by or the constraints from the other groups using the park.

### *6.1.2 Frequent user groups – children and adults*

Children were the most observed group in this park. This could be due to the park's proximity to the primary school. Baran et al. (2014) found that parks that support free play and unstructured activities generally appeal to younger children, which this park was designed to provide (see chapter 4.2). In addition, the park contains facilities that are used a lot by children, as I will discuss in chapter 5.2.1, and might be a partaking reason for the children being the most frequent user group.

Adults were the second most frequent user group of Lakkegata activity park. Notably, the number of adult park users was high when counting the transit zone. As previously mentioned, paths and trails could increase general park visitation (Van Hecke et al., 2018; Zhang et al., 2019). However, since the difference in the park use with and without the transit zone was so large, it indicates that the park was primarily used for transit and that the adults that walk through it could potentially have used it to sit down, for example on a bench. This might indicate that there is not much spontaneous use by adults but that the people who use it plan to come to the park. For example, to take their children out to play.

## 6.2 How the park is used and the activities that take place there

### *6.2.1 Children*

The park facilities varied in use by children, but some facilities stood out with particularly much use, and many utilized affordances. The zone with the spinner was the most used zone by children of both genders (zone 4). This could simply be due to the placement of this zone, which is located closest to the school and therefore is the most accessible zone to children. However, the spinner was the facility where children utilized the most affordances within the park, indicating that the spinner played a large part in why this zone was so much used. Consolidating this finding, the spinner was observed in a study on parks in Denmark by Refshauge, Stigsdotter, and Petersen (2013), and a study by Cohen et al. (2020) on two neighborhood parks in the United States, which looked at the facilities and use by children. The spinner was one of the most frequently used facilities in both studies. While the spinners

from the parks in these studies looked different from the one in my study, they had the same function of spinning around its own axis (Cohen et al., 2020; Refshauge et al., 2013).

In my study, the children utilized affordances for high-speed activities on the spinner, which is considered one of the six categories of risk play (Kleppe, 2018). The children utilize the affordance of standing, walking, kicking, and interacting with loose objects on the spinner. The level of speed on the spinner was something that the children could decide themselves, which meant that they could decide how high a risk they wanted to take. A similar study investigating children's play discovered that the facilities in the environment that challenged the children's physical and social resources led to high physical activity (Bjørngen, 2016). Risk-taking activities are important for children's learning and development, and children do generally prefer environments that challenge their physiological motoric while playing (Brussoni et al., 2015). These preferences might explain the particularly high use of this zone.

Even though zone 4 was used by both boys and girls, the boys were using the zone more than the girls, despite that the girls were more observed in the park overall. Moreover, the boys utilized far more affordances using the spinner than girls. This large difference in the number of utilized affordances between the genders does not comply with the share of affordances between the genders in all other zones, which is quite similar between the genders. In addition, a study on children's affordances did not find a difference in utilized affordances between the genders, supporting the findings from all other zones than zone 4 (Kyttä, 2002). One possible explanation for this large difference in utilized affordances could be that it supports risk play. Studies have found boys to be more vigorously active and involved in more risk play than girls, which supports this assumption (Harper & Sanders, 1975; Refshauge et al., 2013). These risk elements are important because they promote behaviors related to higher physical activity and social activity (Brussoni et al., 2015). Therefore, Tremblay et al. (2015) advocate that risk play in outdoor physical environments is important to children's health.

Like the zone with the spinner (zone 4), children also utilize affordances of risk play related to speed from rolling activities in the zone with the skating ramp (zone 1). The children also

utilize many affordances with loose objects in this zone by rolling and lifting stones, which is also identified as risk play (Kleppe, 2018). On one hand, the loose materials on the skating ramp in zone 1 might be somehow unexpected, as this zone is supposed to provide a place for rolling activities. On the other hand, this study was conducted during the cooler months, when the skating area could not be used for rolling activities due to snow and ice. Therefore, loose objects should be considered a part of the reason why the skating area was used during the winter, despite the snow and ice. Considering that the loose objects could have been used in the other zones, the reason why this was not the case could be due to the soft slopes of the skating area that made the loose object more exciting to play with, thus providing more affordances. Smooth slopes do also have more affordances in other studies, consolidating with my findings (Kyttä, 2002; Othman & Said, 2012). The number of affordances is important because low availability of affordances is found to have a negative impact on children's social play (Larrea et al., 2019).

