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A City of Heathy Mobility.
Mixed method case study on development of sustainable bicycle mobility in Warsaw.

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Abstract Page

The uncontrolled development of automotive transportation worldwide raised the urgency to promote sustainable transportation among European cities, whereas bicycle as the most sustainable alternative to cars has become a symbol of urban sustainability. The popularization of cycling trips is conducive to reducing congestion, noise, and pollution in cities. It also serves to promote a healthy lifestyle. In Warsaw, sustainable transportation development is a priority for over twenty years, but cycling modal share is still on the lowest level comparing with other modes of transportation. Thus, this mixed method study investigates what influences the motivations of Warsaw inhabitants to cycle in relation to the three theoretical hypotheses based on Bourdieu's concept of habitus, social identity theory and opportunity structures to facilitate understanding of the behavioral patterns prevailing among Warsaw society. The data was collected through one hundred face-to-face surveys and three interviews with key informants, including one governmental representative and two non-governmental representatives. The analysis presents how socialization processes, social affiliation and infrastructural opportunities influence decisions to cycle. The findings of the study indicate that promoting the bicycle as an everyday mode of transportation is a complex challenge that includes various, interrelated thematic areas of culture, policy, opportunity and social identity.

Key words: sustainable transportation; development; bicycle; Warsaw

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1. Introduction and background

The popularity of automobile transportation has been overgrowing for years worldwide to the extent that many countries and cities are now failing to contend it. Between 1950 and 1990 along with doubling population from 2.5 billion to near 5.0 billion (OEDC, 1996, p. 14) the number of motorized road vehicles (primarily cars and motorcycles) increased ninefold from 75 million to about 675 million (OEDC, 1996, p. 14). Whereas in 2017, the world's population was estimated to nearly 7.6 billion (UN, 2017, p. 1) and in 2016, the vehicle population reached 1,32 billion cars (Wardsauto, 2017). These numbers show that vehicles are used by around 17% of the world's population. Throughout the years, favorable transport infrastructure and growing car availability raised the worldwide trend of automobile transportation. In consequence today the modern world is overfilled with cars.

Excessive automotive traffic is also one of the many essential problems faced by the authorities of contemporary Polish cities. As presented by European Statistical Office (2016), Poland was the sixth country in the EU in terms of the highest number of passenger cars per 1000 inhabitants with 571 passenger cars per 1000 inhabitants and the number is continuously increasing (Eurostat, 2018).

The uncontrolled expansion of automotive transportation and the diversity of the challenges it poses on sustainable development emerged international focus on the topic of sustainable transport and the necessity for the implementation of comprehensive solutions to restore the balance of the transportation systems.

United Nations' (UN) emphasized the significance of sustainability in urban areas among the Sustainable Development Goals (SDGs). SDG 11 sets out the priority to strive to develop cities to provide its citizens with safety, inclusion, equality and sustainability in different life spheres (SDG 11, 2016) and four of its sub-goals urge to protect natural environment against the adverse impact of the urban areas by "paying special attention to air quality and municipal and other waste management" (SDG 11, 2016), "protect and safeguard the world's cultural and natural heritage" (SDG 11, 2016), "provide universal access to safe, inclusive and accessible, green and public spaces" (SDG 11, 2016) and "provide access to safe, affordable, accessible and sustainable transport systems for all" (SDG
11, 2016).

In Warsaw, high levels of air pollution caused mainly by automotive transportation emissions, harm the quality of the environment as well as the health and life-comfort of Warsaw

residents. In response to the challenges posed by excessive automotive transportation emissions in the city, the research raises the subject of cycling, which is the most sustainable method of transportation but the least common (4,5% in 2017) among Warsaw inhabitants (Buciak, Krajewska, and Pawłowska, 2017). Thus, considering the low percentage of cycling society, it was of interest to examine the subjective perspectives of Warsaw inhabitants to obtain knowledge about their cycling routines and how they perceive bicycle and the experience of cycling.

The study begins with a review of existing literature where different factors influencing the individuals' decisions to use bicycles are presented in a multidimensional perspective considering; the convenience of bicycle facilities, and various socio-cultural conditions. Then, the theoretical framework builds a foundation for understanding how road opportunities, the process of socialization, and social self-categorization influence the choice to cycle. Subsequently, the cycling experience of Warsaw constitutes an introduction to the empirical part of the study consisting of methodology, analysis, and limitations of the study. The thesis ends with the conclusion which summarizes the acquired results.

1.2 Aim and research question

This exploratory study aims to give insight about the development of cycle traffic in Warsaw by focusing on understanding how determinants of everyday life; cultural conditions, social (self) transportation identity and cycle opportunities, overlap and impact bicycle traffic. This study analyzes the perceptions of inhabitants of Warsaw regarding their bicycle routines drawing on Bourdieu's concept of habitus, social identity theory, and opportunity structures. Thus the three central theoretical hypotheses lead the study; first hypothesis is that habitus once embedded in social structures, unconsciously steer decisions about cycling, second hypothesis is that self-categorization determine individuals' optimistic, apprehensive or reluctant attitudes towards cycling, and the third hypothesis concerns infrastructure opportunities that encourage or discourage to commute with bicycle. The analysis contributes to existing research by contrasting the assumptions that decisions to cycling are guided mainly by objective evaluation by highlighting the significance of socialization processes that frame people's decisions conditioned by various cultural discourses and by stressing that infrastructural opportunities not only influence physical experience of cycling but also visual and psychological comfort creating reluctant or favorable attitudes towards cycling. As the study focuses on understanding social determinants influencing the choices to cycle, the research question is as follows:

1. What are the motivations for Warsaw inhabitants to use or not to use bicycles?

1.3 Cycling in Warsaw

Warsaw's 2030 development strategy aims at limiting the role of individual automotive transportation in the city and instead increase the policy emphasis on sustainable transportation, like cycling (Warsaw development strategy 2030, 2017, p. 30). In 2015 the modal choice in Warsaw presents that 3,1% of all trips were by bicycle, 46.8% by public transport, 31.1% by cars and 17.9% walking (Warsaw Traffic Count, 2015). Since 2016 cycle traffic increased by 22%. In 2015, the total amount of cycle trips was estimated at 3,1%, whereas in 2017, the cycle share was 4,5% (Buciak, Krajewska, and Pawłowska, 2017).

In recent years, bicycle infrastructure in Warsaw continually develops. In 2017, the total amount of the cycling networks reached 532 km, of which 400 km are separated paths for bicycles (Urban Road Authority, 2018, p. 26). In the same year, 21km of bicycle paths have been built and renovated (Urban Road Authority, 2018, p.8).

