Adoption of Car Sharing Services in the Netherlands

The effect of information providing about environmental benefits and the dependence on personality traits and (socio)demographic characteristics.

Stijn van Seters (2788776)

Vrije Universiteit Amsterdam

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Supervisor: Dr. Erik Verhoef

Abstract

This thesis investigates how certain factors affect the willingness of individuals to use car-sharing services (CSS). Car sharing offers a viable solution to the problems of growing urbanisation, including congestion and environmental damage, by providing short-term access to cars without the expense of ownership. A possible cause for the poor adoption rates of CSS might be a need for more knowledge about its potential environmental benefits. This study uses a randomised controlled trial, carried out in the Netherlands, to examine whether informing people about the environmental benefits of car sharing can increase their willingness to use CSS. Respondents' stated preferences and intended behaviour are analysed to draw conclusions. The findings suggest that although increased knowledge on environmental benefits does not significantly change the willingness to use CSS, particular traits and sociodemographic factors can be crucial in adoption rates. In addition to providing stakeholders with valuable insights, this thesis advances our understanding of the complicated mechanisms impacting the adoption of CSS.

Keywords: Car sharing services (CSS), perceived benefits, information providing, willingness to use, environmental concern, collectivism, (socio)demographic characteristics, travel mode choice.

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1. Introduction

Cities are increasingly populated, and, as a result, there is an increasing demand for mobility. If everything stays the same, there will eventually be insufficient road supply to handle the ever-increasing demand (Mahdavian et al., 2021). A prediction by the United Nations states that by 2050, approximately 64% of the developing world and 86% of the developed world will be urbanised (United Nations, 2015). Moreover, almost all population growth in the upcoming decennia will be absorbed by urban areas (Mounce & Nelson, 2019).

Apart from the disbalance between people and space, causing congestion and parking problems, there is a severe need for the solvation of transport problems related to the environment. Combustion engines, either petrol or diesel, use large amounts of fossil fuel, causing pollution and environmental damage (Perera & Nadeau, 2022).

A concept that has a high potential in reducing both of the problems stated above is car sharing. Services for car sharing can be described as car rental programs where participants can borrow cars from convenient locations for a brief period (usually hourly) in exchange for a monthly subscription fee, a per-hour price, and/or a per-kilometre fee. Members of car-sharing services (CSS) get access to vehicles on a temporary rental basis without incurring associated capital expenses. The concept is divided into free-floating and station-based car sharing. Free-floating car sharing allows users to pick up a car at point A and end their trip at point B, whereas with station-based car sharing, users must end the ride at the exact location where they started it. The service described above differs from ride-sharing or carpooling when trips are shared with other passengers in the same vehicle (Rabbitt & Ghosh, 2016).

Acheampong and Siiba (2019) state that car-sharing helps to reduce greenhouse gas emissions and parking problems. In addition, problems that arise from road congestion may be released by the introduction of CSS as a result of reduced car ownership, shifts in transportation choices, efficient use of vehicles, reduction in vehicle kilometres travelled (VKT), and support for multi-model transportation networks (Shaheen & Cohen, 2013).

Due to the high sunk costs of purchase and insurance for privately owned vehicles, people are incentivised economically to travel more and pick their cars over public transport modes. Costs per

kilometre travelled for private car owners are relatively low once these sunk costs are made (Gössling et al., 2022). As stated in the definition above, car-sharing services are priced per kilometre and/or time unit. Therefore, users of car-sharing services do not face sunk costs but, in return, face a higher cost per kilometre travelled. It can, therefore, be assumed that, due to the high costs of additional travel, users of car-sharing services are incentivised to travel less and, when economically beneficial, choose other (public) transport modes. Via this mechanism, the use of car-sharing services can result in a decrease in the total amount of annual vehicle kilometres travelled (VKT). Shaheen & Cohen (2007) even found that the average reduction in the annual VKT because of car-sharing is 28% – 45% in Europe.

Finally, experience in car-sharing services can lead to higher acceptance of non-polluting electric vehicle (EV) technology, accelerating the shift towards a dominant EV choice in daily travel (Lindloff et al., 2014). Thus, car sharing might be essential in reducing negative externalities on the environment and society caused by daily travel.

Even though the concept has many benefits and the use of CSS has increased recently (Schmöller & Bogenberger, 2020), adoption is not very high, and it is questionable if most people know about the concept. A study performed by *I&O Research* in 2022 showed that of respondents in the Netherlands, only 2% know about the concept of 'car-sharing' and also use it, as stated in the definition provided in the survey.

The same research showed that almost 70% were unfamiliar with the potential benefits of widespread car-sharing adoption. The fact that so many people are unfamiliar with the concept and its potential benefits might be one of the reasons the market for car sharing is not (yet) as big as it could be. As aforementioned, the perceived benefits of car-sharing have the highest effect on eventual willingness to use CSS (Acheampong & Siiba, 2020).

If the environmental benefits of car sharing could be brought more to people's attention, the perceived benefits might increase, which could lead to increased willingness to car-share. Widespread information providing might be a simple way for stakeholders to increase global knowledge about car-sharing's environmental benefits. However, research has yet to be performed on the direct relation between providing information on the environmental benefits of car-sharing and willingness to use

CSS. Therefore, this study aims to find a relationship between the two. A randomised controlled trial has been performed to do so. The main research question for this study is the following:

Does awareness creation about the potential environmental benefits of car sharing result in a higher willingness to use CSS?

However, perceiving something as beneficial is a personal matter. For the information providing to be effective, stakeholders should know what people they are trying to reach. For example, willingness to use car-sharing services can strongly depend on (socio)demographic characteristics (Amirnazmiafshar & Diana, 2022) and current transport mode choice (Fioreze et al., 2019). On top of that, the general willingness to use CSS might strongly depend on certain personality traits like environmental concern and collectivism.

Acheampong and Siiba (2019) find that pro-technology and pro-environmental attitudes correlate positively with the perceived benefits of car-sharing, and these perceived benefits, in turn, have the most significant predictive effect on intentions to use car-sharing services. Aguilera-Garcia et al. (2022), on the other hand, find that pro-environmental behaviours reduce car-sharing usage.

Also, Way and Lieberman (2010) found that higher collectivism is associated with higher social sensitivity. Curtale et al. (2021) study shows that social influence is the most crucial driver of willingness to use CSS. The aforementioned might indicate that collectivism is positively associated with willingness to use CSS.

The overall aim of this study is to use the experiment results to see whether providing information on car-sharing benefits to the environment effectively increases willingness to car-share. In addition, this study seeks to understand the effects of personal characteristics and current transport choices on intention to use CSS. These insights can help car-sharing companies, governments, and other stakeholders increase adoption and generate a clear profile of potential users. A survey is distributed to collect the data that can help find relations between the abovementioned variables.

In the next part of this study, past literature written on the subject will be evaluated further. The rest of the paper is structured as follows. The methodology and survey characteristics are covered in the third section. Results from this research are analysed in the fourth section. Finally, in the fifth

section, the paper summarises the most important findings, implications for managers, limitations, and directions for future research.