Moreover, this park was designed to be particularly appealing to female teens and girls. Looking at the findings on children, the proportion of girls using this park is slightly higher than that of boys, which differs from other similar studies on park use, that find girls and females to be less prominent overall (Baran et al., 2014; Cohen et al., 2007; Floyd et al., 2011; Padiál-Ruz et al., 2021). The park was designed with heights to sit on, although the zones with these facilities were very little used overall. The girls used zone 4 and 6 with mostly non-rigidly, attached objects. However, zone 6 is mainly associated with sedentary activities, and this zone was used by girls the double of boys. Commensurable to this finding, the girls used zone 4 with the spinner less than boys, despite that the girls used the park more overall. This indicates that the zone where boys found the most affordances related to risk play was less interesting for girls. As suggested by other studies, girls are less vigorously active than boys, which might support the finding of girls using zone 6 because it affords more sedentary activities (Evenson et al., 2019; Harper & Sanders, 1975; Ries et al., 2009). Leisure activities, such as sedentary activities, are found to be important to children's well-being (Nordbø, Raanaas, et al., 2020). Therefore, the affordances that rely on these objects should be considered important park facilities.

Finally, zone 6 and 4 both had a rubber surface, and both zones afforded to pray. This is somewhat unexpected activity in a playground. Considering that this could be done in other places, the persons perceived the affordance of praying and were not constrained by the social environment. Grünerløkka borough has a high share of immigrants, thus holding many different cultures. This affordance illustrates that when designing parks, it is important to consider the demography of the neighborhoods, in order to promote use by the target groups (Evenson et al., 2019).

### *6.2.2 Teens*

The teens used zone 3 with the roof and sitting group most, contrary to the other age groups. The roof provides shelter, which is found in another study to be the facility most used by adolescents, consolidating my findings (Baran et al., 2014). The roof might give a sensation of being slightly framed from the surroundings and therefore provides a place where teens can utilize the affordances of drinking and smoking, which might be considered typical teen behavior. Teens have reported that they would like places to hang out for longer periods of time and be loud. The teens mentioned facilities like tables and benches, which the roof and sitting group in this park might provide (Nissen et al., 2020).

The activities in the sitting group were mostly sedentary behaviors, like sitting. A review by Zhang et al. (2019) found that environmental facilities that afford sedentary activities are also used for social interaction. This could explain the large number of teens, particularly female teens, using this zone. The findings from Zhang et al. (2019) might indicate that teens use the sitting group because it affords social interaction through sedentary behavior. This might suggest that teens use the sitting group where people utilize the affordance of sedentary activities because the teens can utilize the affordance of social interaction. In that case, it consolidates my findings on teens' using this park mostly in company with others.

There was also a large difference in park use between the genders among teens. First, the female teens were observed half the number of males. Secondly, the female teens were almost only observed under the roof with the sitting group. They mainly utilized the affordances of sedentary activity, contrary to the boys that also used the zones that were more associated with vigorous physical activity. Other studies have found girls to be sedentary or less

vigorously active than male teens (Evenson et al., 2019; Harper & Sanders, 1975; Ries et al., 2009). This could mean that girls rely more on activities where they can utilize affordances of socialization (Baran et al., 2014; Zhang et al., 2019). However, Tester and Baker (2009) suggested that increasing the attendance of female teens in parks will require more than built environment improvements alone because there might be mechanisms in the social environment constraining the actions.

Teens have been using the facilities that utilized the most sedentary activities in this study. There could be reasons why particularly the female teens did not use the other zones more. Studies have suggested increasing the physical activity level among teens in general by providing a skating area (Floyd et al., 2011; Zhang et al., 2019). The park holds a skating area, although the weather might not have allowed for as many rolling activities during the time of the year, this study was conducted. The skating area might be more used in the summer by teens.

In zone 3, where the teens hung out the most, it was recorded that somebody was doing pullups while hanging from the roof. Installing fitness equipment has been found to increase park use in one other study (Cohen et al., 2012). Installing such facilities would provide a greater variety in facilities, and might increase usage and promote physical activity among teens (Cohen et al., 2020).

