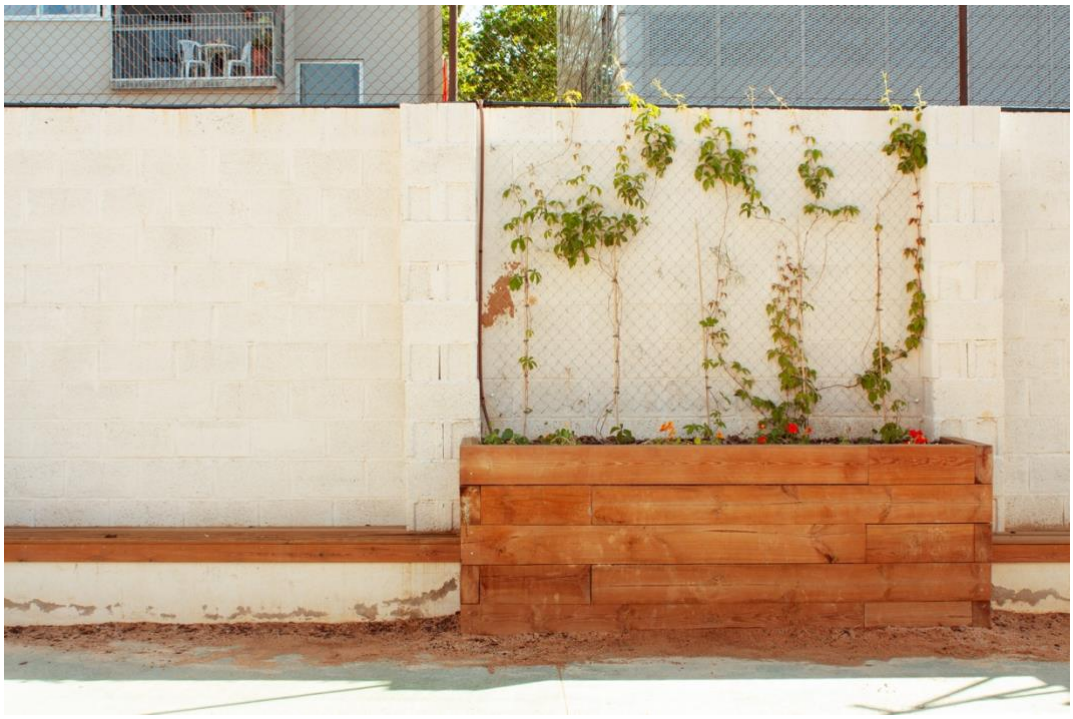
Impacts and perceptions of schoolyard greening: a comparison across various neighbourhoods of Barcelona

Alexandra Mestre Garcia



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This master thesis was an individual paper suggested by my supervisors Filka Sekulova and Isabel Ruiz-Mallén, both researchers at UOC and members of the COOLSCHOOLS project, which is an applied-research project aiming to analyse the benefits of implementing NBS in school environments for climate adaptation in European metropolitan cities. The thesis is tightly linked to COOLSCHOOLS. Although the main guidelines and methods were suggested to me, I had complete freedom in choosing the focus of the thesis.

Journal guidelines

Wordcount: 5,000-7,000 words, excluding references and additional material.

Structure: tittle page, abstract, keywords, main text introduction, materials and methods, results, discussion, acknowledgements, declaration of interest statement, references, appendices, tables with captions, figures, figure captions.

Keywords: between 3 and 6.

Figures: figures should be high quality (300 dpi for colour). Should be supplied in one of the file formats: EPS, PS, JPEG, TIFF

Tables: tables should present new information rather than duplicating what is in the text.

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Abstract

The objective of this thesis is to compare the impacts and perceptions of schoolyard greening of 3 public primary schools in different neighbourhoods of Barcelona, and see whether the social circumstances of the neighbourhood affect the greening and its impacts. This was done by focusing on three categories: the schoolyard (1) as a playground promoting diversity and equity in play and learning, (2) as an outdoor learning space, and (3) as a space to build community. The schools chosen for this thesis were located in 1 low-income neighbourhood, 1 middle-income neighbourhood, and 1 higher-income neighbourhood. I interviewed 5 people of the schools' communities and carried out 6 observations during break times and the weekend. I also collected photographic material to compare the extent of greening in each school and researched data about each neighbourhood. The results of this thesis show that schoolyard greening helps to diversify play and reduce conflict. It also confirms that outdoor learning is beneficial for children, but teachers find barriers to using the schoolyard as an outdoor classroom. Finally, it shows that the community aspect of the schoolyard greening helps to build ties between neighbours, but it is still very weak and solutions should be given to deal with the vegeation maintenance.

Keywords: schoolyard greening, nature, diversity of play, outdoor learning, community

1. Introduction

As the effects of climate change intensify and cities get hotter, urban planners are opting for the renaturing of the city, bringing nature-based solutions (NBS) to increase urban climate resilience. One of the tools being used in large metropolitan cities like Barcelona, Brussels or Paris – among others – is the greening of schoolyards. The projects 'Refugis Climàtics' and 'Transformem Els Patis', carried out by the Barcelona Municipality, redesigned 23 schoolyards in Barcelona, creating green spaces with vegetation, water points and shading constructions. This is also a response to the need to diversify play in the schools of Barcelona and bring more co-educational spaces. Creating other spaces, where different types of play – other than football – are offered, allows children to explore, enhance their curiosity and creativity, which will result in a more equitable and diverse playground. Additionally, the projects also aim to be beneficial for the community by opening the schoolyards' facilities to the neighbours outside school hours.

It is well-known that "exposure to nature is highly beneficial to children's physical and psychological well-being" (Giezen and Pellerey, 2021). Firstly, the greening of schoolyards allows children living in urban areas to access and interact with nature, especially knowing that school is where they spend most of their time. Natural spaces in school provide more space for children's creative and exploratory play (Van Dijk-Wesselius et al., 2022), hence, more diversity of play is brought to the schoolyard. Given the dominance of sports during break time – which are mostly played by boys –, creating other spaces decreases passive non-play behaviours (Ibid.) – especially from girls – allowing children to try other types of games.

