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# Design to encourage physical activity: A case study on the environment of secondary schools

Bachelor thesis premaster Society, Sustainability and Planning  
Minke Kluivingh  
June 2022

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# Design to encourage physical activity: A case study on the environment of secondary schools

Bachelor thesis premaster Society, Sustainability and Planning

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**June 2022**

## Abstract

This study contributes as an explorative research that addresses the societal importance of environment surrounding secondary schools that encouraging physical activity of adolescents. The main question in this research is: *'How can the environment around secondary schools encourage physical activity of adolescents?'* Qualitative data on this topic is collected through semi-structured interviews. For this purpose a case in Delft, the Netherlands has been researched. Results for interventions in the built environment are in line with literature: if a school is located in a neighbourhood that has (sports) facilities or green spaces, adolescents are more likely to be physically active during the day. By using space smarter, more can space for facilities be realised. Smarter parking policies can create space. For example, by stacking, using space underground or on a roof, the space on the square can be used in a different way. However, institutional interventions appeared to be more complex. Institutional barriers (e.g. private sports fields and no policies) and lack of a clear problem owner result in complicated situations where obvious interventions are challenging to implement. A limitation of this study is that it is a single-case study. In the optimal circumstances, mixed methods would be used in which the scope and complexity of the problem would be covered. Further research could contribute to this. Other future research could address institutional barriers such as the problem of ownership.

**Key words:** *Adolescents, Secondary schools, Physical activity, Built Environment*

## Table of content

Abstract .....	2
Table of content .....	3
1. Introduction .....	4
1.1. Research problem .....	4
1.2. Academic relevance .....	4
1.3. Reading guide .....	5
2. Theoretical framework .....	6
2.1. Characterizing physical activity .....	6
2.2. Urban Form Influences on young adult Physical Activity Patterns .....	6
2.3. Characteristics of the built environment regarding Physical Activity .....	7
2.4. Mediating Influences on Physical Activity .....	8
2.5. Conceptual model .....	9
3. Methodology .....	10
3.1. Location of the high school .....	10
3.2. Interviewees .....	10
3.3. Data analysis .....	11
3.4. Ethics .....	12
4. Results .....	13
4.1. Adolescents' perspective .....	13
4.2. School employees' perspective .....	15
4.3. Local governments' perspective .....	16
4.4. Comparing perspectives .....	16
5. Conclusion & Discussion .....	17
List of literature .....	19
Appendices .....	21
Appendix I – Interview Guide .....	21
Appendix II – Coding tree .....	24
Appendix III – Consent form .....	26

## 1. Introduction

Worldwide, peoples physical activity is reduced, young and old alike. Causes include the availability of cars and social media. Overweight is increasing and this leads to less physical activity (Scherdert, 2020). This growing inactivity is alarming, because physical activity is important for body and mind. By exercising, people reduce the chance of developing high blood pressure and cardiovascular disease, but also type 2 diabetes (Scherdert, 2020). The decreasing physical activity and increasing health risks are the main reason for this research.

The focus of this research will be adolescents because cities are often not designed for children. The difference between young children and adolescents is that young children are dependent on their parents (Loon & Frank, 2011) while older children, also known as adolescents (age 11-20 (Clark & Uzzell, 2005)), are able to spend their time more independently. However, while there is a lot of research available on playgrounds and fun schoolyards for younger children, there is almost no research on spaces designed for adolescents in the near secondary school environment specifically. This is remarkable, because there are studies that show that there is a steady decline of physical activity throughout adolescence (Pate, et al., 1994; Bungum & Vincent, 1997). The environment can contribute to physical activity of adolescents. It is evident that urban form can either serve to constrain or promote physical activity and that urban form interventions may result in health benefits for youth (Loon & Frank, 2011). It is therefore important to research how the environment of the secondary school can contribute to the health of adolescents and be designed for them.

### 1.1. Research problem

Young people do not exercise enough and are therefore at risk of an unhealthy lifestyle. Cell phones are an important factor to be less physically active (Yen, et al., 2010). The aim of this research is to create an environment for adolescents around secondary schools that supports adolescents to be physically active. This leads to the following research question:

*[research question]: "How can the environment around secondary schools encourage physical activity of adolescents?"*

Sub questions:

1. What spatial elements encourage physical activity?
2. What motivates adolescents to use the environment to be physically active?
3. How can secondary schools facilitate physical activity in the environment for adolescents?
4. How can the municipality encourage physical activity in the environment amongst adolescents?

### 1.2. Academic relevance

This study contributes as an explorative research that addresses the societal importance of environment surrounding secondary schools that encouraging physical activity of adolescents. I wrote this article for a planning audience. How the environment of secondary schools can contribute to physical activity has not yet been clearly researched, this leaves us with a research gap. 'The examination of physical environments to explain and promote physical activity is an important yet under-investigated area of research inquiry' (Fein, et al., 2004, p. 135). There has been international research. International research often focuses on routes to schools for children, for example a 'Safe Routes to School programme' (Crowe, et al., 2009). However, this is less applicable in the Netherlands because the Netherlands is densely built up and therefore has, compared to many countries, safe walking and cycling routes within cities. In the Netherlands, research into physical activity in the public space often focuses on the living environment and not specifically on adolescents. This research does not look at housing areas, but at the secondary school environment. This environment was chosen because young people spend a lot of their time here. Also, young people from different neighbourhoods come together in schools. Thus, the benefits of an environment designed for exercise are not just for adolescents from a particular neighbourhood, but for a wider group.

### 1.3. Reading guide

The second chapter is the theoretical framework that describes the relationship between the dependent and independent variable. In addition, it is a determination of the used terms and how it is dealt with in this study. The chapter concludes with a conceptual model. Chapter three describes methodology and approaches and in chapter four the results of the study are presented. At last, chapter five contains the conclusion and discussion. This research uses qualitative data collection in the form of semi-structured interviews.

## 2. Theoretical framework

### 2.1. Characterizing physical activity

Adolescents are not physical active enough (Pate, et al., 1994; Bungum & Vincent, 1997). This has consequences for their health (Sisson & Katzmarzyk, 2008). Physical activity means all muscular activity through which the body uses energy (Sallis & Owen., 1997) and expresses itself in many forms: for example walking, biking or team sport. The three components that determine physical activity are duration, frequency and intensity (Courneya & McAuley, 1994). Nederlands Norm Gezond Bewegen (NNGB) also uses these three components. The norm for adolescents is one hour (duration) of moderately intensive (5-8 MET's: measures for intensity) physical activity per day (frequency), including at least two times per week (frequency) of intensive activities (intensity) (Jongert, 2012).

The duration is the length of the activity, often expressed in hours, minutes or seconds. The duration of an activity can be measured as one session or it can contain interval sessions. Longer time slots of physical activity may however be associated with additional health benefits above and beyond those associated with more intervals between the sessions of physical activity (Mark & Janssen, 2009). Frequency stands for how often physical activity takes place. It is measured per time slot, for example per day or week. The intensity of the exercise activities can be expressed in Metabolic Equivalents (METs). METs indicate the level of energy consumption. At rest, a person consumes 1 MET of energy. Energy consumption is linked to oxygen uptake. At rest (at 1 MET energy consumption), oxygen uptake is 3.5 ml/kg/min. The METs are used in the exercise standards to indicate the intensity of physical activity (Jongert, 2012).