Warsaw also offered its residents the Warsaw Public Bicycle Veturilo, which is operating since 2012. In 2017, there were 355 city stations, 5147 bicycles, including 60 children's bikes, 45 tandems, and 100 electric bicycles (Urban Road Authority 2018, p. 55)

Besides, bicycle traffic is stimulated by social campaigns, such as the socio-educational campaigns called bicycle May, European cycling challenge and campaign under the slogan "Look, Signalize, Turn" and "Match" (researcher's translation). The campaigns aim at promoting a healthy lifestyle and healthy mobility by presenting bicycles as a means of transportation, not only for recreation, including the youngest generations and encourage people to choose the bike as the primary mode of transportation. They also aim at promoting good manners and increase public awareness about security on the roads, from the perspective of a cyclist and car driver (Urban Road Authority 2018, p. 77).

Despite the positive changes in Warsaw, the majority of the road surface is still occupied by automotive transportation, meaning cars. Moreover, although the highest share of movement in the city is by public transportation, there are still 715 passenger cars registered per 1,000 city residents (GUS, 2018). Therefore, currently, one of the primary challenges for Warsaw in terms of sustainable transportation is assuring spatial quality that will include all traffic participants.

2 Existing literature

2.1 Infrastructural design and safety

In most cities, automotive transportation has a privilege and occupies most of the cities' street space. Mikael Colville-Andersen calls it "the Arrogance of Space" (Colville-Andersen 2018, p. 90) explaining on the example of Copenhagen that 64% of city's transport space, including car lanes and curb parking, is destined for cars, even though in 2016, 91% of Copenhageners did not commute in the city with a cars (Colville-Andersen 2018, p. 95).

Although the topic of sustainable bicycle mobilities is becoming increasingly important, the quality and amounts of bicycle roads in the European cities are unequal. Comparison of the capital cities of Denmark, Copenhagen (which achieved success in shaping cycling culture, because most people commute with bicycles), and Poland, Warsaw (that attempts to increase their cycle traffic, but it is continuously relatively low comparing with other modes of transportation) shows the scale of those inequalities. In Copenhagen (88,25 km²), there are 400 kilometers of cycle paths - separated from car lanes and sidewalks (Ministry of Foreign Affairs of Denmark, n.d.) whereas in Warsaw (517 km2) there is also 400 km of cycle paths (Urban Road Authority, 2018, p. 26). However, Warsaw is almost six times larger than Copenhagen.

Many contemporary analyses (Hull and O'Holleran, 2014; Andrade, Jensen, Harder, and Madsen, 2011; Wang, Mirza, Cheung, et al., 2014; Akar and Clifton, 2009) indicates the connection between the development of cycle infrastructure and policies, and increase in bicycle traffic. The Hull and O'Holleran study (2014) has shown that the design of cycle infrastructure can encourage more people to cycle, but it also engages several spatial and behavioral factors (Hull and O'Holleran, 2014). Therefore, the development of cycling traffic requires not only physical infrastructure but also an implementation of favorable to cycling policies including transportation systems integrated with cycling facilities because the design of cycling infrastructure has a significant impact on inhabitants' choice to ride a bike (Hull and O'Holleran, 2014). Hull and O'Holleran (2014) study indicates that factors that influence the choice to use a bicycle the most were safety, comfort, and routs continuity. Andrade, Jensen, Harder, and Madsen study (2011) confirms that factors related to infrastructure design influence the choices to use a bicycle, pointing out the importance of safety, connectivity, visual experience.

Hull and O'Holleran (2014) study show that continuous improvement and preservation of the cycle infrastructure especially the surface of the routes rise cyclist's sense of comfort and

security, and that separation of bicycle routes from other modes of transport may increase cyclist's trust and participation (Hull and O'Holleran, 2014). Correspondingly, Wang, Mirza, Cheung et al. (2014) study shows that the most desired route characteristics for individuals are; separation from traffic and pedestrians, good surface quality, away from traffic noise and air pollution, cycle routes connectivity, adequate width of cycleways. Considering the continuity and connectivity of network in cycling routes, not only affects the distance between places what enables smooth and fast movement around the city, but it builds the sense of security for the cyclist by giving them uninterrupted space to commute and avoids stress and confusion related to suddenly interrupted bicycle routes. The study conducted by Stinson and Bhat (2005) indicates that cyclists have a negative attitude towards the suddenly ending bicycle routes, which particularly considers inexperienced cyclists rather than experienced. Whereas Dill and Voros (2007) and Jacobsen et al., (2009) researches evidence that most people avoid high traffic zones which they perceive as dangerous and unpleasant and that the share of cyclists is higher in safer places, with less traffic or with good quality cycling paths.

2.2 Psychological factors

Many studies indicate that safety is a significant determinant for the decision to cycle (Götschi et al., 2018; Sørensen and Mosslemi; 2009, Jacobsen et al., 2009; Souzaa et al., 2014), whereas fear constitutes a primary barrier to cycle (Horton, 2010). To asses, different dimensions of safety, objective, and subjective safety have been distinguished (Sørensen and Mosslemi, 2009). Objective safety concerns the actual possibility of risks such as road injuries or accidents, whereas subjective safety involves individual perception, experience, and sense of safety and safety apprehension (Sørensen and Mosslemi, 2009). Subjective safety differs from objective due to the cultural influences and particular characteristics of the individuals who experience the fear (Jacobsen et al., 2009). As presented by Horton (2010) persistent cultural perception of the bicycle as dangerous explains the marginalization of cycling which then leads to perceiving of cyclists as "strangers" or "others" or "margins." He argues that a combination of ideological, spatial, and cultural marginality is constantly influencing cycling practices (Horton 2010).

On the other hand, various researches on the impact of attitudes on bicycle traffic indicate that attitudes are important factors influencing decisions to cycle. The studies of Souzaa et al., (2014) and Dill and Voros (2007) indicate that positive attitudes towards cycling raise the likelihood of using a bicycle for utilitarian trips. Those positive attitudes include: not liking to drive a car,

environmental concern, and enjoying cycling (Souzaa et al., 2014; Dill and Voros, 2007). According to Dill and Voros (2007) cycling to school during childhood does not increase cycling levels during adulthood, however, cycling to other destinations and for fun does. Moreover, people who had coworkers that commuted with a bicycle, or lived in households with other people that cycled systematically and saw people in they neighborhood cycling regularly have a greater tendency to cycle frequently themselves (Dill and Voros, 2007). Thus, the study points out that socially embedded values, individual habitus have an impact on people's choices during a lifetime (Dill and Voros, 2007).

While many studies evaluate the impact of attitudes, social norms, and habits, there is not much research on habitus, which constitutes a fundament for social behaviour. It occurs before social norms, habits, and attitudes, shaping characteristics for an individual's lifestyles. The research conducted by Bamberg and Schmidt (2003) indicates that in the case of choice of mode of transportation, individuals behaviour and choice are first embedded by conscious decision making but then it becomes influenced by more automatic process "habitualized process". Furthermore, the study proves that car usage by individuals is motivated by habitual choice process grounded in once made conscious considerations about pros and cons (Bamberg and Schmidt, 2003).

