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Beyond School- and Playgrounds: Adolescent's Preferences on Environmentally Friendly Urban Design Scenarios - A Groningen Case Study

BSc Spatial Planning and Design

Bachelor's Thesis

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Abstract

To mitigate the effects of climate change, urban areas need to transition from spaces of emission and pollution into environmentally friendly places. This transition has the potential to be collaborative and inclusive by involving often disregarded groups, such as adolescents. To understand adolescents' urban design preferences and how they relate to environmental sustainability, a focus group was conducted and analysed through a thematic analysis. The resulting eight themes were sustainability, nature, well-being, transport, ownership, uncertainty, and degree of change. The study concluded that although adolescents' urban design preferences relate in many ways to environmental sustainability, their understanding of the topic is still partly limited and characterised by uncertainty. Additionally, most adolescents exhibit an individual focus and prefer non-transformational environmentally friendly change.

Keywords

Urban Design, Sustainability, Environmental Friendliness, Adolescents, Design-Based Research

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INTRODUCTION

With climate emergencies being declared all around the world,¹ the urgency for global climate action is evident. Although its institutional structure and economic position are favourable, the Netherlands is especially vulnerable to a changing climate due to its geographical features. Therefore, further developing sustainably is a necessary precondition for protecting the country and planet for future generations. A large part of emissions and pollution are caused by urban environments² as the consumption is high and growing cities face the challenge of accommodating people sustainably. The transformation of urban spaces has the potential to have a great impact by reducing greenhouse gas emissions and becoming more environmentally friendly. As urban spaces are socially created,³ this transition towards environmentally friendly cities offers the opportunity for social collaboration, participation and the inclusion of often disregarded groups such as children. According to Article 12 in the UN's Convention on the Rights of the Child, children's opinions on subjects that concern them should be taken into consideration.⁴ The UNICEF Child Friendly City Initiative connects Article 12 of the UN's Convention on the Rights of the Child explicitly to the right to participation in matters of urban planning.⁵ Participation is often reduced to child-specific spaces such as playgrounds and schoolyards. However, in order to enable the integration of children's perspectives in the sustainability transition in urban environments, it is necessary to be aware of children's preferences on environmental urban design trends. Therefore, this research project analyses children's, or more specifically, adolescents' attitudes towards different environmentally sustainable urban design scenarios of a street in Groningen (Netherlands) by means of a focus group and a thematic analysis.

The aim of this study is to create insight into adolescents' approaches to environmental sustainability at a micro-scale. The urban micro-scale is preferable due to its tangibility, which improves the understanding of the space for children. To research the environmental urban design preferences of the next generation, this study aims to answer the following research question and its sub-questions:

Research Question:

- To what extent is environmental sustainability reflected in adolescents' urban design preferences?

¹ Mik Aidt, 'Climate Emergency Declarations in 2,356 Jurisdictions and Local Governments Cover 1 Billion Citizens', Climate Emergency Declaration, 22 April 2024, <https://climateemergencydeclaration.org/climate-emergency-declarations-cover-15-million-citizens/>.

² Katherine Calvin et al., 'Climate Change 2023: Synthesis Report.', 1st ed. (Intergovernmental Panel on Climate Change (IPCC), 25 July 2023), <https://doi.org/10.59327/IPCC/AR6-9789291691647>.

³ Alexander R. Cuthbert, 'Urban Design: Requiem for an Era – Review and Critique of the Last 50 Years', *URBAN DESIGN International* 12, no. 4 (1 December 2007): 177–223.

⁴ UNICEF, 'Convention on the Rights of the Child' (UN General Assembly), accessed 10 June 2024, <https://www.unicef.org/child-rights-convention/convention-text>.

⁵ 'Effective, Representative, and Inclusive Child Participation at the Local Level' (UNICEF, August 2022), <https://www.childfriendlycities.org/documents/effective-representative-and-inclusive-child-participation-local-level>.

Research Sub-Questions:

- How does the understanding of sustainability develop in children?
- Which environmentally friendly urban design trends do adolescents prefer?

To answer these questions, background information on sustainability, its relation to urban design, child-friendly urban design, and sustainability understanding throughout children's development will first be provided. Subsequently, the methodology and results will be described after which a discussion of the results will follow. The paper will end with a concluding summary of the study.

BACKGROUND

Theoretical Framework

In order to understand the basis of this research it is necessary to cover the issue of sustainability, its relation to urban design, the connection between child-friendliness and urban design, and Children's understanding of sustainability.

Sustainability

Most models representing sustainability distinguish between the economic, social, and environmental spheres of sustainability.⁶ As sustainability relates to all these different aspects of society and the environment, it is complex in its nature. Due to this complexity, sustainability has even been identified as a 'wicked' problem which requires a multitude of approaches to be successfully tackled.⁷ Although approaches to sustainability within the field of spatial planning can differ drastically in their underlying assumptions, such as worldview, paradigm, and necessary action,⁸ generally, all three spheres are addressed. With the growing urgency of climate change, many actors focus on environmentally sustainable issues specifically. Even though none of these spheres are generally covered in isolation, the focus on environmental sustainability enables a more detailed evaluation of and distinction between different degrees of sustainable development. While outlining various approaches to sustainable development, Hopwood et al. argue that 'status quo' or 'reform' approaches are insufficient and that "transformation is necessary."⁹ Closely connected to this approach is the idea of a nested conceptualisation of sustainability which entails the natural environment as a foundation for society and society as a base for the economy.¹⁰ Consequently, the economy cannot function with a non-existent or non-functioning society and society, in turn, cannot function without a healthy environment, which highlights the need for transformative climate action.

Sustainable Urban Design

One urban design theory encompassing these environmentally transformative values is green urbanism as defined by Lehmann.¹¹ Green urbanism is an interdisciplinary approach to planning that aims to "minimize the use of energy, water and materials at each stage of the city's or district's life-

⁶ Ben Purvis, Yong Mao, and Darren Robinson, 'Three Pillars of Sustainability: In Search of Conceptual Origins', *Sustainability Science* 14, no. 3 (May 2019): 681–95.

⁷ Vincent Blok, Bart Gremmen, and Renate Wesselink, 'Dealing with the Wicked Problem of Sustainability: The Role of Individual Virtuous Competence', *Business & Professional Ethics Journal* 34, no. 3 (2015): 297–327.

⁸ Leah V. Gibbons et al., 'Regenerative Development as an Integrative Paradigm and Methodology for Landscape Sustainability', *Sustainability* 10, no. 6 (June 2018): 1910, <https://doi.org/10.3390/su10061910>.

⁹ Bill Hopwood, Mary Mellor, and Geoff O'Brien, 'Sustainable Development: Mapping Different Approaches', *Sustainable Development* 13, no. 1 (1 February 2005): 38–52. 49.

¹⁰ Purvis, Mao, and Robinson, 'Three Pillars of Sustainability'.

¹¹ Steffen Lehmann, 'What Is Green Urbanism? Holistic Principles to Transform Cities for Sustainability', in *Climate Change: Research and Technology for Adaptation and Mitigation*, ed. Juan Blanco and Houshang Kheradmand (InTechOpen, 2011), <https://doi.org/10.5772/23957>.

cycle.”¹² The three pillars of green urbanism are energy and materials, water and biodiversity, and urban planning and transport (Figure 1).¹³ To be effective at sustainable development, urban design theories, such as green urbanism, need to be practised in a collective and holistic manner.¹⁴



Figure 1: The Three Pillars of Green Urbanism and Their Interaction¹⁵

In their research, Carmona showcases that good urban design and planning are naturally sustainable and part of a larger sustainable development agenda.¹⁶ Moreover, urban environments are physically and conceptually formed through social production.¹⁷ With the social aspect of spatial (re-) production playing a central role in shaping the urban form, the opportunity of democratising spatial transformations arises through citizen participation. Therefore, participation, preferably in an inclusive manner, should be central to urban (re-)design towards environmentally friendly cities.¹⁸

¹² Lehmann. 245.

¹³ Lehmann.

¹⁴ Lehmann.

¹⁵ Lehmann. 246.

¹⁶ Matthew Carmona, 'Sustainable Urban Design: Principles to Practice', *International Journal of Sustainable Development* 12, no. 1 (2009): 48–77.

¹⁷ Cuthbert, 'Urban Design'.

¹⁸ Carmona, 'Sustainable Urban Design'.