### 2.2. Urban Form Influences on young adult Physical Activity Patterns

Urban design influences physical activity among children, according to Ding et al (2011). Young children's physical activity is influenced by traffic, access and proximity to recreational facilities, mixed land use, residential density, and walkability. For adolescents, mixed land use and residential density stimulate physical activity in the environment (Ding, et al., 2011). Van Loon and Frank (2011) made an overview of influencing elements in the built environment (figure 1).

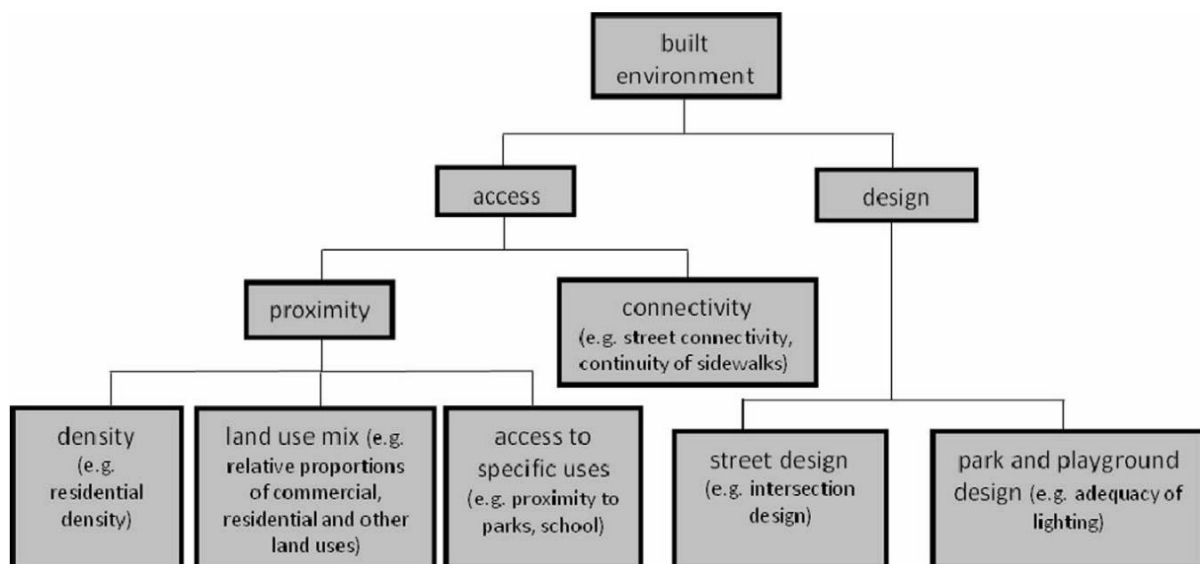


Figure 1.: A typology of built environment correlates of physical activity (Loon & Frank, 2011)

By defining the elements that influence the physical activity of young people, "I used literary research to find an empirical answer the sub- question "What spatial elements encourage physical activity?". Spatial elements that encourage physical activity are safety, facilities and access to these facilities (Davison & Lawson, 2006; GROW, et al., 2008; Loon & Frank, 2011).

## 2.3. Characteristics of the built environment regarding Physical Activity

### *Safety*

For children, safety in terms of safe routes, cross-overs and slow traffic speed, is an important factor influencing physical activity in a neighbourhood (Loon & Frank, 2011). However, for adolescents these factors are less significant. Davison and Lawson argue: "In general, no effects were found for perceived neighbourhood safety or the perceived safety of play areas." However, their studies about attributes influencing children's physical activity showed evidence that objective measures of crime rates reported a significant negative association between crime and children's physical activity (Davison & Lawson, 2006). Similarly, signs of deprivation and wild dogs affected the physical activity of young people (Davison & Lawson, 2006). Their research concludes that adolescents' perception of crime threat in the neighbourhood is negatively related to their physical activity. This is also confirmed in earlier studies (Taylor WC, 2000; Brodersen, et al., 2005). In addition, adolescents with better perceived pedestrian infrastructure (e.g., sidewalks, lighting) were more likely to walk or bike to sites (GROW, et al., 2008). In the literature that focuses on adults, similar results have been found (Saelens BE, 2003). Safety can be measured in terms of neighbourhood disorder (Molnar, et al., 2004), neighbourhood social economic status and neighbourhood social interaction (social capital) (Loon & Frank, 2011).

### *Facilities*

Next to safety, facilities to practice physical activity are important motives to be physically active (Loon & Frank, 2011). In the research 'Factors Influencing the Physically Active Leisure of Children and Youth: A Qualitative Study' of Thompson, reasons not to be physically active are mentioned, such as insufficient or inadequate recreation facilities (i.e., tennis courts, skate park). Also, facilities being too far away, costly, or inappropriate are negatively influencing physical activity among adolescents (Thompson, et al., 2005). Besides, Davidson and Lawson found evidence of a relationship between the availability of facilities in neighbourhoods and the availability of equipment and permanent activity structures in school play areas. Those school areas were associated with higher physical activity (Davison & Lawson, 2006).