3. Theoretical framework

3.1 Pierre Bourdieu's concept of habitus

Bourdieu's concept of habitus explains how different socialization processes influence the lives of individuals, leaving them free will, but one that is constructed by society. To emphasize how social structures and social background influence individual choices, perception, way of thinking, behavior in the context of bicycle use in Warsaw, this concept will guide the analysis of collected data. Moreover, it will serve as a base for the first theoretical hypothesis: *Habitus embedded in social structures determines decisions to cycle.* Bourdieu himself defines habitus as:

"The conditionings associated with a particular class of conditions of existence produce habitus, systems of durable, transportable dispositions, structured structures predisposed to function as structuring structures, that is, as principles which generate and organize practices and representations that can be objectively adapted to their outcomes without presupposing a conscious aiming at ends or an express mastery of the operations necessary in order to attain them.

Objectively 'regulated' and 'regular' without being in any way the product of obedience to rules, they can be collectively orchestrated without being the product of the organizing action of a conductor." (Bourdieu, 1990, p.53)

Bourdieu attempted to balance the tensions between peoples' subjective and objective social worlds (Costa and Murphy, 2015, p. 5). In this context, subjectivity represents the world of an individual who understands the reality through the prism of his own experience and life context, whereas objectivity is a world in which the individual is outside the influence the social, economic, cultural, institutional, and power structures (Costa and Murphy, 2015, p. 5). Bourdieu studied society through both individuals' perceptions of life as well as social structures that constituted a base for their personal experience (Costa and Murphy, 2015, p. 5)

On this base, habitus can be defined as socially and culturally acquired dispositions to act, perceive, feel in a certain way and approach the world. Those dispositions are produced, contained in and influenced by social structures (fields), social history, social-class (Costa and Murphy, 2015, p. 7). Different social classes and fields characterize with different habitus, and different habitus reflects different lifestyles, beliefs, perceptions, behaviors. Therefore people with similar social status, similar capitals, and life-conditions might share or acquire similar dispositions of habitus. Life of an individual is a part of the collective history of his social spaces in which he and its habitus reflect those social spaces (Costa and Murphy, 2015, p. 4). The social background becomes internalized into what people think and how they act; thus, habitus becomes a personal preference of individuals. Each choice, which is a result of individual taste, in the case of food, books, art, and the means of transportation, is a reflection of habitus.

3.2 Social identity theory

Social identity defines how people self-categorize themselves into different social groups; therefore, identify oneself with some elements or groups of social reality (Stets and Burke, 2000, p. 224). Social groups consist of individuals who hold a common social identification or perceive themselves as belonging to the same social category (Stets and Burke, 2000, p. 225). This phenomenon can be used to explain various transportation behaviors, arising as different social groups choose to use either car, public transport or bicycles as a primary mode of transportation or bicycle for recreational and sport purposes. Social identity theory helps to explain conflict within groups, helps to understand the patterns of human behavior based on a sense of belonging that

builds the basis for thinking that their actions and perceptions are the most convenient and appropriate. This theory is the second theory that guides the data and constitutes a fundament for another theoretical hypothesis: self-identification with different transportation groups determine individuals' optimistic, apprehensive or reluctant attitudes towards cycling,

Social identity theory is divided into three components; first is social categorization, second is social identification, and the third is social comparison. Once the individuals settle in and belong to the social groups, they begin social comparisons. The social comparison process distinguishes two groups: the in-group is a group that individual wants to be a part of, is categorized with self, simply understood "us." The second group is the out-group, with categorizes people who differ from the self, in which an individual does not want or is not involved, simply "them" (Stets and Burke, 2000, p. 225). The comparison of the social groups was in early works associated with psychological such as emotional and evaluative correlates within the in-groups (Turner et al., 1987 in Stets and Burke, 2000, p. 225). Later, to examine the relationships between social groups, self-categorization was separated into the evaluative self-esteem component and psychological commitment component (Ellemers and Van Knippenberg, 1997 in Stets and Burke, 2000, p. 225).

The two essential processes of the self-categorization and social comparison result with different consequences (Hogg and Abrams, 1988 in Stets and Burke, 2000, p. 225). The self-categorization consequence with the accentuation of similarities between the self and other members of in-groups and on the other hand it also consequences with accentuation of diversities and differences between the self and other out-groups (Stets and Burke, 2000, p. 225). This accentuation concerns all types of features that are recognized to be consistent with the intergroup categorization such as attitudes, values, behavioral norms, affective reactions, styles (Stets and Burke, 2000, p. 225). Furthermore, Stets and Burke (2000) describe that social comparison consequence with selective application of accentuation effect, which means that individuals will choose mainly those features that will enhance their self-image. It primarily works in a way that the self-esteem is enhanced by comparing the in-group and the out-group what effect with the in-group to be judged positively and out-group to be judged negatively (Stets and Burke, 2000, p. 225).

Individuals' social categories are parts of structured societies, in which individuals are born, which exist in relation to other different categories such as power or status (Hogg and Adams, 1988 in Stets and Burke, 2000, p. 225). Peoples' identity is shaped by social categories to which they belong to. During a lifetime each belongs to various, unique social categories that make him acquire many social identities that make each individuals' self-concept unique (Hogg and Adams, 1988 in Stets and Burke, 2000, p. 226).

3.3 Opportunity structure

The third theoretical hypothesis will be based on the concept of opportunity structures: Unblocked opportunity structure raises the likelihood that individuals will cycle.

The term "opportunity structure" serves to provide understanding on how success or failure of traditional and legitimate opportunity structures influence individuals decisions to cycle (Crossman, 2018), more specifically how society and institutions enable people to fulfill the cultural expectations such as their choices and needs, like for example the choice to cycling. In this context, "success" reflects the traditional and legitimate opportunity structures that enable the realization of individuals choices that lead to success in meeting their needs and socialized values. The "unblocked" cycling opportunity structures rise the decision to cycle and make the practice of cycling more natural. On the other hand, "failure" of the traditional and legitimate opportunity structures reflect are the constraints to fulfill once' needs and choices by "blocking" the opportunities. It can lead to different emotional barriers towards cycling, reluctance or hostile behaviors and perceptions (Crossman, 2018) such as fear of cycling, riding a bicycle on the sidewalks, pedestrian crossing, or resignation from cycling. Horton (2010) explains that fear of cycling is lesser in places where cycling is perceived as an ordinary practice, such as the Netherlands and Denmark. Thus, places that create open cycling opportunity structures for all people.

Various aspects can block the opportunity structures, for example, social features as classism or sexism that block the possibility to an individual to for example study in school, but they can also be embedded in institutional systems that discriminate or do not consider people's opportunities (Crossman, 2018). Within the concept of opportunity structure, it is not always people who choose not to cycle, but sometimes traditional and legitimate structures are unable to provide them with opportunity structure, like for example infrastructure (Roberts, 2009, p. 365).