Child-Friendly Urban Design

Additionally, previous research has highlighted the necessity for intergenerational spaces which enable non-working people to actively socialise and play.¹⁹ Due to the nature of intergenerational spaces, different abilities and perspectives on the environment can be encompassed.²⁰ Hence, it is highly relevant to plan spaces for, and especially with, people who do not belong to the working population. Instead of solely concentrating on people active in the labour force, addressing the needs of children has the potential to create spaces which are beneficial to people in all kinds of situations.²¹ In one of her articles, Horelli outlines a methodological approach to children's participation which supersedes the descriptive sphere and concentrates on normative and explanatory participation processes.²² Even though implementation of children's participation often proves difficult, previous research showcases that children should be involved in the entire planning process instead of than only in certain phases for consultation.²³ The lack of involvement, especially in the later stages of the planning process, often has the consequence that children can only indirectly contribute to their environment. Participatory projects with children often focus on child-specific environments such as schoolyards or playgrounds. Consequently, child-friendly spaces are limited to specific areas and, in contrast to the intergenerational space principle, do not extend across the entirety of the urban fabric.

Understanding Sustainability

As sustainability is a 'wicked' problem,²⁴ the complexity and multitude of dimensions it includes can be hard to understand, especially for younger children. The abilities to understand sustainability concepts differ greatly between children and are mainly dependent on age.²⁵ It is often not possible for young children to understand the different aspects and effects of climate change and pollution simultaneously. Nevertheless, involving children as active participants in the planning process also provides them with a feeling of responsibility for their environment.²⁶ Additionally, their attitudes towards the spatial form of different environmentally sustainable trends are still valuable, as their individualistic focus can showcase solutions which not only improve environmental health but also appeal to children generally. In contrast to younger children, adolescents are generally able to

¹⁹ Simon Biggs and Ashley Carr, 'Age- and Child-Friendly Cities and the Promise of Intergenerational Space', *Journal of Social Work Practice* 29, no. 1 (2 January 2015): 99–112, <https://doi.org/10.1080/02650533.2014.993942>.

²⁰ Biggs and Carr.

²¹ Özlemnur Ataol, Sukanya Krishnamurthy, and Pieter van Wesemael, 'Children's Participation in Urban Planning and Design: A Systematic Review', *Children, Youth and Environments* 29, no. 2 (2019): 27–50.

²² Liisa Horelli, 'A Methodological Approach to Children's Participation in Urban Planning', *Scandinavian Housing and Planning Research* 14, no. 3 (1997): 105–15.

²³ Ataol, Krishnamurthy, and van Wesemael, 'Children's Participation in Urban Planning and Design'.

²⁴ Blok, Gremmen, and Wesselink, 'Dealing with the Wicked Problem of Sustainability'.

²⁵ Matija Svetina et al., 'How Children Come to Understand Sustainable Development: A Contribution to Educational Agenda', *Sustainable Development* 21, no. 4 (2013): 260–69.

²⁶ Karen Ann Malone, "'The Future Lies in Our Hands': Children as Researchers and Environmental Change Agents in Designing a Child-Friendly Neighbourhood', *Local Environment: The International Journal of Justice and Sustainability* 18, no. 3 (August 2013): 372–95.

understand more complex external and internal subject relations.²⁷ Next to a higher level of understanding of morality and ethics, adolescents also begin to comprehend aspects of economic sustainability which enables them to reflect on issues pertaining to equality and equity.^{28 29} Moreover, in early adolescence, children start to consider everyone instead of thinking solely on an individualistic level.³⁰ In addition, they begin to challenge the expectations set on them, as well as the assumptions present in their social surroundings.³¹ Furthermore, with age, children extend their understanding of time and start making plans further and further in the future.³² Within these more developed ideas of their futures, sustainable considerations begin to emerge and become increasingly relevant for them. Nevertheless, due to their social environment, consisting mainly of peers, and especially the resulting pressure to conform to these social standards, sustainable behaviour lags behind adolescents' understanding of sustainability.^{33 34}

Concerning adolescents' understanding of sustainability, this research project aims to investigate the intersection of children's attitudes regarding urban design and environmentally friendly urban design through their consultation on urban design scenarios in their vicinity. To further understand the aforementioned concepts, Figure 2 displays the conceptual connection between the literature.

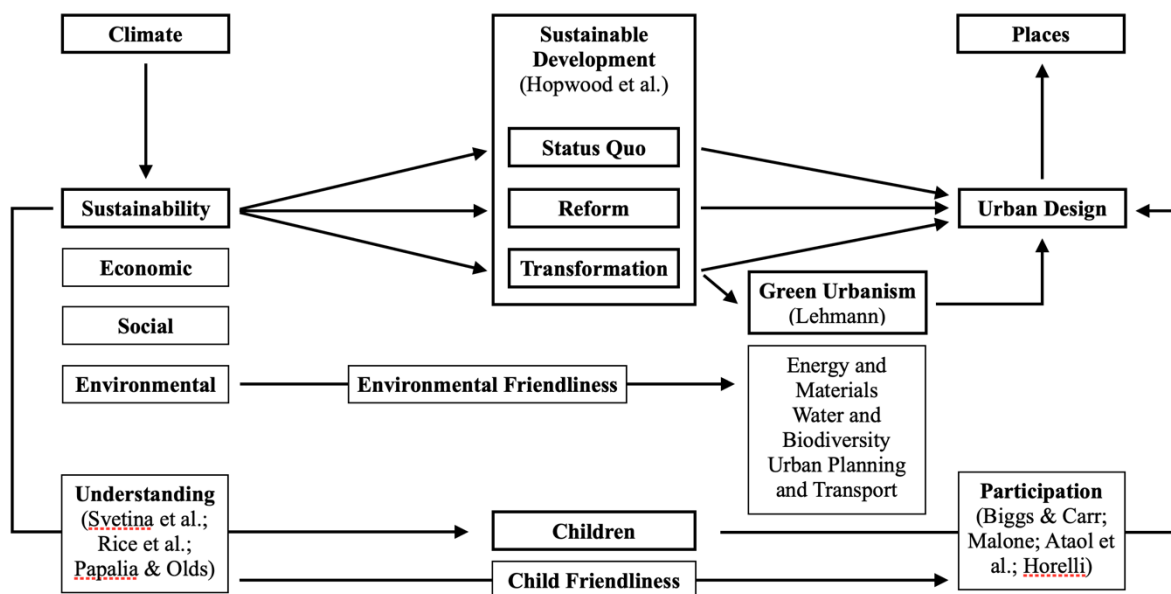


Figure 2: Conceptual Model Displaying the Conceptual Relationships Between Literature

²⁷ Svetina et al., 'How Children Come to Understand Sustainable Development'.

²⁸ F. Philip Rice, *Human Development: A Life-Span Approach*, 4th ed (Upper Saddle River, NJ: Prentice Hall, 2001).

²⁹ Diane E. Papalia and Sally Wendkos Olds, *Human Development*, 6th ed (New York: McGraw-Hill, 1995).

³⁰ Delyse Springett and Kate Kearins, 'Gaining Legitimacy? Sustainable Development in Business School Curricula', *Sustainable Development* 9 (1 November 2001): 213–21.

³¹ Rice, *Human Development*.

³² Papalia and Olds, *Human Development*.

³³ Papalia and Olds.

³⁴ Rice, *Human Development*.

METHODOLOGY

To research adolescents' attitudes towards different environmentally friendly urban design scenarios, their preferences and reasoning for these were collected as part of a qualitative study.

Sampling

The participants of this study were selected based on multiple criteria. Participants needed to be children (i.e. between 0-18 years old) and live in or around the city of Groningen. Schools were contacted, to allow for a group with the same age profile. The homogeneity of the group allows for the detailed evaluation of similarities and differences within one group.

A local school in Groningen hosted the research project. The data collection session was facilitated by a teacher during two 45-minute lessons of the class. The visuals and questions were created to be age-appropriate.

Participant Profile

The eight participants are adolescents between the ages of 16 and 17. Being high school students, their level of public education is as high as possible for their age. Within the Dutch education system, the participants were in grade five of pre-university education (Voorbereidend Wetenschappelijk Onderwijs) and all belonged to the same cohort. Although the school is located within the urban area of Groningen in the Netherlands, all adolescents indicated that they lived in the surrounding rural area. Furthermore, all participants identified as male. For ethical reasons, which will be elaborated in more detail shortly, additional data was not collected.