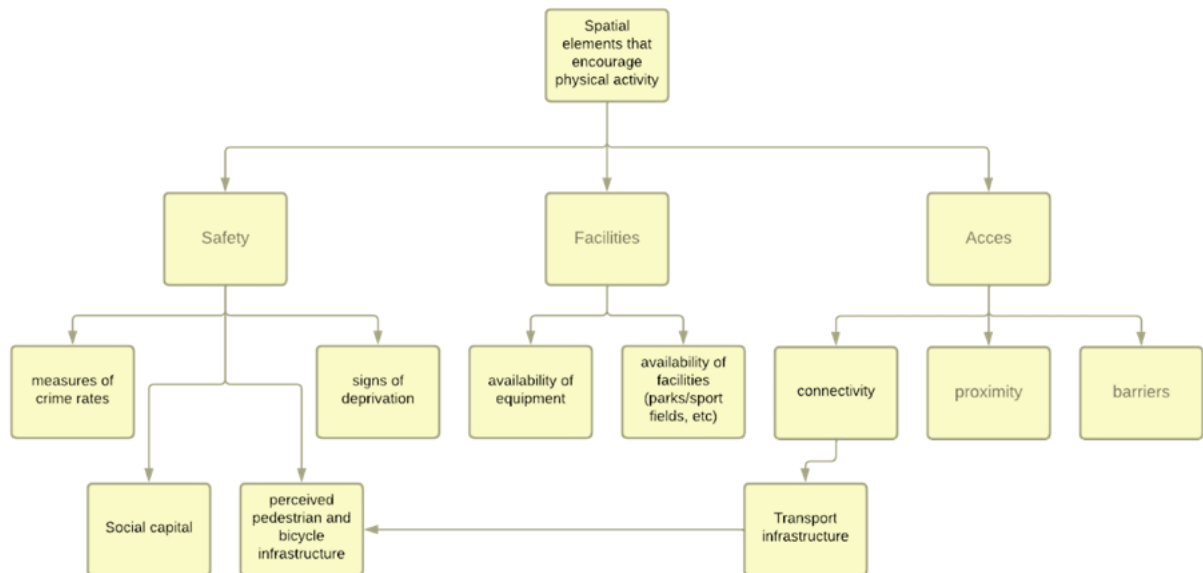
### *Access & barriers*

Access to these facilities influences the physical activity of adolescents. Access contains connectivity and proximity (Loon & Frank, 2011). Results across various studies showed that children's participation in physical activity is positively associated with transport infrastructure. Transport infrastructure, which facilitates connectivity, influences the physical activity of children (Davison & Lawson, 2006). A young person that has access to a recreation site by walking or biking is very likely to use it for physical activity. Here proximity (density, land use mix, access to specific places) influences physical activity (Loon & Frank, 2011). However, close proximity to a recreation site does not necessarily mean that a young person has access to a site. Physical barriers such as highways can cause inaccessibility, or a lack of desired features can be a reason for young people not to use the site (Veitch, et al., 2008). Walkable built environments score highly in terms of walkability, transport and physical activity, with some evidence of similar associations with youth physical activity (GROW, et al., 2008).



### *Overview Characteristics of the built environment regarding Physical Activity*

Spatial elements that encourage physical activity for adolescents are safety, facilities and access to these facilities. Figure 2 is a variant of the overview of van Loon and Frank (2011) and shows an overview of these elements and their sub-elements that influence each other.



*Figure 2: Spatial elements that influence physical activity*

## 2.4. Mediating Influences on Physical Activity

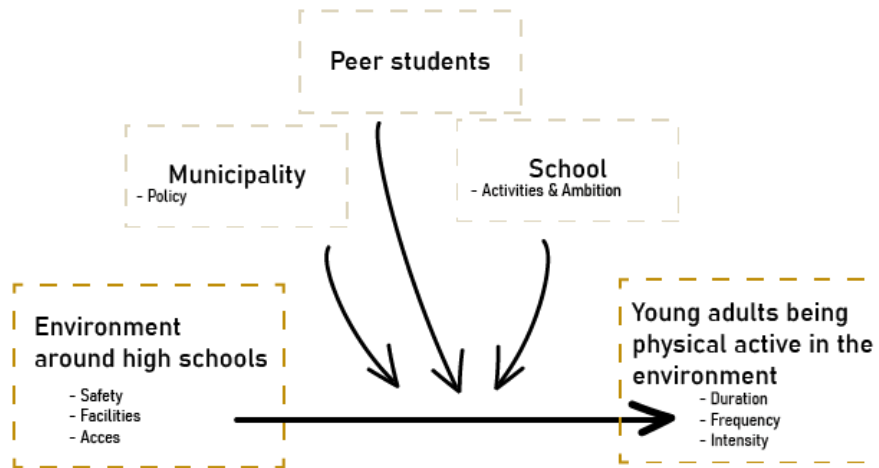
### *Municipality*

Municipalities are responsible for the design of neighbourhoods and visions about the neighbourhoods around secondary schools. Besides designing the neighbourhoods, the municipalities are responsible for policies. Policies and interventions are important when it comes to the school environment in order to use it as places where physical activity can take place (Fein, et al., 2004). Kostrzewska (2017) explains that when stimulating physical activity, it is not enough to have a good design, but the policy and the people behind it also need to be considered. 'Sport is present in cities thanks to active people, not thanks to sports facilities. Places of importance to residents are created by taking action, not just by drawing up design plans' (Kostrzewska, 2017, p. 9). Policies in the environment influence physical activity in the environment.

Furthermore, the schools' social environment is also influencing students. Peers, family and physical education teachers' influences are all positively associated with physical activity and activity levels of adolescents (McLellan, et al., 1999; Godin & Shephard, 1986; Moon, et al., 1999; Leslie, et al., 1999; Wold & Anderssen, 1992; Gottlieb & Baker, 1986). This implies schools can influence their students by organising activities. Additionally, schools can lead students towards other behaviour with their ambitions/guidelines on physical activity and students also influence each other.

## 2.5. Conceptual model

Characteristics of the environment around secondary schools influence characteristics of adolescents being physically active. Peer students, the municipality and school employees can contribute to or negatively affect this. *Figure 3.*



*Figure 3: conceptual model*

### 3. Methodology

This research uses qualitative data collection in the form of semi-structured interviews. A single case qualitative research was chosen over quantitative research because quantitative research can investigate more cases, but not the experiences of adolescents. Since the study is about physical activity, and therefore about behaviour of adolescents, it was important to investigate experiences and to engage in deeper conversations about how this behaviour can be influenced. Quantitative research would not provide such insights (Yin, 2004).

#### 3.1. Location of the high school

It is important that the case for this study is located in a promising area, so that there are still options to improve the environment. Other requirements are willing to cooperate and several grades. The case in this research is the Christelijk Lyceum Delft (CLD), located in Delft, the Netherlands. Using this case was a pragmatic choice because there were already warm contacts and they are interested in the research subject. The school is built in a relatively dense built-up area, surrounded by residential areas. As you can see on the map in figure 4, the CLD is not the only secondary school in the area. Less than 100 metres away is 'the Stanislascollege Westplantsoen', situated next to a park. The two schools are separated by a provincial road (Beatrixweg). As a result, the park is about a kilometre's walk or bike ride away from CLD. Next to CLD are the sports fields of the Stanislascollege. These are private and can be reached by students of the Stanislascollege via the 'Stanislasbridge'. This bridge is not open to the public.