Secondly, natural spaces in the schoolyard can also be used for teaching. It has been proven that outdoor learning improves children's academic performance as well as creative and critical thinking (Dyment, 2005). Therefore, by interacting with natural spaces, children would benefit from being involved in the schoolyard's maintenance and from having this incorporated in their curriculum. (Giezen and Pellerey, 2021).

Thirdly, as stated above, the public policies implemented in Barcelona aim for the schoolyard to be a shared space for the community where neighbours can also access natural spaces during non-school hours and build ties between one another. It can be used

for extracurricular activities and/or events, among other activities. However, access to nature is increasingly inequitable. Low-income or predominantly ethnic communities usually face more difficulties to access natural spaces. This is why it is important to integrate green spaces in school, ensuring that "every child has access to nature in places where they are required to spend a significant portion of their daily lives" (Stevenson et al., 2020). Nevertheless, schools with green schoolyards in these neighbourhoods also fear vandalism and, therefore, doubt in keeping their doors open to the public.

For this paper, my interest is in understanding the perspective of those affected by the schoolyard greening. This thesis studies the impacts of schoolyard greening in Barcelona; how is it being used, how is it being maintained, how is it being managed, and how is equality being addressed. This is done by focusing on the three categories briefly described in the previous paragraphs: the schoolyard (1) as a playground promoting diversity and equity in play and learning, (2) as an outdoor learning space, and (3) as a space to build community. It compares these variables between 3 public primary schools in different neighbourhoods in Barcelona – 1 in a low-income neighbourhood, 1 in a middle-income neighbourhood and 1 in a higher-income neighbourhood – to observe the change of practices depending on the neighbourhoods' social conditions. The data collection involved conducting interviews to the schools' headmistresses and teaching staff and observations of children's behaviour during break times. Additionally, with the help of photographic material, this paper compares the extent of greening in each school, which will help explain the difference in the variables mentioned above.

This thesis is tightly linked to the COOLSCHOOLS project, which is an applied-research project aiming to analyse the benefits of implementing NBS in school environments for climate adaptation in European metropolitan cities. They study the different capacities and impacts resulting from the implementation of nature-based climate shelters in school environments from the perspectives of social justice, biodiversity conservation, public health, safety, inclusive governance and quality education.

2. Literature review

There is an increasing body of work acknowledging the benefits of nature and natural spaces on citizens in large metropolitan areas. The urban forester Cecil Konijnendijk

proposed the 3-30-300 green space rule, suggesting that every citizen should be able to see at least 3 trees form their house, have a 30% tree canopy cover in their neighbourhood and not live more than 300m away from the nearest park or green space (Konijnendijk et al., 2022, as cited in Nieuwenhuijsen et al., 2022).
With this rule in mind, a study conducted by the ISGlobal observed that very few citizens (4.7%) in Barcelona met this rule and, when met, it was associated with better mental health, less medication use, and fewer psychologist or psychiatrist visits (Nieuwenhuijsen et al., 2022). More specifically, the current *Eixos Verds* plan that aims to remove concrete and cars from several important roads in Barcelona, to make them pedestrian and greener, could reduce cases of self-perceived mental health by 14%, visits to mental health specialists and antidepressant use by 13%, and tranquiliser/sedative use by 8% (Vidal Yañez et al., 2023).

Nature provides crucial sensory-motor interactions for children's development, "children need experiences to wonder, explore, give meaning, take risks, feel comfortable, be challenged and physically modify the world around them" (Van Dijk-Wesselius et al., 2018). Given that Barcelona is not abundant on natural spaces, greening schoolyards brings children the opportunity to have these experiences. Besides playing a small, but essential, role in renaturing the city, as it can bring numerous benefits to the area and raise environmental awareness (Giezen and Pellerey, 2021).

A significant amount of research has been carried out about the greening of schoolyards. There is evidence that voluntarily engaging with nature can encourage children's emotional, cognitive, social and physical development (Chawla et al., 2014; Giezen and Pellerey, 2021; Kuh et al., 2013; Van Dijk-Wesselius et al., 2018; Van Dijk-Wesselius et al., 2020), as well as reducing stress, anger, inattention and problem behaviour, and enhancing relaxation and peacefulness (Chawla et al., 2014).

2.1. Diversity of play and equality

Regarding the schoolyard as a space for equality and diversity of play, given the dominance of sports at break time and the dominance of boys in this type of play, schoolyard greening opens up the space for other type of activities and other types of play. Van Dijk-Wesselius et al. (2022) observed children's play and non-play behaviour

before and after schoolyard greening, concluding that non-play passive behaviour decreases considerably, mostly due to girls switching from non-play to play behaviour. This confirms Gibson's Affordance Theory (1979, as cited in Van Dijk-Wesselius et al., 2022) that greening the schoolyard brings several different opportunities of play, affordances, that accommodate better to each children's needs, abilities, and interests.

Simon Nicholson developed the Loose Parts Theory (1971) claiming that "in any environment, both the degree of inventiveness and creativity, and the possibility of discovery, are directly proportional to the number and kind of variables in it". That is, when loose materials (parts) are available to children, they are given more opportunities to play around, rearrange the parts and create new objects and patterns, and, therefore, get imaginative, creative and inventive. Chawla et al. (2014) found that the availability of loose parts in nature and, as a consequence, the chances for children to get imaginative make natural spaces a "safe haven" for children. Nature gives children "the value of free movement and free choice" (Ibid.).

Following the same reasoning, Lucas and Dyment (2010) claim that green areas are a promising solution to the gender inequality issue during break times in schoolyards. The authors studied whether the schoolyard's design influences where children choose to play and if this choice changes between boys and girls. They found that the most popular area for both boys and girls was the green area, with no dominance of either gender.