Data Collection

Design-Based Research

To achieve higher student involvement and support the participants' discussion on urban design preferences, objects of discussion were designed and presented to the adolescents. These objects of the discussion consisted of four visuals of a local street of which one represents the current situation and the remaining three visuals showcased different scenarios of possible environmentally friendly futures.

Site

The site at hand was selected based on multiple criteria. One of these criteria was the scale of the space. To foster more interaction and increase the potential for understanding of the visualisations, the urban micro-scale (i.e. streets or squares) was deemed appropriate. Furthermore, the site should be representative and not too unique so that the designs can be applied to similar situations. Due to the time constraints and the students' familiarity with the area, another factor was the selection of a site in close proximity to the selected school.

Based on these selection criteria, the *Van Swinderenstraat* (9714 HB, Groningen, Netherlands) in the *Korrewegwijk* neighbourhood was chosen (Figure 3). This approximately 200-meter-long residential street fulfils the above-mentioned criteria. Characterised by post-war buildings, this site is representative of many areas in Groningen and the Netherlands in general. The picture from the southeast end of the *Van Swinderenstraat*, as shown in Figure 3, was used as the foundation of the design scenarios. Thus, the visualisations of these are from the same perspective.



Figure 3: *Van Swinderenstraat*: Picture from South-West End (Top Left), Satellite Picture (Top Right),³⁵ Zoomed-In Satellite Picture (Bottom Left),³⁶ and Aerial Photograph (Bottom Right)³⁷

Morphological Analysis

A morphological analysis or matrix is an explorative design methodology which aims to compile as many solutions or parts of solutions as possible.³⁸ In the ideation phase of the design process, designers develop a table with *functions* and *means*. Functions, as the name suggests, are the functions the design needs to fulfil and means constitute the means through which these functions can be achieved.³⁹ The aim of performing a morphological analysis is to collect as many means that fulfil the required functions as possible. The morphological matrix can in further design steps be used to evaluate

³⁵Google, 'Google Earth', Google Earth, accessed 9 June 2024, <https://earth.google.com/web/@53.2321965,6.57349418,488.52172164a,10.00250595d,35y,-0h,0t,0r/data=OgMKATA>.

³⁶ Google.

³⁷ Google.

³⁸ Wim Zeiler, 'Morphology in Conceptual Building Design', *Technological Forecasting and Social Change* 126 (1 January 2018): 102–15.

³⁹ Zeiler.

the ideal solution to the design problem by exploring different combinations of means to address the issue. In this project, the morphological analysis performed exactly this function.

Based on the means or design elements listed in the morphological table in combination with themes extracted from literature,⁴⁰ design scenarios have been developed. Each scenario consists of different means which were selected based on their relation to the theme the scenario corresponds to. As the created design scenarios are concerned with representing visions of possible futures, design elements in both public and private spaces were included in the morphological chart. To control for the economic and social aspects of sustainability, the design elements listed in the morphological analysis must fulfil the requirement of being environmentally sustainable. Therefore, the design scenarios do not specifically include any child-friendly aspects. This allows for research on the intersection between environmental- and child-friendliness.

Central to the morphological chart developed is the notion that all interventions should increase the environmental sustainability of the place of concern. Importantly, the design elements should not solely act as climate adaptive but as climate mitigative designs. The functions (headings of the columns) that are represented on different spatial scales (i.e. roofs, facades, pedestrian infrastructure, etc.) are divided into the categories of public and private spaces. Table 1 (see page 11) displays the morphological chart for environmentally friendly urban design at a micro-scale. This functional dimension encompasses building systems, roofs, facades, pedestrian-, bicycle-, public transport-, and car infrastructure as well as water and waste systems, buffer zones, street furniture, and public art. The means (elements sorted below the functions) categorised under these functions are colour-coded to showcase their relation to one of the pillars of green urbanism.⁴¹ The elements selected for the development of the design scenarios are underlined.

Design Scenarios

To enable participants to choose between different forms of environmental urban design, three future scenarios were developed based on ‘the three pillars of green urbanism’.⁴² The themes of the pillars are energy and materials, water and biodiversity, and urban planning and transport.⁴³ While these pillars are meant to act together to form sustainable urban spaces, in this project they will be separated into different scenarios to allow for a thematic comparison of adolescents’ urban design preferences. This division allows the participants to evaluate the design elements and contrast them with one another. For each green urbanism theme, five urban design elements were selected from the morphological analysis table. These elements were added to the visual representation of the current situation resulting

⁴⁰ Lehmann, ‘What Is Green Urbanism?’

⁴¹ Lehmann.

⁴² Lehmann.

⁴³ Lehmann.

in four different scenarios (Figure 4; Appendix 1). As this research project aims to explore adolescents' preferences on environmentally friendly urban design, the designs do not necessarily adhere to current spatial guidelines, such as, for example, minimum parking requirements. The chosen drawing style is minimalistic to effectively communicate the changes to adolescents.

The first visual (top left) is the graphic representation of the current situation or status quo, which mostly acts as a reference for the participants to understand the process of abstraction present in the designs. The second visual (top right) which is based on the green urbanism theme of energy and materials, is the Energy Scenario. This includes solar panels, catenary lighting, louvers, and renewable materials as well as an electric car charging station. The third visual (bottom left) is the Nature Scenario which is based on the water and biodiversity pillar of green urbanism and incorporates permeable surfaces, green walls, swales, fewer barriers between habitats, and additional vegetation. The last visual (bottom right) is the Transport Scenario which is based on the urban planning and transport theme of green urbanism. In addition to the current situation, it includes fewer parking spaces, many of which are electric vehicle-only parking spaces, a cycling-priority street, bicycle racks, and benches as additional seating options. Based on the current understanding in literature, all design elements should to some degree have a positive effect on the sustainability of the site they are implemented in.⁴⁴

⁴⁴ Zeiler, 'Morphology in Conceptual Building Design'.

Private Spaces			Public Spaces							
Building Systems	Roofs	Facades	Pedestrian Infrastructure	Bicycle Infrastructure	Public Transport Infrastructure	Car Infrastructure	Waste & Water Systems	Buffer Zones	Street Furniture	Public Art
District Heating System	Green Roofs	Green Walls	Permeable Surfaces	Permeable Surfaces	Permeable Surfaces	Permeable Surfaces	Stormwater Conveyance	Permeable Surfaces	Catenary Lighting	Water Feature
Grey Water Recycling	Solar Photovoltaic Panels	Recycled Materials	Recycled Materials	Recycled Materials	Recycled Materials	Recycled Materials	Storm-/Rainwater Storage	Increased Vegetation Cover	Recycled Materials	Recycled Materials
Grey Water Treatment	Solar Thermal Panels	Durable Materials	Durable Materials	Durable Materials	Durable Materials	Durable Materials	Stormwater Infiltration Basin	Increased Vegetation Diversity	Durable Materials	Durable Materials
Passive Heating	Water Capture	Highly Insulated Windows	Low Maintenance Pavement	Low Maintenance Pavement	Low Maintenance Pavement	Low Maintenance Pavement	Stormwater Treatment Vault	Climate Appropriate Vegetation	Low Energy Lighting	
Passive Cooling	High Albedo Surfaces	Renewable Materials	Increased Sidewalk Width	Electric Bicycle Charging Station	Add/Improve Bus Stop Shelters	Electric Car Charging Station	Natural Drainage Systems	Low Maintenance Vegetation	Solar Powered Lighting	
Compost	Water Storage	Hemperete	Add/Improve Pedestrian Shelters	Bicycle Charging Station	Bus-Specific Lanes	Low Energy Traffic Signals	Swales	Animal Diversity Supporting Vegetation	Higher (and, thus, fewer) Lighting Poles	
Flexible Design		Louvers	Pedestrian Supportive Signals	Bicycle Maintenance Station	Bus Priority at Intersections	Electric Car Parking Spaces	Utility Corridors	Native Vegetation Species	Combined Functions on Poles	

Energy Storage		Prefabricated Structures	Indicated Pedestrian Crossing	Bicycle Racks	Wide Turns for Large Vehicles	Traffic Calming Features	Recycling Bins	Remove Habitat Boundaries		
Backup Systems		Environmentally Friendly Coatings	Shorten Street Crossings	Bicycle Storage Lockers	Live Waiting Time Display	No On-Street Parking	Future Proof Systems	Swales		
			Add/Improve Pedestrian Rest Options	Bicycle Detection at Signals	Flexible Use of Street	Flexible Use of Street	Flexible Design	Daylighting Streams		
			Accessible Curb Design	Bicycle Priority at Intersections	Noise Reduction Pavement	Noise Reduction Pavement		Rain Gardens		
			Pedestrian Lighting	Simultaneous Bicycle Signals	High Albedo Surfaces	High Albedo Surfaces		Soil Amendments		
			Pedestrian Refuges	Cycling Route Signs		Car Sharing		Bioengineered Planting Strips		
			Pedestrian Zone	Cycling-Priority Street		Narrow Lanes		Less Parking Spaces		
			Raised Crossing			Reversible Lanes		Medians		
			Stormwater Storage Pavement			Communicative Street Design		More Active Transport Parking		

Table 1: Morphological Chart of Environmentally Friendly Micro-Scale Urban Design (Energy and Materials: Yellow, Water and Biodiversity: Green, Urban Planning and Transport: Blue; Figure adapted from Bevan et al.⁴⁵)

⁴⁵ Timothy Bevan et al., 'Sustainable Urban Street Design and Assessment', July 2007. 13.