4. Methodology

4.1 Research design

The research was conducted between 9 and 12 April 2019 in Warsaw. The design of the study is based on a mixed method study, meaning that the data was collected both within the quantitative and qualitative methods, including one hundred survey forms and three interviews with key

informants. Using both methods enabled understanding the collective and individual perspectives of participants. In this study, quantitative study precedes qualitative study. The type of this mix-method study is explanatory meaning that the qualitative method will be used to explain the outcomes generated of quantitative study (Bryman, 2012, p. 633). The use of the quantitative method in the first place was to unveil the repeating tendencies of the majority of participants, in perceiving bicycles and on this basis the study was further conducted within a qualitative method explaining the phenomena's prevailing across Warsaw society and how it impacts the development of bicycle traffic. Additionally, participatory observation method has been used to increase researchers general overview regarding the cycling conditions in the area of interest.

4.2 Personal Interview Surveys

Quantitative data in this study was significant to give an insight into the perspective of the selected members of Warsaw's population and provide information about the tendencies that prevail among the sample group (inhabitants of Warsaw) regarding the perception of bicycles. A self-completion survey assisted by the researcher conducted the study. The survey consisted of 19 questions that have been completed by 100 inhabitants of Warsaw.

Convenience sampling was used, meaning that incidentally encountered individuals completed the survey on the streets of Warsaw (Bryman, 2012, p. 201). Survey forms have been printed out and handed into selected participants personally to fill out the forms directly. Using this method reduced the chances of the data-collection error caused by, for example, misunderstanding the questions (Bryman, 2012, p. 205). It also enabled collecting many answers within a short time and allowed for observation of respondents behavior and control over external factors such as in what situation are they refiling the survey. Whereas for the participants, it assured a sense of privacy, allowing respondents for unhampered answering, but at the same time being able to ask questions in case they needed or wanted to.

The survey conducted covered the following thematic areas: socio-demographic features, cycling routines, perception about bicycle usage, infrastructural facilities, safety, and dedication towards the environment. Questions within particular thematic blocks were closed, enabling respondents to give one or more answers or to enable the respondent to evaluate the phenomenon using a point scale of 1 to 5 points, where one meant "very low" and five "very high”. The survey was created in both, Polish and English languages to enable understanding for possibly the most extensive group of Warsaw's inhabitants.

4.2.1 Quantitative data analysis

Although the survey forms have been handed out to respondents in the printed form, the data has been analyzed using an online survey form. The results of the printed survey forms that were collected each day have been regularly transcribed into an online survey website, which allowed to consolidate and analyze the obtained data. The acquired data has been analyzed and provided in the form of frequency tables which presented the information about the number of respondents (n) and their percentage (%) belonging to each of the categories for the given variable (Bryman, 2012, p. 337). Also, the data was evaluated using cross tables what allowed to analyze the relationship between different types of variables across various closed survey questions. Then, the results of the quantitative analysis have been grouped into conductive themes on which qualitative analysis was based.

4.3 Individual interviews with key informants

Qualitative data for this research has been collected by individual in-depth interviews with key informants. A total of 3 individual interviews were conducted with key informants, chosen purposively as representatives of institutions involved in the development of bicycle traffic. Key informant 1 is government representative, director of Urban Road Administration, and Plenipotentiary for cycling communication in Warsaw. Key informants number 2 and 3 are social activists and representatives of non-governmental organization Zielone Mazowsze. The interviews were held in places depending on the possibility of participants, mostly in the workplace of the interviewees. The first was in the office of the director of Urban Road Administration, the second one in Copernicus Science Center, the third one in Warsaw's Sociology Institute. Since the study was held in Warsaw, the interviews were conducted in polish language, the native language in Poland. The interviews were carried within semi-structured method, each interviewee has been asked eleven structured questions (see Appendix 2) whereas further additional questions have been dependent on the course of their replies and conversation. Using his method enabled to obtain in-depth information from respondents by letting them the possibility to introduce new threads to the conversation, essential for the objectives of the study. Each interview was recorded to enable accurate transcription and to set the interviewer in a comfortable situation of a "free flow conversation" by attentive listening to answers.

4.3.1 Qualitative data analysis

The qualitative data analysis has begun by making transcriptions. After the interviews have been transformed into written form, the analysis process has started by searching for analytical categories through coding, thanks to which data has been divided into descriptive categories. As the qualitative data has been explaining and supplementing quantitative data, the manual coding method has been used which enabled to capture different dimensions and regularities prevailing between quantitative conductive themes and qualitative descriptive categories (Bryman, 2012, p. 299). Lastly, data were summarized into analytic categories that enabled to conclude.

4.4 Observation and own participation in bicycle traffic

The participant observation was mainly conducted in Śródmieście district due to the limited duration of the study. It is an area of 15.57 km² with a population of 117 005 which encompasses nine districts: Muranów, Staromiejskie, Żelazna Brama, Centrum, Powiśle-Skarpa, Koszyki, Krucza, Powiśle-Solec, Oleandrów. Śródmieście is a particularly important commune in this study because it is a central part of the city, characterized by a compact architecture and it is bringing together various functions such as administrative, commercial, service, and tourist from all over the city. As measured and observed during participatory observation, in Śródmieście the distances between different locations were relatively short, for example from Central Warsaw to Muranów there is 3,2 km distance, if moving with a bicycle it takes 11 minutes from one location to another. Whereas if commuting the same distance using public transport it takes around 19 minutes and with the car, depending on how high is the road traffic, it usually takes 11-20 minutes. Choosing another route from Old Town to Powiśle-Solec the distance with a bicycle is 2,9 km, and it takes 10 minutes to cover this distance, whereas to arrive at the same place but with public transport, it takes 18 minutes. Using car the distance increases to depending on the route 4,8 or 5,7 km and it takes around 16-18 minutes to commute. Those numbers show that commuting with a bicycle in Śródmieście does not consume much time, if not less than other means of transportation because the bicycle is independent of road traffic and time-table. The distances in Śródmieście are also relatively short. The significant attitude of Warsaw from a cycling perspective is also its flat surface what makes cycling movement in the city more comfortable and very convenient.

4.5 Ethical considerations

Due to the mixed method nature of this study, ethical considerations were consistency applied throughout the realization of both quantitative and qualitative methods. As the examination investigated the motivations of Warsaw inhabitants on the choices toward cycling and involved contact with a large group of participants under examination, it required transparency and coherence (Bryman, 2012, p. 393) precisely to introduce the objective of the study. In the course of the research, each method required a different approach.

The quantitative part of the study has been conducted by survey forms that were handed out personally in paper forms on the streets of Warsaw and filled in directly by the participants. Before completing the survey form, each participant has been informed about the purpose of the survey and assured about the anonymity. Additionally, to confirm that every participant is well informed, each survey form contained an informative written explanation.

The qualitative study consisted of face-to-face semi-structured interviews. Each interview began with an explanation of the topic and the purpose of the study. Then participants were asked two fundamental ethical questions: 1) if they agree for the interview to be recorded and 2) if they agree that fragments of the interviews will be used in the academic research. During data analysis, the selected fragments of the interviews have were sent to informants for the authorization. After approval, the fragments were used in the study.