> "Alive with trees, shrubs, native grasses, logs, rocks, and gardens – the children are finding opportunities to engage in non-competitive games, to interact with the natural world, and to play in ways that just are not possible on hard barren asphalt surfaces that favour the sporting preferences of boys." (Lucas and Dyment, 2010)

2.2. Outdoor learning

Knowing that natural spaces are beneficial for children's health and wellbeing, there is evidence that shows that healthier and happier children obtain higher educational achievement (Marchant et al., 2019). Concerning the schoolyard as a space for outdoor learning, the literature suggests that having the class outside the limits of the classroom and/or in a natural space can increase students' creative and critical thinking (Dyment, 2005; Marchant et al., 2019), along with improved academic performance (Dyment,

2005; Stevenson et al., 2020; Van Dijk-Wesselius et al., 2020; Giezen and Pellerey, 2021) and renewed motivation for learning (Dyment, 2005; Van Dijk-Wesselius et al., 2020; Marchant et al., 2019). The freedom that children experience when they leave the four walls of the class allows them to move and express themselves (Marchant et al., 2019). Other demonstrated benefits include increased attention and decreased stress (Chawla et al., 2014; Stevenson et al., 2020; Giezen and Pellerey, 2021). Learning in an outdoors space, there might be background noise and distractions, so students must balance paying attention to the class and the background noise, hence, working on their ability to focus (Marchant et al., 2019)

However, many teachers find a lot of barriers when taking the first step to give lessons outside the classroom. Both Van Dijk-Wesselius et al. (2020) and Giezen and Pellerey (2021) have found that a lack of time and information on outdoor teaching prevent outdoor learning to be part of the curriculum. On the contrary, Dyment (2005) – with 15 years of difference from the previous studies – found that a lack of time and resources was not a barrier for outdoor learning. In addition, Van Dijk-Wesselius et al. (2020) and Giezen and Pellerey (2021) also observed a lack of confidence from teachers.

2.3. Community

When it comes to the community aspect of schoolyard greening, very few research has been done. From a theoretical point of view, it is known that a schoolyard open to the public outside of school hours can be very beneficial for the neighbours to build community ties (Stevenson et al., 2020; Giezen and Pellerey, 2021). Although schools in low-income communities might hesitate to open their doors to the public due to fear of vandalism (Stevenson et al., 2020). There is a big gap in empirical research concerning the community aspect of schoolyard greening, and this thesis aims to provide a small contribution.

In large metropolitan cities, not every child has the same opportunities and access to nature. Pulido (2000) introduced the term environmental racism in an urban context to show how racism shapes places and the relationships between places. She employed the concept of white privilege to see how environmental racism has been produced by urban development processes “in which whites have sought to fully exploit the benefits of their

whiteness" (Ibid.). The author studied the case of Los Angeles where the majority of people who live downtown and are more exposed to pollution are people of colour, and the suburbs are mostly populated by white people; "people of colour's disproportionate exposure to pollution in Los Angeles is not by chance" (Ibid.). This can also be applied to Barcelona, a segregated city, where the North-West suburbs are mostly populated by white people, and immigrants, mostly from the Global South, live downtown, within the borders of 'el Raval'.

Climate change's impacts are linked to historical injustices, such as colonization and its continuing effects nowadays. In Global North cities, such as Barcelona, immigrants from the Global South are the most vulnerable to the effects of climate change, encountering multiple injustices. First, their countries of origin are the least contributors to climate change. Second, in their destination – Barcelona in this case – they usually live in the neighbourhoods with poor quality housing and little access to nature, such as 'el Raval'. Third, they do not usually benefit from adaptation policies and infrastructures, in fact they are often displaced from these infrastructures – i.e., green gentrification (Anguelovski et al., 2022). Additionally, many climate shelters have an entry fee and it is too high of a financial burden for many of them to access these places. Fourth, they have very few opportunities to participate in decision making towards climate change adaptation in the city (Kotsila, 2023). On top of that, schools – where children spend most of their time – in more vulnerable neighbourhoods of Barcelona have generally fewer green areas than schools in wealthier neighbourhoods (Baró et al., 2021).

Lastly, Bates et al., (2018) show evidence that schoolyard greening in low-income neighbourhoods has long-term benefits, such as increased positive interactions and physical activity and reduced levels of bullying and conflict. In spite of this, very few literature shows an empirical comparison of different schools taking into account the social conditions of the neighbourhoods. This paper will do this by having the categories mentioned above in mind, and through the schoolyard users' point of view.

3. Methodology

The data for this paper was collected in 3 different primary schools. At the beginning of the project, the idea was to work with 4 schools – 2 in low-income neighbourhoods and

2 in middle-class neighbourhoods – to see if the social conditions of the neighbourhoods are relevant. The criteria used to choose the participant schools involved different variables such as location of the school, resources of the school, size of the schoolyard, year of the schoolyard transformation, and several particular facts that were already of our knowledge about each school. Of the four schools that were contacted, the two schools in the higher-income neighbourhoods were interested in participating in the research, on the contrary, the other two did not respond on the first place or said that they had too much work and were not interested. Thus, other schools in low-income areas were contacted repeatedly, and only one responded. Finally, the schools that participated were 1 in a higher-income neighbourhood, 1 in a middle-class neighbourhood and 1 in a low-income neighbourhood.

The first school, Escola de les Aigües, is located in 'el Baix Guinardó' (see figure 1), an upper-middle class neighbourhood where the majority of its inhabitants are Catalan families. The second school, Escola Tàber, is in 'Sarrià' one of the wealthiest neighbourhoods of Barcelona located in the skirts of the Collserola Natural Park, with also mostly Catalan neighbours. In contrast, the third school, Escola Rubén Darío is located in 'el Raval', one of the lowest-income neighbourhoods of Barcelona where the majority of neighbours are immigrants from low- and middle-income countries (Institut d'Estadística de Catalunya, 2020).