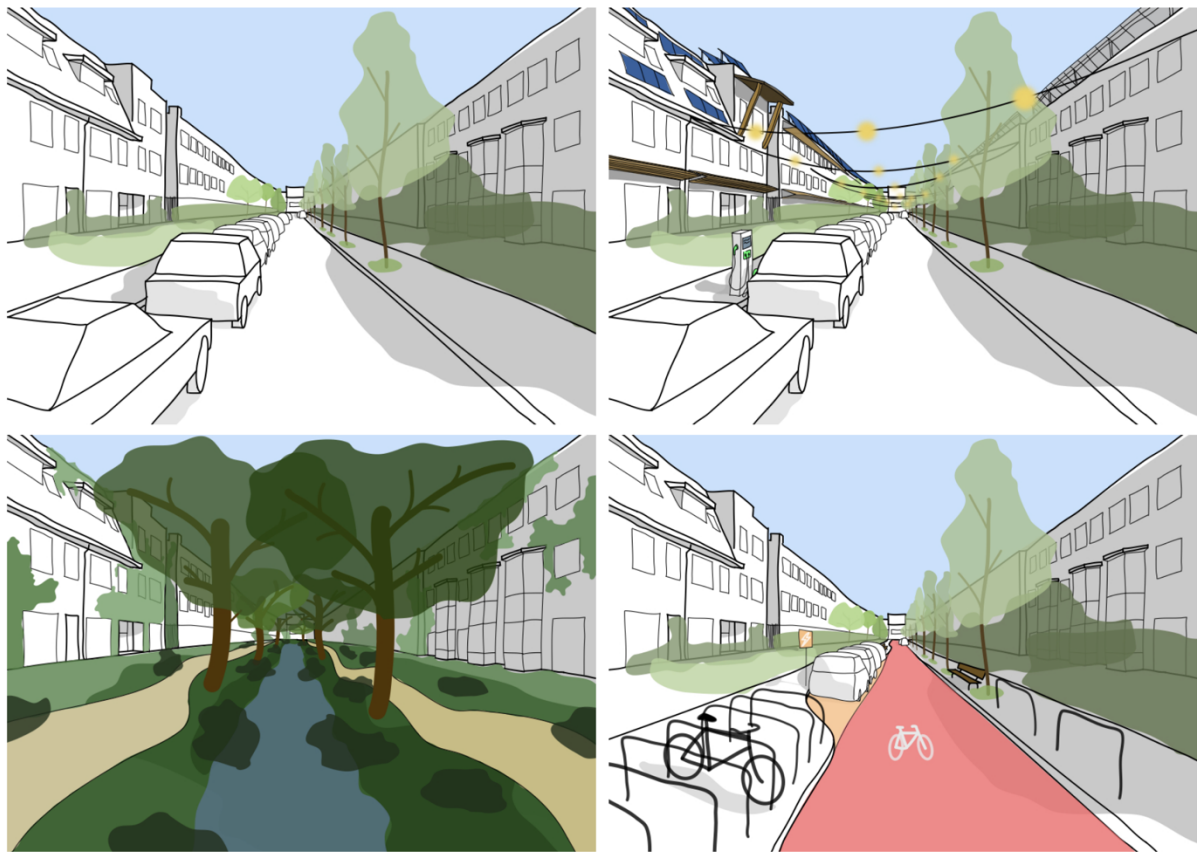


Figure 4: *Design Scenarios: Current Situation (Top Left), Energy Scenario (Top Right), Nature Scenario (Bottom Left), and Transport Scenario (Bottom Right; see Appendix 1 for Full-Sized Figures)*

Site Visit and Focus Group

Part of the data collection was for the participants to familiarise themselves with the site in question to better understand the location and setting of the designs. To enable this, a short field trip was performed. Additionally, the students were asked to note down their thoughts on the street in its current state and how they experienced it. After the familiarisation with the current situation, the design scenarios were presented and the adolescents could ask questions about the design elements. At this point, participants were asked to note down which scenario they prefer.

Following the site visit and the subsequent break, the adolescents participated in a moderated focus group interview. At the end of the focus group, the participants were asked to write down their currently preferred scenario again. The full data collection guide, including the focus group questions, can be found in Appendix 2.

Data Analysis

The analysis process started with transcribing the audio recording of the focus group. The initial transcription was done with Microsoft Word Online, after which the audio recording and the transcript

were compared manually to correct any inaccuracies and errors. The Dutch transcript was translated into English using DeepL Pro and again manually checked and corrected.⁴⁶

Based on the research question and the resulting qualitative data, it was decided to perform a theoretical thematic analysis. A thematic analysis is a method of analysing qualitative data which reveals underlying themes through the coding of the data.⁴⁷ Based on the literature review and the participant profile, it was expected that adolescents would understand the general concept of sustainability and connect multiple themes but still mostly focus on themselves.

After familiarisation with the data, relevant sections within the transcript were coded inductively. These initial codes were reassessed and edited until they represented the data relevant to the research question. From the resulting codes, initial themes were developed which after reevaluation were finalised and defined.⁴⁸ Although the English translation of the focus group transcript was mainly used for coding, in the case of arising uncertainties about the meaning of phrases, the Dutch transcript was utilised as a reference. The outcome of the thematic analysis is showcased in the results section.

Ethical Considerations

During data collection, ethical considerations were taken into account. The data was stored securely on a single device and the participants, as well as the school management, were required to give their informed consent before the start of the data collection. To ensure the privacy of the participants, no personal information apart from their age and grade was collected. In addition, the data collection followed a low-impact approach by keeping the data collection period to a single lesson consisting of two 45-minute timeslots with a break in between. Moreover, the data collection was integrated into the curriculum as much as possible.

Limitations

The main limitation of this research project is the limited number of focus group interviews. With one focus group consisting of eight participants, the possibility for generalisation of findings is limited. Next to the amount of data, the engagement of adolescents might have been limited due to the school setting they were in. In addition, with all participants identifying as male, the gender diversity was not given. However, the homogeneity of the group allows for an in-depth analysis of the similarities and differences within a group with the same background.

⁴⁶ For the Dutch version of the data collection guide and the full transcript in Dutch or English, request access by contacting jovan.vdberk@gmail.com.

⁴⁷ Moira Maguire and Brid Delahunt, 'Doing a Thematic Analysis: A Practical, Step-by-Step Guide for Learning and Teaching Scholars.', *All Ireland Journal of Higher Education* 9, no. 3 (31 October 2017).

⁴⁸ Mojtaba Vaismoradi et al., 'Theme Development in Qualitative Content Analysis and Thematic Analysis', *Journal of Nursing Education and Practice* 6, no. 5 (15 January 2016): 100–110.

RESULTS

Survey Results

Table 2 displays the adolescents' urban design scenario preferences before and after the focus group. Due to a lack of complete responses to the survey, certain data fields are incomplete. Nevertheless, the available data showcases great variety. Prior to the focus group, the Transport Scenario was preferred the most and after the Transport and Energy Scenarios were equally preferred. Respondent 4 was the only one who changed his preference after the discussion completely. Others remained with their preferences, made small additions, or mentioned a second scenario. Additionally, the Nature Scenario, which was only preferred by one student, or its design elements became more present in Adolescents' preferences after the focus group. In general, it can be said that their answers became more nuanced.