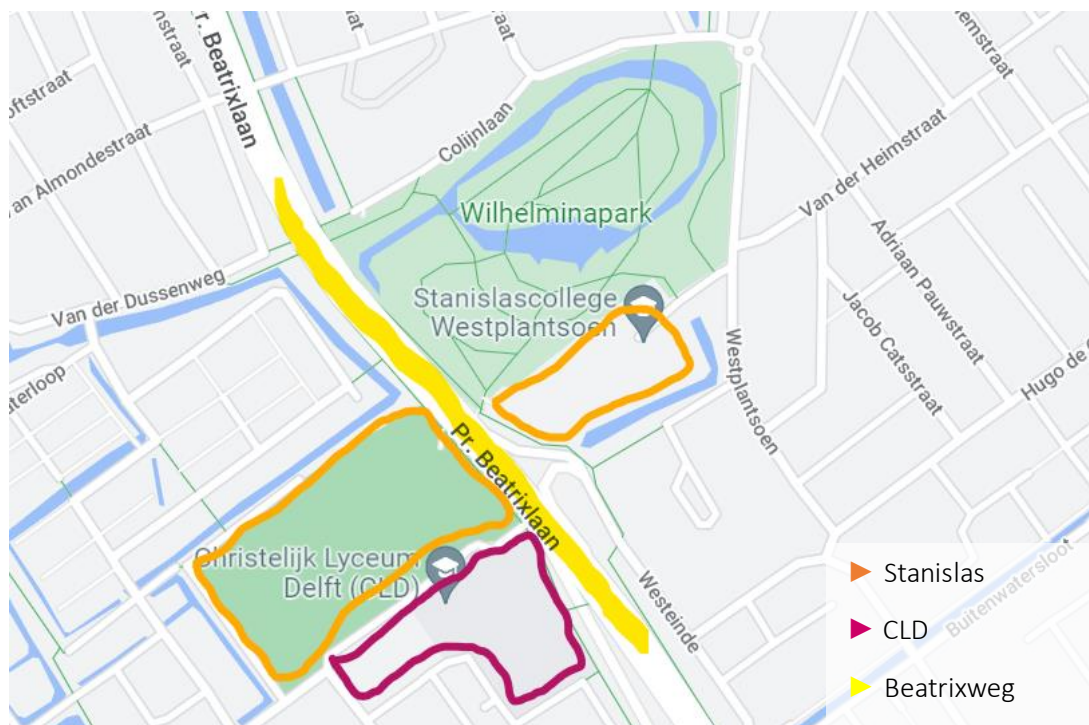


Figure 4: Map schools and provincial road in Delft

#### 3.2. Interviewees

I interviewed 15 adolescents of different ages, of which 47% were male and 53% female (table 1). The adolescents who were interviewed were asked to participate in the hallways of the school on the day itself. In this way, as diverse a group as possible was interviewed without being influenced by teachers' preferences. The interviews with the adolescents were held in groups of two and three to create a relaxed environment for the interviewees to make them speak more freely.

*Table 1: Information about the interviewees – Adolescents*

	Age	Male (M)/Female (F)
1	12	M
2	12	M
3	12	M
4	13	F
5	13	F
6	13	M
7	14	F
8	14	F
9	15	M
10	16	F
11	16	M
12	17	M
13	17	M
14	17	F
15	18	F

Next to the student interviews I interviewed three different teachers, two of whom are team managers and the school's adjunct director/location manager. The team managers are responsible for the guideline for one or more grades. In addition to managing a grade and its teachers, they both spend a number of hours teaching in the classroom. One of them is a sports teacher and the other a history teacher. This way, the sports teacher was able to point out the ambitions of the sports teachers. The adjunct director was asked about his vision on youth physical activity and about his vision on environment as location manager. Furthermore, I interviewed a spatial designer of the municipality of Delft who designs schoolyards, among other things. The purpose of the interview was to investigate the perspective of the municipality on this issue and get an inside view on the topic from an expert perspective. She was interviewed about how she works with the current policy and how it stimulates the development of an active environment.

*Table 2: Information about the interviewees – School Employees and Spatial Designer*

	Function...	Interviewed because...
1	Team manager / Sports teacher	Vision on adolescents Physical Activity as a team manager and as a sports teacher
2	Team manager / History teacher	Vision on adolescents Physical Activity as a team manager and as teacher that is more neutral about physical activity
3	Adjunct director/location manager	Vision on adolescents Physical Activity as adjunct director and vision on environment as location manager
4	Spatial designer municipality of Delft	Perspective of the municipality and expert view on designing

Interview questions of all the interviews can be found in the Interview Guide in appendix I.

### 3.3. Data analysis

To analyse the data I transcribed and coded the interviews. The coding process started with a deductive coding method (Smith, et al., 2017; Medelyan, (n.d.)). The categories safety, facilities, access/barriers and influences emerged from the theoretical framework and the sub questions. In the first instance, statements from the interviews were subdivided on the basis of these categories.

New codes were discovered during the coding process, so the next step of coding was done by means of inductive coding (also called open coding). Similar answers to questions are categorised to make it possible to look for patterns. Next, the coded transcriptions will be used to determine a pattern, as defined by Smith, et al (2017) and Medelyan ((n.d.)).

The coding tree can be found in appendix II (coding tree). Transcriptions can be requested from the author.

### **3.4. Ethics**

I conducted the interviews in Dutch, since they took place in Delft, the Netherlands. The school gave permission to conduct interviews about the environment around the school. The interviews do not address home situations or personal issues, so the consent of the interviewed adolescents was sufficient. Additional consent from parents of underage adolescents was not needed. In the interviews with the adolescents, their age was taken into account by using easy-to-understand language and many examples with the questions if clarification was needed (Couper, 2018).

All interviews were anonymous. Results are presented by using paraphrasing because the quotes are translated to English. Participants filled in a consent form before participating in the interview, which can be found in appendix III.

## 4. Results

### 4.1. Adolescents' perspective

The interviews showed that adolescents are positively and negatively motivated in various ways to be physically active in the environment. The interviews also demonstrate that young people can be influenced by teachers and fellow students, to be or not to be physically active in the environment.

The case study showed that adolescents go outside because it is healthy and to get some fresh air. Furthermore, when there is enough time (for example two consecutive gap hours), adolescents like to go to the city centre. The adolescents indicated that they perceived the environment around the secondary school as safe.

*"When we have a bit more time in between classes, we sometimes go to the city centre or something like that" – Student 14yrs*

*"I am physically active because it is good for your body and fresh air also helps with studying" – Student 13yrs*

Changes that could make the environment more suitable for adolescents to be physically active during the day, would be facilities such as a basketball court, a football field, equipment that can be borrowed from the desk (ball/ ping pong tools) or space for greenery or games.

*"If there had been a basket, I think I would keep a ball in my locker" – student 16yrs*

*"Just a little field to play sports on would be nice" – student 12yrs*

*"If the desk would lend out things, for example ping-pong balls, I would be more likely to go and play there" – student 18yrs*

Contrary to the motivations above, the adolescents do not actually exercise plenty during the school day. The interviews indicated that there are no facilities in the neighbourhood or at the schoolyard. The current schoolyard consists mainly of bicycle parking places, some benches and a ping-pong table. The adolescents implied they had to bring their own equipment in order to use the ping-pong table. There is little green and a lot of built environment. The adolescents argued they cannot use the sports fields next to the school and the park on the other side of the road is not accessible.

*"A green space at all would be nice" – student 14yrs*

*"The Wilhelminapark is nearby, but you can't go there during your break, that is too far" – student 14yrs*

*"Next door there are sports fields, but we are not allowed to access them. They are used by the Stanislas" – Student 17yrs*

Furthermore adolescents like to play games on their phones during breaks, alone or together. In the case study, phones and fellow-students are important factors for adolescents' behaviour.

*"If others don't feel like going out, but you do, then you don't go, because you don't want to be alone either" – student 12yrs*

*"Usually, we sit at a table with a group of students during a break or a gap hour. Then we just talk, or we spend time on our phones" – student 17yrs*

Contrarily, fellow-students also influence each other in a positive way, for example by competitiveness. Likewise, some students mentioned using the sports hall during the break to play football with friends.

*"if there were more people outside at some basketball court, I would join them" – student 16yrs*

*"I find exercising more fun with other people" – student 13 yrs.*

*"Playing together with friends against other people. We play together against people we know, that's just fun" – student 15yrs.*

Furthermore, students are influenced by the school and, for example, by activities that are organised:

*"In biology we are explained why it is important to exercise" – student 13yrs*

*"During mentor lessons we sometimes do assignments outside" – student 13yrs*

*"In the break they organise 'pauzetoernooien', then you can do sports. I sometimes take part in that. Also they organise sport days at the end of the year" – student 15yrs*

Besides positive and negative motivations to be physically active, some adolescents also mentioned the transition in behaviour when they started secondary school. At primary school children play outside. At the age of 12 or 13 they switch to secondary school. From then onwards, it is expected not to play in the schoolyard anymore and behave differently.