5. Limitations

The first limitation to be pointed out is that the research does not have external validity. Therefore the results cannot be generalized for the whole population of Warsaw. Due to the short duration of the study (4 days), the scope of the study had to be limited. The quantitative sample is not representative of the whole population as it is relatively small compared to the number of the Warsaw population (Bryman, 2012, p. 11). The same limitation concerns qualitative study; however, in this case, a purposive sample selection enabled gather of reliable data from experienced respondents, including governmental and non-governmental sources.

Another limitation associated with the short duration of the study is that it narrowed down the quantitative data collection and participant observation to the central district of Warsaw - Śródmieście. The collection of 100 surveys was highly time-consuming, and there was not enough time to collect data in each district so the study might be limited of the perspective of those

inhabitants who live further in the suburbs of Warsaw. Furthermore, the time strains limited the cycling experience to the central part of the city where the distances between destinations are relatively short. Therefore the perspective of inhabitants who have to commute a long way to work might be overlooked within participant observation. Additionally, the amount of the cycle infrastructure in central Warsaw is relatively lessen than outside the city center as can be seen on the Warsaw cycling map (Appendix 3) what can reflect with the researchers' personal bias regarding the quality of the bicycle roads in the whole Warsaw.

6. Mixed method analysis and discussion

6.1 Background characteristics of the survey participants

The survey has been answered by 68% of women and 32% of men. Most answers (91%) were acquired from respondents between age 18 to 44. The remaining 9% of respondents were people below 17 years old and over 45 years old. Such age distribution is primarily due to the greater willingness to fill out the survey of people in this age groups among all people that have been asked on the streets of Warsaw. However, such age and gender structure among the respondents corresponds to the age and gender structure in Warsaw (GUS, 2018). All presented data in the form of descriptive tables are to be found in the Appendix 1.

6.2 Cycling habitus

Along with the theoretical hypothesis this study (section 6.2 and 6.2.1) investigate how embedded in social structures habitus determines decisions to cycle.

The survey analysis indicates that bicycle is the less used form of transportation and among respondents, only 3% cycle daily. For the majority of respondents, the bicycle is not considered as a mode of transportation, but rather a tool for recreation (80%), sport and health (47%). However, quite a high percentage of respondents (24%) declare to use a bicycle to commute school or work, and 15% declares to use a bicycle for shopping. When asked how often they use a bicycle, the highest share of respondents (44%) declared to use it during spring and summer when the weather is warm, but 16% also declared to use it a few times a month. To sum up, the results indicate that respondents perceive cycling as a way to spend their free time rather than an integral part of their

daily lives. However, it looks like even if most respondents do not commute with bicycles, they anyhow use it for practical purposes from time to time.

6.2.1 The roots of cycling habitus

Trying to understand why such a low percentage of inhabitants use a bicycle to commute and how habitus influences the perceptions about cycling, it seemed crucial to get to know the roots of cycling habitus among Warsaw society. The informants shared different views on how the bicycle has become perceived as a tool mainly for sport and recreation. The first informant (09-04-2019) explains that the times of communism shaped various values and patterns of behavior functioning among Warsaw society and that cycling attitudes could be the remains of historical experiences. He says that; "Warsaw once was a place where was a rat race," because everyone had to have the same things and everyone lived the same way, and it was important for people to impress their neighbors, coworkers or in school. Thus the way bicycle was associated "as a tool to commute for the poor" did not encourage people to cycle.

The second informant (10-04-2019) explains that during communism, there were no special road conditions for bicycles, nor did the policy of authorities took bicycles into account. Public transport was dominating in the city. Motorization was not yet developed, because of financial barriers or, in general, lack of automobiles availability. He explains that the trend of using bicycles on a broader scale had no right to develop in Warsaw because cycling practices in that time have never been of any concern and that perceiving cycling as a tool for sport and recreation was a natural course of things. "It somehow became established, by the strength of any such inertia and people without further considerations, accepted that bicycle is a tool for sport and recreation" (interview 2, 10-04-2019, researcher's translation).

The third informant explains that the reason why people do not bike daily is their lack of experience. In his opinion, people have to try to ride a bicycle by themselves to convince themselves about it. If they do not know how is it to ride a bicycle, their perception of this experience will not change. However, he said, people will not try until they do not feel safe. "The reason is simply the lack of experience. I think that many people have not tried and will not try if they do not have this clear signal that it is safe" (interview 3, 11-04-2019, researcher's translation).

Lack of cycling daily practice, experience, or examples from the surrounding environment led most people to follow values that they acquired from their social surroundings. Along with habitus, individuals perceive things through the prism of their experience and acquired knowledge

throughout their lifetime (Costa and Murphy 2015, p. 8). If within particular social structures that surrounded individuals, the bicycle was perceived as a tool for sport and recreation, then the habitus automatically produces a similar perception. However, habitus can be transformed within its structures (Hillier and Rooksby, 2005, p. 46), therefore if individuals would try cycling and have positive experience associated with it, there is a chance their habitus would re-structure and acquire a new subjective perception of cycling (Hillier and Rooksby, 2005, p. 46).

6.3 Cycling identity

This part of the survey (6.3 and 6.3.1) investigate how people identify themselves with different means of transportation they choose and along with the theoretical hypothesis; how self-categorization shapes the perceptions about cycling. The "self-identification" in this part of the analysis was measured mainly by declaration whether they perceive cycling as part of their lifestyle, the will sacrifice car facilities for bicycle facilities, environmental consciousness and being active in environmental campaigns.

When asked about the reasoning behind using the bicycle, 20% of inhabitants declared that it is part of their lifestyle. This percent is high considering the number of population under the study, and it shows that the bike is an essential element of life to one-fifth of participants, regardless if it concerns utilitarian or recreational cycling, they identify with it.

The vast majority of respondents are in favor of improving the infrastructure even if it would be at the expense of road transport. It is a very positive trend among inhabitants because it shows that most of them would be in favor to change: 35% of respondents "definitely" support to limit the privileges of car drivers, another 34% "rather" support such changes. The group of 9% of respondents is against such a solution; however, for 4% this is an unacceptable situation. The high number of positive voices can be caused by the fact that the broadest share of studied population commute with public transportation, therefore the exclusion of car traffic privileges does not seem to be problematic because it does not affect most people personally. However, one more conclusion that follows this result is that most respondents do not identify themselves with the car, but rather with public transportation and even bicycle agreeing for changes favorable to bicycles.

Respondents assessed the air quality in the city for 2.1, meaning that in their opinion, the quality of air in Warsaw is asses the air quality in the city is "bad." The result shows that the survey population is aware of the seriousness of the situation related to air pollution in the city. Moreover, most respondents participate in environment protection actions, such as the "car-free day"

campaign. The majority of respondents (50%) declare to be to some extent arranged (summing up the answers: very often, sometimes, rarely) in environmental protection. 8% of respondents declare to always participate in actions that help protect the local environment, whereas 24% of respondents answered that they never participate. The study proves that most respondents, more or less, identify themselves with environmental problems; over half 58% of respondents belong to the social group that is not passive in terms of environmental problems.