2. Literature Review

Literature on this study's subject will be discussed in three different sections. Current findings on the effect of widespread information providing about car-sharing benefits will be discussed in section 2.1. The effects of personal characteristics on willingness to use in section 2.2. Section 2.3 will summarise and conclude with a visualisation of the overall model. Section 2.2 is divided into four subsections discussing the effect of collectivism (2.2.1), environmental concern (2.2.2), (socio)demographic characteristics (2.2.3), and current transport mode choice (2.2.4), respectively.

2.1 Perceived benefits and information providing

Multiple studies have stated that only some people are familiar with the concept of car-sharing. In a survey distributed by Acheampong and Siiba (2019) in Ghana, most respondents did not know about car-sharing before filling in the survey for their research. The study from *I&O research* (2022) showed that, in the Netherlands, 22% of the people had never heard of the concept, and 34% heard about it but never stopped to think about it. Only 2% know the concept (very) well and also use the concept of car-sharing. After reading the definition stated in the survey, almost 90% of the respondents stated that their image of car-sharing became (much) clearer. Also, the survey showed that 37% of the respondents are (highly) unfamiliar with the benefits associated with car sharing. Moreover, 30% were neither familiar nor unfamiliar, and only 30% of the respondents were (highly) familiar with the benefits.

The above results can be one reason car sharing is not growing rapidly. Namely, Chun et al. (2019) found that the perceived benefits of car-sharing are an essential determinant of intention to use CSS. Acheampong and Siiba (2019) even found that perceived benefits are the most important predictor of people's willingness to use CSS. These papers fail to report how these perceived benefits can be increased to achieve a higher overall willingness to use CSS.

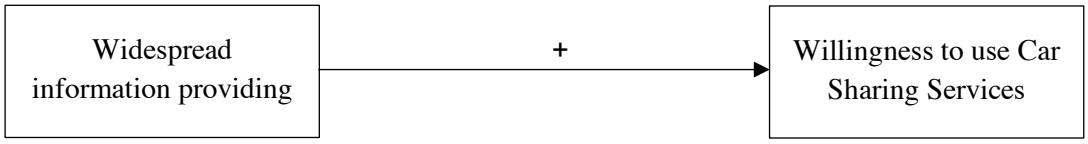
A straightforward option would be to provide widespread information on the environmental benefits associated with car sharing. It can be assumed that widespread information on the environmental benefits of CSS causes the perceived benefits from car-sharing to increase, at least for all people who are not (yet) familiar with the benefits of car-sharing. The reasoning behind this seems straightforward. Firstly, widespread information providing increases knowledge of car-sharing and its benefits. Secondly, due to the increased knowledge, overall perceived benefits will increase. Finally, the increase in perceived benefits will cause an increase in overall willingness to use CSS.

If widespread information provision indeed increases the willingness to use CSS, it might be an effective and cheap way for policymakers and stakeholders to increase its adoption. This would benefit society, as higher adoption would increase its positive effects on welfare (more parking space, lower greenhouse gas emissions, less road congestion, and more).

However, no research has yet been performed on the direct effect of providing people with information on car-sharing benefits and its effect on their propensity to use CSS. This study aims to find a relation by dividing the survey respondents into a treatment and a control group. The treatment group receives information about the environmental benefits of car sharing; the control group does not.

Based on the literature above, it is hypothesised that widespread information providing on the environmental benefits of car-sharing increases the overall willingness to use CSS. Figure 1 visualises the central hypothesis of this study.

Figure 1: ***A visual representation of the effect of awareness creation on adoption***



2.2 Personality and willingness to use Car Sharing Services

Whether someone perceives something as beneficial depends heavily on their personality. This highlights the importance of identifying personal characteristics influencing willingness to use shared cars. Collectivism and environmental concern are personality traits that may influence willingness to use CSS. In addition, many demographic characteristics can influence someone's willingness to car

share, such as income, education, or gender. Also, as stated in the introduction, current travel mode choices can significantly impact an individual's attitude towards car sharing. This part of the paper thoroughly examines what the existing literature tells us about the relationships mentioned above.

2.2.1 Collectivism

As stated before, higher collectivism is associated with higher social sensitivity (Way & Lieberman, 2010), and social influence is one of the most important drivers of willingness to use CSS (Curtale et al., 2021). Therefore, it can be argued that collectivism positively relates to willingness to use CSS. The reasoning behind this is twofold.

Social Influence and Collectivism. The observation of Curtale et al. (2021) of a robust social influence effect would probably be even more significant in collectivist societies, which place greater value on social networks and the opinions within a person's social circle (Way & Lieberman, 2010)). Since car-sharing can be described as a model of sharing resources among a community, it is consistent with these principles, and collectivistic people might be more willing to use CSS.

Shared Resources and Community Welfare. Two traits that define collectivism are a preference for shared resources and an emphasis on the group's welfare as a whole rather than on personal benefit (Ianole-Călin et al., 2020). Since car-sharing can be described as a model of sharing resources (cars) among a community, it is consistent with these principles, and collectivistic people might, therefore, be more willing to use CSS.

However, direct empirical data linking collectivism to a person’s willingness to use CSS is needed for a more definitive conclusion. Therefore, this study aims to find a direct relationship between the two and, by doing so, fill a gap in the existing literature. Based on past literature and the argumentation stated above, it is hypothesised that collectivistic individuals show a higher willingness to use CSS.

2.2.2 Environmental concern

The transportation sector is one of the most polluting sectors worldwide. Approximately 23% of total energy-related CO_2 emissions are caused by the sector (Georgatzi et al., 2020). As CSS almost

always use EVs for their operations, their non-emitting fleets seem like an environmentally beneficial solution for daily travel (Baptista et al., 2014). It might seem straightforward to argue that people with high environmental concerns are more open to CSS, as increased use of CSS benefits the environment by reducing emissions and decreasing the number of cars on the streets (Vanheusden et al., 2022).

Many papers have investigated the relationship between environmentally conscious personality traits and willingness to use shared cars. However, no clear outcome has yet been established. Acheampong & Siiba (2019), among others, state that pro-environmental attitudes positively correlate with perceived benefits of car-sharing, which have the highest effect on willingness to use CSS. However, some papers state the exact opposite. In a research study by Agueilera-Garcia (2022), for example, it was found that pro-environmental behaviours are correlated with a reduction in the use of CSS.

Increased willingness. It has been suggested that those who care about the environment will be more likely to use car-sharing services because they support sustainable transportation objectives, which aim to reduce the adverse environmental effects of traditional private car ownership (Acheampong & Siiba, 2019). Findings in the literature that point to an increasing awareness of car-sharing and Mobility-as-a-Service (MaaS) as instruments for encouraging more environmentally friendly urban mobility patterns (Efthymiou et al., 2013) provide credibility to this perspective.

Decreased willingness. On the other hand, there are suggestions that people who care about the environment are less likely to use car-sharing services because of possible limitations in these services' ability to efficiently and environmentally satisfy all travel demands. Car-sharing might have a small positive environmental impact for people already committed to using public transportation or active transportation modes (Kim et al., 2017). The results of a pilot study conducted in Belgium by Storme et al. (2020) found the same result. Although initial interest in car-sharing as a sustainable transportation option may be higher for more environmentally concerned persons, their willingness to adopt and regularly use CSS depends on the capacity of CSS to effectively meet user needs and provide clear environmental benefits. Therefore, as long as public transport and active travel modes remain environmentally more beneficial, these individuals are not incentivised to switch to car-sharing services.

The literature written in the past decennia underscores the complex interplay between environmental concern and willingness to use car-sharing services. On the one hand, environmentally conscious people are open to sustainable mobility solutions and, therefore, to CSS. On the other hand, environmentally conscious people seem less open to CSS as they prefer even more sustainable transport options, such as public transport or cycling. As there is no clear answer yet in the current literature, this study will investigate the relationship between environmental awareness and willingness to use CSS. By doing so, this study attempts to provide additional support for either point of view.

However, due to the complex interplay, no a priori hypothesis has been formed. The current 'state of science' does not provide unequivocal directions for guiding expectations on the relation between environmental concern and willingness to use CSS.

2.2.3 Sociodemographic characteristics

Much literature has been written on how (socio)demographic personality traits influence the adoption of CSS. As a car-sharing company's stakeholder or manager, it is essential to gain know-how on the 'typical customer' of your product or service (Perez & Rodriguez del Bosque, 2016). The studies that have been performed mainly looked into the relationship between willingness to use CSS and age, gender, income, and education. Most studies found the same results; a typical user of car-sharing services is a young, highly educated male in a higher income class. See Table 1 for an overview of the different papers and the relations between gender, age, education, wage and a person's willingness to use CSS.

Table 1: ***Found effects on willingness to use CSS***

	Male	*Age*	*Education*	*Income*
Acheampong & Siiba (2019)		−	+	+
Aguilera-Garcia et al. (2022)	+	−	+	+
Alonso-Gonzalez et al. (2020)		−	+	
Amirnazmiafshar & Diana (2022)		−	+	+
Efthymiou et al. (2013)		−		−
Prieto et al. (2017)	+	−	+	

Remarkably, Efthymiou et al. (2013) found an opposite result in the relationship between income and car-sharing adoption compared to the other papers. Their findings suggest that individuals from the low

to middle-income class, who typically use public transport to commute, are most likely to use car-sharing services. It is essential in an analysis to include demographic control variables. As stated above, much literature has already been written on the role of (socio)demographic characteristics and car-sharing adoption. Nevertheless, this study will look into the relation between (socio)demographics and willingness to use CSS in order to find additional evidence for found results or question found results by opposite findings. It is hypothesised for this study that highly educated, young males show a higher willingness to use CSS. Regarding the relation between income and willingness to use, no a priori hypothesis is formed.

2.2.4 Current Transport Mode Choice

As stated in the introduction, current transport mode choice can be an important predictive factor of an individual's willingness to use CSS.

To begin with, Fioreze et al. (2019) found that individuals who rarely use their private car are highly willing to use CSS. People who use their car on a daily basis, on the contrary, show a low willingness to use CSS. Their study also found that individuals who sometimes use the bus and who use the train at least once a month showed a higher willingness to use CSS. On top of that, the study by Eftymiou et al. (2013) found that car-sharing is more attractive to people who currently use the bus, tram or trolley for daily commuting.

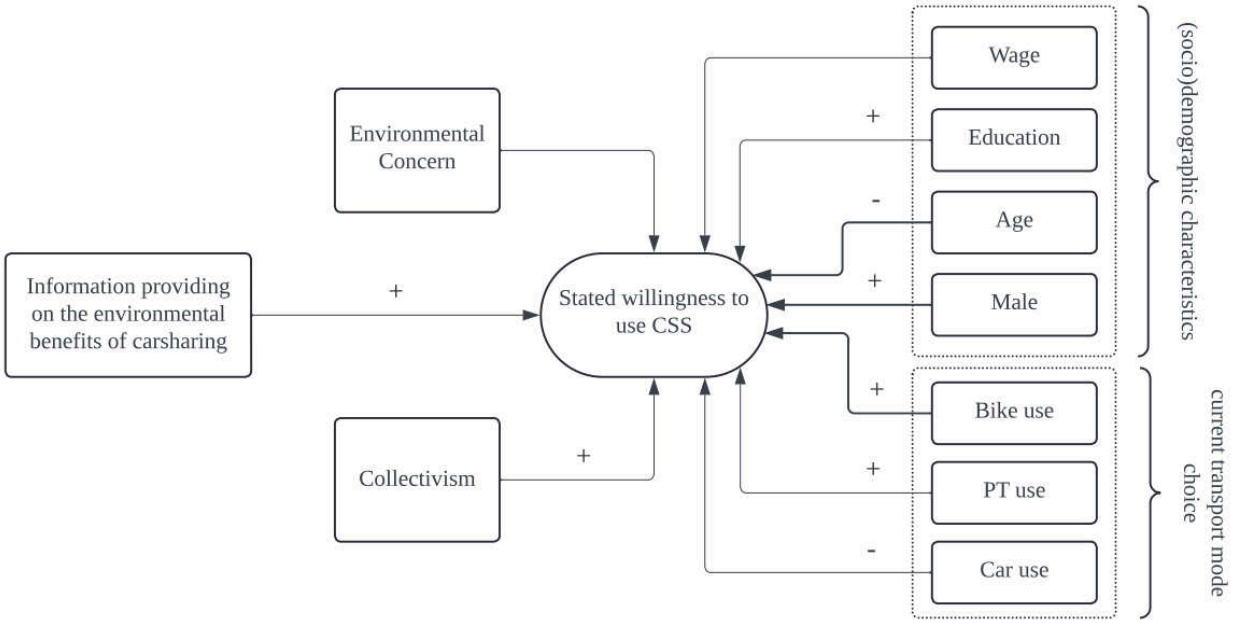
On the other hand, Kim et al. (2017) reveal that individuals currently using public transport or 'active modes' (walking or cycling) for daily commuting are not necessarily likely to switch to shared cars, especially for environmentally conscious people. These individuals perceive public transport and active modes as environmentally optimal. For that reason, environmentally conscious individuals using their own bike or public transport on a frequent base might not show a higher willingness to use CSS.

Based on studies performed in the last decade, it is hypothesised that individuals who currently use public transport or cycling as frequent travel modes show a higher willingness to use CSS. For individuals who currently use their car frequently, it is hypothesised that they show a low willingness to use CSS.

2.3 The overall model

A visualisation of the overall model from this study is shown in Figure 2. The figure is based on the hypotheses formed in the literature sections above. The overall dependent variable is stated willingness to use car-sharing services, shortly stated as a willingness to use CSS in the remainder of the paper. If a hypothesis is formed, the relation between two variables is marked with either a plus or a minus sign, indicating a positive or negative relation. No signs are added for relations between variables for which no priori hypothesis is formed. All hypotheses formed are stated below in Figure 2. The relationship between the different variables and the analyses used will be discussed in more detail in the next chapter, methodology.

Figure 2: ***A visual representation of the overall model***



H1 Widespread information providing on the environmental benefits of car-sharing causes the overall willingness to use Car Sharing Services to increase.

H2 Collectivistic people are more likely to show a high willingness to use Car Sharing Services.

H3 Highly educated, young males are more likely to show a high willingness to use Car Sharing Services.

H4 Frequent bike users are more likely to show a high willingness to use Car Sharing Services.

H5 Frequent public transport users are more likely to show a high willingness to use Car Sharing Services.

H6 Frequent car users are more likely to show a low willingness to use Car Sharing Services.

3. Methodology

3.1 Design and Participants

The survey sample consists of 238 participants, of which most are 25-34 years old, and 60.5% are men. The survey was distributed online in January 2024 in the Netherlands. Gender is almost equally divided, resulting in a well-distributed sample. Other demographic factors that may cause bias are accounted for; see Table 2. The experiment design is based on randomly presenting two definitions of car-sharing services to respondents. The first is a general definition of car-sharing and its possible forms (free floating vs. station-based). The second definition focuses on the environmental benefits of car-sharing as well. It provided the participants with the benefits of car sharing to society: more parking space, less congestion, reduced emissions, and more. For the complete definitions, see *Section 3.2*. This experiment aims to observe possible differences in willingness to use CSS caused by (not) being presented with information on the environmental benefits that arise from widespread adoption of car sharing.

Moreover, all participants were tested on environmental concern and collectivism to study the possible effects of high versus low scores on the variables above on willingness to use CSS.

The survey was created using *Qualtrics*. Social media, personal networks, and *Survey Circle* were used for the distribution. Due to the dependency on a personal network, the results are exposed to a risk of bias. The survey sample is relatively young and highly educated and, therefore, no perfect representation of the Dutch population. As a result, average willingness to use in the sample might be biased towards a higher score and the coefficients of the independent variables might also be biased. For the latter, however, the risk is relatively lower, as the sample is diverse enough (see Table 2) to be

able to evaluate possible differences in willingness to use related to different values for the independent variables.

Table 2: ***Descriptive statistics of the survey sample (N=238)***

Items	Classification	Sample Amounts	Percentage (%)
Gender	Female	94	39.50
	Male	144	60.50
Age	18-24	53	22.27
	25-34	73	30.67
	35-44	34	14.29
	45-54	35	14.71
	55-64	33	13.87
	65-74	5	2.10
	75 or older	5	2.10
Education	None	4	1.68
	Primary School	6	2.52
	HAVO	6	2.52
	VWO	4	1.68
	HBO Bachelor	59	24.79
	WO Bachelor	37	15.55
	WO Master	122	51.26
Wage	Less than €30.000	62	26.05
	€30.001 - €60.000	75	31.51
	€60.001 - €90.000	36	15.13
	€90.001 - €120.00	13	5.46
	More than €120.000	23	9.66
	I prefer not to say	29	12.18
Situation	Employed in paid employment	144	60.50
	Self-employed entrepreneur	25	10.50
	Job-seeker	15	6.30
	Inactive (e.g. student, ill, retired)	53	22.27
	Temporarily unemployed	1	0.42

3.2 Procedure

The survey questionnaire starts after informing respondents about the survey's anonymity and thanking them for their participation.

Firstly, the participants were asked about their current travel behaviour. They were first asked if they have a car available for personal use. Respondents could answer by *"yes"*, *"no"*, or *"I prefer not to answer"*. Then, participants were asked about their current transport mode choice and frequency of use. First, they were asked about their current use of public transport, then about their current use of a private vehicle, and finally about their current use of a private bike. Answers were given based on a Likert-Scale ranging from *"1 = Never / I do not own a car (or bike)"* to *"6 = (Almost) every day"*. Thus, higher scores denote a higher frequency of using the specific transport mode.

Then, participants were presented with a definition of car-sharing services. As mentioned above, participants were randomly provided with one of two definitions. The treatment group received a definition containing information on the environmental benefits of car-sharing services:

"Car sharing is like renting a car, but it's a bit different. You can rent and open a car from a nearby place via an app on your phone. Mostly, for a shorter time, like an hour, and you pay for it in a few ways: a monthly fee, how many hours you use it, or how far you drive. It's a good choice if you want to ***save money*** *and* ***help the environment****. You* ***don't have to buy a car or pay for repairs****, and you* ***spend less on gas and parking****. Car sharing might also mean fewer people need to own a private vehicle. That means* ***less pollution****,* ***fewer cars on the road, less gas used****, and* ***less need for parking spaces****. It's a way to make our world cleaner and less crowded."*

The control group received a general definition of car sharing without information on the potential environmental benefits:

"Car sharing is like a special way to rent cars. You use an app on your phone to rent and open a car from a nearby place. You pay a monthly fee, and then you can use the cars for a short time, like an hour. Sometimes, you also pay for each hour you use the car or for how far you drive. People who use car sharing don't have to buy a car or worry about big expenses. They can just rent a car when they need it. There are two types of car sharing. One is called "free-floating," where you can pick up a car at one place and drop it off somewhere else. The other is "station-based," where you have to return

the car to the same place you got it from. This is different from ride-sharing or carpooling, where you share a ride with other people in the same car."

In order to avoid a 'concentration bias', both definitions are approximately the same length.

As stated, the main aim of this setup is to evaluate if a treatment effect can be found: Do participants from the treatment group, who are informed about the environmental benefits that arise with car sharing, show a higher willingness to use CSS?

Then, participants were asked if they had already used car-sharing in a way as defined in the previous part ("*yes"*, *"no"*, "*not sure"*) and if they were already familiar with the definition of car-sharing that was distributed to them. Respondents were asked to answer the latter question according to a Likert-Scale (1 = not familiar, 5 = very familiar). Higher scores denoted higher familiarity with the definition.

The questions that followed were about willingness to use and frequency of use. Firstly, participants were asked if they were interested to start using CSS within two years from now. Answers possibilities ranged from *"1 = It is very unlikely that I will use it"* to *"5 = It is very likely that I will use it"*. After that, participants were asked about their (intended) frequency of use. They could answer on a scale ranging from *"1 = Not applicable, not expecting to use it"* to *"6 = (Nearly) every day"*.

Then, the next part of the survey is announced, and participants are presented with several statements on which they are expected to answer using a Likert-Scale ranging from 1 = strongly disagree to 5 = strongly agree.

The first set of statements aims to measure respondents' level of Environmental Concern (Dunlap et al., 2000). Participants were presented with 15 statements like *"Humans are severely abusing the environment"* and *"The earth has plenty of natural resources if we just learn how to develop them"*. Half of the statements are 'pro-environmental', and half represent a person not concerned about environmental change, like the latter one presented above. Answers to the 'non-concerned statements' will be reversed (1 = 5, 2 = 4, ..., 5 = 1). By doing so, the results can be evaluated as follows: a higher score denotes a higher level of environmental concern.

The second set of statements intends to measure how collectivistic (individualistic) respondents are. A set of 8 statements by Triandis & Gelfand (1998) is used to do so. Examples of statements are *"I feel good when I cooperate with others"* and *"I'd rather depend on myself than on others"*. The first statement corresponds to a collectivistic personality, and the second corresponds to an individualistic personality. The answers to statements that represent an individualistic personality are reversed in order to be able to analyse the results correctly. Moreover, a higher score denotes a higher level of collectivism. Low scores denote a tendency towards an individualistic personality.

In the last part of the survey, participants are asked about particular (socio)demographic characteristics. They are asked about their gender, age, education, income, work-related situation and zip code.

After identifying their gender (male, female, non-binary or prefer not to answer), participants are asked to indicate their age based on eight multiple-choice options ranging from *"under 18"* to *"85 or older"*. Each option in between has a range of 10 years, except for *"18-24 years old"*.

Then, respondents are asked to identify their highest level of education according to the Dutch education system, ranging from "none" to "WO-master or higher". A higher score denotes a higher education level.

After that, respondents are asked to state which of the following situations applies to them: employed in paid employment, self-employed entrepreneur, job-seeker, inactive (e.g., retired, studying, ill), or temporarily unemployed.

Finally, participants were asked to indicate their yearly income before taxes, ranging from "*less than €30.000*" to "*more than €120.000*". Within these limits, there are three options, each with a range of 30.000 euros. Participants could also choose not to answer this question.

At the end of the experiment, participants were asked to indicate their zip code. Finally, they were thanked for their participation and asked to provide their email addresses if they were interested in the results of this study.

3.3 Analysis

For the survey analysis, STATA is used to gain insight into the descriptive and inferential statistics that can be drawn from the survey output. This section will be divided into three parts: the analysis of the dependent variable (Section 3.3.1), the independent variables (Section 3.3.2), and the treatment effect (Section 3.3.3).

3.3.1 Dependent Variable

The dependent variable in this study, "stated willingness to use", is analysed using an ordered logit regression. Respondents scored the variable on a scale ranging from *"1 = It is very unlikely that I will use it [CSS]"* to *"5 = It is very likely that I will use it"*, as mentioned in the previous section. An ordered logit regression is an appropriate modelling technique since there is no precise definition for the spacing between the scores on this ordinal scale. Without assuming equal intervals between the willingness to use CSS levels, this regression method estimates the chance that a respondent's willingness to use CSS falls into or below a particular category subject to the independent variables. This approach is selected to handle the independent variable's categorical nature efficiently and accurately reflect the ordered nature of the Likert-Scale used in the survey question on willingness to use CSS. All of the regressions with willingness to use CSS as its dependent variable will, therefore, be regressed as ordered logit and will take on the following regression form (Long & Freese, 2006):

$$(1)\ \log\left(\frac{P(Y \leq j|X)}{P(Y > j|X)}\right) = \mu_j - \beta X$$

Where,

- Y = level of willingness to use (categorical dependent variable measured on a Likert scale ranging from 1-5)
- X = independent variable of interest
- μ_j = cut points or thresholds separating the Likert scale categories for the dependent variable with a different μ_j for each category boundary. Where μ_1 represents the boundary between categories 1 and 2, μ_2 the boundary between categories 2 and 3, etcetera.

- β = coefficient listed for each variable

Regression 1 helps us to understand the 'log-odds' that an individual's willingness to use CSS is at a certain level (j) or lower. The sign of a positive (negative) coefficient β, increasing (decreasing) the 'log-odds' of being above a certain level of willingness to use CSS, is therefore reversed by the minus sign added to the last term of the regression. As a result, positive coefficients reduce the 'log-odds' of being at or below a certain threshold and vice versa. A β value of 0.50 suggests that a one-unit increase in the independent variable, X, is associated with an increase in the log-odds of being in a higher category of willingness to use CSS by 0.50 (ceteris paribus).

Independent variables will all be treated according to the most efficient way based on their nature. How each independent variable is treated will be mentioned in the following part.

3.3.2 Independent Variables

Multiple independent variables are used in this study. These can be split into three sections: independent variables measuring a person's personality traits, (socio)demographic characteristics, and current travel behaviour. This subsection will handle each variable, respectively.

Personality traits. The personality traits measured in this study are environmental concern and collectivism. It is hypothesised that collectivistic individuals are more willing to use CSS. As stated in *Section 3.2,* the answers to the survey questions on the above variables are averaged to measure a person's score on either of the two. By doing so, values for both variables can take on any value between 1 and 5, and their categorical nature disappears. Since collectivism and environmental concern are significantly correlated ($\beta \approx .32$), both personality traits are analysed in separate regressions to avoid multicollinearity.

(Socio)demographic characteristics. The most essential (socio)demographic characteristics considered in this research are income, education, age and gender. Gender is analysed as a dummy variable where women form the reference group for the current study. There were only male or female participants; therefore, gender is either 1 (male) or 0 (women). Income, education and age are divided into ranges, as stated in *Section 3.2*; therefore, a categorical dummy is created for each range. The lowest category will be set as the reference category for all of these variables. Due to the significant

correlation between wage and age ($\beta \approx .47$) and wage and gender ($\beta \approx -.56$), all characteristics are analysed separately.

Current travel behaviour. In order to understand the relation between current travel behaviour and a person's willingness to use, respondents were asked about their current travel behaviour. Moreover, they were asked to state how often they use public transport and their personally owned bike/car. As stated in section 3.2, participants could state their frequency according to 6 possible frequency categories for each transport mode. Therefore, like the (socio)demographic characteristics, current travel behaviour for each of the three travel modes will be treated as categorical with dummies for each category. As all travel modes are directly related, using the car means not using a bike or public transport; each will be analysed separately. Again, the lowest category of each variable will be set as the reference group.

3.3.3 Treatment effect

In order to analyse if information providing on environmental benefits affects a person's willingness to use CSS, a treatment and control group were created (see *section 3.2*). A dummy variable, 'treatment', was created to analyse a possible treatment effect. The value for this dummy is either 0 (control group) or 1 (treatment group). A positive coefficient would suggest a higher willingness to use CSS for the treatment group (presented with the environmental benefits of car-sharing) than for the control group (not presented with the environmental benefits of CSS). And vice versa.

4. Results

The main dependent variable of interest for the result section is willingness to use. The following section will elaborate on the findings from this study about the relationship between willingness to use and the treatment effect, personality traits, (socio)demographic characteristics, and current transport mode choice, respectively.

4.1 Treatment

As stated in the section above, a dummy variable was created to estimate the difference in willingness to use CSS between the treatment and the control group. Respondents' average willingness to use CSS in the control group was higher ($M = 2.79, SD = 1.46, N = 117$) than the average willingness to use CSS in the treatment group ($M = 2.91, SD = 1.55, N = 121$). However, the ordered logit regression results were insignificant, as seen in Table 3; therefore, no treatment effect was found. Thus, the results do not align with hypothesis 1, as stated in *Section 2.3*. As a result, it cannot be concluded that either the treatment or the control group show a significantly higher/lower willingness to use CSS.

Table 3: ***Output from the ordered logit regression of the treatment effect on willingness to use***

	(1)
VARIABLES	wtu
treatment	-0.143
	(0.230)
/cut1	-0.949***
	(0.185)
/cut2	-0.310*
	(0.176)
/cut3	0.336*
	(0.176)
/cut4	1.413***
	(0.201)
Observations	238

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

A possible explanation for the insignificant results is the time-consuming nature of reading the definitions thoroughly. Time is costly, and respondents were not rewarded for their responses. Therefore, respondents may not have read the definitions carefully. This may have caused them not to perceive the benefits properly, which might be the reason for an unobserved treatment effect.

4.2 Personality traits

As stated in the method section, both personality traits are regressed separately due to multicollinearity. The relation between environmental concern ($M = 3.59$, $SD = .56$, $N = 238$) and

willingness to use is estimated using an order logit regression. A significant result is found and shown in Table 4. No a priori hypothesis was formed on the relation between environmental concern and willingness to use CSS. However, it can be concluded that an increase in a person's level of environmental concern is associated with an increased willingness to use CSS.

Table 4: ***Output from the ordered logit regression of environmental concern on willingness to use***

	(1)
VARIABLES	wtu
average_ec	0.413**
	(0.205)
/cut1	0.587
	(0.739)
/cut2	1.230*
	(0.740)
/cut3	1.884**
	(0.746)
/cut4	2.975***
	(0.762)
Observations	238

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

For the relation between collectivism ($M = 3.40, SD = .50, N = 238$) and willingness to use, the same method is used as for environmental concern. No significant result was found on the relation between collectivism and willingness to use CSS, see Table 5. Therefore, it cannot be concluded that collectivistic individuals are more willing to use CSS, as stated in the hypothesis (H2).

Table 5: ***Output from the ordered logit regression of collectivism on willingness to use***

	(1)
VARIABLES	wtu
average_collectivism	0.314
	(0.239)
/cut1	0.183
	(0.816)
/cut2	0.825
	(0.817)
/cut3	1.475*
	(0.822)

/cut4	2.556***
	(0.834)
Observations	238

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.3 (Socio)demographic characteristics

As stated in the method section, categorical dummies are created for all (socio)demographic variables. By doing so, running an ordered logit regression shows us the probability that individuals in each category of the according (socio)demographic variable fall within a higher willingness to use CSS than the reference category. In order to clearly state all results, this section evaluates all (socio)demographic variables separately. The descriptive statistics of all (socio)demographic characteristics can be found in Table 2, *Section 3.1*.

Age. As stated in Hypothesis 4, younger people are expected to be more willing to use CSS. Alternatively, older people are less likely to use CSS. The ordered logit regression shows that older people are, indeed, less willing to use CSS (see Table 6). For all individuals older than 34, significant results state a lower willingness to use compared to the reference category (18-24 years old). People 25-34 years old do not show a significantly different willingness to use than those 18-24. No linear relation is found, but it becomes clear that older individuals are less likely to use CSS. Individuals aged 45-54 and those over 75 are least willing to use CSS.

Table 6: ***Output from the ordered logit regression of age on willingness to use CSS***

	(1)
VARIABLES	wtu
age2	0.284
	(0.313)
age3	-1.297***
	(0.405)
age4	-2.304***
	(0.448)
age5	-1.955***
	(0.417)
age6	-1.894**
	(0.799)

age7	-2.378***
	(0.900)
/cut1	-1.859***
	(0.282)
/cut2	-1.018***
	(0.258)
/cut3	-0.180
	(0.243)
/cut4	1.061***
	(0.259)
Observations	238

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Gender. The data show that men are significantly more willing to use CSS, ceteris paribus. The output is shown in Table 7. Therefore, it can be concluded, as hypothesised (H3), that men are more likely to use CSS than women.

Table 7: ***Output from the ordered logit regression of gender on willingness to use CSS***

	(1)
VARIABLES	wtu
gender	0.550**
	(0.239)
/cut1	-0.554***
	(0.199)
/cut2	0.0947
	(0.194)
/cut3	0.752***
	(0.200)
/cut4	1.842***
	(0.231)
Observations	238

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Education[1]. It is hypothesised (H3) that individuals with higher education levels are more willing to use CSS. As shown in Table 2, there are almost no observations in the lowest four education

[1] The sample did not contain MBO graduates

levels. Therefore, to analyse the relation between education and willingness to use, the variables edu1 – edu4 are dropped. After dropping these variables, a significant positive effect is found for higher education levels, see Table 8. Both WO Bachelor (edu6) and WO Master (edu7) graduates show a significantly higher willingness to use than HBO graduates (edu5). Thus, participants from the highest education levels are more likely to use CSS. However, as the confidence intervals of the coefficients for WO Bachelor and WO Master graduates overlap, it is hard to argue if there is a linear relationship between education and willingness to use CSS. It can, therefore, not be concluded that WO Bachelor graduates are more willing to use CSS than WO Master graduates or vice versa.

Table 8: ***Output from the ordered logit regression of education level on willingness to use CSS***

	(1)
VARIABLES	wtu
edu6	1.425***
	(0.358)
edu7	1.184***
	(0.270)
/cut1	-0.104
	(0.215)
/cut2	0.591***
	(0.219)
/cut3	1.288***
	(0.231)
/cut4	2.421***
	(0.263)
Observations	238

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Wage. No a priori hypothesis was formed on the relation between income and an individual's willingness to use CSS. The regression output shows that higher income levels are associated with a lower willingness to use CSS. Significant negative effects are found for income levels 3 – 5 (income3 – income5) (see table 9). Individuals who did not want to mention their income (income6) also showed a significantly lower willingness to use CSS. Overall, a U-shaped relation is found. Until income level 4, the negative effect becomes stronger. From income level 4 onwards, the negative effect becomes weaker.

Table 9: ***Output from the ordered logit regression of income level on willingness to use CSS***

VARIABLES	(1) wtu
income2	-0.202
	(0.303)
income3	-1.998***
	(0.392)
income4	-2.098***
	(0.622)
income5	-1.620***
	(0.471)
income6	-1.156***
	(0.394)
/cut1	-1.781***
	(0.259)
/cut2	-1.021***
	(0.239)
/cut3	-0.258
	(0.227)
/cut4	0.918***
	(0.241)
Observations	238

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.4 Current transport mode choice

This section will evaluate the results on the relation between current transport mode choice (and frequency) and an individual's willingness to use CSS. Descriptive statistics can be found in Table 10 below.

Table 10: ***Descriptive statistics of current transport mode choice and frequency (N=238)***

Items	Classification	Sample Amounts	Percentage (%)
Bike use	I do not own a bike	21	8.82
	Less than once a month	6	2.52
	Once a month	7	2.94
	Once a week	24	10.00
	A few times a week	46	19.33
	(Almost) every day	134	56.30
Public transport use	Never	7	2.94
	Less than once a month	45	18.91

	Once a month	36	15.13
	Once a week	39	16.39
	A few times a week	75	31.51
	(Almost) every day	36	15.13
Car use	I do not own a car	94	39.50
	Less than once a month	8	3.36
	Once a month	6	2.52
	Once a week	13	5.46
	A few times a week	0	0.00
	(Almost) every day	117	49.16

Bike use. As hypothesised (H4), frequent bike users are more willing to use CSS. However, the results are only significant for individuals from the highest frequency level (see Table 10). Therefore, only individuals who use their bike (almost) every day show a significantly higher willingness to use CSS. Another significant result is found for individuals who do not own a bike. They also show a higher willingness to use CSS. The aforementioned is not hypothesised but understandable as these individuals do not have a bike as a mobility option and, therefore, face fewer mode choice possibilities.

Table 11: ***Output from the ordered logit regression of current bike use on willingness to use CSS***

VARIABLES	(1) wtu
bikeuse1	1.701*
	(0.929)
bikeuse3	0.489
	(1.109)
bikeuse4	0.457
	(0.916)
bikeuse5	1.153
	(0.880)
bikeuse6	2.096**
	(0.855)
/cut1	0.657
	(0.839)
/cut2	1.358
	(0.841)
/cut3	2.065**
	(0.845)

/cut4	3.210***
	(0.856)
Observations	238

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0

Public transport use. For high frequencies of public transport use, significant and strong positive effects are found on willingness to use CSS (Table 11). Individuals who use public transport at least once a week are more willing to use CSS. Moreover, individuals who use public transport a few times a week show an even higher willingness to use it. Furthermore, individuals who use public transport on a daily basis show the highest willingness to use it. The hypothesis (H5) is partly true as it only applies to frequent public transport users.

Table 12: ***Output from the ordered logit regression of current public transport use on willingness to use CSS***

VARIABLES	(1) wtu
ptuse2	0.757
	(0.863)
ptuse3	1.250
	(0.860)
ptuse4	2.669***
	(0.863)
ptuse5	2.938***
	(0.844)
ptuse6	3.044***
	(0.870)
/cut1	1.107
	(0.808)
/cut2	1.898**
	(0.815)
/cut3	2.689***
	(0.822)
/cut4	3.918***
	(0.834)
Observations	238

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Car use. As no respondent stated to use their car a few times a week, this variable was dropped. High levels of private car use significantly negatively affect willingness to use CSS, see Table 12. Individuals who use their car once a week show a lower willingness to use CSS, as well as individuals who use their car on a daily basis. The latter ones show an even lower willingness to use CSS. As hypothesised (H6), the regression output shows that (significantly) high levels of private car use are associated with a lower willingness to use CSS.

Table 13: ***Output from the ordered logit regression of current car use on willingness to use CSS***

	(1)
VARIABLES	wtu
caruse1	0.567
	(0.622)
caruse3	0.739
	(0.930)
caruse4	-1.406*
	(0.772)
caruse5	-2.041***
	(0.631)
/cut1	-2.042***
	(0.618)
/cut2	-1.180*
	(0.606)
/cut3	-0.255
	(0.596)
/cut4	1.148*
	(0.605)
Observations	238

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. Conclusion

The main goal of this study was to investigate whether increasing awareness regarding the environmental benefits of CSS might increase individuals' willingness to use CSS. Using a randomised controlled trial design implemented in a survey, the study provided information on car-sharing benefits

to a treatment group yet kept it hidden for a control group. Apart from that, this study aimed to provide additional insight into the (personal) characteristics that impact the adoption of CSS.

5.1 Main findings

Unlike expected, no significant difference was found in the willingness to use CSS between the treatment and the control groups. Thus, solely providing information on car-sharing benefits related to the environment cannot be concluded as an effective measure in increasing an individual's willingness to use CSS.

The current study highlighted the importance of personality traits and (socio)demographic factors as influential factors in car-sharing adoption. A positive correlation is found between environmental concern and willingness to use CSS, suggesting that people with higher levels of environmental concern are more likely to adopt car-sharing services. Collectivism had no significant impact on individuals' willingness to use CSS.

Furthermore, it turned out that younger, highly educated men are more prone to using CSS, which is consistent with previous research on the topic. However, there is a U-shaped negative correlation found between income and willingness to use CSS. This is an interesting result, as the majority of earlier research found a positive correlation. Future research could focus on possible explanations for the U-shaped relation.

Finally, it is found that current travel behaviour significantly influences willingness to use CSS. Individuals who regularly use public transport or private bikes were more likely to use CSS. A possible explanation might be the complementarity of CSS with their current transport modes. Private car owners, on the other hand, who use their cars frequently, showed less willingness to use CSS. They might simply prefer the pre-existing use of their personal cars.

5.2 Implications for managers and other stakeholders

This research suggests several strategic possibilities for managers and other stakeholders in the car-sharing market.

To begin with, findings on personality traits and (socio)demographic characteristics enable car-sharing firms to tailor their marketing strategies towards environmentally conscious, younger individuals by highlighting the environmental benefits of car-sharing in a less static way than used for the current research, possibly more effective in reaching young(er) individuals.

Secondly, as public transport users and bike users are more willing to use CSS, CSS firms' managers and other stakeholders should focus on collaboration with urban planners. Suppose CSS are effectively integrated into public transportation networks and complement private bike use easily. In that case, CSS might become a more accessible and practical component of urban mobility.

Finally, CSS firms and other stakeholders (like local governments) could focus on customer education. Although information-sharing alone did not increase individuals' willingness to use CSS, educational campaigns combined with trial options might increase the perceived benefits of CSS and bridge the gap between awareness and actual usage.

5.3 Limitations

To begin with, this survey's sample is limited in size and mainly consists of younger, highly educated individuals. Therefore, the results might show a biased representation of the broader population's attitudes towards CSS.

In addition, information on car sharing benefits was only provided briefly in a simple definition. This could be the reason that the treatment effect results are insignificant. Individuals might not have even read the definition provided in the survey, and as a result, the treatment effect might not have reached its full potential.

To conclude, this study focused on individuals' behavioural intentions. Participants in the survey stated their willingness to use CSS. However, this is no guarantee of actual behaviour. Therefore, an intention-behaviour gap causes a possible bias, and results are therefore debatable.

5.4 Future research directions

Based on the findings of this research, multiple areas could be explored in future research. To begin with, longitudinal studies might be effective in examining the effects of different types of informative campaigns over extended periods of time on willingness to use CSS.

Also, more diverse demographic groups in multiple countries can be studied to better understand the varying needs and responses to CSS of individuals across different population segments in countries outside the Netherlands.

Lastly, additional studies on how CSS can be integrated with other mobility solutions most effectively can be interesting. Some research has been performed in this area. However, like this study, it is mainly about stated preferences and, therefore, hypothetical. Actual behaviour is, in the end, most important for firms and stakeholders; therefore, additional study in this area is needed.

5.5 Concluding remarks

This study provides some crucial new insights about the factors influencing the willingness to adopt car-sharing services. The study emphasises the significance of matching CSS marketing initiatives with potential customers' environmental values and travel habits. Static information providing on the environmental benefits of CSS does not affect willingness to use in this study. Therefore, stakeholders must adopt diverse strategies beyond simple information providing to allow CSS to have a more significant impact. Managers and stakeholders of CSS should focus on effective integration and tailored marketing techniques. As a result, CSS can play an essential role in developing sustainable urban mobility environments.

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7. Appendix

Appendix 1: Survey Questionnaire

Q1 Dear participant, Welcome to my experiment. Thank you for cooperating, and helping me with my current study. You will be asked multiple questions. Please answer all questions truthfully, there are no right or wrong answers. All your answers will be kept anonymously and confidential. Taking part will take approximately 5-10 minutes. Thanks again for participating!

Q2 Do you have a car available for your own household?

- ○ Yes
- ○ No
- ○ I prefer not to answer

Q3 How often do you use public transport?

- ○ (Nearly) every day
- ○ A few times a week
- ○ Once a week
- ○ Once a month
- ○ Less than once a month
- ○ Never

Q4 How often do you use your own car?

- ○ (Nearly) every day
- ○ A few times a week
- ○ Once a week
- ○ Once a month
- ○ Less than once a month
- ○ I do not own a car

Q5 How often do you use your own bike?

- ○ (Nearly) every day
- ○ A few times a week
- ○ Once a week
- ○ Once a month
- ○ Less than once a month
- ○ I do not own a bike

Q6 (Control) Please read the information below carefully: Car sharing is like a special way to rent cars. You use an app on your phone to rent and open a car from a nearby place. You pay a monthly fee, and then you can use the cars for a short(er) time, like an hour. Sometimes, you also pay for each hour you use the car or for how far you drive. People who use car sharing don't have to buy a car or worry about big expenses. They can just rent a car when they need it. There are two types of car sharing. One is called "free-floating," where you can pick up a car at one place and drop it off somewhere else. The other is "station-based," where you have to return the car to the same place you got it from. This is different from ride-sharing or carpooling, where you share a ride with other people in the same car.

Q6 (Treatment) Please read the information below carefully: Car sharing is like renting a car, but it's a bit different. You can rent and open a car from a nearby place via an app on your phone. Mostly, for a shorter time, like an hour, and you pay for it in a few ways: a monthly fee, how many hours you use it, or how far you drive. It's a good choice if you want to save money and help the environment. You don't have to buy a car or pay for repairs, and you spend less on gas and parking. Car sharing might also mean fewer people need to own their own cars. That means less pollution, fewer cars on the road, less gas used, and less need for parking spaces. It's a way to make our world cleaner and less crowded.

Q7 Do you already use car-sharing in a way like mentioned in the previous part?

- ○ Yes
- ○ No
- ○ Not sure

Q8 Are you familiar with the information provided in the previous part of the survey? (1 = not familiar, 5 = very familiar)

	1	2	3	4	5
Familiarity with the information provided in the previous part of the survey	○	○	○	○	○

Q9 Are you interested to start using car-sharing services in within 2 years from now? (1 = It is very unlikely that I will use it, 5 = It is very likely that I will use it)

	1	2	3	4	5
Willingness to start using car-sharing services within 2 years from now	○	○	○	○	○

Q10 If you are willing to use it, how often do you think you would use car-sharing services in the future?

- ○ (Nearly) every day
- ○ A few times a week
- ○ Once a week
- ○ Once a month
- ○ Less than once a month
- ○ Not applicable, not expecting to use it

Statement We now turn to the final part of the questionnaire, in which you are asked to give your opinion on a number of statements.

Q11 Please answer all statements truthfully according to the following scale: 1 = strongly disagree, 5 = strongly agree.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
We are approaching the limit of the number of people the earth can support	○	○	○	○	○
Humans have the right to modify the natural environment to suit their needs	○	○	○	○	○
When humans interfere with nature, it often produces disastrous consequences	○	○	○	○	○
Human ingenuity will insure that we do NOT make the earth unliveable	○	○	○	○	○
Humans are severely abusing the environment	○	○	○	○	○
The earth has plenty of natural resources if we just learn how to develop them	○	○	○	○	○
Plants and animals have as much right as humans to exist	○	○	○	○	○

The balance of nature is strong enough to cope with the impacts of modern industrial nations	○	○	○	○	○
Despite our special abilities, humans are still subject to the laws of nature	○	○	○	○	○
The so-called “ecological crisis” facing humankind has been greatly exaggerated	○	○	○	○	○
The earth is like a spaceship with very limited room and resources	○	○	○	○	○
Humans were meant to rule over the rest of nature	○	○	○	○	○
The balance of nature is very delicate and easily upset	○	○	○	○	○
Humans will eventually learn enough about how nature works to be able to control it	○	○	○	○	○

If things continue on their present course, we will soon experience a major ecological catastrophe	○	○	○	○	○

Q12 Please answer all statements truthfully again, according to the same scale: 1 = strongly disagree, 5 = strongly agree.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I rely on myself most of the time; I rarely rely on others.	○	○	○	○	○
I feel good when I cooperate with others.	○	○	○	○	○
I'd rather depend on myself than others.	○	○	○	○	○
The well-being of my coworkers is important to me.	○	○	○	○	○
I often do "my own thing."	○	○	○	○	○
If a coworker gets a prize, I would feel proud.	○	○	○	○	○
My personal identity, independent of others, is very important to me.	○	○	○	○	○
To me, pleasure is spending time with others.	○	○	○	○	○

Q13 What is your gender?

- ○ Male
- ○ Female
- ○ Non-binary / third gender
- ○ Prefer not to say

Q14 Please indicate your age

- ○ Under 18
- ○ 18 - 24
- ○ 25 - 34
- ○ 35 - 44
- ○ 45 - 54
- ○ 55 - 64
- ○ 65 - 74
- ○ 75 - 84
- ○ 85 or older

Q15 Please indicate your highest level of education

- ○ VMBO
- ○ HAVO
- ○ VWO
- ○ MBO
- ○ HBO Bachelor
- ○ WO Bachelor
- ○ WO Master
- ○ Other

Q16 What is your current situation?

- ○ Employed in paid employment
- ○ Self-employed entrepreneur
- ○ Job-seeker
- ○ Inactive (e.g., retired, studying, ill)
- ○ Temporarily unemployed

Q17 Please indicate your income before taxes

- ○ Less than €30.000 a year
- ○ €30,001 - €60,000 per year
- ○ €60,001 - €90,000 per year
- ○ €90,001 - €120,000 per year
- ○ More than €120,000 per year
- ○ I prefer not to answer

Q18 Please indicate the four digits from your zip code.

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Q19 Thank you very much for your willingness to take part in this study! In case you wish to be updated about the background and results of this research project, you are welcome to leave your email address here. I will notify you about the results as soon as they become available. If you are not interested in learning more about the research project, it is fine to leave the space below blank.

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