Respondent	Preference(s) before Discussion	Preference(s) after Discussion
1	-	-
2	Transport Scenario	Transport Scenario (with added solar panels, catenary lighting, and possibly green walls)
3	Current Situation	-
4	Transport Scenario	Energy Scenario (with added green)
5	Transport Scenario	Combination of Energy & Transport Scenario (water, solar panels, and catenary lighting)
6	Current Situation	-
7	Nature Scenario	Nature Scenario
8	Energy Scenario	Combination of Energy & Transport Scenario, Nature Scenario is most beautiful but also most unrealistic

Table 2: *Scenario Preferences Before And After Focus Group Discussion*

Thematic Analysis

The thematic analysis reveals the content relevant to adolescents through themes and codes. These themes and codes are displayed in Table 3 and constitute the result of the thematic analysis.

Codes and Themes

The results of the thematic analysis, as displayed in Table 3, consist of eight themes, each encompassing two to five codes. In the following section, the themes, their codes, and the adolescents' narratives will be showcased further.

Codes	Themes
Functionality	Purpose
Practicality (<i>Ease of Use</i>)	
Aesthetic Value	
Comfort & Convenience (<i>Mainly Related to Motor Vehicle Travel</i>)	Well-Being
Safety	
Intrinsic Value of Nature	Nature
Experiencing Nature (<i>i.e. Options to Rest/Relax</i>)	
Integration of Nature (<i>into Urban Environment</i>)	
Rural Environment	
Concern for Sustainability	Sustainability
Pollution (<i>Emissions</i>)	
Energy & Electrification (<i>i.e. Solar Panels and Electric Vehicles</i>)	
Mobility & Accessibility	Transport
Space for Cars (<i>Car Access, Parking, and Recreation</i>)	
Public Transport	
Cycling	
Sound (<i>of (Non-) Electric Vehicles</i>)	
Private Ownership (<i>Mainly Car Ownership</i>)	
Shared Use	
Economic Considerations (<i>Opportunities & Constraints</i>)	
Future Developments (<i>Economic/Technological/Demographic/Societal/Institutional/Climate</i>)	Uncertainty
Functionality (<i>Technology or Processes</i>)	
Responsibility	
Future Developments (<i>Economic/Technological/Demographic/Societal/Institutional/Climate</i>)	Degree of Change
Feasibility	
Responsibility	

Table 3: Codes and Themes Derived from the Thematic Analysis of Adolescents Preferences on Environmentally Friendly Urban Design.

Purpose

The theme *purpose* is central to the preferences of the adolescents and can be found throughout the discussion. During the focus group, adolescents pointed out that the changes should provide more utility. While some adolescents identified louvers as “useless” and the Nature Scenario as “unpractical,”⁴⁹ others classified entire scenarios as functional by saying that “this is all really useful.”⁵⁰ Therefore, most urban design elements were evaluated based on their *functionality* and *practicality*. Although the codes of *functionality* and *practicality* seem rather similar, in this case, *functionality* broadly relates to the provision of use value to wider society while *practicality* is concerned with the provision of utility to individuals and mainly considers the ease of use and not necessarily its usefulness.

⁴⁹ Transcript (English Translation) 3.

⁵⁰ Transcript (English Translation) 4.

On the topic of green walls and roofs, one student mentioned that, although they remain unsure about the exact functionality, green facades seem “useful, though” while another noted that they look “a bit ugly, though.”⁵¹ This comment showcases the last code categorised under this theme, namely the *aesthetic value* assigned to environments and their elements. The code *aesthetic values* is, in most cases, closely connected to the theme of nature, which is either described as useful or useless depending on the student. Regardless of their perceived functionality, natural elements are predominantly understood as being responsible for increasing *aesthetic value*. While opinions within this group of adolescents on the importance of *functionality* and *aesthetic value* differ, the presence of this theme throughout the discussion indicates that the purpose of urban design elements generally seems relevant to adolescents. Hence, this theme describes the notion within this discussion that urban design interventions should have a purpose.

Well-Being

Next to their purpose, the theme of *well-being* describes added benefits or flaws of specific urban design elements which adolescents identified. Multiple students regarded car access, infrastructure, and ownership as providing more *convenience and comfort* to them, for example, saying “if I had a car, it would be easier to get over.”⁵² Nevertheless, some students noted that similar convenience and mobility can be achieved by cycling and using public transport as well. The code *comfort and convenience*, therefore, closely relates to the transport theme. In addition to *comfort and convenience*, the code of *safety*, next to transport, is further connected to the nature theme due to a discussion on the maintenance of green walls. Thus, the participants of this focus group value urban design that ensures aspects such as comfort, convenience, and safety.

Nature

Despite not addressing well-being directly, the theme of *nature* is related to it, as the presence of natural features, such as trees, is relevant to adolescents. Even without any considerations of functionality or mentioning of nature’s aesthetic appeal, most of the students understand nature as valuable for its own sake. The *intrinsic value of nature* is, therefore, one of the codes describing adolescents’ relationship to their natural surroundings. In addition to this code, adolescents point out that in most of the presented scenarios, they lack the ability to stop, take time to relax, and experience nature. The code *experiencing nature* manifests within the dialogue through comments such as “green is good to sit [in] for a while.”⁵³ To be able to enjoy natural features, the *integration of nature* needs to be facilitated through urban design. Nevertheless, the preferences for the number of natural features implemented in urban street design differ quite a lot from student to student. While the *integration of*

⁵¹ Transcript (English Translation) 9.

⁵² Transcript (English Translation) 6.

⁵³ Transcript (English Translation) 11.

nature is in most cases perceived as something positive, the adolescents note that this would significantly impact the ability to retain the same functionalities, such as providing access to cars stating that “[if] it’s possible, would be cool.”⁵⁴ Furthermore, all students indicated that they currently live in a rural area, which had a noticeable effect on the discussion, as village landscapes were often used as a comparison. Adolescents’ comments on making urban spaces resemble rural spaces or moving towards rural areas. This necessitated a code for *rural environments*, specifically. This becomes apparent with students saying that “then that is just the solution; go and live in a village” and urban design should change to village-like spaces “where you have a lot of greenery anyway.”⁵⁵ Due to its relation and connection to other themes and nature’s centrality in the discussion surrounding future urban design preferences, the *nature* theme is one of the most relevant themes within this focus group.

Sustainability

Besides natural features improving local environments, the overarching topic of *sustainability* and environmentally friendly futures occurred on multiple occasions as well. The theme of *sustainability* consists of three codes of which the first one is the *concern for sustainability* of adolescents. Phrases related to this code mostly present themselves in connection to *pollution* which is the second code of this theme. During a discussion on the topic of *pollution*, one student stated that in “a city [it] is so important that [there] is as little as possible from exhaust fumes.”⁵⁶ This illustrates that greenhouse gases (GHGs), especially the ones emitted by motor vehicles, are perceived to be the main type of pollutants by adolescents. As a result of this, a section of the focus group pertained to electric vehicles and the importance of generation (clean) energy. The aspects of the discussion concerning *energy and electrification* were coded separately due to this. While preferences regarding electric vehicles differed between students, solar panels were an appreciated addition to the streetscape. With its apparent link to multiple challenges in urban environments, the theme of *sustainability*, although not coded in a high frequency, is significant within adolescents’ narratives on urban spaces.

Transport

The sector influencing the sustainability of urban design scenarios most drastically is *transport*. The theme of *transport* describes everything related to the movement of humans through space and includes five different codes. The code of *mobility and accessibility* contains all comments relating to the efficiency and the possibility of movement through the spaces discussed. This encompasses statements such as “I did find the pavement quite narrow, especially with all [that] green [...] next to it”⁵⁷ and “no car can get through that way and cycling also gets tricky.”⁵⁸ Notably, cycling and car

⁵⁴ Transcript (English Translation) 5.

⁵⁵ Transcript (English Translation) 21.

⁵⁶ Transcript (English Translation) 10.

⁵⁷ Transcript (English Translation) 1.