6.3.1 Stigmatisation

As mentioned before, associated with bicycle symbolic meanings has an impact on shaping attitudes towards cycling. One of the essential aspects that came out during the interviews was stigmatization. It became clear that not only "bicycle function" itself was "stigmatized" by thinking it is only for sport and recreation, but also stigmatized were people who used bicycles. The phenomenon of stigmatization can be understood through the prism of social identity theory, which presents the perspective that people belong to certain groups that they identify with; it can be self-identification as a cyclist, or as a car or motor driver. Being identified with ones' categorized group lead to social comparison. Groups compare each other always in the more beneficial way towards "the self," including the "in-group" and are critical towards the others, the "out-group." Stigmatization in case of the bicycle can be a result of the self-distinguishing of the in-group and the self (such as higher or middle social classes, car driver and any other group that does not identify with cyclists) from the out-group (the cyclists), to build, maintain and enhance once' self-esteem. This behavior is associated with ethnocentrism, in-group favoritism, and hostility toward the out-group (Stets and Burke, 2000, p. 232).

"Bicycle has been perceived of being a shameful topic, that if someone commutes to work by bicycle, then people might think that maybe police took his driving license after alcohol, or he was not able to pass his driving license, or he can not afford to buy a car." (interview 1, 09-04-2019, researcher’s translation) The perception of cycling, to a large extent, has been influenced by accepted social norms and divided across social-class and categories with which many people did not want to be identified. Thus, people who used a bicycle as a main mode of transportation would be associated with the lower social class or as gauche or as the poor. This stigmatization process led to the general social perception of the bicycle as a less valuable mode of transportation. Thus, many people excluded the bicycle as a mode of transportation.

Nowadays, the general interest with bicycles is growing and cycling traffic increases in Warsaw. People use bicycles more, either for recreation or to commute. The third informant explains that there has been a significant change in bicycle traffic over the last ten years. However, despite this change, most people are still surprised to see other people using a bicycle as the primary mode of transport and perceive them as athletes or as people who are very determined to cycle or "vegetarians and the greens" (interview 1, 09-04-2019, researcher's translation).

Although social mentality is slowly transforming, the trace after stigmatization will last in the society perception for a long time reflecting on various aspects concerning bicycle development, such as treating it equally with other transportation modes. When asked about the approach and actions of decision-makers to the development of bicycle traffic, the second informant (whose primary transportation mode is a bicycle for many years) answered; "in the sphere of words, it is much better now, no one would say what they use to in the past; that Warsaw is not a village to ride there with a bike and that they will only focus on the development of motorization, but still the practice is far away" (interview 2 10-04-2019, researcher's translation).

During the interview, the third informant pointed out his observation, about the fact that people's perception that bicycle is not a part of road traffic is so deeply rooted in that they neglect or forget about its road space and walk on the bicycle paths very often. Whereas, cyclists when there is no bicycle path often prefer to cycle among pedestrians on sidewalks than join the road traffic. Both groups forget that bicycle is a mode of transportation. Moreover, he explains that often cycling in road traffic turns out to be a big problem, even for the experienced automotive drivers. This phenomenon can be understood by returning to survey analysis, which shows that most people cycle for recreation and sport. Thus, following their habitus people most often do not cycle to move around from one destination to another quickly, but to enjoy the bicycle ride in pleasant surroundings. Cycling within road traffic might generally cause fear, especially among inexperienced cyclists. Habitus and acting within its frames give people a sense of security to which they are used to. "It is interesting that bike is seen as a different type of pedestrian and that bicycle path is not seen as a [traffic] lane but some kind of sidewalk, although it is a traffic lane according to law." (interview 3, 11-04-2019, researcher's translation)

Stigmatization and stereotypes are very harmful to the general perception of bicycles. As explained by the second informant (10-04-2019), a significant stereotype among Warsaw society is that riding a bicycle is dangerous. Additionally, promotional activities for cycle traffic are based on giving vests, handing helmets to cyclists. He explains that this kind of campaigns are not a good idea, because they "stigmatize cyclists even more by giving them an additional reason to be

scared" (interview 3, 11-04-2019, researcher's translation). Whereas fear is considered to be one of the main constraints for the development of bicycle traffic and as pointed out by the third informant (11-04-2019); "the practice shows based on the highest bicycle traffic, people cycle where infrastructure meets certain standards. It must be separated from the roadway - if they are separated from the car traffic in any possible way, then it is seen as safer."

As presented in the survey analysis and through the interviews, people belong to certain social groups that they self-identify with. Some declare that bicycle is their lifestyle, whereas for others it is unacceptable to reduce automotive traffic in the city. All these different social perceptions collide with each other in everyday life, forming opinions and evaluating each other, each in a self-honoring perspective. Social perception has led to perceiving bicycle practice in a "certain" way, for example as a tool for recreation or a mode of transport for the poor. Later this "certain" way has become in a sense a cultural discourse - the same, but contrasting as in Denmark or the Netherlands, where cycling is a symbol of equality. In Warsaw, cycling is perceived as a symbol of sport and recreation. Stigmatization caused by the embedded in social norms perceptions influence decisions to cycle or not. Whereas, lack of practice of utilitarian cycling, produced fear associated with bicycle daily. As presented by Horton (2010) until cycling will be associated with fear, it will always be marginalized. Cycling fear rules the decisions against cycling, and this fear is mainly associated with infrastructure which will be evaluated below.

6.4 Cycling opportunities

The third part of the survey concerned the cycle opportunities in Warsaw. Specifically, how individuals perceive infrastructural opportunities, cycle routes, safety and Veturilo city bikes. Sections 6.4 and 6.4.1 analyzed the usefulness of theoretical hypothesis; that infrastructure opportunities raise the likelihood individuals will cycle.

The survey within the third part of the quantitative study stated by the question whether there are cycling facilities in Warsaw, almost half of the respondents (40%) declared that the most useful facilitation for cyclists in Warsaw are existing bicycle paths, but for most of them (72%) the networks are definitely insufficient. Moreover, inhabitants declare that bicycle traffic signs do not make it easier to cycle. It seems like a significant amount of new infrastructure in Warsaw effect with positive feedback of roads by residents. Nonetheless, respondents claim that there is not enough networks and that the road signs are not helpful.

The vast majority of respondents (56%) believe that Warsaw is a safe city for cyclists, with 8% recognizing the city as definitely safe. However, the answers provided indicate that these are users who rarely and for recreational purposes ride a bicycle. Whereas 19% of respondents considered Warsaw as a dangerous city to cycle, among which 60% are those who use the bike daily.

Car traffic (76%) and lack of bicycle paths (63%) are the biggest obstacles to cycling in Warsaw in the opinion of the surveyed population. Additionally, a high share of respondents (53%) felt that the poor condition of cycling infrastructure is an essential obstacle in moving around Warsaw. 25% declare that another obstacle is pedestrians, and 9% declare that the obstacle is air pollution. The two main obstacles given by respondents (car traffic and lack of bicycle paths) can be connected. People are afraid to cycle among road traffic. However, in Warsaw city center cyclists are mainly forced to cycle within the road traffic, because there are not many cycle paths. The missing parts of cycling infrastructure in the city constitute one on the main obstacles to the cycle for a large share of people.