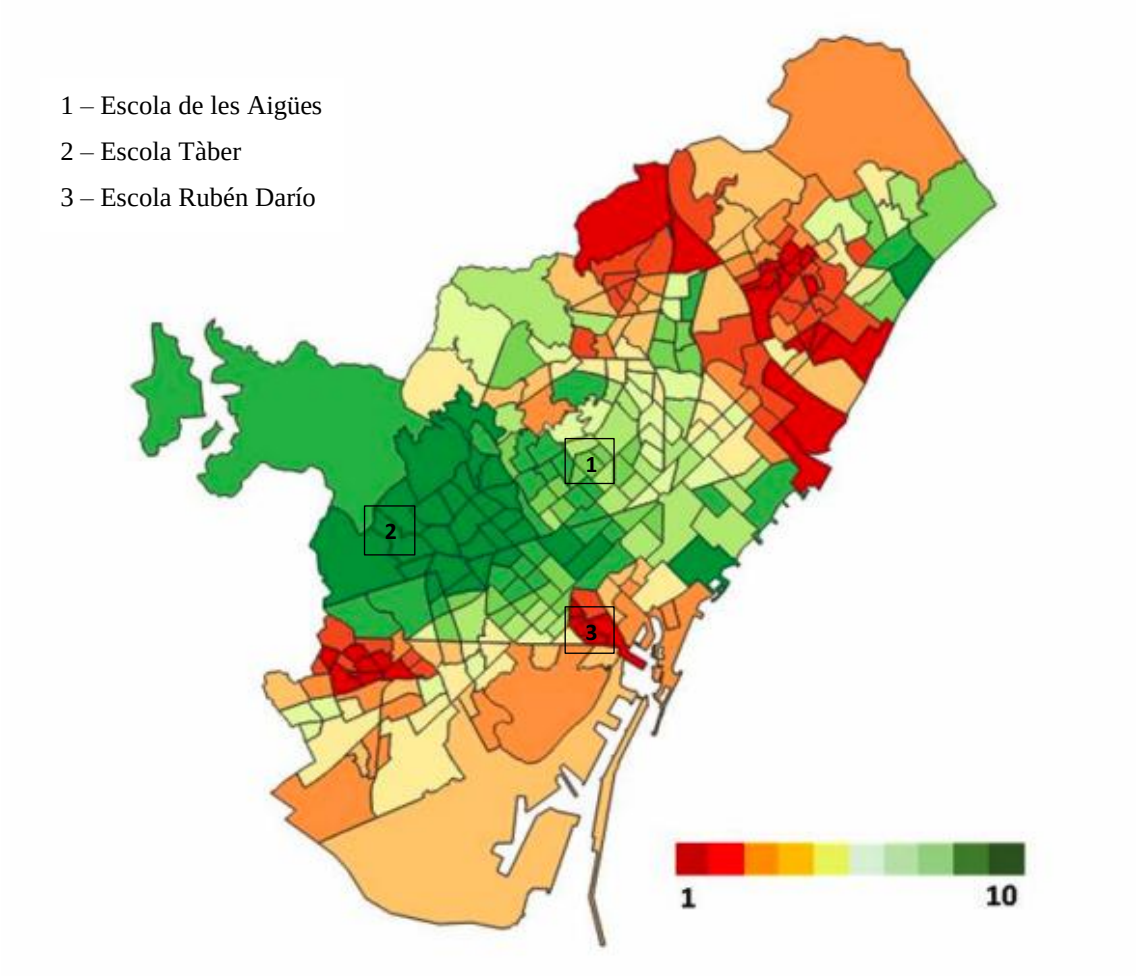


Figure 1. Territorial socioeconomic index. IDESCAT (2022)

For the data collection, 5 semi-structured interviews were conducted. These help to better understand the school community's perceptions on the schoolyard greening, as they provide a more detailed and insightful set of answers, allowing, thus, more depth of analysis. In order to have more diversity in the answers, the interviewees were each school's headmistresses and one teacher. Although both stakeholders have a general overview of the project since the planning process, they can differ in their perceptions and anecdotes of the transformation process and on its impacts, which can be very relevant for the analysis.

The interviews conducted were 5 – instead of 6 – because in the school Escola Rubén Darío (low-income) they had too much work and very little time to participate in the research, so only one member of the school community could be interviewed. In general, schools in low-income areas were less resourced and have more complex demands, associated with the livelihoods of their students and their families. To analyse the

interviews, they were transcribed and later coded using a focused coding strategy by applying the most significant and frequent codes – such as diversity of play, gender, conflict, outdoor teaching, families, neighbourhood, park, biodiversity, open doors, community, maintenance, changes, design process – to synthesize the data. This was done using the Nvivo program.

To extend on the findings of the interviews, another method carried out for this research was observation (Pérez del Pulgar et al., 2020). I observed how children (aged 6–12) play and interact with each other and with nature during break times. 6 observations were carried out: 3 in Escola de les Aigües, 2 in Escola Tàber and 1 in Escola Rubén Darío. In Escola de les Aigües, I did one observation during the mid-morning break, one during the lunch break and another one during the weekend with the open schoolyards' initiative, to have a bigger sample and see whether children's behaviour changed in different times. In Escola Tàber I observed the mid-morning and lunch breaks, as they do not open their schoolyard on the weekend because they are located near one of the most green and biodiverse parts of Barcelona and it does not make sense for them. Finally, in Escola Rubén Darío I could only observe one mid-morning break, as they do not open their schoolyard either because they have a small internal courtyard which was not properly greened for several reasons, and they are concerned about maintenance issues if they were to open.

For the observations I designed a checklist with categories of play (Appendix A) inspired on other literature. For the sake of this paper, I developed my own categories of play while taking categories of play from other authors that were relevant for this paper and for the conditions of these three schools. Van Dijk-Wesselius et al. (2022), developed their categories within the realms of cognitive play and non-play behaviour. From cognitive play behaviour, I took the categories: (1) games-with-rules, where I also added sports as a sub-category; (2) constructive play, that is, manipulating objects to construct something; (3) dramatic or pretend play (e.g., role-playing); and (4) exploratory play, examining objects or natural elements like plants or insects. From non-play behaviour (also Van Dijk-Wesselius et al., 2022) I took the following: (5) active conversation; (6) onlooker, that is, looking at other children playing without doing specific activity; (7) aggressive or conflict; (8) rough-and-tumble, i.e. mock fighting or playful physical contact; and (9) children talking or interacting with a teacher. Kuh et al. (2013) developed

four categories, sharing constructive play with Van Dijk-Wesselius et al. (2022). From these authors I took the category (10) locomotor play, that is, running, climbing, skipping, rough-and-tumble, etc.