*"It is sad that there are no playgrounds in the neighbourhood" – student 13yrs*

*"I remember that in my first year at school, I found it weird that we did not play outside anymore during the breaks" – student 17yrs*

*"Maybe, if we would have tree houses people would go outside. People like to sit and play in there" – student 13yrs*

The results of the interviews show that the environment of the school does not meet the requirements of an active environment, defined in the theoretical framework. Students feel safe in the environment, but mention the lack of facilities and the inaccessibility of the sports fields and the park nearby. It is not surprising that the adolescents are not motivated to be physically active during the day. However, the school encourages the students to be active by organizing activities. Students participate in these activities provided by the school. These activities trigger the students, which aligns with the students being influenced by fellow students (e.g. not wanting to do things alone) and competitiveness (peer-pressure). A remarkable result of the interview is the need to play by younger adolescents. The transition to secondary school expects students behave less actively, even though some of them would like to play outside.

To answer the question "What motivates adolescents to use the environment to be physically active?" the literature has shown that safety, facilities and access play an important role in whether adolescents use an environment. The environment lacks (access to) facilities and an improvement in these facilities would help adolescents to be physically active, according to the interviewees. Furthermore, the interviews show that young people in this case are influenced by fellow students and teachers, both in a positive and a negative way. For example, competition has a motivating effect on students. Besides interventions in the built environment, institutional interventions are an important aspect in encouraging adolescents. Activities to encourage physical activity are adopted by the students. Likewise, students mention the inaccessibility of the sports fields, which is an institutional barrier.

## 4.2. School employees' perspective

The school is located in a rather densely built environment with very few green spaces. The school experiences growth, therefore it has to take into account an increasing number of parking spaces for bicycles, while the schoolyard is already almost completely filled with bicycles. Previously, the school used to have a basketball court, which was transformed into a parking lot years ago. It is not feasible to transform it back due to a lack of parking spaces in the neighbourhood. School employees would like to see more greenery in the area, but as described above, this conflicts with (mainly parking) interests. They have the opinion that if there is more green space, adolescents will automatically be physically active.

*“More greenery or more opportunities cause physical activity” – team manager*

*“Back in the days, my school used to be located at a county estate, especially the first couple of years we were very active during the day” – team manager*

*“People feel more comfortable in a greener environment, we could make more use of that” – adjunct director*

*“I also worked at another school. If there is a right environment, youth will naturally be more active” – team manager*

Furthermore, it is unclear whose responsibility it is to facilitate physical activity in the environment. After all, a school already has a lot of responsibilities when it comes to teaching. Comparing with developments at schoolyards of primary schools, these developments took place through initiatives from the government.

*“I think a school has quite a lot to do, at all” – team manager*

*“According to the spatial planning regulations, you get a number of m<sup>2</sup> per student. In terms of sports facilities, but it also notes that you have to put the bicycles somewhere. Outdoor facilities are not mentioned” – adjunct director*

The main opportunity in the area is the sports field next to the school according to school employees. This belongs to the other secondary school on the other side of the road. The school director is already discussing the possibilities with the school and the municipality because this is a matter of institutional organisation.

Although the environment around the school is lacking of facilities, there are a number of well-run initiatives in the school. The development of optional sports lessons is now in process. Besides, during the break, 'pauzetoernooien' are organised. Students participate in these tournaments to compete against fellow students. Furthermore, the school currently works on student well-being. After the corona lockdown, students felt the need to do activities together. This often took the form of physically active activities (e.g. bouldering). However, there is no policy to get students to be physically active throughout the day. Before the corona crisis, there were some initiatives (e.g. the ping pong table). Yet, these initiatives came to a standstill during the corona crisis.

*“The priority now is to keep the school running. The corona crisis has done a lot to the students, which is why we are now working on well-being, and that includes physical activity” – team manager*

The results of the interviews show that the environment around school is not facilitating physical activity, aside from one ping-pong table. Regardless of the lacking facilities, the school has initiatives like the pauzetoernooien, the optional sports lessons and the current activities regarding well-being that actually encourage physical activity. This is a remarkable result, especially since there is no policy written on this subject. Another notable result is that the school employees think that it is not their responsibility



to encourage the adolescents to be physically active in the environment around school, because they do not have the time and resources to accomplish this.

To answer the question “How can secondary schools facilitate physical activity in the environment for adolescents?” I looked into the built and institutional aspect. In the built environment the school could provide facilities (e.g. sports fields, greenery, etc.). However, a school needs time and resources to achieve this. If the school cannot obtain this, they can inquire institutional matters. For example the accessibility of the sports fields next door or providing (and communicating about) equipment. Furthermore, schools could facilitate physical activity by organizing activities (e.g. the successful initiatives at CLD).

### 4.3. Local governments' perspective

For this school it is important to start by creating space in order to make room for facilities. Organising parking space more efficiently or stacking bicycles creates space for facilities. Besides, if there is a pleasant outdoor space, adolescents will automatically go outside and physical activity will follow. Furthermore, agreements should be made about the fields next door according to the spatial designer.

*“It all starts with making space, just make sure you have some free land, then you can do something with it. In that case, I would use less space for parking bicycles. Maybe they can stack the bikes” – Spatial designer municipality of Delft*

Furthermore, the municipality has no policy on active environments around secondary schools. Policy is written on such a broad level that designers can interpret this according to their own preference. The schoolyards are property of the secondary schools, which means that the municipality is not responsible for the design. The municipality is responsible for the surrounding area.

The results show that in the current situation, the municipality does not consider the schools' environment to encourage physical activity for adolescents. Yet, there is a lot of knowledge about spatial development on hand. According to the designer, creating space is the starting point for physical activity in the environment.

To answer the question “How can the municipality encourage physical activity in the environment amongst adolescents?” is bilateral. Knowledge about opportunities and possibilities in the neighbourhood is available at the municipality. With this information they can contribute and realise obvious opportunities. However, the municipality is responsible for the surrounding area and could therefore stimulate physical activity here by providing facilities and access to facilities.

### 4.4. Comparing perspectives

The interviews show clear evidence of the absence of (access to) facilities in the neighbourhood. Knowledge about spatial development (e.g. smart parking) could help the school with their space shortages. Furthermore, the access to facilities is primarily an institutional matter. The lack of policy on the subject of physical activity for adolescents in the schools' environment is remarkable. Yet, this is not surprising since both parties do not feel responsible for the environment around schools.