Regarding the Veturilo bikes, although almost half of the respondents (48%) states that Veturilo did not increase their cycle routines, it did increase cycling routines for another 40% of respondents. It is a large number of people and a great success knowing that 100 inhabitants participated in a survey and that 40 of them started to use bicycles more often after Veturilo has been introduced. Veturilo encouraged many people to try cycling and to convince themselves to bicycles.

Concluding, everyday cycling mobility in the center of Warsaw is cumbersome, because there are not many cycling paths. However, the outskirts of Warsaw have a well-developed network of bicycle paths where people can comfortably and safely cycle for recreational purposes. Such a structure of cycling routes reflects the difference of respondents who ride a bike daily and who for recreation. Within the framework of this survey, it is 3% utilitarian cyclists and 80% recreational cyclists. Nonetheless, as pictured by the example of veturilo providing people with opportunities can lead to a significant increase in cycling participants.

6.4.1 The conflict of space

The last part of the analysis presents how self-categorization and infrastructural opportunity structure, influence cycling perceptions and behavior of Warsaw inhabitants. Referring back to social identity theory, people self-categorize themselves into different social groups that they

identify with the most. In Warsaw, transportation groups are divided into; pedestrians, cyclist, car drivers, and the most numerous group passengers of public transport. Now there is also a new group, the users of electric scooters. Each of those groups self-prioritize their needs and expects to develop activities related to its development. Self-categorization, as further analysis will show has a massive impact on infrastructural opportunities structure.

The first informant (09-04-2019) explained how each group prioritizes their will and how it is perceived when once' privilege is taken for the cost of another. In the paid parking zones, people who have subscriptions, park the cars for the whole days. Therefore other people who would like to park cannot do so and appeal for the bigger parking lots. On the other hand, those groups who would like in this place more greenery or a bicycle path or a pedestrian crossing - they meet the resistance of those who would like to have more space to park their cars; "Today we have space dominated by cars. Basically in every case when someone wants to take something from a group to give it to a closer undefined group which is even smaller than the group from which it would be taken, it is easy to collect a negative message - but also positive" (interview 1, 09-04-2019, researcher's translation)

Every social group has certain expectations that are in the center of importance for them. Car drivers want more space not to stand in the traffic jams and to park more quickly, and cyclists want more bicycle routes, or just paths separated on one road from car traffic to feel safe and to be able to commute with bicycle without boundaries. Whereas pedestrians want to have a safe space to walk - not interrupted by cars, bicycles, or electric scooters.

Through the eyes of a cyclist who cycle every day for many years (the second informant, 10-04-2019) when talking about how he imagines sustainable transportation in Warsaw, he explains that he wishes that everyone would be able to choose the mode of transportation that suits their needs. He wishes that transport would be treated equally and that the costs of functioning of any modes of transport would not be shifted on others. "Individual car transport brings a lot of social damages, and these costs are in fact passed on to the whole society, for example, everyone pays for roadway construction, lighting, cleaning and maintenance, costs of accident treatment, health costs of air pollution, and health costs of noise" (interview 2, 10-04-2019, researcher's translation).

Another cyclist that commutes with a bicycle (the third informant, 11-04-2019) presents his vision of equality within transportation modes. That individuals are not perceived as being different because of their way of life. He wishes that all the alternatives to transportation will be real possibilities to everyone. "My dream vision of sustainable transportation is so that the choice of transportation modes would not have to be dictated by any ideology or to be more green, but that all

options are comfortable, or some are more comfortable, so that the choice of someone traveling by tram or bike will be dictated just by the convenience and practicality. However, for this, we still have a lot to change“ (interview 3, 11-04-2019, researcher’s translation).

Although there has been a significant improvement in bicycle conditions over recent years, bicycle infrastructure develops unevenly in the city. There has been a lot of new investments that connect agglomerations with suburbs; however, all of them end in the city center because there is a deficit of space. Moreover, the city center is the most densified area because the city center has social, cultural, and transport functions. As explained by the third informant, “there is a war about space. To give space to someone requires taking it from someone else” (interview 1, 09-04-2019, researcher’s translation).

Warsaw is complicated when it comes to who manage each piece of the road, which hinders the opportunities for change because when one street has to be rebuilt, it must go through many entities. “Unfortunately, the barrier is the decision-makers, who are afraid to expose towards automotive drivers, because they think that if they will narrow any road or limit the speed, the electorate will not choose them” (interview 2, 10.04.2019, researcher’s translation). The barriers for bicycle development presented by informants not only reflect embedded cultural habitus of prioritizing automotive transportation but also show how institutional structures limit the development of alternative modes of transportation other than automotive. “We had really good project of Warsaw Mobility Policy /…/, but we do not have this document approved by the city council, not because it is rejected, but the vote has been suspended, and the subject never returned to the agenda.” (interview 3, 11.04.2019, researcher’s translation) he further explained that the current sustainable transportation program development until 2020 would be not even realized in 15% by 2020.

However, the third informant explains that there has been an enormous revolution and generation change among the officials who are responsible for example, in the mobility office and the management of municipal roads. Now most people who work there are younger and for the sustainable mobility is an important subject, but they can not make decisions, so they only suggest their propositions, and then they have to be approved by the district council of the city and “this is where the most things stuck” (interview 1, 11-04-2019, researcher’s translation).

Concerning the perspectives discovered during the duration of the third part of the analysis, both within quantitative and qualitative methods, it seems that opportunities structure have a significant impact on individuals decisions to cycle. Not only (as presented within quantitative analysis) because proper cycling infrastructure leads to the development of safety feeling and

therefore, the development of motivation among people to cycle. But also because psychological barriers that appear both in the attitude of many residents as well as among individuals in governing institutions, disqualify bicycle as a mode of transportation what discourages people from using it this way.

Currently, in Warsaw, different social identities in government and among inhabitants try to find a balance between what is a "real priority" to be implemented. However, as previously mentioned, "real priority" means something different among different social identities. Until habitus of the society does not change on a broader scale, it might be challenging to reach a higher cycling modal share in the city.

7. Conclusions

This thesis analyses the factors that influence Warsaw inhabitants' motivations in decisions about cycling and focus mainly on how embedded habitus, social identity, opportunity structures produce those motivations. The mixed method study was based on face-to-face surveys and individual interviews, which were then collectively analyzed guided by the three theoretical hypotheses, shading light on factors associated with making decisions and patterns of social behaviors. The findings of this study show that the behavioral patterers related to cycling are very complex, and influencing them requires acting from different angles. Habitus constitutes a base for social behaviors, perceptions, understanding. It shapes peoples' lifestyles based on embedded during socialization processes, experiences, and structures (Burdieu, 2005, p. 45). Associations generated to bicycle, to how it is perceived and how people uses bicycles vary depending on the social environment, opportunity structures, and culture. As the study indicates, people's motivation to cycling can be influenced not only by implementing policies but also primarily it can be influenced by how a bicycle is socially perceived. Therefore, creation policies that could motivate inhabitants to use bicycles should include three interdependent approaches; economic (infrastructural opportunities), environmental (sustainable development) and social (habitus and social identity).