For the weekend observations, I applied and adjusted some of the categories developed by Pérez del Pulgar et al. (2020) in urban parks' observations. The categories I used were (11) free play, (12) play directed or controlled by adults, (13) children of different ages playing together, (14) adults interacting with each other, (15) children and adults from different families interacting, and (16) children playing with adults.

To carry out the observations, it was very important to divide the different areas of the schoolyard to see how (and if) play behaviour changes depending on the area and how gender plays a role in this. The areas were divided in (1) sports court area, (2) relax area – usually with benches and natural elements –, and (3) structures area – usually with wooden equilibrium or climbing structures. During the observations, I also had informal conversations with children and teachers who gave their perceptions on the new green schoolyard.

Additionally, photographic material was collected to compare the extent of greening and transformation in each school and make it easier for the reader to visualize the changes. For ethical issues, the pictures were taken during class hours so that no children would appear and be recognised.

Finally, to properly compare the three schools and their surroundings, I researched and extracted data on each neighbourhood – such as pollution and noise levels, average income, immigration, etc. – from the Council's webpage, as well as the Institut d'Estadística de Catalunya (IDESCAT).

4. Results

Before starting the analysis, it is important to give a little context and background of each neighbourhood in order to create a bigger picture and understand the social conditions surrounding the schools. This is useful to see how the surroundings of the school are

relevant for the schoolyard greening project, as well as for the school and children in general.

4.1. Neighbourhoods' background

As stated above, Escola de les Aigües is located in 'el Baix Guinardó", a neighbourhood of the district 'Horta-Guinardó'. The average income per person here is a little higher than the average in Catalunya. The school is next to a big park with natural areas and there are other green areas around the neighbourhood. Considering how busy a large metropolitan city can be, the neighbourhood is relatively quiet.

Secondly, Escola Tàber in 'Sarrià', in the district 'Sarrià-Sant Gervasi', is surrounded by nature; it is under the Collserola Natural Park – visible from the schoolyard – and next to a big green park. The average income per person in this neighbourhood is significantly above the average of Catalunya. The school is not located inside the busyness of the neighbourhood, it is in the outskirts, which makes its surroundings quieter.

Thirdly, Escola Rubén Darío is in the centre of the city, in 'el Raval', a neighbourhood belonging to the district 'Ciutat Vella'. Here, the average income per person is well below Catalunya's average. There are hardly any green areas and infrastructures for climate adaptation, and the neighbourhood is quite dense.

IDESCAT created a territorial socioeconomic index (IST), for each 'territorial unit' – census block group – of Barcelona. For this, they took into account each area's employment situation, educational level, immigration, and income. The index has a reference value for Catalunya which equals to 100, and a value for each territorial unit which is compared to the index (or average) value of Catalunya. That is, if the value is lower than 100, the social conditions of the area are lower than the average conditions of Catalunya, and if it is higher, the social conditions are above average. Table 1 summarises the values of the year 2019.

Index Catalunya = 100 (2019)	**Escola de les Aigües**	**Escola Tàber**	**Escola Rubén Darío**
IST	113	121.3	77.7
Occupied population	105.4	94.7	70.2
Low qualification workers	83.2	79	100.3
Population with low education level	93.3	82.7	113.1
Young population without post-compulsory studies	81	83.7	108.5
Immigrants from low- or middle-income countries	96	89.5	148.1
Average income per person	110.9	142	81.5

Table 1. Territorial socioeconomic index (IST). (IDESCAT, 2022). Own elaboration.

Furthermore, there is also a notable difference in the levels of noise and air quality. As is expected, Escola Tàber, surrounded my nature, has the lowest levels of noise and air pollution. In contrast, Escola Rubén Darío, located in an avenue with very few green areas around, has the highest levels of noise and air pollution (see table 2).

	WHO guideline	**EU limit value**	**Escola de les Aigües**	**Escola Tàber**	**Escola Rubén Darío**
Noise (dB(A)) (2017)	-	-	55-60	50-55	70-75
Air quality NO_2 ($\mu g/m^3$) (2021)	10	40	20-30	10-20	30-40

Table 2. Average anual noise and NO_2 pollution levels at the schools. (Ajuntament de Barcelona, Agència de Salut Pública de Barcelona (ASPB), 2021). Own elaboration.

4.2. Students' profile and families

First, in Escola de les Aigües, the students' profile are mostly Catalan children from families that live in the neighbourhood. The families in this school are highly involved in the schools' activities and decision-making. They have a strong AFA (Asociació de Families d'Alumnes) who organize events and are part of various committees of the school – such as the environmental committee. In fact, the schoolyard greening process was a merge between two projects, 'Transformem els Patis' and 'Decidim' (the AFA

applied to ‘Decidim’ municipal participative budgeting program with the schoolyard project before being contacted for ‘Transformem els patis’).

Secondly, in Escola Tàber, the interviewees emphasized that they are not an “escola de barri”, that is, not a school that children go to because of proximity. Many children go to this school because it is easier for the parents who work in other towns to drop them off there on their way to work. The students here are also mostly Catalan from upper-middle class families, but there is diversity of profiles because of the children that don’t live in ‘Sarrià’. Additionally, the school is also a SIAL (Suports Intensius a l’Audició i Llenguatge) centre, so they have deaf students from other places of Barcelona and different socioeconomical status. In this school, the AFA is also very involved in organizing events and in the school’s maintenance, if necessary, they pay extra for maintenance or for more vegetation in the schoolyard.

Thirdly, the students at Escola Rubén Darío are the majority first generation immigrants: 98% of students are from Pakistan, Bangladesh and Morocco, there are only 4 Catalan families. The children’s families’ income is generally very low and they are characterized by a high degree of vulnerability. 75% of the students are NESE B students (Necessitats Específiques de Suport Educatiu), which means that they need especial (mostly financial) aid in school, deriving from disadvantaged socioeconomic situations. For example, 160 of the 210 students receive municipal meal grants, and others have 70% of the meals covered. Many of the children’s families experience house evictions, “we are talking about families with a very high degree of vulnerability” (interviewee). In this school there is no AFA, as the interviewee said, in their countries of origin it is not common for families to get involved with educational purposes. They consider that the teachers and school staff are the experts and they do not feel capable (or empowered). Additionally, there is a big language barrier among the parents. However, when it comes to organizing cultural events, they are very involved and always attend, bring food and/or other items and socialise.