Other facilities suggested to increase teens' physical activity are sports fields and adventurous playgrounds, which are found to be more appropriate for teens than small swings and slides (Van Hecke et al., 2018). Although Lakkegata activity park offers a wide range of facilities and does not have many swings and slides, the results show that the children utilize more affordances than teens and adults. This finding suggests that the facilities in the park are primarily directed toward children and that the park might not afford adventure for teens. The different body scaling of teens compared to children might make the teens find less affordances for risk play, which can make the park more adventurous for the teens. Thus, the park might not provide the right characteristics to utilize many affordances by teens.

### 6.2.3 Adults

As previously stated in chapter 6.1.2, there are indicators that most adults visiting the park had planned to come and visit the park in advance. This assumption is supported by the following findings. The adults used at a large part the same zones as children. Since adults and children were primarily observed in company with others, this could indicate that the adults were taking their children to play in the park. However, there are exceptions to this use, as some zones are much more used by adults than children, such as the zone with the skating area (zone 1). The adults also utilized more affordances relative to the number of children and who used the skating area. However, the skating area is primarily used for rolling activities and not walking. This suggests that the adults that used the skating area were accompanying their children to the skating ramp, or that it attracted adults with a particular intention or interest in rolling activities.

Moreover, a large number of male adults have been observed using the zone with the roof and sitting group, which was not the case for female adults. Why only male adults were using the sitting group to this extent is difficult to say, but the findings indicate that there might be more male adults coming to the park without accompanying children. This difference between the genders might be due to the facilities in the environment and other mechanisms in the social environment. To promote park use by adults that are not there to accompany children, particularly women, adults reported that they would have liked more fitness equipment for physical activity, among other (Veitch et al., 2022). When adults in the study by Veitch et al. (2022) were asked what would encourage them to be more social, they responded that facilities such as barbeques and a great variety of facilities that attract other people would encourage them to be more social.

In addition, sitting groups are found to be the most used by adults, which this park does offer (Baran et al., 2014). As mentioned in chapter 6.2.2, the persons using the sitting group mainly utilized sedentary behaviors. Sedentary behaviors are associated with social activities, consolidating the findings on the high share of adult's park use in company with others (Zhang et al., 2019). This park also has a barbecue, which was requested by adults in the study by Veitch et al. (2022). Barbeques were also found by Zhang et al. (2019) to be one of the most important facilities for generating activities among the people using the park.



However, nobody was observed utilizing the affordance of grilling in this park. This could be due to practical limitations, as someone might have seen the potential affordance of grilling, but do not simply understand how to use it. The barbeque could also be a more used feature during the summer. A third possibility is that people might be afraid of taking up too much space in the park by using the grill, thus constraining their actions.

#### *6.2.4 Elderly*

As there are no findings on elderlies' use of this park, it is difficult to assume what facilities may appeal to them. Other studies have found paths and trails to increase general park visitation (Van Hecke et al., 2018; Zhang et al., 2019). Paths and trails were found to be particularly important to the elderly's participation in physical activity. These findings were based on a study in Germany and Hong Kong, where the same results across different cultures strengthen this assumption (Duan et al., 2018). These findings suggest that the elderly that were observed using Lakkegata activity park for transit could have used the park but chose not to.

There is reason to believe that the elderly would want to use a bench for sitting and resting on and looking at something for entertainment. A study by Perry et al. (2021) interviewed elderly with disability in New Zealand and found that the elderly would like to use the equipment in the park, such as slides and swings, but that they felt that the park was not designed for them and that people would judge them. Therefore the elderly living in this neighborhood might choose to go other places. This suggests that the elderly might to use the park due to social constraints. It could also be that the facilities did not afford anything for the elderly. If one is to increase the park use by the elderly, there is a need for greater effort to understand what facilities the elderly needs to utilize more affordances, thus increasing the use and physical activity level in their local environments.

#### *6.2.5 Less used zones*

The less used zones were zone 2, 5, 7, and 8. There are some possible reasons why particularly these zone were so little used. All these zones utilized few affordances in addition to the little use. However, the few utilized affordances observed were usually associated with risk activities, such as throwing and climbing. The zones that were supposed to afford

climbing were zone 7 with the white metal bars and zone 8 with the climbing walls (see chapter 4.4.1), which should suggest that these zones would be more used by children. I will suggest some possible reasons for why these zones were so little used even though I observed risk-related activities.