⁵⁸ Transcript (English Translation) 4.

infrastructure were topics that appeared on multiple occasions. Suggestions such as “I would actually just put a really big car park there”⁵⁹ and comments “that cyclists [having] priority, [is] more practical”⁶⁰ resulted in the creation of the codes *space for cars* and *cycling*. In addition to cycling and car infrastructure, *public transport*-related sections were coded, although with a significantly lower frequency. While the code *space for cars* covers a broad array of statements including those concerning parking, a separate discussion on the importance of the *sound* of cars necessitated a separate code. Therefore, the most common forms of transportation have their own code attributed to them with the exception of walking which is included in the *mobility and accessibility* code. Being one of the more frequently coded themes, *transport* plays a large role in the perception of urban spaces in this focus group discussion.

Ownership

One theme often paired with *transport* during coding is *ownership*. *Ownership* consists of the codes of *private ownership*, *shared use*, and *economic considerations*. While a student expressing his perception of the scenario in which paved surfaces are replaced with shared green space says that “nobody has a garden anymore,”⁶¹ every other phrase concerning *private ownership* is linked to car ownership. Most students indicated that they could not imagine living without a privately owned car and another stated that “you have to know for yourself.”⁶² Although most adolescents were hesitant to abandon privately owned cars, others embraced *shared use* vehicles by stating that “we already have shared scooters and shared bikes, I think it is also good [to have shared] cars somewhere.”⁶³ Moreover, the group of adolescents also paid attention to *economic considerations*, for example, by accounting for the “cost of my petrol”⁶⁴ in a discourse about electric cars. This code, however, was also more broadly applied in a dialogue about the financial security and future of fossil fuel companies, for example. Therefore, the theme of *ownership* is broadly applied and more specifically showcases the relevance of private property within this focus group.

Uncertainty

Although most students express clear opinions and preferences, a recurring theme is the lack of knowledge or confidence in it. The theme of *uncertainty* addresses this through three codes, namely, *future developments*, *functionality*, and *responsibility*. As with most coded lines within this theme, the *uncertainty* about *future developments* is mainly revealed through questions or self-questioned

⁵⁹ Transcript (English Translation) 6.

⁶⁰ Transcript (English Translation) 9.

⁶¹ Transcript (English Translation) 4.

⁶² Transcript (English Translation) 6.

⁶³ Transcript (English Translation) 8.

⁶⁴ Transcript (English Translation) 8.

statements such as this one on electrification: “Because we are going to drive electric, aren’t we?”⁶⁵ In contrast to the code of *future developments* which includes uncertainty about technological, environmental, and societal changes, the code *functionality* describes the missing understanding of processes of the functionality of certain technologies. Even more relevant for the successful implementation of sustainable urban design elements than *functionality* is the question of *responsibility*. As part of the adolescents’ focus group discourse, a student asked “Who is going to do this? Who has the money for this?”⁶⁶ Therefore, the theme of *uncertainty* remains present in many aspects of adolescents’ perceptions of urban design and its wider context.

Degree of Change

While the themes of *uncertainty* and *degree of change* are closely related, they differ largely in their content. In contrast to the theme of *uncertainty*, the content of the theme of *degree of change* consists of certain and conclusive statements on *future developments*, *feasibility*, or *responsibility*. Although all students agree that preventing further environmental destruction is important, the degree to which they are willing to change their behaviour as well as the degree of change they expect vary quite drastically. The adolescent’s phrase “Still happening; That’s never going to stop”⁶⁷ on the topic of melting polar ice showcases the degree of expected change and has been coded as *future developments*. In addition to *future developments*, the code *feasibility* signifies the notion of most adolescents that you “should be able to do it.”⁶⁸ Despite an individual’s concern about the future of fossil fuel companies, most students agree with the sentiment that they “should adapt”⁶⁹ whereby they place the *responsibility* on companies. The concept of adaptation is, therefore, at the essence of the theme of *degree of change*.

Cross-Theme Relationships

The thematic map displayed in Figure 5 showcases the relationships between the themes of this thematic analysis. The themes with the strongest relation, *transport* and *nature*, are underlined. The theme *purpose* represents the functional purposes of *transport* and *sustainability* while relating to the *nature* theme through the purpose of aesthetics. The theme of *ownership* is central to the discussion and mainly relates to the *transport* theme through car ownership and to the *well-being* theme through the comfort and convenience of individual motor vehicle travel. Next to sustainability, *uncertainty* and *degree of change* are themes mostly concerned with the future and are, therefore, connected.

⁶⁵ Transcript (English Translation) 8.

⁶⁶ Transcript (English Translation) 18.

⁶⁷ Transcript (English Translation) 21.

⁶⁸ Transcript (English Translation) 2.

⁶⁹ Transcript (English Translation) 12.

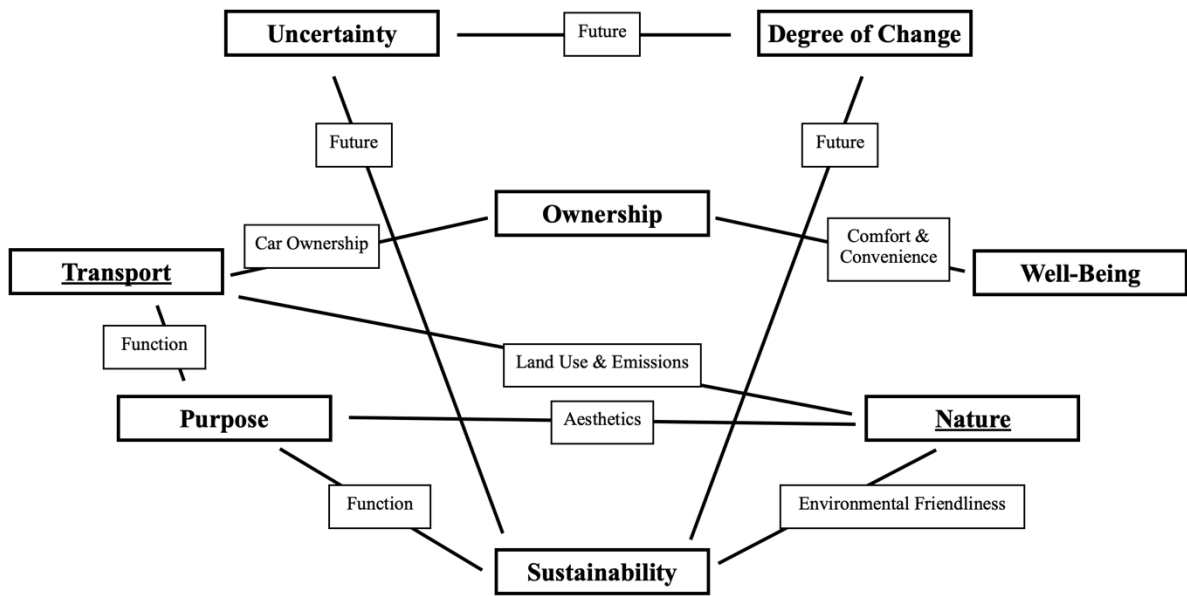


Figure 5: *Thematic Map Displaying the Relationships Between Themes*

DISCUSSION

The aforementioned results revealed themes and narratives revolving around urban design and sustainability, which the adolescents deemed important during the focus group discussion.

Purpose of Urban Design

During the focus group interview, a recurring dynamic between functionality and aesthetics emerged in the adolescents' discussion. The functionality of urban design elements, especially in accommodating many different behaviours, was perceived to be crucial. However, students frequently highlighted the importance of aesthetics and did this specifically in relation to nature. While natural spaces in urban environments were only accepted as far-future developments, rural environments were perceived to be aesthetic as well as contemporary by all. This might be the case because the rural areas, which they are used to, fulfil the adolescents' preference for car accessibility while providing more vegetation and, therefore, aesthetic landscapes in the view of this group of adolescents living in rural areas. Due to car ownership often being the only convenient form of transportation in rural areas, adolescents' preference for car-accessible urban environments probably originates from this. Interestingly, this group of adolescents also seems to assign a higher potential for sustainability to people moving to rural areas than to the transformation of urban spaces. Here, their preferences contradict the transformative approach Hopwood et al. propose and green urbanism embodies.^{70 71} The view that urban design can only support sustainable development to a certain extent might relate to their understanding of sustainability as a concept. Previous research has identified a difference in sustainability understanding between rural and urban children of the same age.⁷² As Svetina et al. argue, due to the earlier exposure of urban children to higher degrees of consumption, emissions, and pollution, urban children are likely to be more sensitive towards the environment.⁷³ While this study lacks a group of urban adolescents of the same age as a reference, it can be hypothesised that their focus on far-future developments for nature-based urban design relates to their uncertainty about the possibility of change and the limited understanding of urban sustainability challenges and their solutions.