4.3. Schoolyards' physical characteristics and transformation

Escola de les Aigües

As briefly mentioned above, the schoolyard greening project in Escola de les Aigües was a merge between two participatory budgets. This means that they could invest more than usual (215,000€) in the schoolyard greening, reaching a total of 400,000€. The schoolyard has a size of 5000m^2 that used to be all asphalt sports fields. With this budget they were able to remove half of the schoolyards asphalt and reorganise the fields. The half part of the schoolyard that was left without asphalt was covered by sand and they added numerous wooden balance structures, wooded bleachers to limit the sports area with the rest of the space, picnic tables, two big musical instruments, shadow spaces, water points, trees, a vegetable garden, and a big sandbox (figure 2) Their main objective with the schoolyard greening project was to diversify play, provide space to adapted to other uses, and reduce the priority that was given to ball-based games.

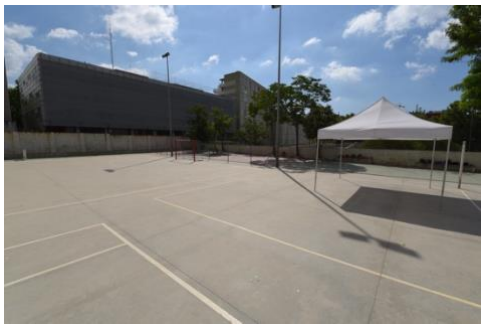
Escola Tàber

The green schoolyard project in this school was also part of the 'Transformem els patis' program of Barcelona Municipality. The size of the schoolyard is similar to Escola de les Aigües, and it used to be two large sports field and a small part with sand and structures. As they had less budget than Escola de les Aigües, they were not able to remove any asphalt, although it was their initial interest. The changes involved updating and adding several wooden structures, picnic tables, water points, shading structures, more vegetation and a meteorological station (figure 3). The motivations for this project were, like Escola de les Aigües, to diversify the types of play and make the schoolyard greener.

Escola Rubén Darío

Finally, the schoolyard greening project in this school was also part of the 'Transformem els patis' program of Barcelona Municipality. This school used to be a fire department station later transformed into a school, therefore, the building was never initially constructed to be a school. Their schoolyard is separated in two parts: the kindergarten schoolyard on the rooftop of the building, and the primary schoolyard in the internal courtyard on the building's ground floor, which has very little sunlight. Both schoolyards are considerably smaller compared to the other two schools. The changes in this school were mostly done in the kindergarten yard because they had more hours with direct sun light, it was hotter during the summer term and it needed to be adapted for these

conditions. They added more wooden structures, shading areas, and more vegetation. In the inner courtyard (which was basically a sports field), they added wooden benches, and some vegetation, but the most significant change was adding noise absorbing panels to reduce the echo and noise levels that were produced during break times because of the surrounding buildings (figure 4). The motivation for the transformation was, like the other two schools, to create more spaces to adapt to every child's needs.



Before

Before

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After

Figure 2. Escola de les Aigües before and after greening. Credit: Before pictures from Cultura, Educació, Ciència i Comunitat. After pictures by Alexandra Mestre Garcia.

Before

Before

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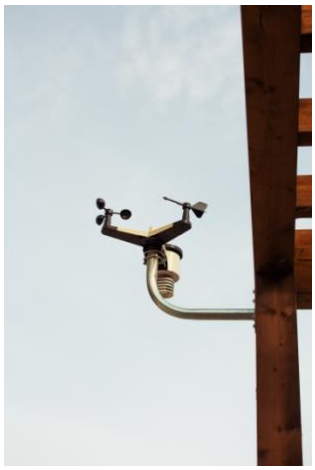


After

Figure 3. Escola Tàber before and after greening. Credit: Before pictures from Cultura, Educació, Ciència i Comunitat. After pictures by Alexandra Mestre Garcia.

Before

Before

Before

After

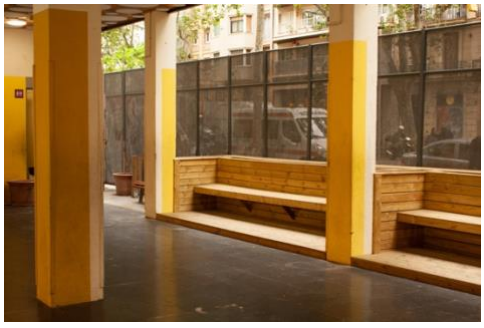
After

After

After

After

After



After

After

After

Figure 4. Escola Rubén Darío. Credit: Before pictures from Cultura, Educació, Ciència i Comunitat. After pictures by Alexandra Mestre Garcia.

4.4. Play behaviour and gender

This section provides the results of the on-filed observations that I conducted. In the three schools, the diversity of play increased considerably, this was both said by every interviewee and observed in every school. The sports field still dominates during break times – mainly with football – but children are engaging with the schoolyard with other types of play. Conflicts during breaktime are usually arisen in the sports field, especially with football. The fact that other types of play are now available and football is not the main activity during break time anymore, has meant a huge decrease in conflicts. For example, in Escola de les Aigües, since the greening of the schoolyard, conflict has decreased by 52%. The emotional support person in Escola Rubén Darío – who dissolves and works out conflicts – said that they are doing an "alternative breaktime" project, which involves opening classrooms and offering board games. This, she says, has opened up the space and created more differentiated spaces, which has helped in reducing conflict.

Continuing with sports, although some girls play in the sports field, they were almost always less than 10, compared to 20-30 boys playing in the three schools. For example, the day when more girls were playing in the field there were 6 girls and 15 boys in Escola de les Aigües, 12 girls and 40 boys in Escola Tàber, and 2 girls and 20 boys in Escola Rubén Darío. Seeing the gender difference, one girl told one of the interviewees in Escola de les Aigües that, although she loves football, she does not play anymore because she does not like the atmosphere. It is notable that relatively fewer girls played football in the 'Raval' school.