Zone 7 and 8 mainly provide fixed play facilities and are quite standardized. Sporrel, Caljouw, and Withagen (2017) investigated standardized playgrounds, which are considered putting two bars parallel to each other, or placing stones at an equal distance from each other, thus making the playgrounds symmetrical. They observed that children spent more time playing on the non-standardized elements than the standardized, symmetrical ones. When the children were asked, they reported that they liked the non-standardized facilities better. That messy structures with variations in heights and distances afforded children to cross over different gaps. Zone 7 has relatively standardized white bars, and the climbing walls in zone 8 are fixed right beside each other at an approximately equal distance. Kyttä (2002) found that nonrigid, fixed objects had the most affordances in the environment. Of the nonrigid, fixed objects, the ones that allowed for swinging and hanging received the maximal score of affordances. Contrary, the categories with the lowest scores of affordances were water, shelter, and fixed objects. The only loosely attached objects in zone 7 were the loosely attached rubber seats, which people utilized the affordance of attempting to swing on. This indicates that the children saw the affordance of swinging, but the swing was attached to the ropes. This might have made the zone less interesting because it did not hold the potential affordance of swinging, which according to Kyttä (2002), should provide the most affordances. This consolidates my findings and suggests that the objects should be less fixed and standardized.

Moreover, both zones 7 and 8 had climbing facilities, which are considered risk activities, and are considered to promote use, although this is not the case (Brussoni et al., 2015; Kleppe, 2018). On one hand, the little use could be because these facilities did not afford a great variety in risk play. On the other hand, the persons using the spinner, which is the facility with the most utilized affordances in the park, did not utilize any other risk activities than speed. Therefore, another possible explanation might be that the climbing facilities afforded too little risk. Children might need greater heights or difficulty. For example, the shed in zone 5 was

observed climbing on. The shed is more challenging to climb on and therefore involves more risk and challenge. Despite these risk activities, zone 5 is still the least used. On the spinner, the individuals could decide for themselves how fast they wanted to spin, and the skating area was designed to be used by various ages, that is, body scaling, and skills. This suggests that the facilities should provide autonomy for the individuals, to utilize affordances best suited for themselves (see chapter 4.4.1).

Another reason for the little use might be that zones 5 and 2 do not have any play facilities. Even though zone 2 is the most nature-related in the park, with a large lawn, nature is the most frequently reported predictor for park use and physical activity among youth (Gardsjord et al., 2014). What's more, Bjørgen (2016) found that an open and natural environment, such as in zone 2, should create flexibility and unrestricted movement solutions, inviting spontaneous exploration by children. In addition, the youth themselves have reported that green spaces are important for a sense of freedom, as a place where they could do anything (Nissen et al., 2020). However, the zone does not utilize any affordances with loose objects, which might be expected in other nature settings with more vegetation. Vegetation is found to provide more affordances for children than the ones with less vegetation, but this zone has little variation in vegetation (Othman & Said, 2012). This might make the zone less attractive, particularly to children. Another possible explanation is that the lawn might be used more during the summer, as the concrete did utilize the affordance of sitting, but the lawn might be too wet for people to utilize more affordances in the winter. However, suppose the lawn had more loose or non-rigid fixed objects, such as trees, sticks, stones, and other vegetation, it might have utilized more affordances, particularly for risk play with loose objects, for hiding/getting lost, and for climbing high up in a tree (Brussoni et al., 2015). Thus, making the physical environment more interesting.

Finally, there is a possibility that these zones were less used because the users did not perceive the affordance of using the facilities in the company with others. Sawyer, Ucci, Jones, Smith, and Fisher (2017) found that the social and physical environmental correlates in that the physical and social environmental variables had interactive effects on activity. Supposing that the zones that had more use and a greater number of affordances, thus activities, could promote social interaction. Thus, it supports the assumption that the more

used zones were the ones that were more appropriate for use in company with others and could promote social interaction.

Wray et al. (2020) advocate the importance of natural and play facilities in outdoor public spaces to enhance health-promoting behaviors related to physical activity and social connectedness. Thus, the park and its facilities provide an important asset for the public health of this neighborhood.

### 6.3 Strengths and weaknesses of the study

This chapter will discuss the strengths and weaknesses of the current study. First, I will discuss the validity and credibility of the study, the possible observation bias, misclassifications that could have occurred, the study's limitations, and finally discuss the study's external validity.

#### *6.3.1 Validity and credibility*

This study is designed as a quantitative, observational case study. A case study focuses on a single phenomenon in its real-life context (Yin, 2018). This made it suitable for observing park use. However, case studies have been criticized for lacking precision (Yin, 2018). Therefore, I used a quantitative observation tool to collect direct observations, and the tool that I used was the validated and reliable system for observing play and recreation in communities (SOPARC) (Cohen et al., 2011; McKenzie et al., 2006).

The data from my study was treated both as quantitative and qualitative data. It provided numeric data on the park visitors, their age and gender, and a number of affordances. However, the description of the affordances in the taxonomy were treated qualitatively. This means that I must consider both the credibility and validity of my study. Validity aims at providing data that could be replicated in other studies, while credibility aims to compare the data to similar findings (Thomas & Magilvy, 2011). The SOPARC tool made it possible to provide internal validity (Kleven, 2008). I observed the park for 29 hours in total and according to the SOPARC protocol, observing 12 to 16 hours is sufficient to estimate 96 hours of park use, providing good internal validity (Cohen et al., 2011). Moreover, I observed through five months of the year under varying weather conditions, which provides a great variety of data. Regarding the

description of affordances, I provided credibility for these qualitative data by looking for similarities with other studies, such as comparing the spinner in Lakkegata activity park to spinners found in other studies (Thomas & Magilvy, 2011).

I also divided the park into zones, which made it possible to compare the zone use. Although this could have been considered a strength, the division of the park into zones poses some weaknesses. This means that the zone could have been divided into smaller and larger zones and might have given a different result in zone use. For example, the zones lying next to each other sometimes had a very different number of uses, such as zone 1 with the skating area and zone 2 with the large lawn and concrete stairs. Dividing these zones differently could have provided a different number of persons in a zone.

### *6.3.2 Observation bias*

Since I collected the data by writing down the most prominent activities, I was the only one determining which activities were the most prominent ones, and thus which activities to write down in the spreadsheet (Fangen, 2011). In addition, I was also the one that interpreted the various movements in the park. For example, when I observed praying, my preconception of what the movement meant might be interpreted differently in other cultures or by other individuals. My preconceptions could have biased the results. This could have been solved by providing a second observer and comparing the results after the observations (Sussman, 2016). However, this was not possible due to a lack of resources and time.

I also provided data on the persons being alone or in company with others in the park. Observing whether a person was in company with someone or not is not always obvious. Sometimes a person could stay close to another but still not communicate; this was especially relevant when I observed kids play. Therefore, I excluded these data from my analysis as they would be too prone to observation bias.

In categorizing my data using the taxonomy, I was the one deciding the difference between a slope or flat ground or if the roof provided shelter. This might not be the experience of the persons using the roof. How I interpreted the data, such as interpreting the rubber surface as

appropriate for praying, might not be the person's experience. To acquire this type of knowledge, interviewing would be more appropriate.

During the observations, I tried to sit in a place that would give me a good overview of the park. However, this does not guarantee that I could see all the activities that occurred in the park, and I might have missed out on something. Concerning my visibility for the park users, the environment could have reacted to my presence by restricting or increasing their behavior. Such as teens that would like to hang out alone and decide not to go to the park because they saw me there, hence biasing the results (Evenson et al., 2016).

### *6.3.3 Misclassification*

This study provided two pilots prior to the study, which diminished the chances of providing invalid data or collecting data that was more prone to misclassification due to insufficient data collection. When I was observing the park, there could be quite a lot of crowding. Crowding is quite a common problem when studying parks with many users, and frequent changes in activity could potentially lead to wrongful notations by misclassifying the individuals. Such as counting the wrong number or writing down the wrong age and gender (McKenzie et al., 2006). However, crowding still occurred in the zones and could have affected the data, leading to wrongful notations in the spreadsheet because I had to write fast. I estimated the age based on a short and subjective impression that cannot be reevaluated. It is not always easy to understand whether a person is a child at 11 or a teen at 13. I could also have misinterpreted the gender, and particularly for younger children can be challenging to estimate the age. This could be unclear if the person was wearing a cap or hoodie or because it was dark and difficult to see.

Misclassification could also have occurred in the processing of the data. While sorting the data, individuals might get overlooked or duplicated in the transfer. However, this has been accounted for by ensuring that the total of individuals in each gender and age category corresponds to other variables. The data conducted contains relatively few individuals, and therefore, it was possible to go through all the individuals to cross-check the data.

#### *6.3.4 Limitations of the study design and its conduct*

A limitation of the study design is that I only used one methodology, and a possible solution could be to add other methods to my study. Interviewing the park users could have provided an interesting dimension to the study, to be able to confirm or contradict the findings of this study. As much as this would provide interesting insights to the study, there was insufficient time to add an additional method for data collection.

Time constraints posed some limitations to the study, including the data analysis. Due to time constraints, I had limited time to analyze my data. Thus, I was not able to include the data I had collected on whom the park users were in the company with. Analyzing this data could have provided interesting information to understand the user groups better. For example, it would have been interesting to explore if adults were using the park in company with their children or if teens were in company with their peers or other age groups.

Moreover, the time constraints also limited the observation period. This study was conducted from November to March. Ideally, collecting the data throughout the whole year would provide more accurate data on park use (Cohen et al., 2011). The cool temperatures and weather conditions during these months could have affected the park's use. There could be fewer users during the cooler months, and certain activities could have been less prominent or absent during this time of the year, such as sitting on the lawn. However, Norway holds a cooler climate and varying weather conditions throughout the year. Ideally, the local facilities should serve the population under varying weather conditions and seasons. Thus, knowing how parks are used during the cooler months provides valuable information in a Norwegian context. Observing during the cooler months could provide important information on how parks are being used when the threshold for getting outdoors is higher, which is a strength of this study.

My study did not collect data on how long the activities were going on, which could have provided information that could have told more about the use of the facilities and may be provided a better understanding of which facilities were of particular interest to the park users. In addition, collecting data on physical activity could also have provided more precise information on whether the park users were sedentary or vigorously active. However, this would require more recourses than were available for this study.

I collected data on interaction. However, this data was excluded from the analysis because interpreting if the persons were doing an activity in relation to each other, was difficult. I, therefore, ended up filling out this category very infrequently. Understanding how the park is used for social activities and interaction would provide interesting knowledge about park use and its affordances. Still, to collect this data, there should be some clear criteria for what would count as interaction and would require more testing of the observation tool for such purposes. Finally, this study found few teens in the park. However, the age categorization of the SOPAC measure provides different intervals for all four age categories. Teens were categorized from 13 to 20, while adults were categorized from 21 to 59 years old, which means that relatively few individuals would be classified as teens. Expanding the category to adolescents might have provided more individuals in this category, or separating the other age categories could have provided different results in the number of users. All though, it would be problematic to estimate the age categories with more classes, increasing the chance of misclassifying the ages.

#### *6.3.5 External validity*

External validity concerns the transferability of my results to other contexts (Kleven, 2008). The quantitative finding on park use could be compared to studies on similar parks in countries with a similar culture and climate. The qualitative data on affordances could be compared to other studies with similar facilities in places that do not hold a Nordic climate. Such as comparing the spinner in this park to other spinners in other climates. However, other park facilities might depend more on the climate, such as the skating ramp that got covered in snow and ice in the cooler parts of the year or the lawn that got wet and soggy. Such facilities could only be comparable to studies with similar climates.

## 7.0 Conclusion

I investigated park-based activity in central Oslo through a case study on Lakkegata activity park. To collect the data, I used systematic observations to find out what characterizes the park users, how the park facilities are used, and what activities that take place in the park. I found that the park was used most by adults and children and least by teens and the elderly. There was also a clear difference in the use of the type of use of the park by the different age and gender



categories. However, some facilities were very little used by all age and gender groups. The facilities that got used by children were the facilities that afforded risk play. While the facilities that got the most used by teens and adults were the facilities that afforded sedentary activities. Finally, the elderly were never observed using the park other than for transit. These findings suggest that Lakkegata activity park is more appropriate for children and adults. However, as suggested by previous international research, providing more or different park facilities may enhance the use of other less prominent groups. Providing more affordances to teens, such as shelters or sitting groups for retreating might increase their use. Moreover, to make less frequently used zones in the park more used by children, my results suggest that more facilities in the environment should afford a higher risk, such as through natural elements. The park should also offer more non-rigid fixed objects that are not standardized, such as the spinner or swings in the park or natural elements like trees and bushes. Finally, these facilities should provide some autonomy to individuals, to use the facilities in different ways.

Future studies on the physical environment should focus on its affordances more than simply studying its shapes and forms. There should also be a greater emphasis on the seasons and weather conditions when designing parks in Norway. There should be more efforts to understand teens and the elderly's use and preferences of parks, and there is a need for more research within the Norwegian context. Research on the use of public outdoor spaces should also be carried out across all seasons, as opportunities for using outdoor facilities should be provided throughout the whole year.

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# Appendix

Table 3 Total number of park users and in each zone by age and gender. N = 494

Zones	Child			Teen			Adult			Elderly			Total n per zone	Total % per zone
	Girl	Boy	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total		
Zone 1	16 (45,7%)	19 (54,3%)	35 (100%)	2 (22,2%)	7 (77,8%)	9 (100%)	15 (53,6%)	13 (46,4%)	28 (100%)	0 (0%)	0 (0%)	0 -	72 (100%)	14,6%
Zone 2	7 (63,6%)	4 (36,4%)	11 (100%)	1 (33,3%)	2 (66,7%)	3 (100%)	2 (40%)	3 (60%)	5 (100%)	0 (0%)	0 (0%)	0 -	19 (100%)	3,9%
Zone 3	6 (50%)	6 (50%)	12 (100%)	7 (43,8%)	9 (56,3%)	16 (100%)	4 (22,2%)	14 (77,8%)	18 (100%)	0 (0%)	0 (0%)	0 -	46 (100%)	9,3%
Zone 4	28 (45,2%)	34 (54,8%)	62 (100%)	3 (27,3%)	8 (72,7%)	11 (100%)	7 (53,8%)	6 (46,2%)	13 (100%)	0 (0%)	0 (0%)	0 -	86 (100%)	17,4%
Zone 5	6 (75%)	2 (25%)	8 (100%)	0 (0%)	0 (0%)	0 -	2 (66,7%)	1 (33,3%)	3 (100%)	0 (0%)	0 (0%)	0 -	11 (100%)	2,2%
Zone 6	24 (66,7%)	12 (33,3%)	36 (100%)	3 (60%)	2 (40%)	5 (100%)	7 (50%)	7 (50%)	14 (100%)	0 (0%)	0 (0%)	0 -	55 (100%)	11,1%
Zone 7	8 (80%)	2 (20%)	10 (100%)	0 (0%)	2 (100%)	2 (100%)	0 (0%)	1 (100%)	1 (100%)	0 (0%)	0 (0%)	0 -	13 (100%)	2,6%
Zone 8	5 (55,5%)	4 (44,4%)	9 (100%)	0 (0%)	0 (0%)	0 -	4 (66,7%)	2 (33,3%)	6 (100%)	0 (0%)	0 (0%)	0 -	15 (100%)	3,0%
Zone 9	11 (52,4%)	10 (47,6%)	21 (100%)	7 (25,9%)	20 (74,1%)	27 (100%)	53 (42,7%)	71 (57,3%)	124 (100%)	3 (60%)	2 (40%)	5 (100%)	177 (100%)	35,8%
Total	111 (54,4%)	93 (45,6%)	204 (100%)	23 (31,5%)	50 (68,5%)	73 (100%)	94 (44,4%)	118 (55,7%)	212 (100%)	3 (60%)	2 (40%)	5 (100%)	494 (100%)	100%
Total % age and gender	22,5%	18,8%	41,3%	4,7%	16,2%	14,7%	19%	23,9%	42,9%	0,6%	0,4%	1,0%	100%	

Dato: 15.11.2021		Antall:	0							
Tid på dagen:	Morgen	Lunsj	Ettermiddag	Kveld	Calciuous					
Merk:										
Tomt:										
Vær:										
Tid (digital):										
	1									
<b>Barn</b>		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon	Kjennetegn
						Antall:				
	Kvinne									
	Mann									
<b>Barn</b>		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon	
						Antall:				
	Kvinne									
	Mann									
<b>Barn</b>		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon	
						Antall:				
	Kvinne									
	Mann									
<b>Barn</b>		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon	
						Antall:				
	Kvinne									
	Mann									