Uncertain Future

In early adolescence, children begin to make plans that extend further and further into the future.⁷⁴ This development affects their urban design preferences as well as their conception of sustainability. In terms of their preferences, adolescents focus mainly on the comforts and conveniences that will be available to them in the future, such as car ownership, and only later take environmental considerations into account. Hence, their sphere of concern is limited to themselves and their close

⁷⁰ Hopwood, Mellor, and O'Brien, 'Sustainable Development'.

⁷¹ Lehmann, 'What Is Green Urbanism?'

⁷² Svetina et al., 'How Children Come to Understand Sustainable Development'.

⁷³ Svetina et al.

⁷⁴ Svetina et al.

surroundings. With the start of adolescence, the focus on oneself and the immediate social environment typically extends to consider wider society and later even global aspects.⁷⁵ While many statements in the focus group still showcase this individual focus, some display a more nuanced understanding of social responsibility and sustainability. This can be connected to the idea that equity considerations and resulting conclusions on individual responsibility are based on the degree of comprehension of economic sustainability.⁷⁶ Moving beyond the realm of the individual, therefore, requires an in-depth understanding of economic relations.⁷⁷ The continuous relevance of car ownership, for example, seems to contradict the presence of this type of understanding or at least showcase the uncertainty present within this group of adolescents. Narratives of consumption, for example, or other types of counterpressure could also have the effect that sustainable preferences are not expressed.⁷⁸ The uncertainty about sustainability and the not-yet-complete understanding of it reveals itself in situations where individual comfort and convenience are prioritised over the collective good.

Understanding Sustainability

Nevertheless, contrary notions are also present. Most adolescents seem to understand the urgency of climate action and the specific measures required for sustainable development to occur. The transition adolescents are in is highlighted through the presence of environmentally conscious behaviour next to the individualistic thought patterns. As previously stated, adolescents' economic considerations showcase a nuanced understanding of sustainability.⁷⁹ While this understanding is present for the most part, students still indicate individualistic preferences. Based on the assumption that understanding directly influences behaviour, we can assume environmental awareness to be translated into sustainable behaviour. However, understanding and behaviour seem to contradict one another. This mismatch occurs when adolescents feel that they need to conform to societal expectations and, especially, peer pressure, which, in general, are contrary to notions of sustainability.⁸⁰ ⁸¹ Thus, the adolescents' behaviour seems to lag behind their understanding. The discrepancy between the participant's understanding of sustainability and their preferences or behaviour will most likely vanish with early adulthood.⁸² Here, the peer pressure generally decreases and allows for additional identity formation.⁸³ ⁸⁴ The suppression of more environmentally friendly preferences before adulthood might also explain the focus on particular reasons for deeming sustainable urban design elements unpreferable. During the focus group discussion, most adolescents indicated that they preferred less drastic changes in the urban

⁷⁵ Svetina et al.

⁷⁶ Springett and Kearins, 'Gaining Legitimacy?'

⁷⁷ Springett and Kearins.

⁷⁸ Svetina et al., 'How Children Come to Understand Sustainable Development'.

⁷⁹ Springett and Kearins, 'Gaining Legitimacy?'

⁸⁰ Papalia and Olds, *Human Development*.

⁸¹ Rice, *Human Development*.

⁸² Rice.

⁸³ Rice.

⁸⁴ Svetina et al., 'How Children Come to Understand Sustainable Development'.

environment as opposed to more transformative scenarios, particularly with regard to the Nature scenario. The thematic analysis revealed that the topic of feasibility is of particular relevance to the participants of this focus group. All transformative scenarios were labelled as unfeasible by a participant at some point in time. Thus, it can be hypothesised that the conception of feasibility currently is the main restrictive notion for sustainability. A definite conclusion, however, requires further research on the role of feasibility in sustainability understanding.

The adolescents' preferences on urban design indicated a varying degree of sustainability understanding. While all participants showcased some degree of environmental awareness, only some discourses demonstrated an interest in collective well-being and most urban design preferences were based on individualistic considerations. Additionally, feasibility seems to be the main factor functioning as a justification for indicating less environmentally friendly preferences, which were deemed preferable as a result of the pressure to conform with expectations. Although most preferences of adolescents contradict the aims of environmentally sustainable development, environmental awareness is an underlying theme but is, as of this moment, not valued enough to outweigh personal benefits such as car ownership. While the adolescents recognise that some factors are conflicting, they struggle to find a satisfactory middle ground. Although their preferences regarding this balance remain unclear, based on past findings, it is to be expected that they will be able to define their preferences more clearly with age.

CONCLUSION

To answer the question “To what extent is environmental sustainability reflected in adolescents’ urban design preferences?,” a focus group interview with eight high school students was performed and analysed through a thematic analysis. Their discussion on urban design, the environment, and future developments was described through the themes of sustainability, nature, well-being, transport, ownership, uncertainty, and degree of change. From the thematic analysis, it can be concluded that adolescents prefer interventions that do not drastically influence the structure of the urban environment but rather small additions with a large potential for increased functionality. Furthermore, adolescents’ preferences for individual conveniences often overshadowed their desire for environmentally friendly urban design elements. Additionally, feasibility was identified as the main constraining factor for environmentally sustainable urban design. The causes for these results were linked to a limited understanding of sustainability or a peer pressure-induced discrepancy between the sustainability understanding and the adolescents’ behaviour. Nevertheless, all adolescents showcased at least some degree of environmental awareness. Specific urban design preferences present throughout the discussion include green space and vegetation, especially for its aesthetic value, space for cars, in close connection to car ownership, benches, and solar panels as well as catenary lighting. Next to these urban design elements, the group of adolescents also expressed non-physical preferences such as functionality or aesthetics, some of which are at odds with one another.

To conclude, although adolescents’ urban design preferences relate in many ways to environmental sustainability, their understanding of the topic is still limited and characterised by uncertainty and most adolescents have an individual focus and prefer non-transformational environmentally friendly change. Thus, practitioners should be aware of the development of sustainability understanding in children, account for limited understanding and uncertainty about sustainability in adolescents, support children in understanding relevant concepts, and adjust for the influence of social expectations and peer pressure in participatory urban design projects.

Due to the scale of this research project, only eight adolescents were interviewed. Further research could investigate the urban design preferences of adolescents on a larger scale. Additionally, future research could adjust the composition of focus groups and create different homogenous or heterogenous variations. Moreover, adolescents’ imitation of societal trends in relation to urban design seems to be a promising topic to research.