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Appendixes

Appendix I Quantitative data: frequency tables survey questions 1-19

1 Gender

one answer	0% 50% 100%	%	n
woman		68%	68
man		32%	32

2 Age

one answer	0% 50% 100%	%	n
17 and below		2%	2
18-24		37%	37
25-34		41%	41
35-44		13%	13
45-54		6%	6
55-64		1%	1
65 and over		0%	0

3 Education

one answer	0% 50% 100%	%	n
primary education		1%	1
lower secondary education		6%	6
vocational education		0%	0
secondary education		30%	30
higher education		63%	63

4 Income

one answer	0% 50% 100%	%	n
1499 PLN net and less		6%	6
1500-2499 PLN net		10%	10
2500-3499 PLN net		21%	21
3500-4499 PLN net		17%	17
4500-5499 PLN net		5%	5
5500 PLN net and over		18%	18
unemployed		23%	23

5 What type of transportation do you usually take?

one answer	0% 50% 100%	%	n
car		30%	30
public transportation		66%	66
bicycle		3%	3
walk		1%	1

6 To sum up, approximately how much time a day do you spend commuting, for example to and from work / school / extracurricular activities?)

one answer	0% 50% 100%	%	n
30 minutes and less		12%	12
31-60 minutes		38%	38
61-90 minutes		31%	31
91-120 minutes		15%	15
121-150 minutes		2%	2
151- 180 minutes		1%	1
181 minutes and over		1%	1

7 Choose one of the following options:

one answer	0% 50% 100%	%	n
I own a car		26%	26
I own a bicycle		31%	31
I own a car and a bicycle		20%	20
I do not own neither a car or a bicycle		23%	23

8 How often do you ride a bicycle?

one answer	0% 50% 100%	%	n
every day		5%	5
a few times a week		10%	10
a few times a month		16%	16
several times a year		12%	12
when the weather is warm outside, mainly in spring and summer		44%	44
I never ride a bicycle		13%	13

9 For what purposes do you use bicycle? In this question you can choose more than one answer.

multiple choice	0% 50% 100%	%	n
for recreational purposes		80%	80
for sports and health purposes		47%	47
I use it to commute to work/school		24%	24
I cycle for shopping		15%	15
to take my children to and from kindergarten/ school		0%	0
I do not ride a bicycle		14%	14
Inne		1%	1

↳ open answer

I do not have a bike	Respondent 13177296

10 What is the reasoning behind your using of the bicycle? In this question you can choose more than one answer.)

multiple choice	0% 50% 100%	%	
it is a part of my lifestyle		20%	20
for sport or/and health		58%	58
because cycling is cheap		20%	20
riding a bicycle is environmentally friendly		44%	44
for recreation		63%	63
bicycles are easily accessible on city streets		23%	23
to quickly move around the city/avoid traffic		29%	29
I do not ride a bicycle		14%	14
Inne		1%	1

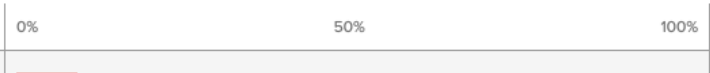
↳ more answers

I enjoy cycling	Respondent 13176952

11 Do you think Warsaw is a safe city for cyclists?

one answer	%	n
definitely yes	8%	8
rather yes	56%	56
I do not have an opinion on that	15%	15
rather not	9%	9
definitely not	10%	10
I do not know	2%	2

12 Do you think that there are facilities for cyclists in Warsaw?



one answer	%	n
places to quickly repair a bicycle	9%	9
cycling paths	40%	40
bicycle parking spots	22%	22
appropriate traffic signs	20%	20
there is no cycling facilities	7%	7
I do not know	2%	2

13 Do you use the bike more often since the introduction of veturilo city bikes in Warsaw?

one answer	%	n
definitely yes	26%	26
rather yes	14%	14
I do not have an opinion on that	12%	12
rather not	30%	30
definitely not	18%	18

14 How do you rate the air quality in Warsaw? 1 meaning very low and 5 meaning very high

1 2 3 4 5

Result 2.1

1	26 (26%)
2	41 (41%)
3	29 (29%)
4	4 (4%)
5	0 (0%)

15 How do you assess cycling routes in Warsaw? In this question you can choose more than one answer.

multiple choice	0% 50% 100%	%	n
cycling routes are in good condition		48%	48
cycling routes are in bad condition		10%	10
insufficient networks of cycling routes		72%	72
traffic signs do not make it easier to cycle		63%	63
sufficient networks of cycling routes		7%	7
traffic signs make it easier to cycle		5%	5
Inne		0%	0

16 In your opinion, what are the main obstacles to cycling in Warsaw?

multiple choice	0% 50% 100%	%	n
pedestrians on the paths		25%	25
car traffic		76%	76
lack of cycling routes		63%	63
poor condition of cycling infrastructure		58%	58
air pollution		9%	9
I do not know		9%	9

17 Do you participate in actions that help protect local environment, for example "car-free day" campaign?

one answer	0% 50% 100%	%	n
always		8%	8
very often		13%	13
often		11%	11
sometimes		19%	19
rarely		18%	18
very rarely		7%	7
never		24%	24

18 Where your knowledge on the need for environmental protection mainly come from?

one answer	0% 50% 100%	%	n
from relatives		2%	2
from mass media		51%	51
from school		10%	10
from friends		1%	1
from work		2%	2
from self-interest		34%	34
I do not think there is a need for environmental protection		0%	0
Inne		0%	0

19 Would you support the improvement of cycling infrastructure if it was at the expense of car facilities?

one answer	0% 50% 100%	%	n
definitely yes		35%	35
rather yes		34%	34
I do not have an opinion on that		18%	18
rather not		9%	9
definitely not		4%	4

Appendix II Qualitative data: interview guide for key informant interviews

1. What is your vision for the development of sustainable transportation in Warsaw?

2. Do you see the prospects of limiting car traffic in the city?

3. What is the role of bike in relation to other modes of transportation in Warsaw?

4. How do decision-makers reduce the dependence of society on automotive transportation?

5. Are bicycles considered equally significant as other modes of transportation such as public transport or cars by residents of Warsaw?

6. Are bicycles considered equally significant as other modes of transportation such as public transport or cars by decision-makers in Warsaw?

7. Why do you think the majority of Warsaw inhabitants consider bicycles as a tool for recreation and sport?

8. Do you think this approach is changeable?

9. What actions would it require?

10. What are the main challenges for the development of bicycle traffic in Warsaw?

11. Do you think there is a possibility that in the future Warsaw will become a city of cyclists such as Copenhagen?

Appendix III Warsaw cycling map