## 5. Conclusion & Discussion

This study has researched how the environment around secondary schools can encourage physical activity among adolescents. The qualitative case study is carried out at the Christelijk Lyceum Delft (CLD), a secondary school in a densely built environment in Delft, the Netherlands. The results are in line with the literature. Facilities (e.g. sports facilities, greenery and equipment) would encourage adolescents to be physically active (Loon & Frank, 2011; Thompson, et al., 2005; Davison & Lawson, 2006). Besides, access to these facilities is important (Loon & Frank, 2011; Davison & Lawson, 2006; Veitch, et al., 2008; GROW, et al., 2008). In a densely built neighbourhood facilities can be nearby, but not accessible due to physical or institutional barriers. Moreover, students are influenced by peer-pressure (e.g. by competitiveness or not wanting to do things alone) and school (e.g. by organised activities) (Fein, et al., 2004; Kostrzewska, 2017). The municipality can influence opportunities in the neighbourhood. Younger adolescents that just start secondary school do sometimes want to play during breaks, like they are used to at primary schools. This is a remarkable result that is a new insight compared to the literature.

### *'How can the environment around secondary schools encourage physical activity of adolescents?'*

The answer to this research question consists of a few elements: influences in the physical environment, institutional influences and influencing factors to be taken into account. Influences in the physical environment contain (access to) facilities. If a school is located in a neighbourhood that has sports facilities or green spaces, adolescents are more likely to be physically active during the day. By using space smarter, more can space for facilities be realised. Smarter parking policies can create space. For example, by stacking, using space underground or on a roof, the space on the square can be used in a different way. However, institutional barriers (e.g. private sports fields and no policies) and lack of a clear problem owner result in complicated situations where obvious interventions are challenging to implement. Neither the municipality nor the school has a written policy on the subject. This is an institutional dilemma. It indicates that this is an under-researched topic. Identifying a problem owner is complicated because in the current situation it is not a problem of one of the parties. This is where I would suggest a future line of inquiry. In my opinion, it would be logical if the municipality takes the lead in improving the physical environment, since they are responsible for the surrounding area and could therefore stimulate physical activity by providing facilities and access to facilities. Additionally, they have knowledge about opportunities and possibilities in the surrounding neighbourhood. The school does not have these resources. However, to draw conclusions, further research is needed.

Furthermore, the sports fields located next to the school are an example of low-hanging fruit that can be improved by cooperating. The fields are adjacent to the school, yet the students of the school have no access to these fields while the school is struggling with spatial conflicts because of space shortage. This is where I would suggest a second future line of inquiry about implementing an open sport park concept (van Hees, 2021).

Even though the built environment does not encourage physical activity, the school stimulates the young adults to be physically active with activities. Given this, it can be concluded that the school plays an important role in influencing its students. A school can facilitate physical activity by organizing activities. Regardless of the lacking facilities, the school in this case has initiatives like the pauzetoernooien, the optional sports lessons and the current activities regarding well-being that actually encourage physical activity.

Moreover, remarkable opportunities might be revealed by this research. Some adolescents mentioned the transition in behaviour when they started secondary school. In primary school, children play outside. At the age of 12 or 13 they switch to secondary school, and from then onwards, it is expected to not play in the schoolyard anymore and behave differently. This indicates a need to play by younger adolescents. The transition to secondary school means that students are expected to behave less actively, even though some of them would like to play outside. This provides opportunities for behavioural change regarding physical activity among young adults, and therefore a third future line of inquiry about this subject can be very interesting.

Limitations of this research are related to the nature of this research. This is a single-case study, which means conclusions are drawn based on only one situation. Conducting a qualitative single-case study means that results could vary researching another case (Couper, 2018). However, physical activity in a secondary school environment is an under-researched topic. This study contributes as an explorative research that addresses the societal importance of this topic. Although, quantitative data research might gather data about more cases, I would not be able to identify the complexity of the problem. Whereas qualitative data research provided data by further questioning (e.g. no policy, but activities and the younger adolescents' need to play). Besides, qualitative data research gives an indication of the motivations of the interviewees. For instance, the way teachers talked about their school and students indicated that they really cared about the wellbeing of the students. Concerning this topic, this is important information, because a school that is less concerned about student well-being, might not be interesting in improving their physical activity. In the optimal circumstances, mixed methods would be used in which the scope and complexity of the problem would be covered. Further research could contribute to this.

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## Appendices

### Appendix I – Interview Guide

#### Questions adolescents

The interviews are going to be at 'het Christelijk Lyceum Delft', a secondary school located in Delft, the Netherlands. Contact person of this school is a team manager/sports teacher. He approved this research to be done at the school. The youth will be approached in their school and the interviews will be done at a quiet spot in the school.

#### *Openingsvraag*

- Hou je van bewegen? Zo ja, wat vind jij een fijne vorm van fysiek actief zijn (wandelen/teamsport/sportvereniging/fietsen)?
  - Zo nee, waarom niet?

#### *Vragen over bewegen*

Onderscheid maken in antwoorden of iets sporten, functioneel bewegen: vervoer, of ander bewegen is:

- Hoeveel beweeg je tijdens een schooldag? (denk aan sport/vervoer/andere fysieke activiteiten)
  - En op school?
  - Als je beweegt tijdens een schooldag, waar doe je dat dan?
  - Hoe veel/vaak

#### *Vragen over de omgeving*

- Stimuleert de omgeving van de school om naar buiten te gaan?
  - De wijk?
  - De buitenruimten van de school (het schoolplein)
- Wat voor faciliteiten zou jij graag willen zien rond om de school die je tijdens een schooldag zou kunnen gebruiken om te bewegen (parken/ sportveldjes/ etc.)?
- Welke faciliteiten zijn er rond school
- Is er rondom jouw school een (sociaal) veilige omgeving om te bewegen? Denk bij een sociaal veilige omgeving aan een omgeving waar je in je eentje durft te lopen waar je niet het gevoel hebt dat er achter elk bosje iemand staat die je komt overvallen.
  - Hoe ziet voor jou een sociaal veilige omgeving er uit?

#### *Vragen over de invloed van de school*

- Hoe word je vanuit school gestimuleerd om door de dag heen te bewegen?
  - Ga je ook wel eens naar buiten in de pauze? Waarom wel/niet?
    - Waar kan je dan naar toe? Wat zou je dan gaan doen?
- Hoe ziet de ideale omgeving rond de school om te bewegen er voor jou uit?
  - (sportveldje/wandelroute/fietsunits waar telefoons mee opgeladen kunnen worden/ etc.)

#### *Vragen over motivatie en beleid*

- Wat zou jou motiveren om vaker actief te zijn door de schooldag heen? (denk aan faciliteiten/ruimte/tijd)
  - Welke aanpassingen in de omgeving zouden hier bij helpen (denk aan een basketbal veldje toevoegen o.i.d.)
- Hoe besteed je pauzes en tussenuren? Hoe zou je deze het liefst besteden?
  - Zou je deze ook op een actieve manier willen besteden?

#### *Afsluitende vraag*

- Heb je verder nog vragen of opmerkingen?

### Questions school employees

The interviews are going to be at 'het Christelijk Lyceum Delft', a secondary school located in Delft, the Netherlands. Contact person of this school is a team manager/sports teacher. He approved this research to be done at the school. The teachers will be approached in their school and the interviews will be done at a quiet spot in the school.