To deal with the dominance of football – and of the older kids in the field –, in Escola Tàber, two days a week they only play ball sports using their hands (e.g., basketball), to encourage different types of play. Locomotor play in the three schools was more manifested by boys playing football and by girls doing cartwheels and free running. An important gender division, especially observed in older students, was play and non-play behaviour. Generally, while many boys played football, the girls were engaged in active conversation. There were typically around 15 girls and 5 boys engaged in active conversation, although it also depended on the area of the schoolyard where they were. For example, in the sports field there were usually more boys talking and in the structures area more girls.

Exploratory play was more common in girls than in boys. The sandbox was a very loved element of the schoolyard, especially by the younger ones. Positive signs of biodiversity were observed in Escola de les Aigües and Escola Tàber: in the first school, one girl said that she likes to play with insects, and in the second, I observed a group of 6 students examining insects and 2 girls watering the plants.

The structures were a very revealing aspect of diversity of play, in Escola de les Aigües, there were many different balance and climbing structures, compared to Escola Tàber and Escola Rubén Darío. This showed a significantly larger number of children playing on the structures and led to more diverse play. In Escola Tàber there were two balance structures and they were hardly used, instead, children were more engaged in active conversation and playing table tennis. In Escola Rubén Darío, there were no structures, however other games were offered, like frisbee and a big Connect 4 game – among others – which children made a lot of use of.

In Escola Tàber and Escola Rubén Darío, several days a week some groups go to the park during the break time. This is beneficial for them as they get to engage with natural spaces and have a bigger space to play, and for the children that stay in the schoolyard as it liberates space for them. On the one hand, the green space next to Escola Rubén Darío is an urban park with different types of spaces - such as sports fields or areas with vegetation, which also helps in diversifying play – where two external educators accompany them and have to check that there are no syringes before the children arrive. On the other hand, the park next to Escola Tàber, is a big natural park resembling a forest – as they call it – where they go to observe nature, run around and relax.

As the interviewee from Escola Rubén Darío said:

> "Natural and organic material helps them to build, and touching helps to construct thought, there is a natural creation part that is being denied, and it needs to be encouraged. Because we try to give them materials, loose parts, something as simple as that, that they can do in any other place, because they go to the beach, to the mountain, to the forest. These families do not go, because they consider that it is far away, the borders of the neighbourhood are very defined, crossing

the ‘Rambla del Raval’ is going out of the neighbourhood, crossing our street to ‘Sant Antoni’ too. They do not move further than their surroundings, because it is their community, where they feel rooted, protected, and it is normal, and they fear the unknown. But all these opportunities have to be offered by the school, it is compensatory, it needs to be done, so we look for it, how? Outside.”

4.5. Outdoor learning

In Escola Tàber, they use both the park and the schoolyard to teach classes outside. They mostly use the park to give continuity to the schoolyard and because, in their words; “we have to take advantage of it, it is our added value, we are not in the neighbourhood but we have this in return”. They have scheduled ‘forest’ in their timetables one day a week, but they can go as much as they want. They teach all kinds of subjects and themes in the park: philosophy, poetry, biology, mathematics, etc. The interviewees emphasize that the kids enjoy it very much and they are more relaxed than inside the classroom, they do not feel the urge to go out to the schoolyard and play.

In Escola de les Aigües, they use the schoolyard to work on their performing arts project, they have more space to move and express themselves. They also use it for all the empirical studies of the science subject and sometimes for debates raised in other subjects or in a school committee involving the students.

In Escola Rubén Darío they currently do not use the schoolyard as a classroom, any teacher can decide to have the class outside, but it is not normal if they do. The neighbourhood and the (missing) schoolyard do not easily allow it.

The three schools feel that the schoolyard could be used more, and that outdoor learning will probably be in the students’ curriculum in the future. However, they all find barriers to doing this. All of them mention that teaching outside is not something that the teachers are used to and it usually does not come to mind that the class that they are teaching could be taught outside. Additionally, all of them also recognise a lack of confidence from teachers. In Escola Rubén Darío, the interviewee said that it is difficult for children to understand that the place that they use for playing can be a classroom. In Escola Tàber, one interviewee mentioned sound levels as a barrier. She said that sometimes teachers

have to speak too loud for the children to understand what they are saying, and that it is more difficult for deaf students to follow the class. She also found the student-teacher ratio a problem, they need 3 people each time they go to the park for support, but it is difficult for the teacher to always find 2 supports available that can go to the park. It is more feasible to go to the park if only one support is needed. Finally, all the interviewees stress that learning that the schoolyard (or park) can be used as an outdoor classroom is a process, both for teachers and students, that does not happen by night, but they are sure that it will eventually be more common because it is beneficial for everyone. None of the schools received any kind of training or tools on how to transfer the class to the schoolyard.

In the three schools, environmental education is on their curricula and they are very involved with the UN Sustainable Development Goals. Additionally, as mentioned above, Escola de les Aigües and Escola Tàber have a vegetable garden which children from one specific year take care of during the whole year as a curricular activity.

4.6. Open doors

The only school that opens their schoolyards to the public during the weekend is Escola de les Aigües. In Escola Tàber they open the schoolyard one Friday a month for the school community, as they are not an 'escola de barri' and the park is next to the school, they do not see the sense in opening it during the weekends. Escola Rubén Darío does not open the doors to the public because they fear how they are going to find the school on Monday, as there is no one in charge of maintenance. However, on Saturdays the teachers leave the school to the multi-cultural communities for encounter and Bengali and other language-teaching.

Finally, during the weekend observation in Escola de les Aigües, there were several families, children that went together to play football and a group of 3 adult friends that went to play basketball. It is a good opportunity to socialize with other families and neighbours and a good meeting point. However, what struck the most during the observation was the gender inequality. There was a clear division between the sports field, where there were only dads with their sons (and the three adults), and the structures area, where there were moms with their daughters and babies. Additionally, there were a pair

of moms with their same-age daughters that did not exceed 6 years old, and they each had a pink baby stroller with a doll.