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APPENDIX

Appendix 1: Full-Size Design Scenarios



Figure 6: *Current Situation*



Figure 7: *Energy Scenario*

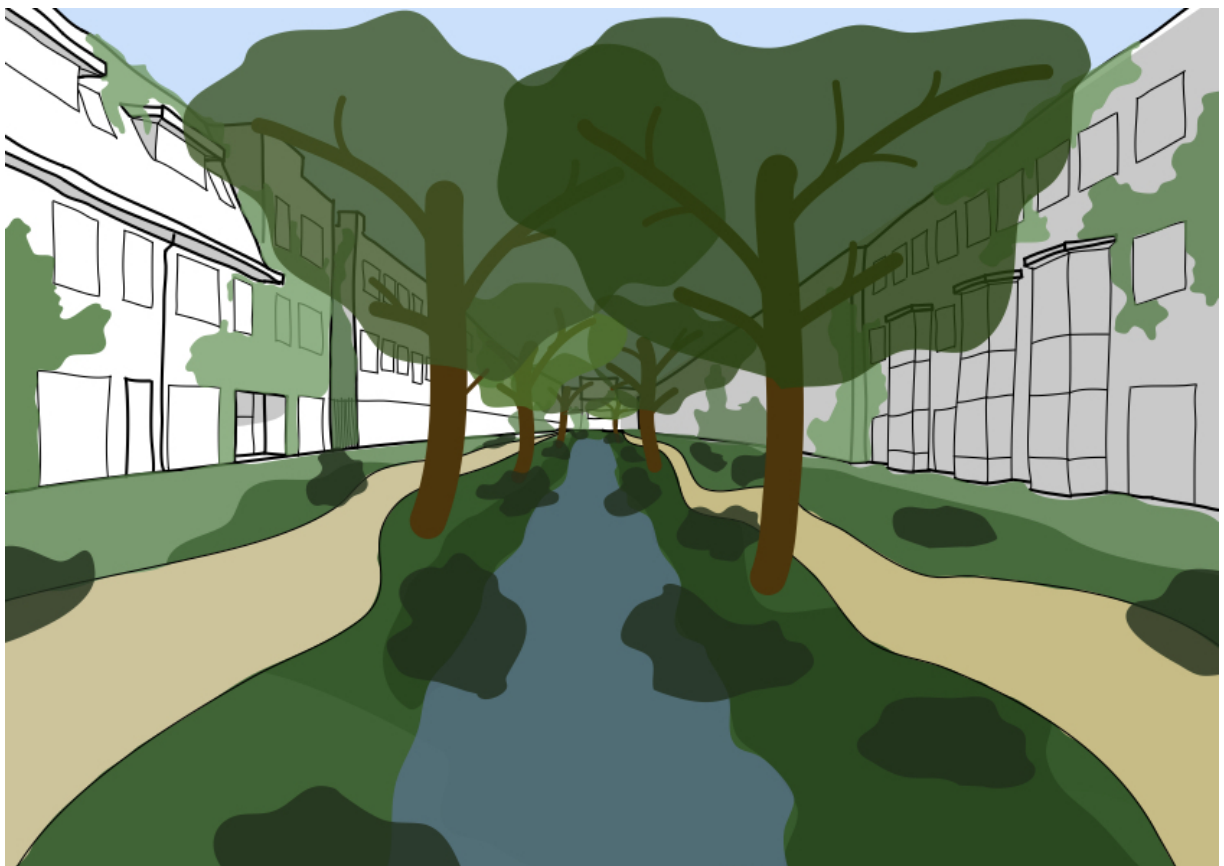


Figure 8: *Nature Scenario*



Figure 9: Transport Scenario

Appendix 2: Data Collection Guide

Data Collection Guide

Field Trip

1. Instructions
 1. Walk to the end of the street
 1. While walking observe your surroundings and write down three bullet points of what you think of the street and three bullet points on how you experience it/would make use of it.
 1. These bullet points can be really simple.
2. Familiarisation with the Scenarios
 1. Present visualisation of the *Current Situation*
 1. No changes
 2. Present visualisation of the *Energy and Material* ('Energy') scenario
 1. **Electric Car Charging Station**
 1. Encouraging the use of electric cars
 1. During operation, electric cars emit fewer GHGs
 2. **Louvers**
 1. Decreasing energy consumption and consequently GHG emissions
 1. Louvers can be adjusted to vary the amount of sunlight entering a building or hitting its walls either cooling or heating a building passively
 3. **Renewable Materials** (i.e. Wood)
 1. Renewable materials promote a circular
 4. **Catenary Lights**
 1. Lowering light pollution

1. A higher quantity of light sources with less brightness decreases light pollution
5. **Solar Panels** (Thermal and Photovoltaic)
 1. Solar panels produce energy without emitting GHGs
3. Present visualisation of the *Water and Biodiversity* ('Green') scenario
 1. **Tree Cover**
 1. Providing shade
 2. Evapotranspiration cools counteracting the urban heat island effect
 2. **Green Walls**
 1. Cool buildings and surrounding environment down
 3. **Vegetation Cover**
 1. Increases biodiversity
 2. Connects habitats
 4. **Permeable Surfaces**
 1. Allows water to infiltrate
 5. **Swale(s)**
 1. Stores water
 1. Prevents flooding
 2. Enables infiltration
 3. Increases cooling through evaporation
4. Present visualisation of the *Urban Planning and Transport* ('Transport') scenario
 1. **Cycling Street**
 1. Encouraging active modes of transportation (i.e. walking or cycling)
 1. Active modes of transportation reduce the GHG emission
 2. **Electric Car Parking Spaces**
 1. Encouraging the use of electric cars
 1. During operation, electric cars emit fewer GHGs
 3. **Amount of Parking Spaces**
 1. Discouraging the use of cars
 1. Reducing GHG emissions
 4. **Pedestrian Rest Options**
 1. Encouraging active modes of transportation (i.e. walking or cycling)
 1. Active modes of transportation reduce the GHG emission
 5. **Bicycle Racks**
 1. Encouraging active modes of transportation (i.e. walking or cycling)
 1. Active modes of transportation reduce the GHG emission

Data Collection

1. Survey 1
 1. Instructions
 1. Choose one of the scenarios (including the Current Situation) and write down the scenario you prefer on this piece of paper.
 2. Hold on to your piece of paper for later.
2. Focus Group
 1. **Do you feel that you now have a good understanding of the scenarios?**
 1. Explain any unclarities.
 2. Inform students that they will be recorded
 1. Start recording
 3. *Current Situation* (5min)
 1. Thoughts
 1. Space
 1. **What do/did you notice about the Current Situation?**
 1. You can also make use of your notes from earlier here.
 2. **What do you think about the Current Situation?**
 1. **Is it good or bad?**
 2. **Why?**
 2. Elements
 1. **Which elements do you like?**
 1. **Why?**
 2. **Which elements do you dislike?**

1. Why?
2. Experiences
 1. Space
 1. How do/did you experience the site?
 1. How would you make use of the site in your day-to-day life?
 1. Imagine you would live close to there.
 2. How does/did this space make you feel?
 1. Positive or negative?
 2. Why?
 2. Elements
 1. How would you make use of these elements in your day-to-day life?
 2. Do you have any experiences connected to (one of) these elements you are willing to share?
4. *Energy and Materials* ('Energy') Scenario (5min)
 1. Thoughts
 1. Space
 1. What do you notice about this scenario?
 2. What do you think about this scenario?
 1. Is it good or bad?
 2. Why?
 2. Elements
 1. Which elements do you like?
 1. Why?
 2. Which elements do you dislike?
 1. Why?
 2. Experiences
 1. Space
 1. How do you experience the site?
 1. How would you make use of the site in your day-to-day life?
 1. Imagine you would live close to there.
 2. How does this space make you feel?
 1. Positive or negative?
 2. Why?
 2. Elements
 1. How would you make use of these elements in your day-to-day life?
 2. Do you have any experiences connected to (one of) these elements you are willing to share?
 3. Is there anything you want to add to this scenario?
 5. *Water and Biodiversity* ('Green') Scenario (5min)
 1. Thoughts
 1. Space
 1. What do you notice about this scenario?
 2. What do you think about this scenario?
 1. Is it good or bad?
 2. Why?
 2. Elements
 1. Which elements do you like?
 1. Why?
 2. Which elements do you dislike?
 1. Why?
 2. Experiences
 1. Space
 1. How do you experience the site?
 1. How would you make use of the site in your day-to-day life?
 1. Imagine you would live close to there.

2. **How does this space make you feel?**
 1. **Positive or negative?**
 2. **Why?**
 2. Elements
 1. **How would you make use of these elements in your day-to-day life?**
 2. **Do you have any experiences connected to (one of) these elements you are willing to share?**
 3. **Is there anything you want to add to this scenario?**
 6. *Urban Planning and Transport* ('Transport') Scenario (5min)
 1. Thoughts
 1. Space
 1. **What do you notice about this scenario?**
 2. **What do you think about this scenario?**
 1. **Is it good or bad?**
 2. **Why?**
 2. Elements
 1. **Which elements do you like?**
 1. **Why?**
 2. **Which elements do you dislike?**
 1. **Why?**
 2. Experiences
 1. Space
 1. **How do you experience the site?**
 1. **How would you make use of the site in your day-to-day life?**
 1. **Imagine you would live close to there.**
 2. **How does this space make you feel?**
 1. **Positive or negative?**
 2. **Why?**
 2. Elements
 1. **How would you make use of these elements in your day-to-day life?**
 2. **Do you have any experiences connected to (one of) these elements you are willing to share?**
 3. **Is there anything you want to add to this scenario?**
 7. Comparative Scenarios (5min)
 1. **Which design do you find most appealing?**
 8. **What do you want in a street?**
 1. **How could it accommodate those needs?**
 2. **How could it be environmentally friendly?**
 9. **Do you still want to add something?**
3. Survey 2
 1. Instructions
 1. Choose one of the scenarios (including the Current Situation) and write down the scenario you prefer on this piece of paper you held on to.