- [openings vraag]: Wat is uw functie bij de school precies en wat houdt dat in?
- Stimuleren jullie leerlingen om, naast de reguliere sport/gymlessen, te bewegen door de schooldag heen?
  - Zo ja, hoe?/is er variatie in aanbod (georganiseerde sport lessen en vrije tijd om te bewegen)?
  - Nee, waarom?
  - mogen leerlingen daar over meedenken?

*\*\*Uitleg onderzoek (elementen actieve leefomgeving jongeren: safety/acces/facilities) en situatie Stanislas/CLD + plaatje\*\**
- In welke mate draagt de schoolomgeving bij aan een jeugd vriendelijke omgeving, een omgeving waar jongeren graag zijn?
  - Zo niet, waarom niet?
  - Waar zouden kansen zijn?
- Het is belangrijk dat Jongeren meer gaan bewegen. Hoeveel prioriteit heeft dit bij de school?
  - Wat doen jullie daar praktisch mee
    - En hoe gebruiken jullie de schoolomgeving daarvoor?
- Een tijdje terug zijn er door de gemeente heen veel schoolpleinen van basisscholen vergroend en aantrekkelijker gemaakt, heeft jullie school ook plannen voor de functie van het plein bij de school?
  - Waarom wel/niet
- Wat voor ambities heeft de school qua beleid voor een gezonde leefomgeving/ actieve leefomgeving?
- Nu we zo dit gesprek hebben gehad en de kaart van de twee middelbare scholen er bij pakken. Stel de school wil de omgeving gebruiken om fysieke activiteit onder jongeren te stimuleren. Waar denkt u dat de kansen liggen en wat voor rol zou de school hier in hebben?
  - hoe kunnen jongeren hier bij betrokken worden?
  - Zou de school jongeren hier bij betrekken (in de plannen)? Zo ja, hoe?
- [afsluitende vraag]: vragen/opmerkingen

## Questions municipality

This interview is held online with an employee of the municipality. This person has been contacted via a project manager. He sent the interview request to policymakers. The policymakers said that there was no literal policy on neighbourhoods around secondary schools, so they forwarded the request to a designer. The designer that has been interviewed has experience with designing school yards of primary schools and in doing a project in the neighbourhood next to the school, so she is familiar with the case.

Interview: Policy-maker spatial planning

- [openings vraag]: Wat is uw functie bij de gemeente precies en wat houdt dat in?
- Werken jullie bij de gemeente met het concept 'gezonde leefomgeving, of actieve leefomgeving' / beweegvriendelijke omgeving? Hoe geeft de gemeente hier invulling aan?
 

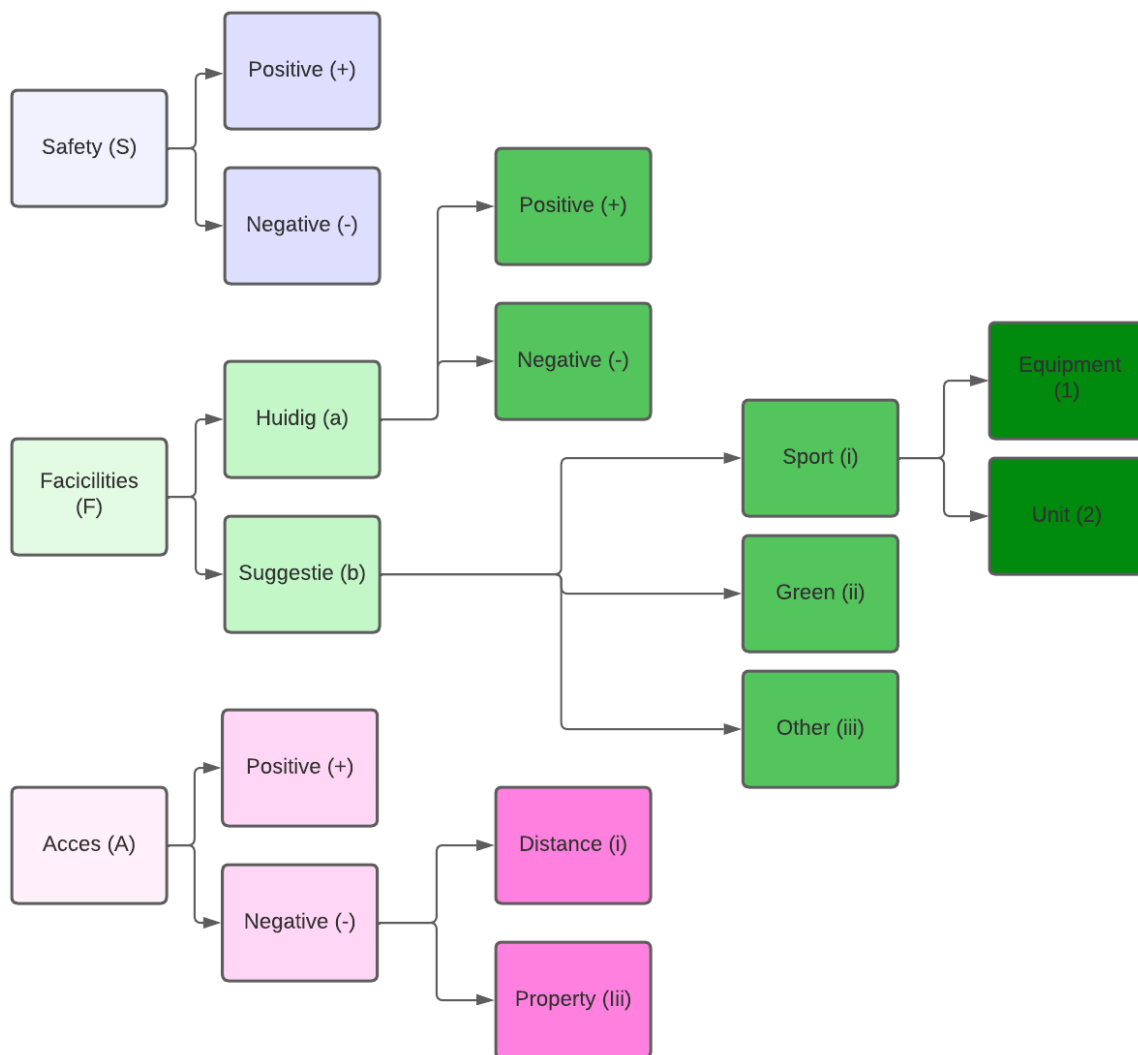
*\*\*Uitleg onderzoek (elementen actieve leefomgeving jongeren: safety/acces/facilities) en situatie Stanislas/CLD + plaatje\*\**
- In welke mate draagt de schoolomgeving bij aan een jeugd vriendelijke omgeving, een omgeving waar jongeren graag zijn?
  - Zo niet, waarom niet?
  - Waar zouden kansen zijn?
- Het is belangrijk dat Jongeren meer gaan bewegen. Hoeveel prioriteit heeft dit bij het maken van plannen in de omgeving?
  - Op wat voor manier wordt het meegenomen in de ontwikkeling en het ontwerp van plannen?
    - En plannen specifiek met betrekking tot de schoolomgeving?
  - Hoe gaan jullie hier mee om?
- Hebben jullie beleid om mensen meer fysiek te laten bewegen?
  - En voor jongeren specifiek?
- Hoe is dat terug te zien in het beleid?
  - Ruimtelijk, gezondheid, sport, infra groen etc.?
- Een tijdje terug zijn er door de gemeente heen veel schoolpleinen van basisscholen vergroend en aantrekkelijker gemaakt, heeft de gemeente ook plannen voor een fijne omgeving om te bewegen rond middelbare scholen?
  - Waarom wel/niet
- Wat voor ambities heeft de gemeente qua beleid voor een gezonde leefomgeving/ actieve leefomgeving?
- Nu we zo dit gesprek hebben gehad en de kaart van de twee middelbare scholen er bij pakken. Stel de gemeente wil van deze omgeving een actieve omgeving maken om jongeren actief te houden. Waar denkt u dat de kansen liggen en wat voor rol zou de gemeente hier in hebben?
  - hoe kunnen jongeren hier bij betrokken worden?
  - Heeft het volgens de gemeente een meerwaarde om jongeren er bij te betrekken.
- [afsluitende vraag]: vragen/opmerkingen