Figure 27 Observation spreadsheet for children

Ungdom		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon	Kjennetegn
						Antall:				
	Kvinne									
	Mann									
Ungdom		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon	
						Antall:				
	Kvinne									
	Mann									
Ungdom		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon	
						Antall:				
	Kvinne									
	Mann									
Ungdom		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon	
						Antall:				
	Kvinne									
	Mann									

Figure 28 Observation spreadsheet for teens

Voksen		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon	Kjennetegn	
						Antall:					
	Kvinne										
	Mann										
Voksen		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon		
						Antall:					
	Kvinne										
	Mann										
Voksen		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon		
						Antall:					
	Kvinne										
	Mann										
Voksen		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon		
						Antall:					
	Kvinne										
	Mann										

Figure 29. Observation spreadsheet adults

Gammel		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon	Kjennetegn	
						Antall:					
	Kvinne										
	Mann										
Gammel		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon		
						Antall:					
	Kvinne										
	Mann										
Gammel		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon		
						Antall:					
	Kvinne										
	Mann										
Gammel		Type aktivitet	Apparat/fysisk struktur	Bruk av apparat:	Alene (ja)	Med andre	Hvem (kategorier)	Aktivitet	Interaksjon		
						Antall:					
	Kvinne										
	Mann										

Figure 30. Observation spreadsheet elderly

Table 4 Affordances in the zone 1 - 9 by age and gender

Affordances												
		Child			Teen				Adult			
Zone	Objects	Girl	Objects	Boy	Objects	Female	Objects	Male	Objects	Female	objects	Male
1	Skating area  Stock Stick and water Water pit	Running, Standing, Walking, Roll ball, Kick ball, Scooter driving, Biking, Jumping from, Climbing,  Painting Jumping into	Skating area  Stone	Running, Standing, Walking, Biking, Jumping from, Scooter driving, Kicking,  Lifting, Rolling	Sidewalk stone	Looking at the phone Looking at children	Skating area	Biking Standing Running Skating Scooter riding	Skating area  Ice	Standing, Walking, Skating, Kick ball, Electrical scooter riding Sitting, Standing Chopping	Skating area  Ice	Stand, Walking Skating, Biking, Electrical scooter riding, Chopping
2	Concrete	Stand, Run, Sitting Laying on blankets, Eating	Concrete	Stand, Run, Looking at the phone, Stand, Eating	Grass	Walk	Concrete	Walk Skating	Grass Concrete	Sitting Eating	Concrete	Walking Standing Eating
3	Benches	Eating, Sitting, Scooter riding	Benches	Sitting, Looking at the phone, Eating, Standing	Benches  Table	Sitting Standing Looking at the phone Drinking Smoking Laying skies on table	Benches  Table	Sitting Standing Looking at the phone Drinking Smoking Leaning	Benches	Sitting Eating Standing Looking at the phone	Benches  Table Cylinder Roof Fountain	Eating, Sitting Standing, Looking at the phone, Leaning, Stretching, Pullups, Pushing
4	Spinner  Trampoline	Walking Running Sitting Standing Balancing Jumping	Spinner  Trampoline	Sitting, Standing, Running, Laying, Walking, Hanging, Balancing, Looking at the phone, Driving toy car, Pushing, Lay under Kicking, Jumping, Long jump over	Spinner  Trampoline Floor	Standing Balancing Walking Jumping Praying	Trampoline Floor	Jumping Standing	Spinner Trampoline	Sitting Jumping Standing		
5	Floor Ludo floor	Walk, Stand, Run Jumping	Shed  Lamppost	Climbing and standing and looking out from Throw cub on Slide down					Floor	Walk Stand	Ludo floor	Walk
6	Swing  Slackline Trees	Sitting, Pushing Standing Laying Balancing Touching	Swing  Floor	Sitting, Walking Laying, Looking at the phone, Pushing Wagging, Flip, Praying	Swing Slackline Trees	Sitting Balancing Smoking			Swing  Slackline	Sitting Standing Laying Pushing Balancing	Swing  Slackline Trees	Sitting, Pushing, Balancing, Standing, Peeing, Smoking,
7	Attached swings Bars	Attempt swinging, Sitting, Standing, Climbing	Attached swings Bars	Climbing, Sitting, Attempt swinging, Hanging, Sitting, Climbing			Attached swings	Smoking Looking at the phone				
8	Climbing wall	Climbing Sitting on top of	Climbing wall	Climbing, sitting on top of								

















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