5. Discussion

This paper has demonstrated that the social conditions of the neighbourhood affect the school, each school's priorities are different. There is a big difference in the extent of greening in the three schools, it is clear that the students at Escola Rubén Darío do not experience the benefits of having natural elements or spaces to engage with, to the extent that the other two schools do. In Escola de les Aigües they were able to invest a bigger quantity in the transformation of the schoolyards because the AFA worked on the project and applied to additional funding. Escola Tàber is far from the city center, which lets a bigger space for the school and the schoolyard, besides being surrounded by nature that children can enjoy, and also having an involved AFA that can pay extra or help with maintenance. In Escola Rubén Darío the priorities are often related with maintaining decent livelihoods, meaning that the students' profiles change the needs, priorities and work load of the school. They try to ensure that children are well at school and at home. They have no time, nor resources to prioritise vegetation or outdoor learning. As the interviewee metaphorically said, if the soil of a plant is not well, as much as the plant is watered, the roots are not going to get better, and the plant is not going to improve. If the basic needs of the children are not covered, if they do not know where they are going to sleep in two days, all the other needs have a secondary role.

From the perspective of diversity and equity in play, the main take out from this research is that greening schoolyards has significantly helped in diversifying play and reducing conflict. The results confirm Gibson's (1979) Affordance Theory, as seen in the three schools, children were given several opportunities of play and they were able to freely choose what was of their interest.

However, there is still a big gender difference, an important effort has to be done as a society to change this. The observations showed a clear dominance of sports for boys and active conversation for girls. This difference has been enhanced during the weekend observation where the areas were clearly defined and separated by gender. Questions that kept emerging in the mind of the observer were "besides the two girls with the baby

strollers, how many boys are seen with baby strollers? Why are the strollers pink?" This is, however, not innate. This effort starts in education, in school, at home, on TV and on advertising. Gender roles and stereotypes are learned, they start from a very young age and can be carried during the adult life (Berk, 1985). It is important to question and start from the root, not differentiate between things for boys and for girls, and to give children freedom of choice (van Dijk-Wesselius et al., 2018). The greening of the schoolyard has proven to be a significant step in enhancing gender equity and justice.

Considering the schoolyard as an outdoor leaning space, although all the interviewees recognise the benefits of outdoor learning, they also recognise that they could do it more often. In Escola de les Aigües they have a big space to teach classes in the schoolyard, even when physical education is being taught in the field. In Escola Tàber, they too have a big space, but most importantly they have the natural park next to the school, which they already use frequently. In Escola Rubén Darío, they do not currently teach outside, and the space is limited if physical education is being taught in the field. As mentioned above, their priorities are different.

The teachers find the same barriers that the previous literature did (see Van-Dijk Wesselius, 2020; Giezen and Pellerey, 2021; Dyment, 2005), with the added barriers of the noise and the ratio per teacher that one interviewee stressed.

It would be interesting and useful for following transformation projects if teachers received a training with tools on how to transfer the classroom to the schoolyard, how to prepare the classes differently, how students' behaviour changes in outdoor environments and how to act accordingly. Essentially, to give them tools to find the confidence for teaching outdoors (van Dijk-Wesselius et al 2020).

The community aspect of the schoolyard transformation project is weak in the three schools. Although it is clear by the observations in Escola de les Aigües that it is beneficial for the neighbours to have space to socialise and play, the three schools worry about the maintenance of the schoolyard and how they will find the school after the weekend.

The three schools worry about the schoolyards' maintenance. There is no one in charge of it and people during the weekends might not take good care of the structures and vegetation. They criticize that when the schoolyard was transformed, they installed all the structures, planted the vegetation and left. Schools were unprepared to take care of the vegetation while the Municipality did not have the funding to provide the continuous maintenance needed, which was actually expected to be taken care of by the Education Consortium.

I did not interview Municipality representatives, so I cannot judge why many schoolyards do not open their doors and why others are open only for limited hours. It was not possible to explore in depth the problems with maintenance in the schoolyards.

Finally, multiple factors need to be met for the schoolyards' real greenness and diversity to happen, such as: commitment by families and the school community, allowance for children's basic needs like food and housing, as well as the structural parameters of the building. Clearly, money is not infinite and budgets are limited, however, many variables that extend outside the borders of the classroom should be taken into account when deciding the budget for each school. The neighbourhood and the needs of the students should be considered; schools located in economically and nature-wise deprived areas should receive priority funding and be entitled to more ambitious transformation plans. For example, as seen in Escola Rubén Darío, the students' families do not usually go on trips to natural areas and the neighbourhood does not have many green spaces, the budget should be adjusted to fulfil the children's needs – and favour this school over others. To make the school their personal and climate refuge, with options to express themselves and develop their personalities and creativity.

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Appendix

Appendix A:

Escola + fecha y hora + zona	
Diseño del patio/características físicas	
Pista deporte(s)	
Gradas	
Mesas	
Bancos	
Zona con sombra	
Arenero	
Huerto	
Ágora	
Estructuras de juegos diversos	
- Casita	
- Tobogán	
- Columpio	
- Estructura equilibrio/escalada (nº)	
- Túnel	
- Cocinita	
- Zona construcción	
- Otro (especificar)	
Fuente	
Árboles/naturaleza	
Otro (especificar)	
Alrededores colegio	
Naturaleza, ruido, contaminación	
Children's behaviour	
Games-with-rules	
- Sports	
- Other (specify)	

Constructive play	
Joc simbolic (Dramatic or pretend play (imaginative))	
Dance	
Exploratory/nature play/creative (arenero)	
Locomotor play	
- Running (/tag/chasing games)	
- climbing	
- rough-and-tumble	
Aggressive/conflict	
Active conversation	
Onlooker	
Children talking or engaging with teacher	
Weekends	
Juego libre	
Juego dirigido/controlado por adultos	
Niños de diferentes edades jugando juntos	

Adultos hablando con otros adultos	
Niños y adultos de diferentes familias interacting	
Niños jugando con adultos	

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