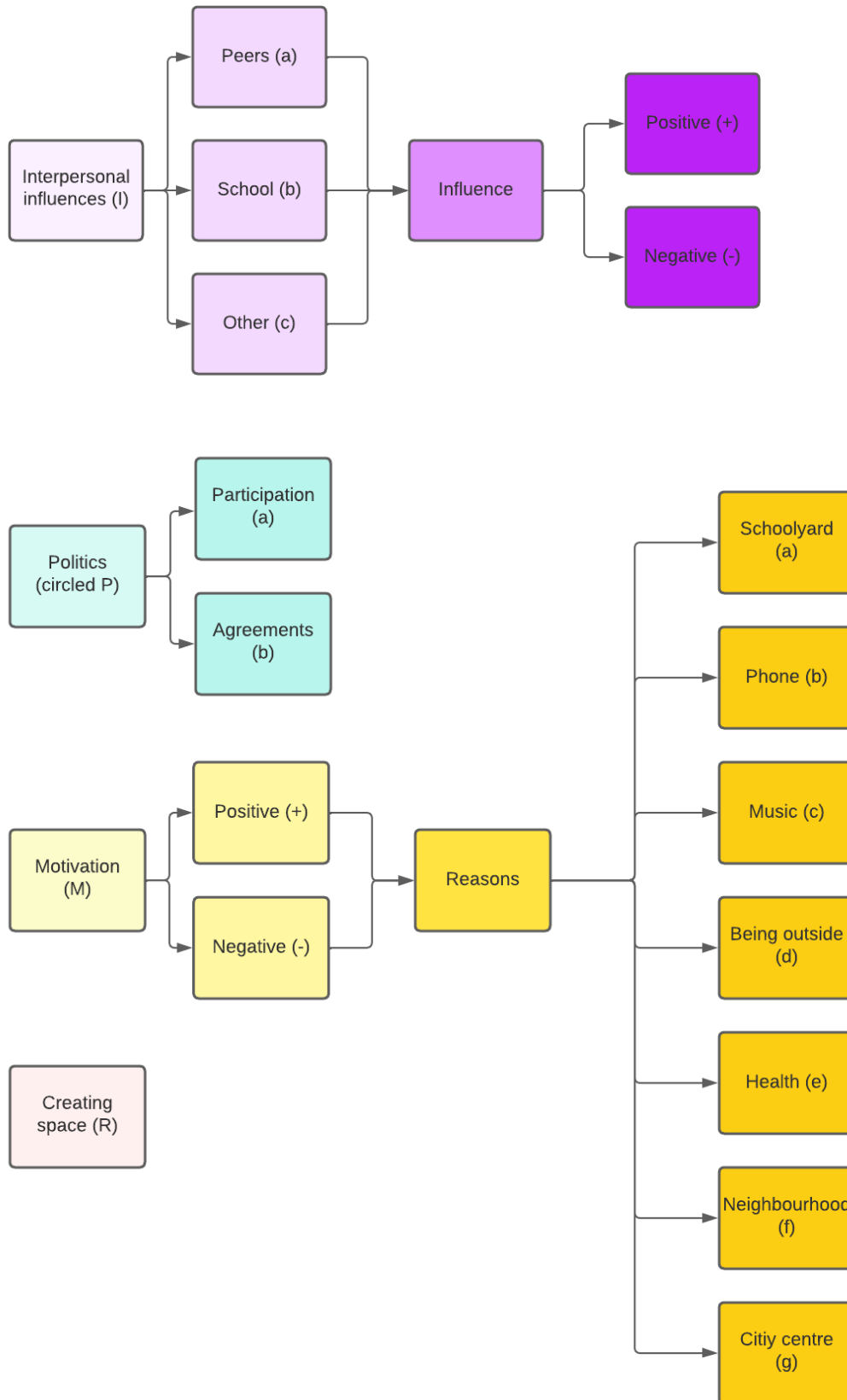


## Appendix II – Coding tree

The coding process started as a deductive coding process. The first four categories (safety, facilities, access and interpersonal influences) are determined by the theoretical framework. During the coding process other categories came up. For example creating space, reasons for motivation to go outside and politics (as in things that needs to be organised on an governmental level). Besides more sub-categories came up. The categories and their sub-categories together form a coding tree.

### Coding tree





## Appendix III – Consent form

### Informatie over het onderzoek: doel, data en data verwerking

Dit interview draagt bij aan het onderzoek naar fysieke activiteit van jongeren in de omgeving van hun middelbare scholen. De audio-opname van het interview wordt uitgetypt en verwerkt in de verslaglegging van het onderzoek.

### Rechten deelnemers

Resultaten van het onderzoek kunnen met deelnemers worden gedeeld als het onderzoek is afgerond. De deelnemers kunnen zich op elk ogenblik en zonder gevolgen uit het onderzoek terugtrekken, nu of in de toekomst.

### Informatie over de mensen met toegang tot de data

Onderzoeker: *ing.* M. (Minke) Kluivingh  
*Pre-master student Society, Sustainability and Planning*  
*University of Groningen*

Begeleider: *dr.* F. (Femke) Niekerk  
*Assistant Professor in Spatial Planning*  
*University of Groningen*

### Contactgegevens

Voor meer informatie, neem contact op met Minke Kluivingh: [m.kluivingh@student.rug.nl](mailto:m.kluivingh@student.rug.nl)

### Gelieve aanvinken bij akkoord

- Ik ga ermee akkoord dat het interview wordt opgenomen
- Ik ga ermee akkoord dat de gegevens van het interview in het onderzoek worden verwerkt.
- Ik begrijp dat ik mij op elk moment zonder het opgeven van een reden kan terugtrekken.
- Ik heb de informatie over het onderzoeksproject en het doel van de gegevensverwerking gelezen en begrepen.
- Mijn deelname aan het interview is vrijwillig.
- Ik ben geïnformeerd over mijn rechten voor dit interview.

### Deelnemer

Naam:

Datum:

Handtekening:

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### Interviewer

Naam: Minke Kluivingh

Datum:

Handtekening: