sustainability

MDPI

Article

Intentions to Participate in Carsharing: The Role of Self- and Social Identity

Loes M. Derikx and Dea van Lierop *

Faculty of Geosciences, Utrecht University, 3508TC Utrecht, The Netherlands; loes.derikx@hotmail.com
* Correspondence: d.s.vanlierop@uu.nl; Tel.: +31-30-253-1367

Abstract: Carsharing is becoming an increasingly popular mode of transportation in many cities around the world. Previous research has revealed that users tend to be young, are highly educated, have high incomes and live in densely populated neighbourhoods. However, this does not explain why people who have similar socioeconomic characteristics do not adopt carsharing when residing in comparable urban contexts. To assess the critical differences between users and non-users of carsharing, the current research uses the theory of planned behaviour as a theoretical framework to analyse how aspects of an individual's social and self-identity determine their intentions to participate in carsharing. In-person intercept questionnaire data were collected in the Berlin neighbourhoods Schloßstraße, Steglitz and Glasower Straße, Neukölln in the fall of 2019 (N = 216). Exploratory and confirmatory factor analysis and structural equation modelling were used to analyse the collected data. The model results suggest that having a pro-technology self-identity and negative pro-car identity are significantly associated with the intention to participate in carsharing. These associations are present in both the structural and alternative models. Moreover, both models indicate a negative relationship between individuals' degree of environmental self-identity and the degree of their pro-car identity. The results suggest that, in order to promote carsharing, regional governments should focus on attracting new users who are currently already using mobility technology. The findings can be used by regional governments to identify potential carsharing users and to specifically target individuals who are likely to be willing to adopt and participate in carsharing.

Keywords: carsharing intentions; theory of planned behaviour; self-identity; social identity; structural equation modelling; sustainable travel; shared-mobility

Citation: Derikx, L.M.; van Lierop, D. Intentions to Participate in Carsharing: The Role of Self- and Social Identity. *Sustainability* **2021**, *13*, 2535. https://doi.org/10.3390/su13052535

Academic Editors: Margareta Friman, Lars Olsson and Hugo Guyader

Received: 7 January 2021
Accepted: 21 February 2021
Published: 26 February 2021

1. Introduction

Carsharing is becoming an increasingly popular mode of transportation in many cities around the world [1–3] and can be defined as an activity in which people with a carsharing membership gain short-term access to locally available, non-privately owned car fleets at a preferred time of the day, (usually) including all costs per use, such as user fees, fuel and insurance [4–8].

Carsharing is a popular sector within the "sharing economy" and can be offered through different business models. The concept of the sharing economy comprises "*several ICT developments and technologies, among others CC [collaborative consumption], which endorse sharing the consumption of goods and services through online platforms*" [9]. Carsharing through the Business-to-Consumer (B2C) business model is central to this research and refers to businesses with a fleet of cars that are rented out to users for shorter or longer periods of time. This business model is different from carsharing based on the peer-to-peer principle (P2P), whereby private vehicles are rented out by one car owner to another person [6].

Various studies have shown that shared mobility, such as carsharing, can contribute to the transition to environmentally sustainable urban mobility [10–14]. For example, studies have shown that individuals with a carsharing membership increasingly sold their personal car after joining a carsharing program and that fewer people purchased a new car [10].

However, with very regular use of (B2C) carsharing, user costs can still be comparable to owning and using a private car. In addition, using a non-electric shared vehicle might result in users having a similar CO_2 footprint compared to those using a privately owned car. However, there is evidence that shows that people with a carsharing membership tend to travel fewer kilometres by car overall after joining a carsharing program [15], resulting in substantially reduced CO_2 emissions [7,14].

According to Schaefers [16] "*one of the key challenges for carsharing providers as well as for public institutions planning for carsharing services will be to successfully expand consumer acceptance of carsharing services*". Moreover, a study by Nazari, Noruzoliaee and Mohammadian [17] indicated that people who frequently use mobility-on-demand services are more likely to be interested in using (shared) automated vehicles in the future. Various studies have assessed which factors influence participation in the sharing economy [9,18,19], the motivations and preferences which drive carsharing adoption [16,20,21], and the behaviour of people already participating in carsharing programs [22]. According to Dias et al. [21], users of carsharing services are often young, with a high educational background and well-paid jobs, and live in densely populated neighbourhoods. However, according to Heinen, Maat and Van Wee [23,24], many studies are grounded in utility theory, which assumes that people choose their mode of transportation on the basis of financial and time efficiency [25]. While previous studies have revealed the sociodemographic factors which influence individuals to adopt carsharing, little is known about why people in similar contexts and with similar socioeconomic characteristics differ in mode choice and travel behaviour [23,24].

Other studies have assessed the personal characteristics of (potential) carsharing users, such as attitudes, lifestyles and different aspects of personal identity [24,26,27]. Several authors have provided evidence that social and self-identity are important predictors of intended travel behaviour and mode choice [24,28–30]. The theory of planned behaviour is a commonly used framework for analysing individuals' intended and actual behaviours [31] and theorises that the intention of an individual to perform a certain behaviour is determined by his or her attitude towards the behaviour, the subjective norm and the person's perceived behavioural control [31]. This framework has been used to analyse (changes in) travel behaviour [32,33] and to assess individuals' intentions to participate in the sharing economy [34]. However, to the authors' knowledge, the role of identity has not been previously assessed in the context of participation intention in carsharing.

The goal of this study is to analyse how the influence of individuals' social and self-identity determines their intentions to participate in carsharing. The findings of this study can be used to identify potential carsharing users and to target individuals and populations with specific identity aspects (e.g., personally identifying as being environmentally friendly or as a user of new technologies) to adopt and participate in carsharing.

2. Literature

2.1. Theory of Planned Behaviour and Transport Research

The theory of planned behaviour (TPB) theorises that the intention of an individual to perform a certain behaviour is determined by his or her attitudes towards the behaviour (ATT), the subjective norms (SN) towards the behaviour and the person's perceived behavioural control (PBC) [31]. Subsequently, the intended behaviour influences the performance of the actual behaviour [31].

Previous research has suggested that, when an individual has performed a certain behaviour in the past, the individual often is more likely to have the intention to practice this behaviour again in the future [35]. Existing transport habits have been demonstrated to be a resistant factor towards intended mode change. For example, evidence from a study on public transport mode choice [36] revealed that habitual car use prevented individuals from having the intention to use public transport. This study, in which the TPB was also used as a research framework, similarly showed that, when controlling for habitual car use,

positive attitudes towards using public transport were less strongly associated with public transport use intentions [36]. Accordingly, we hypothesise the following:

Hypothesis 1. *A positive experience with past use of carsharing has a significant positive effect on the intention to participate in CS again.*

2.1.1. Attitudes towards Behaviour

Attitudes towards behaviour can be defined as "*one's positive or negative evaluation of the benefits and drawbacks of performing a specific behavior*" [37], as cited by [34], p. 109–117. Attitudes towards a behaviour are formed by more general attitudes and personality traits of an individual; however, these general attitudes usually only indirectly predict an individual's intention and behaviour [31]. If an individual believes in a positive outcome after executing a certain behaviour, this will likely increase their intention to engage in a behaviour. Moreover, previous research has shown that attitudes can be formed by conscious as well as subconscious associations and evaluations towards a behaviour [38,39].

In the context of this research, we suggest that attitudes can, for example, be grounded in attitudes towards carsharing as opposed to car ownership or can be grounded in more general environmental attitudes. For example, Bardhi and Eckhardt [4] provide evidence from semi-structured interviews with young professionals who have carsharing memberships and who reside in urbanised areas that access-based carsharing is thought of as a popular and sustainable alternative to car ownership. Evidence from a study on commuting change showed that environmental attitudes are an influential factor in transport behaviour change [40]. However, other authors suggested that individuals can hold onto negative attitudes towards carsharing when they consider owning a car as a status symbol [41–43]. In addition, cultural differences are likely to cause variation in the degree to which vehicle ownership is perceived as an important status symbol. For example, a study on undergraduate students' motivation for car ownership conducted across several countries indicated that students from The Netherlands and Japan perceived cars as less of a status symbol when compared to students from China, Indonesia, Lebanon, Taiwan and the USA [44]. Based on the results of these studies, we hypothesise the following:

Hypothesis 2a. *Positive attitudes towards CS have a positive effect on intentions to participate in CS.*

2.1.2. Subjective Norms towards Behaviour

Subjective norms (SN) have been defined as the extent to which a person perceives social pressure towards performing a certain behaviour [31]. These social pressures can be experienced through the opinions of people who are important to an individual or who play an important role in a person's decision-making process [34]. When an individual perceives that the people close to him or her have positive (or negative) opinions about a certain behaviour (such as participation in carsharing), this can have a positive (or negative) influence on whether the person intends to participate in a specific activity. For example, Barth, Jugert and Fritsche [45] assessed the role of social (subjective) norms and collective efficacy on the acceptance of electric vehicles (EVs), which was shown to have stronger effects than cost-related factors on the acceptance of EVs. Although EVs and carsharing are not the same, research on the early adopters of carsharing and EVs have shown that these groups often have similar demographic characteristics [46,47]. Barth et al. [45] grounded their research in social identity theory [48], which is based on the idea that individuals identify themselves as being part of certain social groups, and the way in which an individual thinks and behaves might be in line with what is perceived to be the norm within their social group. This also shows how identities are related to the formation of an individual's subjective norms. Therefore, we hypothesise the following:

Hypothesis 2b. *A positive evaluation of subjective norms towards CS has a positive effect on the intention to participate in CS.*

2.1.3. Perceived Behavioural Control towards Behaviour

Perceived behavioural control (PBC) refers to the extent to which a person thinks it is easy or difficult to perform a certain behaviour or to participate in a specific activity [31,49]. This can be due to limiting internal factors such as the level of confidence or the level of autonomy that a person perceives they have to participate in a certain activity [31,49] or due to external factors such as lack of time, money or knowledge [31,34,49]. Furthermore, PBC affects the intended behaviour as well as the actual behaviour [31]. In previous research, PBC has been shown to have a stronger effect on the intention to perform a behaviour than the attitudes and perceived norms towards performing a certain behaviour [50]. For example, Falco and Kleinhans [51] identified digital illiteracy to be one of the challenges in using digital platforms in local civic engagement. In the case of carsharing, low levels of digital literacy may result in an individual's inability to use the digital platforms on which shared cars are offered. People might also perceive that carsharing is inaccessible because shared cars are not offered near the starting point of their trip [52]. Accordingly, we hypothesise the following:

Hypothesis 2c. *A positive evaluation of PBC towards CS has a positive effect on the intention to participate in CS.*

2.2. Extending the Theory of Planned Behaviour with Social and Self-Identities

Different concepts and examples of identities have been included as a determinant in research using TPB as a framework [53,54] and in research concerning travel mode choice and behaviour [24]. Identity is a concept that is conceptualised in different ways: it can refer to an individual's (1) social identity, (2) self-identity, or (3) culture and ethnicity [55,56]. Self-categorisation is inherently linked to the process of identity formation, and self- and social identity are also often mentioned in connection with behavioural intentions or (un-)willingness to change behaviour [56].

Social identities refer to people identifying themselves as belonging to a social group or categorisation with a certain societal role [56,57]. There are many examples of social identities, since people can identify as part of multiple categories or groups. In previous research, social identities related to, e.g., parenthood, employment [24], and specific modes such as being a car driver or a cyclist [24,28,58] have been shown to be important determinants of travel behaviour. For example, in a study on motives related to car use, Steg [58] demonstrated not only that instrumental factors (such as convenience) influence the popularity of car use but also that symbolic and affective factors (such as how people can express themselves or their social position) played an important role [58]. Accordingly, for many groups, the status or image of owning a car is associated with belonging to a certain social group. In the context of carsharing, people expressing a stronger social identity related to habitual car use and vehicle ownership could therefore have a lower intention to use shared cars. Based on the results of these studies, we hypothesise the following:

Hypothesis 3. *A pro-car identity has a negative (indirect) effect on the intention to participate in CS.*

Rather than identifying with a certain functional role within society, an individual's self-identity (or self-concept) refers to the personal characteristics or lifestyles with which a person identifies. Examples of self-identities in transportation research include environmentally friendliness [24,59], being a user of new technologies [60,61], being sporty and healthy [24], and engaging with green consumerism [54]. In the context of carsharing, people who see themselves as environmentally friendly could have a higher intention to participate in carsharing than people who do not see themselves as environmentally friendly due to the association that car usage has a negative effect on environmental sustainability [40,62]. Similarly, those who value engaging with new technologies may have a higher intention to engage with the latest carsharing services and technologies, such as state-of-the-art electric vehicle technologies and mobile applications. Moreover, in a

study on stereotyping threats of battery electric vehicle (BEV) users, pro-technological and environmental identities were formulated based on the personal characteristics of early adopters of BEVs [61]. However, while the authors warn against negatively stereotyping people who identify with specific characteristics, they advocate that BEV users could be desirable and potential customers interested in the sustainable car market [61]. We therefore hypothesise the following:

Hypothesis 4. *Identifying as environmentally friendly has a positive (indirect) effect on the intention to participate in CS.*

Hypothesis 5. *Identifying as being a user of new technologies has a positive (indirect) effect on the intention to participate in CS.*

Among the different identities that people have, there may be differences with regard to which identities are more important for shaping their attitudes towards a certain situation or behaviour; this hierarchy of identities is called identity salience [55]. In the context of behavioural intentions, individuals consider (consciously or subconsciously) which attitude is most important in relation to what the perceived norm is towards a certain behaviour of people identifying with this same social group or category [53]. Someone can have a pro-car identity, but based on the identity as a local resident, the same person can be annoyed by the amount of cars parked on the street.

Furthermore, Murtagh et al. [29] suggest that, in addition to determinants such as social and self-identity, contextual determinants such as geographic location should be taken into account. For example, a study on forecasting the use of automated vehicles indicated that people residing in city centres or suburban areas were more likely to state that they would use a shared automated vehicle service as opposed to people residing in other urban or rural areas [63]. Moreover, identities related to a geographic location can be accounted for. However, the results from a study on identities and intended mode change in Utrecht, the Netherlands, indicated that "place identities" (I see myself as Utrechter (Dutch)) did not affect people's intentions to reduce their car use [24]. Additionally, a study by Murtagh, Gatersleben and Uzzell [64] showed that there was no significant association between identifying with the local community and commuting mode choice. Furthermore, previous research showed that differences between geographic locations explained only minor differences in intended environmentally sustainable behaviour [65].

2.3. Conceptual Framework

The large grey box presented in Figure 1 demonstrates how the hypotheses are conceptually related. The current study uses the theory of planned behaviour as a framework to assess the effects of social and self-identities on individuals' intentions to participate in carsharing. As carsharing participation has been previously researched from a utility study perspective, actual carsharing participation (as opposed to intended participation) is not within the scope of the current study and, in Figure 1, is therefore represented outside of the grey box. Moreover, including actual behaviour would require a longitudinal study, as there is a certain time frame between an individual's intention to act in a certain way and their actual behaviour. Past use of carsharing services will be taken into account; however, past use is not the same as the actual behaviour that occurs after the expression of intention. Furthermore, although we do acknowledge the role of other factors and contextual variables, these effects are not included in the analysis as they are beyond the scope of this research. Although these contextual factors are not included in the analysis, in Figure 1, we demonstrate the possible role of these variables, using dotted lines leaving the main conceptual framework.

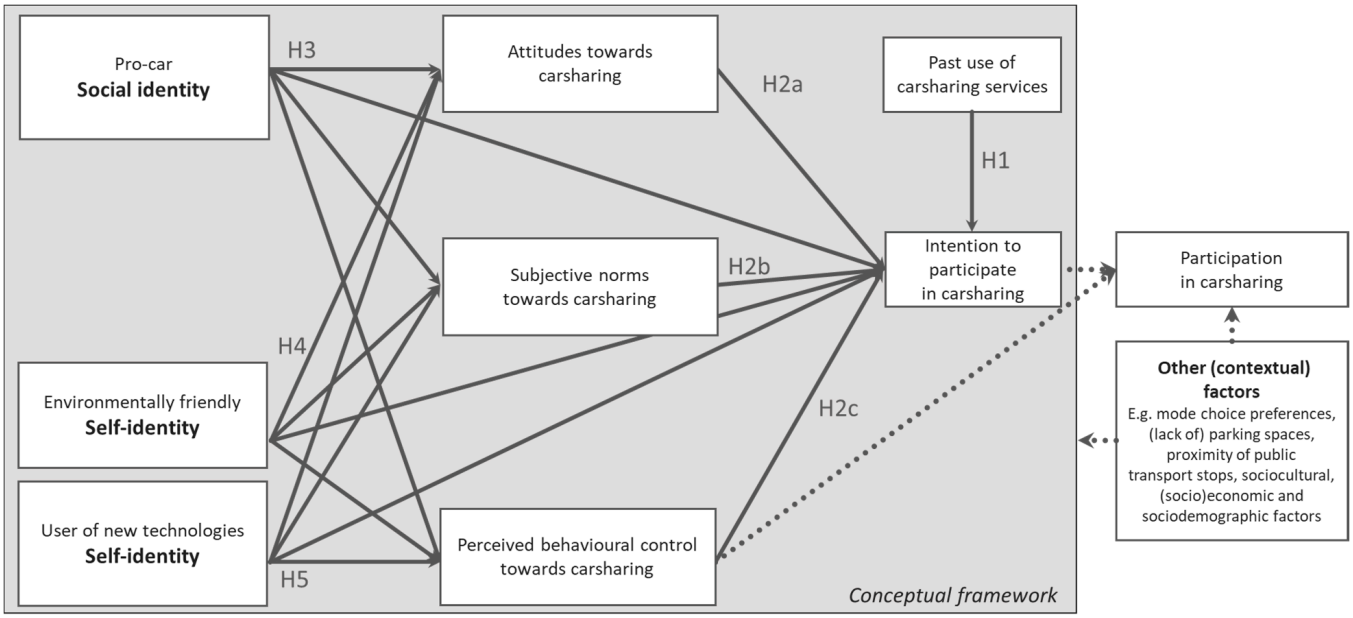

Figure 1. Conceptual framework and hypotheses.

3. Materials and Methods

3.1. Context

The current study focuses on Berlin, Germany. In 2019, Germany had 83.02 million inhabitants [66], of which 3.7 million lived in Berlin [67]. Berlin was selected for the purposes of this study because the city's government increasingly promotes and implements alternative and environmentally sustainable forms of urban mobility, including carsharing [68]. Moreover, in 2018, the municipality of Berlin presented the Berlin Mobility Act [69]. The purpose of this Act is to reduce private car use by developing the public transport system into the most attractive and efficient transport option [69].

Compared to the national average of 561 cars per 1000 inhabitants, the motorisation rate in Berlin was lower at the time of the study, with 326 cars per 1000 inhabitants [70,71]. In 2018, 77.4% of German households had one or more cars [72], compared to 48.9% of Berlin's households [73].

3.1.1. Carsharing in Germany

The popularity of carsharing has been growing in Germany since it was first introduced in Berlin in 1988 [74]. Between 2018 and 2019, the number of registered carsharing participants in Germany increased by 16.6% and the number of available cars increased by 12.5% [75]. Despite its increasing popularity, barely 3% of Germany's population is registered as a member in a carsharing service [76].

ShareNow (formerly DriveNow and Car2Go) is the supplier with the largest fleet of B2C free-floating shared cars in Germany. People using free-floating carsharing can pick-up and drop-off the shared car in any parking spot in the area where the carsharing service allows picking up and returning the shared car [77]. When using station-based carsharing, the vehicle must be collected at a fixed location, for example, at a dedicated terminal provided by the carsharing provider [6].

3.1.2. Mobility and Carsharing in Berlin

Berlin's public transport system is widely accessible and integrates multiple modes, including shared mobility [78–80]. Public transport modes include S-bahn (train), U-bahn (metro), tram and local bus services, which provide the city with 0.76 public transport stops per 1000 inhabitants [80].

In recent years, a wide range of shared mobility services, including shared cars, shared bicycles, shared e-scooters and shared scooters, have also become available on Berlin's streets. In 2019, there were 5814 carsharing vehicles available in Berlin, which was the highest absolute number of shared cars in Germany [81]. However, in terms of the relative share of shared cars, Berlin was in fourth place with 1.6 shared cars per 1000 inhabitants [75]. Per 1000 inhabitants, 1.43 shared cars were offered as free-floating shared cars and 0.17 shared cars were offered through station-based carsharing [75]. ShareNow is also the largest provider in Berlin, with over 1400 shared cars [82].

3.2. Data Collection and Participant Selection

Quantitative survey data were collected in two urban neighbourhoods in Berlin: Schloßstraße, Steglitz and Glasower Straße, Neukölln. The areas were selected based on their residential characteristics, population density, socioeconomic status and availability of carsharing offers. Neighbourhoods with residential characteristics located further away from the city centre were selected to avoid approaching non-residents (such as tourists) to participate in the study. While the selected neighbourhoods have a similar number of inhabitants, the populations differ with regard to socioeconomic status [83–86]. We included neighbourhoods with different socioeconomic characteristics (differences in the degree of unemployment, social security benefits granted and child poverty in the neighbourhood) to control for these differences. However, the aim of the current study is not to conduct a comparative analysis between neighbourhoods.

Data were collected in person by surveying passers-by at different central locations in the areas (e.g., close to supermarkets and public transport stops). To avoid selection bias, every 4th passer-by was asked to participate in the research [87]. Carsharing users as well as non-carsharing users were asked to participate in study. Passers-by were informed that the study was about the kinds of transportation they used and about their intention to participate in carsharing. It was not explicitly stated that the study was about identity to prevent people from giving socially desirable answers.

When respondents were approached to participate in the study, they were asked whether they lived in the neighbourhood. Respondents residing nearby but across the border in surrounding postal code areas were also included in the analysis. A sensitivity analysis using Mann–Whitney U tests showed no significant distributional differences between the cases inside and directly outside the postal code areas that we defined as the neighbourhood. Moreover, the borders that individuals define or experience as belonging to their neighbourhood are often distinct from the official borders provided by planning bodies [88].

The survey was administered from October 7th until November 7th, 2019. To select a diverse sample of people with different daily schedules, data were collected at different times of the day between 12:00 and 20:00, during both peak and off peak travel times. The survey was presented to the respondents using a tablet, and participants were asked to fill out a Google Forms questionnaire in either German or English. Questions were read to the respondents and the respondents could click on the preferred answers themselves or verbally indicate their answers, after which the researcher registered the answers for them. People who indicated that they did not have time to complete the survey at that moment were offered a small flyer with a QR code to give them the opportunity to complete the survey at a later moment. Approximately 10% of the respondents filled in the questionnaire by themselves in their own time using the QR code, while 90% of the surveys were filled in during the passer-by surveying. As an incentive, respondents could enter their email address to join a raffle and win a EUR 15.00 gift card of their choice. In total, 299 respondents submitted the questionnaire, of which 154 were collected in Schloßstraße, Steglitz and 145 were collected in Glasower Straße, Neukölln.

3.3. Survey Design

The survey contained 50 questions divided into three categories. The first part of the survey contained six questions regarding respondents' use and perceived accessibility of transportation modes, which included questions about whether the respondent had a valid carsharing membership, whether the respondent had used a carsharing service in the past 12 months, to which carsharing services the respondent had memberships, and perceived access and the use of other modes of transport over the past 12 months.

The second part of the survey was comprised of 32 questions that contained standardised statements. Variables in the theory of planned behaviour were not measured directly but consisted of several items that together made up the respective latent variables of "attitudes", "subjective norms" and "perceived behavioural control" [88,89]. The answers to the standardised statements served as items within specific latent variables that were needed to answer the research questions. Although Ajzen [89] suggested measuring variables reflecting TPB items on a seven-point Likert scale, five-point scales are considered common practice in transportation research [23,26,30,60,90]. Therefore, these statements were measured on a five-point scale ranging from "I disagree" to "I agree". All questions in the second part of the survey included the answer options "I don't know" and "does not apply", which were regarded as missing values in the dataset and in further analyses. The full survey instrument can be found in the Appendix A.

3.3.1. Intentions to Participate in Carsharing

To construct the latent variable "intentions", we derived two statements from Ajzen [89], in which a time component (1) "I intend to use carsharing services within the next three months" as well as a financial component (2) "I am willing to spend money to use carsharing services" were incorporated.

3.3.2. Attitudes towards Participation in Carsharing

Attitudes towards participation in carsharing were measured using two statements with attitudes towards dimensions of carsharing (I think carsharing is good for 1. my personal health and 2. the environment) and two general attitudes towards the respondents own transport behaviours (3. I make environmentally friendly transport choices; 4. I make transport choices that benefit my health). We also included three statements related to car-ownership, as previous literature suggested that car ownership can be a detracting factor towards participating in carsharing.

3.3.3. Subjective Norms towards Participation in Carsharing

To measure subjective norms towards carsharing, we derived three statements from Ajzen [89] regarding the beliefs of most people that are important to the respondent (Most people who are important to me 1. participate in carsharing themselves, 2. would approve of my participation in carsharing, and 3. would like to see me participating in carsharing).

3.3.4. Perceived Behavioural Control towards Participation in Carsharing

Statements to measure perceived behavioural control towards carsharing were derived from Ajzen [89] and included questions concerning the respondents' confidence and decisional freedom towards participating in carsharing. Based on previous literature, we also included three statements to measure a lack of perceived behavioural control due to digital illiteracy and due to a lack of time (I can't participate in carsharing 1. because I do not know how it works, 2. because I don't know how to work with smartphone apps, and 3. because I don't have the time) [34,51].

3.3.5. Social and Self-Identity Variables

Following the example of various authors [24,62], identity variables were measured by asking the respondent to what extent they see themselves as (I see myself as . . .), following a characteristic. The following identities were derived and included in the questionnaire: environmentally friendly [24,59,61]; a green consumer [54]; health-oriented; sporty; career-

oriented; family-oriented; a Berliner, German [24]; a member of your neighbourhood community [64]; a user of new technologies [61]; a cyclist; a pedestrian; a user of public transport; and a car driver [24,64]. We also included "identifying as a user of new transport innovations", as it contains a combination of transportation behaviour and interest in new technologies.

3.3.6. Contextual Variables

To account for information about respondents' spatial and personal contexts, the last part of the survey contained 12 questions regarding the sociodemographic context of the respondent, such as in which neighbourhood the respondent resides; the respondent's age, gender, education level, monthly net household income, employment status, and housing status; the number of people in the household; the number of children that the respondent has; whether the respondent owns a car or a valid driver's licence; and if the respondent has people that rely on them for their mobility needs. We also included a question regarding the national background with which the respondent identified. However, several respondents indicated that they identified themselves as European. As a result, these data could not be compared with the demographic statistics for the neighbourhoods.

3.4. Analysis

Structural equation modelling (SEM) was used to analyse the collected data, as it is suitable for research that explores structural relationships between latent variables [88]. Moreover, it is an appropriate method for research that uses the TPB [90].

The analytical process involved three phases. First, summary statistics were analysed to test the quality of the data. The second step was to derive latent factors from the collected survey items with exploratory factor analysis (EFA) using SPSS 25 and confirmatory factor analysis (CFA) using Amos 25. In EFA, items are not restricted to loading onto only one factor and can therefore (partially) be loaded onto multiple factors, whereas in CFA, the respective items are restricted to loading onto only one factor. EFAs were performed for data reduction and to extract latent variables for the TPB factors as well as the self- and social identity latent variables. Due to low factor loadings, however, not all variables collected with the survey were included in the final structural model.

After performing the EFA, we applied listwise deletion of cases with missing values for the variables used in the analyses [91] to avoid means and intercepts estimation for these missing variables in the CFA. When means and intercepts are estimated, it is assumed that the missing data is missing (completely) at random [91]. This was not the case in our dataset.

Subsequently, we performed a CFA to confirm the factors that we derived using the EFA. The output of the CFA is the measurement model, which shows how well the data fits the factors that were derived from theory.

The third step in the process was to confirm the structural relations between the latent constructs using structural equation modelling. The difference between CFA and SEM is that, with SEM, the direct and indirect relationships between latent variables can be estimated. We first tested the initial model and hypotheses based on the TPB, as proposed in our conceptual framework. Furthermore, Kline [91] suggests that, after finding a final model, equivalent variants of this model should also be assessed. Alternative (or equivalent) models give (nearly) the same correlations and covariances as the structural model but have different directions between variables in the model. As a measurement model has an infinite number of variants, it is not realistic for researchers to assess all possible alternative models. However, it is recommended to generate a few, theoretically possible alternative models, as it contributes to the validity of the structural model. As suggested by Kline [91], we tested several equivalent and near-equivalent models with our data to find out if there were any alternative models that fit the data better or to confirm that the structural model based on the literature best fits the data. Finally, model fit indicators were used to assess the overall model fit for the measurement model as well as for the structural models.

3.5. Sample Description

Table 1 demonstrates the summary statistics for the control variables collected for the purposes of this research. First, cases were excluded on the basis of unlikely answer combinations (e.g., a carsharing membership but no driving license). Next, we removed cases with missing data for the variables used in further analyses. In total, there were 216 suitable cases, meaning that, in 27.8 percent of the 299 cases, one or more answer(s) was (were) missing for variables used in further analyses. In the final sample, 50.9% of the cases were collected in Schloßstraße, Steglitz and 49.1% were collected in Glasower Straße, Neukölln. Table 1 also shows that 46.3% of the sample identified as female and that 52.3% identified as male. Respondents' ages ranged from 18 to 80 years old (M = 41.57; SD = 15.088).

Table 1. Summary statistics.

Variables	Freq.	%	*M* [1]	*SE* [2]	*SD* [3]	*Var.* [4]	Min.	Max.
Neighbourhood where data was collected (N = 216)			1.49	0.034	0.501	0.251	1	2
Steglitz	110	50.9						
Neukölln	106	49.1						
Age (N = 216)			41.57	1.027	15.088	227.642	18	80
18–24	21	9.7						
25–34	64	29.6						
35–44	53	24.5						
45–54	32	14.8						
55–64	27	12.5						
65–74	11	5.1						
75–80	8	3.7						
Gender (N = 216)			0.56	0.038	0.559	0.313	0	3
Female	100	46.3						
Male	113	52.3						
Genderfluid or Non-binary	1	0.5						
I do not want to say	2	0.9						
Number of people in household (N = 216)			2.39	0.080	1.176	1.384	1	7
1 person	51	23.6						
2 people	82	38.0						
3 people	43	19.9						
4 people	32	14.8						
5 people	4	1.9						
6 people	3	1.4						
More than 6 people	1	0.5						
Number of children respondent (N = 216)			0.75	0.064	0.946	0.895	0	5
No children	116	53.7						
1 child	48	22.2						
2 children	45	20.8						
3 children	5	2.3						
4 children	1	0.5						
More than 4 children	1	0.5						
Do people rely on respondent for mobility needs (N = 216)			0.24	0.029	0.426	0.181	0	1
No	165	76.4						
Yes	51	23.6						
Housing situation (N = 213)			0.63	0.087	1.273	1.62	0	5
Private housing	163	76.5						
Social housing	7	3.3						
Student/shared housing	18	8.5						
Home owner (pay mortgage)	11	5.2						
Home owner (no mortgage)	11	5.2						
With parents	3	1.4						

Table 1. *Cont.*

Variables	Freq.	%	*M* [1]	*SE* [2]	*SD* [3]	*Var.* [4]	Min.	Max.
Primary employment status (*N* = 216)			2.66	0.143	2.100	4.411	0	9
Unemployed	3	1.4						
Employed full-time	101	46.8						
Employed part-time	20	9.3						
Self-employed	35	16.2						
High school student	3	1.4						
Student	26	12						
Retired	20	9.3						
Fulltime unpaid caretaker	1	0.5						
Unable to work	3	1.4						
Other	4	1.9						
Education levels (*N* = 216)			2.48	0.050	0.741	0.548	1	3
Low (No education, primary or lower secondary education)	32	14.8						
Medium (Upper secondary education, vocational training and education)	48	22.2						
High (Bachelor's, Master's, Doctoral degree or equivalent)	136	63.0						
Monthly net household income (*N* = 216)			4.59	0.183	2.696	7.267	0	9
<———900 EUR	14	6.5						
901–1300 EUR	26	12						
1301–1500 EUR	13	6						
1501–2000 EUR	26	12						
2001–2600 EUR	24	11.1						
2601–3200 EUR	22	10.2						
3201–4500 EUR	41	19						
4501–6000 EUR	17	7.9						
>———-6001 EUR	7	3.2						
I do not want to say	26	12						
Valid car driver's license (*N* = 216)			0.84	0.054	0.365	0.133	0	1
No	34	15.7						
Yes	182	84.3						
Car ownership (*N* = 216)			0.44	0.034	0.497	0.247	0	1
No	122	56.5						
Yes	94	43.5						
Carsharing membership (*N* = 216)			0.25	0.030	0.437	0.191	0	1
No	161	74.5						
Yes	55	25.5						
Carsharing used within past 12 months (*N* = 216)			0.23	0.029	0.423	0.179	0	1
No	166	76.9						
Yes	50	23.1						

[1] Mean; [2] standard error; [3] standard deviation; [4] variance.

Although 84.3% of the respondents were in the possession of a valid car driver's licence, only 43.5% reported owning car. Moreover, 25.5% of the respondents indicated having a valid carsharing membership and 23.1% reported having used a carsharing service in the past 12 months 6. Finally, Table 1 also presents further information on the respondents' housing situation, household composition, employment status and education level.

4. Results

4.1. Descriptive Statistics

The items included in the EFA and CFA have means ranging from 2.18 to 4.72. Some items have substantially negatively skewed distributions (values exceeding ±1), and others have substantially high and low levels of Kurtosis (values exceeding ±1). However, due to the sample size, we assume that the sampling distribution is normally distributed [92].

Other statistics such as Cook's distance (all distances were below 0.1, tested for both items that load onto the dependent latent variable "intention to participate in CS"), the variable inflation factor (VIF) (all values were <———-3.0) and tolerance statistic (all values were >———-0.1) indicated that there were no multivariate assumptions that were violated.

4.2. Exploratory and Confirmatory Factor Analysis

Principal component analysis was conducted using a varimax rotation, as the values in the factor correlation matrix did not trespass the cut-off value of ±0.32 [93]. The final factors and items included in the EFA as well as their respective Cronbach's alpha, Eigenvalue and variance explained by the factor are reported in Table 2. Based on the scree plot's point of inflection, six factors were manually extracted, which together explained 70.4% of the total variance. The factors derived from the EFA are respectively related to a pro-car identity (PCID), subjective norms (SN), technological self-identity (TSID), environmental self-identity (ESID), perceived behavioural control (BPC) and attitudes (ATT) (see Table 2).

Table 2. Rotated component matrix with factor loadings, Cronbach's alpha, Eigenvalue and variance explained.

——-	Factors					
Items	**PCID**	**SN**	**TSID**	**ESID**	**PBC**	**ATT**
1. Owning a car is important to me	**0.867**	−0.047	0.027	−0.114	−0.083	0.008
2. NOT owning a car is important to me	**−0.721**	0.052	−0.049	0.109	−0.038	0.100
3. Owning a car is important for my transportation needs	**0.876**	−0.034	−0.030	−0.026	0.004	0.055
4. I see myself as car driver	**0.709**	−0.018	−0.056	−0.060	0.333	−0.182
5. Most people who are important to me would approve my participation in CS	−0.285	**0.681**	0.133	−0.060	0.213	0.099
6. Most people who are important to me would like to see me participating in CS	0.009	**0.805**	0.091	0.092	0.025	0.116
7. Most people that are important to me are participating in CS	0.034	**0.834**	0.040	0.041	0.039	−0.051
8. I can't participate in CS. because I don't know how to work with smartphone apps	−0.062	0.032	**0.826**	−0.078	0.131	−0.023
9. I can't participate in CS because I do not know how it works	−0.001	0.081	**0.766**	−0.116	0.189	0.075
10. I see myself as user of new technologies	0.129	0.246	**0.616**	0.364	−0.082	−0.193
11. I see myself as environmentally friendly	−0.187	0.040	−0.110	**0.801**	0.020	0.272
12. I see myself as green consumer	−0.114	0.029	0.019	**0.877**	0.077	0.153
13. I am confident that I can participate in CS	−0.003	0.099	0.205	0.014	**0.830**	0.023
14. I have the freedom to decide whether I want to participate in CS	0.138	0.105	0.073	0.073	**0.865**	−0.068
15. I make environmentally friendly transport choices	−0.285	0.198	0.118	0.279	−0.149	**0.628**
16. I make transport choices that benefit my health	0.040	0.010	−0.110	0.190	0.035	**0.851**
Cronbach's α	0.825	0.708	0.614	0.781	0.720	0.525
Eigenvalue	3.361	2.635	1.813	1.361	1.243	0.849
% of Variance explained	21.0	16.5	11.3	8.5	7.8	5.3

Extraction method: principal component analysis; rotation method: varimax with Kaiser normalisation; KMO (0.715); Bartlett's test of Sphericity (χ^2 = 1023.091; p = 0.000). Cut-off value for factor loadings: >———0.50. Items 8 and 9 are reversely coded. For reliability analysis, item 2 was also reversely coded.

The items loaded slightly different than expected based on the theoretical framework proposed using the TPB, which means that the latent construct "attitudes" measures more general beliefs about the respondent's own transport behaviour. However, this factor makes up a plausible latent variable that can be supported by theory because this latent variable measures more general beliefs that are aligned with the TPB [31].

Cronbach's alpha for pro-car identity ($\alpha = 0.825$), subjective norms ($\alpha = 0.708$), environmental self-identity ($\alpha = 0.781$) and perceived behavioural control ($\alpha = 0.720$) all suggest a good internal consistency with alpha's above 0.7. The dependent construct "intention to participate in CS" was excluded from the EFA but showed good internal consistency ($\alpha = 0.748$). One of the "intention to participate in CS" variables indicated being related to other variables in the EFA. However, since our goal is to assess the relationship between identity constructs and carsharing intentions, we measured the internal consistency of this construct separately.

Cronbach's alpha for "attitudes towards own transport behaviour" is under the cut-off value of 0.7 ($\alpha = 0.525$); however, the average inter-item correlation between the two items in the factor (0.356) suggests that the items do have an acceptable internal consistency [94]. Moreover, since this factor is a necessary component in TPB, the factor will still be used in further analyses. In a similar study on youth attitudes toward sustainable transport [43], Cronbach's alpha's with similar values are also used in further analyses. The authors of the current study suggest that these factors can still be included, but should be interpreted with care.

Cronbach's alpha for "technological self-identity" is also lower than 0.7 ($\alpha = 0.616$). However, the average inter-item correlation between the items in the factor (0.364) suggests that the items do have an acceptable internal consistency [94] and can be used for the analysis. Since one of the goals of this study is to assess whether a technological self-identity has an effect on the intentions to participate in carsharing, this factor is also included in further analyses. Both factors have significantly high factor loadings above the cut-off value of 0.5.

The next step was to perform a confirmatory factor analysis (CFA) to confirm the structural relationships between the factors extracted in the EFA. The final output of the measurement model is presented in Figure 2. Latent variables are represented in ovals, whereas directly measured variables are represented in rectangular boxes. As mentioned earlier, the directly measured variables were measured on a five-point scale ranging from "I disagree" to "I agree" and included the answer options "I don't know" and "does not apply". The full survey instrument can be found in the Appendix A.

Goodness of fit indicators such as χ^2/df (1.666), CFI (0.932), GFI (0.916), AGFI (0.874), SRMR (0.063), RMSEA (0.056) and PCLOSE (0.242) suggest that the CFA has a good model fit. The indicators have the following preferred cut-offs: χ^2/df <——- 3, CFI >——- 0.90, GFI >——- 0.90, AGFI >——- 0.8, SRMR <——- 0.09, RMSEA preferably >——- 0.05 but 0.05–0.10 indicates moderate fit, and PCLOSE >——- 0.05 [95,96]. χ^2 (191.611(115); p <——- 0.001) is preferably not significant; however, it is common that χ^2 is significant, even when there is appropriate model fit [96]. The AIC suggests that the measurement model has a better fit without the item "identifying as a user of new technologies" (AIC = 273.668) than with the item included (AIC = 303.611). However, we include this item in further analyses as part of the "technological self-identity" factor, as it is advantageous if the factor includes an identity aspect for testing the previously established research hypotheses.

The item "I am confident that I can participate in carsharing" indicated being a Heywood case, meaning that the item had a negative error variance [91]. Allowing Heywood cases is not recommended because the occurrence of negative variances in a population is impossible [97].There are multiple causes for Heywood cases, but a likely cause for the occurrence in our model is using only two items in a factor [91]. A method to resolve this is by constraining both item parameters with equality constraints and by fixing the variance of the respective latent variable "perceived behavioural control" to 1 [91,98].

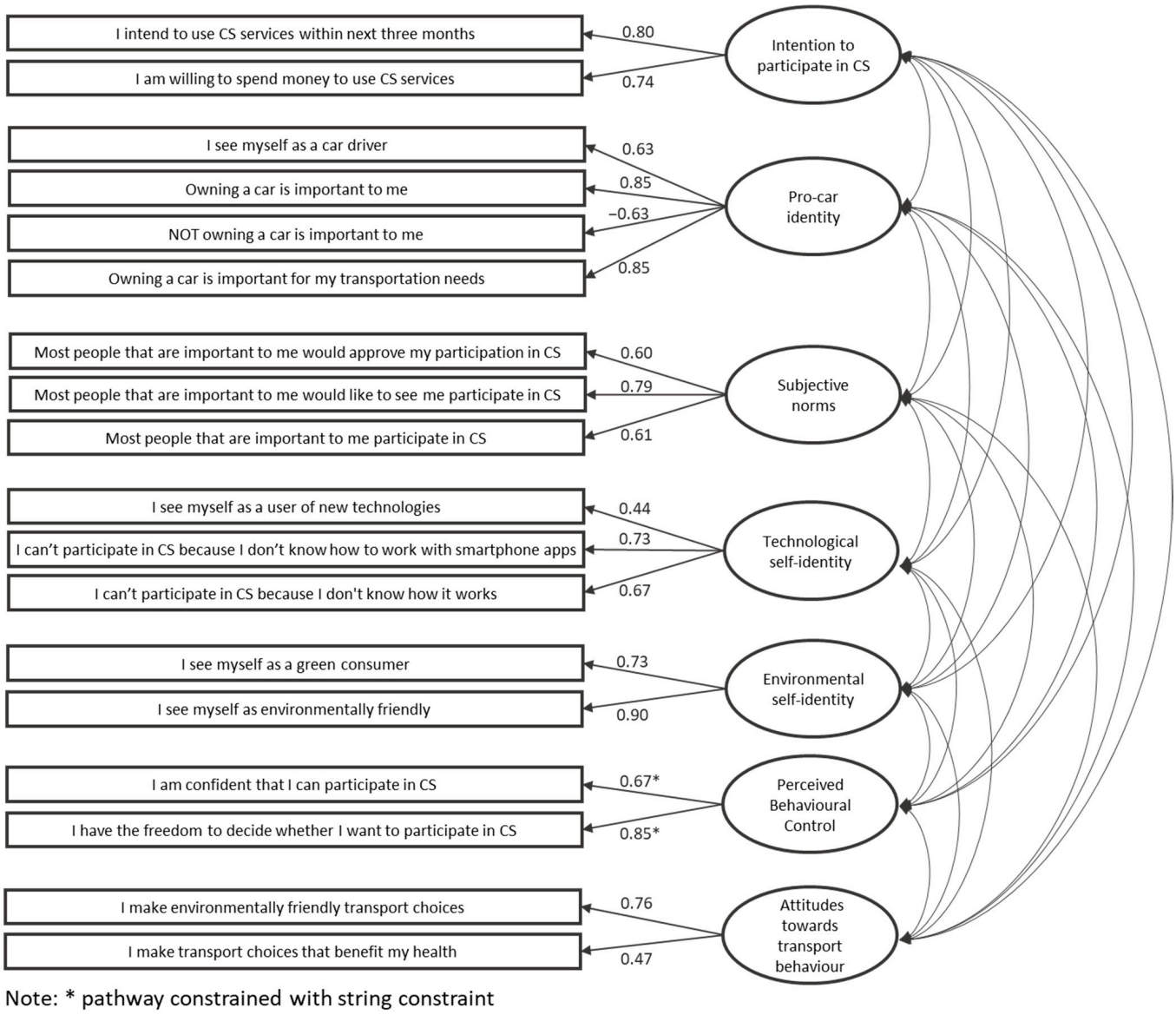

Figure 2. Confirmatory factor analysis output of the final measurement model.

4.3. Structural Models and Testing Hypotheses

In a next step, we identified the structural relationships between the latent constructs using structural equation modelling. The structural relationships were tested as proposed in the conceptual framework in Figure 1. Figure 3 presents the relationships that were significant. Latent variables are represented in ovals, whereas directly measured variables are represented in rectangular boxes.

Figure 3 and Table 3 report the output of the structural model. The structural model indicates a negative effect between "attitudes towards own transport behaviour" and people's "intentions to participate in carsharing". However, this effect was not significant ($p = 0.327$). Therefore, hypothesis 2a cannot be supported. Individuals who perceive higher social pressures (SN) to participate in carsharing also have higher intentions to participate in carsharing (p <——- 0.001), and people that perceive to have more behavioural control towards participating in carsharing also have higher intentions to participate ($p = 0.011$). This means that hypotheses 2b and 2c can be supported.

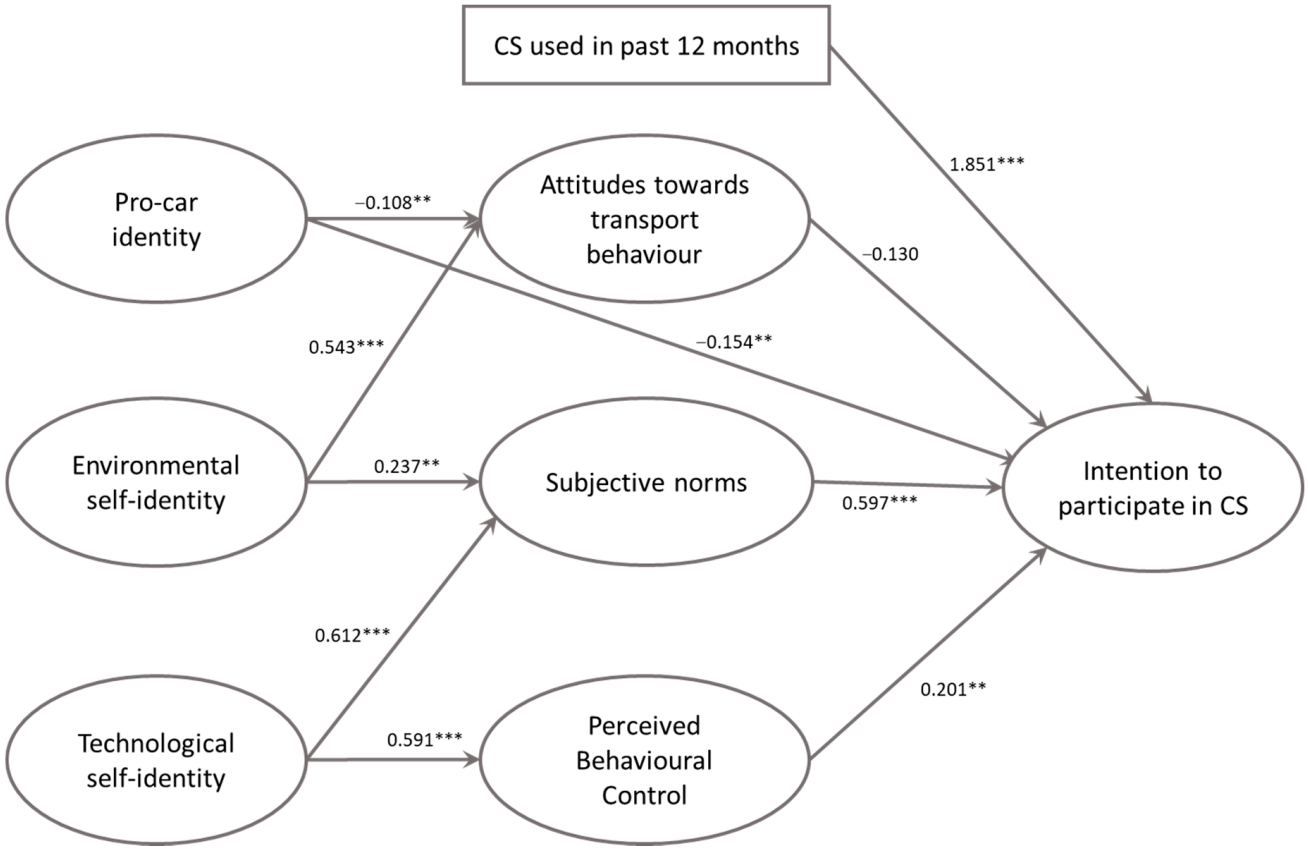

Figure 3. Structural model; significant at the 90% level; ** significant at the 95% level; *** significant at the 99% level.

Table 3. Direct, indirect and total effects on "intentions to participate in carsharing" (structural model).

	Direct	**Indirect**	**Total**
Effect on attitudes towards own transport behaviour	Unstandardised estimate (standardised estimate)		
Pro-car identity	−0.108 ** (−0.201)	N/A	−0.108 ** (−0.201)
Environmental self-identity	0.543 *** (0.616)	N/A	0.543 *** (0.616)
Effect on subjective norms	**Direct**	**Indirect**	**Total**
Environmental self-identity	0.237 ** (0.201)	N/A	0.237 ** (0.201)
Technological self-identity	0.612 *** (0.412)	N/A	0.612 *** (0.412)
Effect on perceived behavioural control	**Direct**	**Indirect**	**Total**
Technological self-identity	0.591 *** (0.386)	N/A	0.591 *** (0.386)
Effect on intentions to participate in carsharing	**Direct**	**Indirect**	**Total**
Attitudes towards own transport behaviour	−0.130 (−0.074)	N/A	−0.130 (−0.074)
Subjective norms	0.597 *** (0.457)	N/A	0.597 *** (0.457)
Perceived behavioural control	0.201 ** (0.158)	N/A	0.201 ** (0.158)
Pro-car identity	−0.154 ** (−0.163)	0.014 (0.015)	−0.140 ** (−0.149)
Environmental self-identity	–	0.071 (0.046)	0.071 (0.046)
through attitudes towards transport behaviour	N/A	−0.071 (0.046)	N/A
through subjective norms	N/A	0.142 *	N/A
Technological self-identity	–	0.484 ** (0.249)	0.484 ** (0.249)
through subjective norms	N/A	0.366 **	N/A
through perceived behavioural control	N/A	0.119 **	N/A
Carsharing used in past 12 months	1.851 *** (0.568)	N/A	1.851 *** (0.568)

Notes: N/A = not applicable; – = effect was not significant and therefore not included in final results; * significant at the 90% level; ** significant at the 95% level; *** significant at the 99% level.

Table 3 shows that there is a significant negative and direct effect (p = 0.012) from pro-car identity towards intentions to participate in carsharing. This suggests that the stronger an individual's pro-car identity is, the less likely they are to report intentions to participate in carsharing. Therefore, hypothesis 3 can be accepted.

There is no significant positive direct effect from environmental self-identity towards intentions to participate in carsharing. This effect was shown to be not significant early on in the analysis process. To achieve better model fit, this effect therefore was not included in the final results. However, environmental self-identity was shown to have a significant positive indirect effect through "subjective norms" (p = 0.052). This means that the more someone identifies as environmentally friendly, the more likely an individual is to perceive social pressure to participate in carsharing from people that are important to this individual. Moreover, the more an individual perceives these social pressures, the more likely this individual is to have intentions to participate in carsharing. However, the total effect of environmental self-identity on "intentions to participate in carsharing" is not significant (p = 0.973). Therefore, hypothesis 4 cannot be supported.

Table 3 shows that there is no significant positive direct effect from technological self-identity towards intentions to participate in carsharing. This effect was shown to be not significant early on in the analysis process. To achieve better model fit, this effect therefore was not included in the final results. Table 3 shows significant positive indirect effects from "technological self-identity" through "subjective norms" (p = 0.011) and through "perceived behavioural control" (p = 0.013). This implies that the more an individual identifies as a user of new technologies, the more likely they are to perceive social pressure to participate in carsharing from people that they deem to be important and the more likely they will be to have intentions to participate in carsharing. Regarding "perceived behavioural control", the more someone identifies as a user of new technologies, the more likely this individual is to perceive confidence and decisional freedom towards participating in carsharing and, subsequently, the more likely they are to have intentions to participate in carsharing. Table 3 also shows that "technological self-identity" has a significant positive total effect on the "intentions to participate in carsharing" (p = 0.013). Therefore, hypothesis 5 can be supported.

Moreover, Table 3 indicates that "carsharing used in past 12 months" has a significant positive effect on "intention to participate in carsharing" (p <——- 0.001). This means that, when people have previously used carsharing, they are more likely to have intentions to use carsharing again in the future. Therefore, hypothesis 1 can be supported.

Goodness of fit indicators such as χ^2 (262.760 (138); p <——- 0.001), χ^2/df (1.904), CFI (0.901), GFI (0.893), AGFI (0.852), SRMR (0.078), RMSEA (0.065), PCLOSE (0.022) and AIC (366.760) suggest that the structural model has a good model fit [95,96].

4.4. Assessing a Near-Equivalent Alternative Model

The structural model presented in Table 3 indicated that "pro-car identity" had an indirect effect on "intentions to participate in carsharing". Moreover, previous models both indicated significant negative covariance between "pro-car identity" and "environmental self-identity" (respectively −0.360, p = 0.001 and −0.361, p = 0.002). As Kline [91] suggested also testing equivalent and near-equivalent models, we assessed a theoretically viable alternative model; specifically, it may be possible that, when an individual identifies his or her own transport behaviour as environmentally friendly and beneficial for their personal health, the less likely it becomes that they would have a pro-car self-image. Moreover, this is also consistent with Ajzen's [31] interpretation that general attitudes affect more specific aspects related to a behaviour. In other words, identities may influence attitudes but attitudes may just as well affect an individual's reported identity. Therefore, we tested an alternative model by changing the directionality between "pro-car identity" and "attitudes towards own transport behaviour". The results of the alternative model are presented in Table 4.

Table 4. Direct, indirect and total effects on "intentions to participate in carsharing" (alternative model).

	Direct	**Indirect**	**Total**
Effects on pro-car identity	Unstandardised estimate (standardised estimate)		
Attitudes towards own transport behaviour	−0.724 *** (−0.386)	N/A	−0.724 *** (−0.386)
Environmental self-identity	N/A	−0.431 *** (−0.264)	−0.431 *** (−0.264)
Effect onattitudes towards own transport behaviour	**Direct**	**Indirect**	**Total**
Environmental self-identity	00.596 *** (0.684)	N/A	0.596 *** (0.684)
Effect on subjective norms	**Direct**	**Indirect**	**Total**
Environmental self-identity	0.238 ** (0.201)	N/A	0.238 ** (0.201)
Technological self-identity	0.611 *** (0.411)	N/A	0.611 *** (0.411)
Effect on perceived behavioural control	**Direct**	**Indirect**	**Total**
Technological self-identity	0.593 *** (0.387)	N/A	0.593 *** (0.387)
Effects on intentions to participate in carsharing	**Direct**	**Indirect**	**Total**
Attitudes towards own transport behaviour	−0.137 (−0.078)	0.114 *** (0.064)	−0.024 (−0.078)
Subjective norms	0.598 *** (0.459)	N/A	0.598 *** (0.459)
Perceived behavioural control	0.201 ** (0.159)	N/A	0.201 ** (0.159)
Pro-car identity	−0.157 ** (−0.167)	N/A	−0.157 ** (−0.167)
Environmental self-identity	–	0.128 (0.083)	0.128 (0.083)
through attitudes towards transport behaviour	N/A	−0.082	N/A
through attitudes towards transport behaviour and pro-car identity	N/A	0.068 ***	N/A
through subjective norms	N/A	0.142 **	N/A
Technological self-identity	–	0.485 *** (0.250)	0.485 *** (0.250)
through subjective norms	N/A	0.365 ***	N/A
through perceived behavioural control	N/A	0.119 **	N/A
Carsharing used in past 12 months	1.850 *** (0.569)	N/A	1.850 *** (0.569)

Notes: N/A = not applicable; – = effect was not significant and therefore not included in final results; * significant at the 90% level; ** significant at the 95% level; *** significant at the 99% level.

In the alternative model (Figure 4), "pro-car identity" again has a negative direct effect on "intentions to participate in carsharing" (p = 0.011), meaning that the more individuals consider a pro-car identity, the less likely they are to have intentions to participate in carsharing. This means that hypothesis 3 is supported.

Similar to the structural model, "attitudes towards own transport behaviour" also has a negative but not significant effect on people's "intentions to participate in carsharing" (p = 0. 311). However, this effect is positively mediated by "pro-car identity" (p = 0.010). This means that the more respondents evaluate their own travel behaviour as healthy and environmentally friendly, the less likely they are to have intentions to participate in carsharing. However, this effect becomes increasingly less negative when individuals increasingly have a pro-car identity. Moreover, the total effect of "attitudes towards own transport behaviour" on "intentions to participate in CS" is not significant (p = 0.970), which means that hypothesis 2a cannot be supported.

Moreover, the model shows a negative indirect effect from "environmental self-identity" to "pro-car identity" through "attitudes towards own travel behaviour" (p = 0.001). This means that the more individuals report an environmental self-identity, the more they evaluate their own behaviour as environmentally friendly and beneficial for their personal health, which in turn leads to a lesser degree of pro-car identity.

The alternative model also indicates that individuals who perceive higher social pressures to engage in carsharing also have higher intentions to participate in carsharing (p <——- 0.001). Moreover, individuals who perceive having more behavioural control towards participating in carsharing also have greater intentions to participate (p = 0.011). Therefore, hypotheses 2b and 2c can be supported.

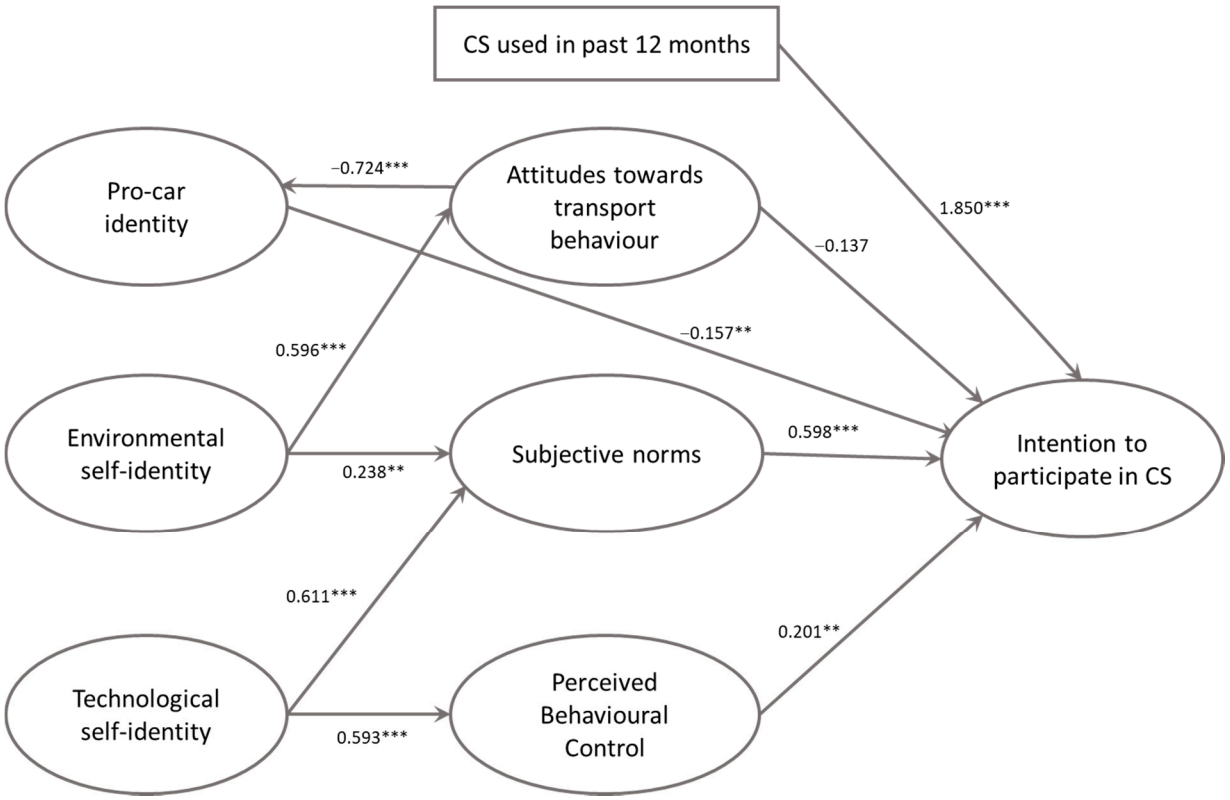

Figure 4. Alternative model; * significant at the 90% level; ** significant at the 95% level; *** significant at the 99% level.

The indirect effect from "environmental self-identity" on "carsharing participation intention" through "subjective norms" ($p = 0.035$) as well as the effect from "environmental self-identity" on "carsharing participation intention" through "attitudes" and "pro-car identity" ($p = 0.009$) are significant. However, the total effect of "environmental self-identity" as a predictor of carsharing participation intention remains not significant ($p = 0.158$). Therefore, hypothesis 4 cannot be supported.

In addition, in the alternative model, "technological self-identity" affects "intention to participate in carsharing" through "subjective norms" ($p = 0.004$) as well as through "perceived behavioural control" ($p = 0.008$), again resulting in a significant positive total effect ($p = 0.002$). This implies again that the more someone identifies as a user of new technologies, the more likely this individual is to perceive social pressure to participate in carsharing from people that are important to this individual and the more likely this individual is to have intentions to participate in carsharing. Regarding "perceived behavioural control", the more someone identifies as a user of new technologies, the more likely he or she is to perceive confidence and decisional freedom towards participating in carsharing and, subsequently, to have intentions to participate in carsharing. This means that hypothesis 5 is also supported for the alternative model.

Moreover, Table 4 indicates that "carsharing used in past 12 months" has a significant positive effect on "intention to participate in carsharing" (p <——- 0.001). This again indicates that, when people have previously used carsharing, they are more likely to have intentions to use carsharing again in the future. Therefore, hypothesis 1 can be supported.

Goodness of fit indicators such as χ^2/df (1.865), χ^2 (262,937 (141); p <——- 0.001), CFI (0.903), GFI (0.893), AGFI (0.855), SRMR (0.077), RMSEA (0.063) and PCLOSE (0.034) indicate that the alternative model also has a good model fit [95,96]. The AIC for this model was 360,937, suggesting that the alternative model has a slightly better fit than the structural model.

We do not reject either the original or the alternative model, as both provide a valid indication of individuals' carsharing participation intentions and support many of the

hypotheses presented at the onset of this manuscript. Although the rest of the model stays stable, we identified that the directionality between individuals' attitudes towards their own behaviour and the degree of their pro-car identity is not yet clear and requires future research. We also identified that there is an indirect interaction between identity aspects and, in this case, also between "pro-car identity" and "environmental self-identity". These results are unsurprising, as individuals can have multiple social and self-identities that may be active to a greater or lesser extent at any given time [53,55].

5. Discussion

5.1. Subjective Norms Strongly Determine Intentions to Participate in Carsharing

This study demonstrates to what extent personal identities play a role in an individual's intention to engage in carsharing. In line with the results of previous studies, this study has revealed that pro-car identities and technological self-identities play significant roles in individuals' intentions to participate in carsharing [24,42,43,61]. Furthermore, the results demonstrate that subjective norms towards carsharing strengthen the role of environmental and technological self-identities on individuals' intentions to participate in carsharing. This means that similarly to the findings by King et al. [61], people who identify as users of new technologies and being environmentally friendly often perceive that people close to them would approve and/or want to see them participating in carsharing.

Moreover, in previous research, perceived behavioural control was a stronger determinant of an individual's intention to participate in carsharing than subjective norms [50]. However, this was not the case in the current study. Instead, the results indicate that, in the context of carsharing, intentions and the perceived pressure to participate in carsharing from people who are important to them are more important determinants of intended carsharing usage than psychological determinants such as self-confidence and autonomy.

5.2. Positive Transport Attitudes Result in Lower Carsharing Intentions

In contrast to Bardhi and Eckhardt [4], who found that access-based carsharing is thought of as a popular and sustainable alternative to car ownership, the results of our study showed that people's attitudes towards their own travel behaviour were negatively associated with carsharing intentions. Specifically, the more individuals evaluated their own travel behaviour as healthy and environmentally friendly, the lower their intentions to adopt carsharing. This result may suggest that many individuals do not evaluate carsharing as an environmentally sustainable transport alternative. However, another explanation is that individuals who do not identify carsharing as an environmentally sustainable mode rarely use passenger cars to begin with and mainly use other, more environmentally sustainable modes such as cycling, walking and/or public transport. This could be explained by the degree of motorisation in Berlin, which is much lower than the average in Germany [70,71]. Moreover, the city of Berlin provides a diverse range of public and shared modes of transport that are more sustainable compared to both private and shared cars, such as shared bicycles and other public transport modes.

5.3. Environmental Self-Identity Indirectly and Negatively Influences Pro-Car Identity

The results of the alternative model suggest that one aspect of identity can indirectly (negatively) influence another form of identity. For example, our alternative model showed that the more an individual relates to being environmentally friendly, the less likely this individual is to identify as a pro-car individual. This is a valid and logical outcome, as individuals can relate to multiple identities [55]. However, a certain identity can be active to a greater or lesser extent in different circumstances or activities, depending on an individuals' active social role in that situation [53,55]. However, further research is needed to better understand the role of social identity salience in the context of using carsharing for various travel purposes (e.g., grocery shopping, bringing children to school, commuting to work and visiting family and friends out of town).

5.4. Behavioural Attitudes Elicit Identity Formation

The results of the alternative model also suggest that, when individuals identify their travel behaviour as being healthy and environmentally friendly, this may negatively affect the degree of their pro-car identity. This is a surprising result, as it suggests that an individual's behaviour may influence them to develop a certain identity. Since previous research shows that it is more common for identity to influence attitudes and subsequently behaviour, we suggest that future studies further explore the directionality of this relationship.

5.5. Past Carsharing Use Increases Future Carsharing Intentions

Finally, and similar to the results of previous studies [35], past use was an important determinant of behavioural intention: the results of the current study showed that individuals who have previously used carsharing have higher intentions to use carsharing than non-past users.

6. Strengths, Limitations and Future Directions

Although previous studies have assessed the determinants influencing the use of carsharing [20–22], they did not show why people with similar characteristics did not use carsharing. Therefore, one of the strengths of the current study is that non-users perceptions' have also been considered. Although it has been shown that pro-car and technological self-identities contribute to an increased intention to participate in carsharing, a limitation is that this study does not demonstrate whether these individuals eventually started using carsharing and whether individuals who were already participating in carsharing continued to do so [99]. Future research should, therefore, assess the long-term adoption of potential users and carefully assess any barriers to adoption among individuals with pro-car and technological self-identities. We therefore recommend using a combination of both quantitative and qualitative methods to explore the relationships between social and self-identities in individuals' decision-making processes to participate in carsharing. In addition, longitudinal research would be helpful to assess whether individuals' intentions and awareness about the possibility to participate in carsharing also result in increased usage [63]. Moreover, we suggest a qualitative approach such as in-depth interviews among people maintaining pro-car identities to explore how the use of shared cars could become part of their pro-car identity, although a strongly embedded identity often prevents behaviour change [36,56].

A limitation of this study is that, due to the in-person data collection method utilized, the sample is relatively small. While we selected neighbourhoods with similar access to carsharing services, which also had similar built environment features, future research should assess whether carsharing intentions vary between neighbourhoods with significant differences to the built environment [63]. Moreover, the possibility of unobserved heterogeneity is a limitation of this study, as there are several factors that might affect people's intentions that were not measurable given the data collected [100,101]. These possible variations could include individuals' preferences towards and intentions to use other transportation modes, sociocultural, sociodemographic, (socio)economic factors and other contextual factors. These should be taken into account in future studies.

6.1. Promoting Carsharing among Early Adopters of New Technologies

The promotion of carsharing participation can have a positive effect on the urban environment of cities and regions. Similarly to the municipality of Berlin, many local governments around the world are already implementing environmentally sustainable transportation systems and are attempting to decrease CO_2 emissions through their urban development plans. Reducing car use and promoting carsharing can contribute to meeting regional environmental sustainability goals. Moreover, carsharing can benefit how public space is used. Unnecessary parking lots and spaces could, for example, be transformed into public space that contributes to a positive experience of the living environment, such as benches, play areas for children and greenery [102].

In addition, the "pay per use" aspect of carsharing makes people assess whether they actually need to use a car for their transport trip, which can lead to reduced overall car use, more sustainable mobility behaviour, and therefore lower levels of CO_2 emissions and congestion [7,14,15]. Therefore, carsharing should be promoted by municipal and regional governments with regard not only to the use of B2C shared cars but also to P2P and community shared vehicles to have citizens contribute to the overall health of neighbourhoods and cities. Based on the results of the current study, we suggest that carsharing providers, and local and regional governments first promote carsharing adoption among those who are early adopters of new technologies through, for example, promotional campaigns on online (social) platforms. In addition, nudging and incentives can be used to promote carsharing amongst users who are currently already using other forms of new (mobility) technology. Moreover, as the results of this study show that people who have used carsharing before are much more likely to use carsharing again than individuals who have not, even a single use could increase future intentions.

6.2. Using Carsharing as Tool to Develop Environmentally Sustainable Transportation Futures

Similarly to the suggestions made by King et al. [61], we recommend that policy makers use carsharing as a tool to further develop environmentally sustainable transportation futures. For example, housing relocation policies can be framed to motivate and nudge individuals who move to a neighbourhood with smart houses (where electricity and safety systems can be operated via smartphones) or low-car neighbourhoods to participate in carsharing at a discounted rate. In addition, municipalities should educate drivers about the potential cost savings resulting from switching from a private car to using shared cars. Finally, barriers to participating in carsharing should be minimized, including signing up for a service, reserving a shared car and parking. Furthermore, we suggest that promotional campaigns are used to confront individuals with pro-car identities to reconsider their car use by advertising in places where drivers regularly come, such as petrol stations or parking lots. Finally, the increased use of carsharing should not be the goal in itself but rather seen as an opportunity to reduce overall car use in urban areas. However, as cars continue to be useful and popular modes of personal transportation, it is important to gain a better understanding of the processes shaping individuals' transition to the use of shared modes of transport. When developing sustainable urban transportation policies, car sharing should not compete with more sustainable means of transport, such as public transport, cycling and bike-sharing programmes. To conclude, intentions to participate in carsharing may lie with the consumer; however, as a step towards achieving sustainable and accessible urban mobility, carsharing adoption can be increased through policy implications that effectively promote the use of the mode.

Author Contributions: The authors confirmed the contribution to the paper as follows: study conception and design: L.M.D. and D.v.L.; data collection: L.M.D.; analysis and interpretation of results: L.M.D. and D.v.L.; draft manuscript preparation: L.M.D. and D.v.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: This study was conducted according to the research guidelines of Utrecht University's Faculty of Geosciences. No vulnerable populations were included in the research and participation was voluntary.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Acknowledgments: The authors thank the respondents for their participation in the study. We also thank Heike Link and Francisco J. Bahamonde Birke for arranging a temporary workplace during the data collection phase in Berlin. Finally, we would like to thank Hannah Roberts for her feedback on the analysis. This research did not receive any specific grants from funding agencies in the public, commercial or not-for-profit sectors.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A. Survey Instrument

Survey Carsharing in Berlin

1. **Please indicate in which area you live.**

☐ Schloßstraße, Steglitz
☐ Glasower Straße, Neukölln
☐ I don't live in one of these areas. My postal code is_____

What is Carsharing?

A carsharing service is a company where you can rent a car for short periods (for example a few hours). You (usually) only pay for the gas costs and the number of hours you have rented the car. You can book such a car a short time in advance and you can unlock the car via a mobile app.

Carsharing should not be confused with ride-hailing/ridesharing, which means the activity of asking for a car and driver to come immediately and take you somewhere (such as Uber or Lyft).

2. **Do you have a valid carsharing membership?**

☐ No
☐ Yes

3. **If so, to which of the following carsharing services do you have a membership?** (Multiple answers possible)

☐ ShareNow (DriveNow, Car2Go)
☐ WeShare
☐ SixtShare
☐ Miles
☐ Multicity Carsharing
☐ Hertz On Demand
☐ Flinkster
☐ Greenwheels
☐ Ubeeqo
☐ Stadtmobil
☐ eMio
☐ Cambio Carsharing
☐ Luxury Movement
☐ EXAKT Kfz Zulassungsdienst
☐ Oply
☐ Other, please specify_____

4. **Have you used a carsharing service in the past 12 months?**

☐ No
☐ Yes

5. **I have (or someone in my household has) access to . . . (Multiple answers possible)**

☐ A car
☐ An electric car
☐ A bicycle
☐ An E-bike
☐ A shared bike (e.g., Deezer Nextbike, Lidl Bike, Mobike, Lime bike)
☐ An E-scooter (e.g.,Lime, Circ, Bird, Voi, Tier, Uber Jump)
☐ A local bus service
☐ U-bahn
☐ S-bahn
☐ Tram
☐ Regional train services

☐ Regional bus services
☐ Ride-sharing (e.g., Uber, Lyft, carpooling)
☐ Other, please specify_____

6. **What other transport modes have you used in the past year? (Multiple answers possible)**

☐ A car
☐ Electric car
☐ Bicycle
☐ E-bike
☐ A local bus service
☐ U-bahn
☐ S-bahn
☐ Tram
☐ Regional train services
☐ Regional bus services
☐ Ride-sharing (e.g., Uber, Lyft, carpooling)
☐ Parking spots
☐ Other (motorized) vehicles
☐ Please specify_____

Please indicate to what extent you agree or disagree with the following statements.

7. I intend to use carsharing services within the next three months.						
☐ I disagree	☐	☐	☐	☐ I agree	☐ I don't know	☐ Does not apply
8. I am willing to spend money to use carsharing services						
☐ I disagree	☐	☐	☐	☐ I agree	☐ I don't know	☐ Does not apply

Please indicate to what extent you agree or disagree with the following statements.

9. Most people who are important to me would approve my participation in carsharing						
☐ I disagree	☐	☐	☐	☐ I agree	☐ I don't know	☐ Does not apply
10. Most people who are important to me would like to see me participating in carsharing						
☐ I disagree	☐	☐	☐	☐ I agree	☐ I don't know	☐ Does not apply
11. Most people that are important to me are participating in carsharing						
☐ I disagree	☐	☐	☐	☐ I agree	☐ I don't know	☐ Does not apply

Please indicate to what extent you agree or disagree with the following statements.

12. I make environmentally friendly transportation choices						
☐ I disagree	☐	☐	☐	☐ I agree	☐ I don't know	☐ Does not apply

13. I make transport choices that benefit my health									
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply
14. I think using carsharing is good for my personal health									
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply
15. I think carsharing is good for the environment									
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply
16. Owning a car is important to me									
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply
17. Not owning a car is important to me									
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply
18. Owning a car is important for my transportation needs									
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply

Please indicate to what extent you agree or disagree with the following statements.

19. I am confident that I can participate in carsharing									
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply
20. I have the freedom to decide whether I want to participate in carsharing									
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply
21. I can't participate in carsharing, because I don't know how to work with smartphone apps									
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply
22. I can't participate in carsharing because I don't have the time									
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply
23. I can't participate in carsharing because I do not know how it works									
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply

Please indicate whether you see yourself as . . .

24. Environmentally friendly									
☐ I disagree	☐	☐	☐	☐ I agree		☐ I don't know		☐ Does not apply	
25. A "green" consumer									
☐ I disagree	☐	☐	☐	☐ I agree		☐ I don't know		☐ Does not apply	
26. Health-oriented									
☐ I disagree	☐	☐	☐	☐ I agree		☐ I don't know		☐ Does not apply	
27. Sporty									
☐ I disagree	☐	☐	☐	☐ I agree		☐ I don't know		☐ Does not apply	
28. A user of new transport innovations									
☐ I disagree	☐	☐	☐	☐ I agree		☐ I don't know		☐ Does not apply	
29. A user of new technologies									
☐ I disagree	☐	☐	☐	☐ I agree		☐ I don't know		☐ Does not apply	

Please specify whether you see yourself as . . .

30. Career-oriented									
☐ I disagree	☐	☐	☐	☐ I agree		☐ I don't know		☐ Does not apply	
31. Family-oriented									
☐ I disagree	☐	☐	☐	☐ I agree		☐ I don't know		☐ Does not apply	
32. A member of your neighbourhood community									
☐ I disagree	☐	☐	☐	☐ I agree		☐ I don't know		☐ Does not apply	
33. Berliner									
☐ I disagree	☐	☐	☐	☐ I agree		☐ I don't know		☐ Does not apply	
34. German									
☐ I disagree	☐	☐	☐	☐ I agree		☐ I don't know		☐ Does not apply	

Please indicate whether you see yourself as . . .

35.	A car-driver								
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply
36.	A cyclist								
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply
37.	A pedestrian								
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply
38.	A user of public transport								
☐	I disagree	☐	☐	☐	☐	I agree	☐	I don't know	☐ Does not apply

Personal and household questions

39. **What is your age (in years).** _____dropdown menu

40. **Please indicate your gender.**

☐ Female
☐ Male
☐ I do not identify as male or female/I am genderfluid
☐ I do not want to say

41. **Do you have a car driver's license?**

☐ Yes
☐ No

42. **Do you own a car?**

☐ No, I do not own a car
☐ Yes, I own a car

43. **What is your highest completed education level?**

☐ Pre-primary education
☐ Primary education/first stage of basic education
☐ Lower secondary/second stage of basic education
☐ (Upper) secondary education
☐ Vocational training and education
☐ Bachelor's degree or equivalent
☐ Master's degree or equivalent
☐ Doctoral degree or equivalent
☐ Other:_____

44. **What is your employment status?**

☐ Unemployed
☐ Employed full-time
☐ Employed part-time
☐ Self-employed
☐ High school student
☐ Student
☐ Retired

☐ Unable to work
☐ Fulltime unpaid caretaker
☐ Other, namely_____

45. **How many people live in your household? (including yourself and children)**

☐ 1
☐ 2
☐ 3
☐ 4
☐ 5
☐ 6
☐ More than 6

46. **How many children do you have?**

☐ 0
☐ 1
☐ 2
☐ 3
☐ 4
☐ More than 4

47. **Do you have children or other dependent people that rely on you for their mobility needs?**

☐ No
☐ Yes

48. **What is your (approximate) monthly net disposable household income?**

☐ Less than 900 EUR
☐ Between 901 EUR and 1300 EUR
☐ Between 1301 EUR and 1500 EUR
☐ Between 1501 EUR and 2000 EUR
☐ Between 2001 EUR and 2600 EUR
☐ Between 2601 EUR and 3200 EUR
☐ Between 3201 EUR and 4500 EUR
☐ Between 4501 EUR and 6000 EUR
☐ 6001 EUR or more

49. **Please indicate which housing situation is applicable to you.**

☐ I rent private housing
☐ I rent social housing
☐ I rent in student housing
☐ I own a house and pay mortgage
☐ I own a house and do not pay mortgage (anymore)

50. **Which national background do you identify with?** _____dropdown menu
Are there any other national background do you identify with?

☐ No
☐ Yes, _____

End of survey

References

1. Machado, C.A.S.; Hue, N.P.M.D.S.; Berssaneti, F.T.; Quintanilha, J.A. An Overview of Shared Mobility. *Sustainability* **2018**, *10*, 4342. [CrossRef]
2. Dhingra, C.; Stanich, R. Car-Sharing Picking Up Speed in the Developing World. Available online: https://www.smartcitiesdive.com/ex/sustainablecitiescollective/car-sharing-picking-speed-developing-world/152996/ (accessed on 21 May 2019).

3. Prieto, M.; Baltas, G.; Stan, V. Car sharing adoption intention in urban areas: What are the key sociodemographic drivers? *Transp. Res. Part A Policy Pract.* **2017**, *101*, 218–227. [CrossRef]
4. Bardhi, F.; Eckhardt, G.M. Access-Based Consumption: The Case of Car Sharing. *J. Consum. Res.* **2012**, *39*, 881–898. [CrossRef]
5. Bundesverband CarSharing Definition CarSharing. Available online: https://www.carsharing.de/alles-ueber-carsharing/ist-carsharing/ist-carsharing (accessed on 1 April 2020).
6. Münzel, K.; Boon, W.; Frenken, K.; Vaskelainen, T. Carsharing business models in Germany: Characteristics, success and future prospects. *Inf. Syst. e-Business Manag.* **2018**, *16*, 271–291. [CrossRef]
7. Shaheen, S.A.; Martin, E. Impacts of Car2Go on Vehicle Ownership, Modal Shift, Vehicle Miles Traveled, and Greenhouse Gas Emissions. 2016. Available online: http://innovativemobility.org/wp-content/uploads/2016/07/Impactsofcar2go_FiveCities_2016.pdf (accessed on 26 February 2021).
8. Duncan, M. The cost saving potential of carsharing in a US context. *Transportation* **2010**, *38*, 363–382. [CrossRef]
9. Hamari, J.; Sjöklint, M.; Ukkonen, A. The Sharing Economy: Why People Participate in Collaborative Consumption. *J. Assoc. Inf. Sci. Technol.* **2016**, *67*, 2047–2059. [CrossRef]
10. Giesel, F.; Nobis, C. The Impact of Carsharing on Car Ownership in German Cities. *Transp. Res. Procedia* **2016**, *19*, 215–224. [CrossRef]
11. Shaheen, S.A.; Mallery, M.A.; Kingsley, K.J. Personal vehicle sharing services in North America. *Res. Transp. Bus. Manag.* **2012**, *3*, 71–81. [CrossRef]
12. Cohen, A.; Shaheen, S.A. *Planning for Shared Mobility*; UC Berkeley Recent Works; Berkeley: California, CA, USA, 2018; ISBN 978-1-61190-186-3.
13. Martin, E.; Shaheen, S.A.; Lidicker, J. Carsharing's impact on household vehicle holdings: Results from North American shared-use vehicle survey. *Transp. Res. Rec.* **2010**, *2143*, 150–158. [CrossRef]
14. Nijland, H.; van Meerkerk, J. Mobility and environmental impacts of car sharing in the Netherlands. *Environ. Innov. Soc. Transit.* **2017**, *23*, 84–91. [CrossRef]
15. Martin, C.J. The sharing economy: A pathway to sustainability or a nightmarish form of neoliberal capitalism? *Ecol. Econ.* **2016**, *121*, 149–159. [CrossRef]
16. Schaefers, T. Exploring carsharing usage motives: A hierarchical means-end chain analysis. *Transp. Res. Part A Policy Pract.* **2013**, *47*, 69–77. [CrossRef]
17. Nazari, F.; Noruzoliaee, M.; Mohammadian, A. (Kouros) Shared versus private mobility: Modeling public interest in autonomous vehicles accounting for latent attitudes. *Transp. Res. Part C Emerg. Technol.* **2018**, *97*, 456–477. [CrossRef]
18. Joo, J. Motives for Participating in Sharing Economy: Intentions to Use Car Sharing Services. *J. Distrib. Sci.* **2017**, *15*, 21–26. [CrossRef]
19. Böcker, L.; Meelen, T. Sharing for people, planet or profit? Analysing motivations for intended sharing economy participation. *Environ. Innov. Soc. Trans.* **2017**, *23*, 28–39. [CrossRef]
20. De Luca, S.; Di Pace, R. Modelling users' behaviour in inter-urban carsharing program: A stated preference approach. *Transp. Res. Part A Policy Pract.* **2015**, *71*, 59–76. [CrossRef]
21. Dias, F.F.; Lavieri, P.S.; Garikapati, V.M.; Astroza, S.; Pendyala, R.M.; Bhat, C.R. A behavioral choice model of the use of car-sharing and ride-sourcing services. *Transportation* **2017**, *44*, 1307–1323. [CrossRef]
22. Costain, C.; Ardron, C.; Habib, K.N. Synopsis of users' behaviour of a carsharing program: A case study in Toronto. *Transp. Res. Part A Policy Pract.* **2012**, *46*, 421–434. [CrossRef]
23. Heinen, E.; Maat, K.; van Wee, B. The role of attitudes toward characteristics of bicycle commuting on the choice to cycle to work over various distances. *Transp. Res. Part D Transp. Environ.* **2011**, *16*, 102–109. [CrossRef]
24. Heinen, E. Identity and travel behaviour: A cross-sectional study on commute mode choice and intention to change. *Transp. Res. Part F Traffic Psychol. Behav.* **2016**, *43*, 238–253. [CrossRef]
25. Adelson, R.M.; Fishburn, P.C. *Utility Theory for Decision Making*; John Wiley and Sons: New York, NY, USA, 1970.
26. Anable, J. 'Complacent Car Addicts' or 'Aspiring Environmentalists'? Identifying travel behaviour segments using attitude theory. *Transp. Policy* **2005**, *12*, 65–78. [CrossRef]
27. Van Acker, V.; Goodwin, P.; Witlox, F. Key research themes on travel behavior, lifestyle, and sustainable urban mobility. *Int. J. Sustain. Transp.* **2013**, *10*, 25–32. [CrossRef]
28. Lois, D.; Moriano, J.A.; Rondinella, G. Cycle commuting intention: A model based on theory of planned behaviour and social identity. *Transp. Res. Part F Traffic Psychol. Behav.* **2015**, *32*, 101–113. [CrossRef]
29. Murtagh, N.; Gatersleben, B.; Uzzell, D. Multiple identities and travel mode choice for regular journeys. *Transp. Res. Part F Traffic Psychol. Behav.* **2012**, *15*, 514–524. [CrossRef]
30. Schuitema, G.; Anable, J.; Skippon, S.; Kinnear, N. The role of instrumental, hedonic and symbolic attributes in the intention to adopt electric vehicles. *Transp. Res. Part A Policy Pract.* **2013**, *48*, 39–49. [CrossRef]
31. Ajzen, I. The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* **1991**, *50*, 179–211. [CrossRef]
32. Busch-Geertsema, A.; Lanzendorf, M. Mode Decisions and Context Change—What About the Attitudes? A Conceptual Framework. In *Cycling and Sustainability*; Emerald: Bingley, UK, 2015; pp. 23–42.
33. Fu, X.; Juan, Z. Understanding public transit use behavior: Integration of the theory of planned behavior and the customer satisfaction theory. *Transportation* **2016**, *44*, 1021–1042. [CrossRef]

34. Kim, Y.G.; Woo, E.; Nam, J. Sharing economy perspective on an integrative framework of the NAM and TPB. *Int. J. Hosp. Manag.* **2018**, *72*, 109–117. [CrossRef]
35. Bamberg, S.; Ajzen, I.; Schmidt, P. Choice of Travel Mode in the Theory of Planned Behavior: The Roles of Past Behavior, Habit, and Reasoned Action. *Basic Appl. Soc. Psychol.* **2003**, *25*, 175–187. [CrossRef]
36. Nordfjaern, T.; Şimşekoğlu, Ö.; Rundmo, T. The role of deliberate planning, car habit and resistance to change in public transportation mode use. *Transp. Res. Part F Traffic Psychol. Behav.* **2014**, *27*, 90–98. [CrossRef]
37. Fishbein, M. A theory of reasoned action: Some applications and implications. *Neb. Symp. Motiv. Neb. Symp. Motiv.* **1980**, *27*, 65–116.
38. Devoto, L.; Kohen, P.; Castro, O.; Vega, M.; Troncoso, J.L.; Charreau, E. Multihormonal regulation of progesterone synthesis in cultured human midluteal cells. *J. Clin. Endocrinol. Metab.* **1995**, *80*, 1566–1570. [CrossRef]
39. Fishbein, M.; Ajzen, I. *Predicting and Changing Behavior: The Reasoned Action Approach*; Taylor & Francis: Milton Park, UK, 2011.
40. Clark, B.; Chatterjee, K.; Melia, S. Changes to commute mode: The role of life events, spatial context and environmental attitude. *Transp. Res. Part A Policy Pract.* **2016**, *89*, 89–105. [CrossRef]
41. Wright, C.; Egan, J. De-marketing the car. *Transp. Policy* **2000**, *7*, 287–294. [CrossRef]
42. Steg, L.; Vlek, C.; Slotegraaf, G. Instrumental-reasoned and symbolic-affective motives for using a motor car. *Transp. Res. Part F Traffic Psychol. Behav.* **2001**, *4*, 151–169. [CrossRef]
43. Pojani, E.; Van Acker, V.; Pojani, D. Cars as a status symbol: Youth attitudes toward sustainable transport in a post-socialist city. *Transp. Res. Part F Traffic Psychol. Behav.* **2018**, *58*, 210–227. [CrossRef]
44. Belgiawan, P.F.; Schmöcker, J.-D.; Abou-Zeid, M.; Walker, J.; Lee, T.-C.; Ettema, D.F.; Fujii, S. Car ownership motivations among undergraduate students in China, Indonesia, Japan, Lebanon, Netherlands, Taiwan, and USA. *Transportation* **2014**, *41*, 1227–1244. [CrossRef]
45. Barth, M.; Jugert, P.; Fritsche, I. Still underdetected—Social norms and collective efficacy predict the acceptance of electric vehicles in Germany. *Transp. Res. Part F Traffic Psychol. Behav.* **2016**, *37*, 64–77. [CrossRef]
46. Kawgan-Kagan, I. Early adopters of carsharing with and without BEVs with respect to gender preferences. *Eur. Transp. Res. Rev.* **2015**, *7*, 1–11. [CrossRef]
47. Plötz, P.; Schneider, U.; Globisch, J.; Dütschke, E. Who will buy electric vehicles? Identifying early adopters in Germany. *Transp. Res. Part A Policy Pract.* **2014**, *67*, 96–109. [CrossRef]
48. Tajfel, H.; Turner, J.C. An integrative theory of intergroup conflict. In *Organizational Identity: A Reader*; Scientific Research Publishing: Wuhan, China, 1979; pp. 56–65. ISBN 0360-3199.
49. Ajzen, I. Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior1. *J. Appl. Soc. Psychol.* **2002**, *32*, 665–683. [CrossRef]
50. Armitage, C.J.; Conner, M. Efficacy of the theory of planned behaviour: A meta-analytic review. *Br. J. Soc. Psychol.* **2001**, *40*, 471–499. [CrossRef] [PubMed]
51. Falco, E.; Kleinhans, R. Beyond technology: Identifying local government challenges for using digital platforms for citizen engagement. *Int. J. Inf. Manag.* **2018**, *40*, 17–20. [CrossRef]
52. Hazée, S.; Delcourt, C.; Van Vaerenbergh, Y. Burdens of Access. *J. Serv. Res.* **2017**, *20*, 441–456. [CrossRef]
53. Fielding, K.S.; Terry, D.J.; Masser, B.M.; Hogg, M.A. Integrating social identity theory and the theory of planned behaviour to explain decisions to engage in sustainable agricultural practices. *Br. J. Soc. Psychol.* **2008**, *47*, 23–48. [CrossRef] [PubMed]
54. Sparks, P.; Shepherd, R. Self-Identity and the Theory of Planned Behavior: Assesing the Role of Identification with "Green Consumerism". *Soc. Psychol. Q.* **1992**, *55*, 388. [CrossRef]
55. Stryker, S.; Burke, P.J. The Past, Present, and Future of an Identity Theory. *Soc. Psychol. Q.* **2000**, *63*, 284. [CrossRef]
56. Stets, J.E.; Burke, P.J. Identity Theory and Social Identity Theory. *Soc. Psychol. Q.* **2000**, *63*, 224. [CrossRef]
57. Tajfel, H.; Turner, J.C. The Social Identity Theory of Intergroup Behavior. *Political Psychol.* **2004**, 276–293. [CrossRef]
58. Steg, L. Car use: Lust and must. Instrumental, symbolic and affective motives for car use. *Transp. Res. Part A Policy Pract.* **2005**, *39*, 147–162. [CrossRef]
59. Cătălin, M.C.; Andreea, P. Brands as a Mean of Consumer Self-expression and Desired Personal Lifestyle. *Procedia Soc. Behav. Sci.* **2014**, *109*, 103–107. [CrossRef]
60. Wolf, A.; Seebauer, S. Technology adoption of electric bicycles: A survey among early adopters. *Transp. Res. Part A Policy Pract.* **2014**, *69*, 196–211. [CrossRef]
61. King, N.; Burgess, M.; Harris, M. Electric vehicle drivers use better strategies to counter stereotype threat linked to pro-technology than to pro-environmental identities. *Transp. Res. Part F Traffic Psychol. Behav.* **2019**, *60*, 440–452. [CrossRef]
62. Van der Werff, E.; Steg, L.; Keizer, K. *I Am What I Am, by Looking Past the Present: The Influence of Biospheric Values and Past Behavior on Environmental Self-Identity*; SAGE Publishing: New York, NY, USA, 2014; Volume 46, ISBN 0013916512475.
63. Saeed, T.U.; Burris, M.W.; Labi, S.; Sinha, K.C. An empirical discourse on forecasting the use of autonomous vehicles using consumers' preferences. *Technol. Forecast. Soc. Chang.* **2020**, *158*, 120130. [CrossRef]
64. Murtagh, N.; Gatersleben, B.; Uzzell, D. Travel mode choice on regular journeys: Identity centrality and salience. *Resolve* **2010**, *22*, 4–10.
65. Mancha, R.M.; Yoder, C.Y. Cultural antecedents of green behavioral intent: An environmental theory of planned behavior. *J. Environ. Psychol.* **2015**, *43*, 145–154. [CrossRef]

66. Eurostat. *Population Change—Demographic Balance and Crude Rates at National Level [Data File]*. 2019. Available online: https://knowledge4policy.ec.europa.eu/dataset/ds00028_en (accessed on 24 February 2021).
67. Amt für Statistik Berlin-Brandenburg. *Statistischer Bericht: Einwohnerinnen und Einwohner im Land Berlin am 31. Dezember 2019*; 2020; Volume 1, Available online: https://www.statistik-berlin-brandenburg.de/publikationen/stat_berichte/2021/SB_A01-05-00_2020h02_BE.pdf (accessed on 24 February 2021).
68. Rode, P.; Hoffmann, C.; Kandt, J.; Smith, D.; Graff, A. Towards New Urban Mobility: The Case of London and Berlin. 2015. Available online: https://lsecities.net/wp-content/uploads/2015/09/New-Urban-Mobility-London-and-Berlin.pdf (accessed on 26 February 2021).
69. Senatsverwaltung für Umwelt Verkehr und Klimaschutz. Berliner Mobilitätsgesetz. Available online: http://gesetze.berlin.de/jportal/?quelle=jlink&query=MobG+BE&psml=bsbeprod.psml&max=true&aiz=true (accessed on 24 February 2021).
70. Steinmeyer, I.; Herrmann-Fiechtner, M. *Mobilität der Stadt Berliner Verkehr in Zahlen 2017*; Berlin, Germany, 2017. Available online: https://www.berlin.de/sen/uvk/en/traffic/traffic-data/facts-and-figures/mobility-in-the-city-berlin-traffic-in-figures-2017/ (accessed on 24 February 2021).
71. European Commission Passenger cars per 1000 Inhabitants. Available online: https://ec.europa.eu/eurostat/web/products-datasets/-/ROAD_EQS_CARHAB (accessed on 9 March 2020).
72. Statistisches Bundesamt Wirtschaftsrechnungen. *Einkommens- und Verbrauchsstichprobe Ausstattung Privater Haushalte mit Ausgewählten Gebrauchsgütern und Versicherungen*; 2018; Volume 15, Available online: https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Einkommen-Konsum-Lebensbedingungen/Ausstattung-Gebrauchsgueter/Publikationen/Downloads-Ausstattung/evs-ausstattung-privater-haushalte-2152601189004.pdf?__blob=publicationFile (accessed on 24 February 2021).
73. Amt für Statistik Berlin-Brandenburg. *Einkommens- und Verbrauchsstichproben*; 2018; Available online: https://www.statistik-berlin-brandenburg.de/BasisZeitreiheGrafik/Bas-evs.asp?Ptyp=300&Sageb=63000&creg=BBB&anzwer=5 (accessed on 24 February 2021).
74. Bundesverband CarSharing Alles über Carsharing: Geschichte. Available online: https://carsharing.de/alles-ueber-carsharing/ist-carsharing/geschichte (accessed on 9 March 2020).
75. Bundesverband CarSharing CarSharing-Statistik 2019: CarSharing in Deutschland Weiter auf Wachstumskurs. Available online: https://carsharing.de/presse/pressemitteilungen/carsharing-statistik-2019-carsharing-deutschland-weiter-auf-wachstumskurs (accessed on 14 May 2019).
76. Statista Number of Registered Car Sharing Users in Germany from 2008 to 2019. Available online: https://www.statista.com/statistics/415635/car-sharing-registered-users-gemany/ (accessed on 20 May 2019).
77. IoT Business News 2018. Free Floating Carsharing Services Are Gaining in Popularity. Available online: https://iotbusinessnews.com/2018/04/17/15974-free-floating-carsharing-services-are-gaining-in-popularity/ (accessed on 24 February 2021).
78. Deloitte The 2019 Deloitte City Mobility Index. Available online: https://www2.deloitte.com/us/en/insights/focus/future-of-mobility/deloitte-urban-mobility-index-for-cities.html (accessed on 7 April 2020).
79. Senatsverwaltung für Umwelt Verkehr und Klimaschutz. *Mobility in the City: Berlin Traffic in Figures*; 2017; Available online: https://www.berlin.de/senuvk/verkehr/politik_planung/zahlen_fakten/download/Mobility_en_komplett.pdf (accessed on 24 February 2021).
80. Here Urban Mobility Index—Berlin. Available online: https://urbanmobilityindex.here.com/city/berlin/ (accessed on 24 February 2021).
81. Statista Number of Car Sharing Vehicles in German Cities. 2019. Available online: https://www.statista.com/statistics/544616/car-sharing-number-of-vehicles-in-german-cities/ (accessed on 9 March 2020).
82. *DriveNow Factsheet DriveNow November 2018*; Available online: https://content.drive-now.com/sites/default/files/2017-10/DriveNow_Factsheet_October_2017_General.pdf (accessed on 24 February 2021).
83. Amt für Statistik Berlin-Brandenburg. *Statistischer Bericht: Einwohnerinnen und Einwohner im Land Berlin am 30. Juni 2019*; Amt für Statistik Berlin-Brandenburg: Potsdam, Germany, 2019; Volume 2.
84. *Senatsverwaltung für Stadtentwicklung und Umwelt Monitoring Soziale Stadtentwicklung Berlin 2017*; Senatsverwaltung für Stadtentwicklung und Wohnen: Berlin, Germany, 2017; pp. 1–117.
85. *Amt für Statistik Berlin-Brandenburg Bestandsdaten Einwohnerregister Berlin—Metadaten*; Amt für Statistik Berlin-Brandenburg: Potsdam, Germany, 2019.
86. Nagel, H.; Beer, I.; Schnur, O. *Monitoring Soziale Stadtentwicklung (MSS) Berlin: Erläuterungen zu den Indikatoren und Indizes zum MSS 2017—"Indikatorenblätter"*; Senatsverwaltung für Stadtentwicklung und Wohnen: Berlin, Germany, 2018; p. 96.
87. Scott, G.G. *The Researcher's Bible: An Overview of Key Concepts and Methods in Social Science Research*; Booktango: Bloomington, IN, USA, 2012; ISBN 9781468900224.
88. Hankins, M.; French, D.; Horne, R. Statistical guidelines for studies of the theory of reasoned action and the theory of planned behaviour. *Psychol. Heal.* **2000**, *15*, 151–161. [CrossRef]
89. Ajzen, I. Constructing A Theory of Planned Behavior Questionnaire. In *TPB Questionnaire Construction*; 2006; pp. 1–7. Available online: https://people.umass.edu/~{-------}aizen/pdf/tpb.measurement.pdf (accessed on 24 February 2021).
90. Haustein, S.; Hunecke, M. Reduced Use of Environmentally Friendly Modes of Transportation Caused by Perceived Mobility Necessities: An Extension of the Theory of Planned Behavior. *J. Appl. Soc. Psychol.* **2007**, *37*, 1856–1883. [CrossRef]

91. Kline, R.B. *Principles and Practice of Structural Equation Modeling*, 3rd ed.; The Guildford Press: New York, NY, USA, 2011; ISBN 9781606238776.
92. Field, A. *Discovering Statistics Using SPSS*, 3rd ed.; SAGE Publications Ltd.: London, UK, 2009; ISBN 9781847879066.
93. Tabachnick, B.G.; Fidell, L.S. *Using Multivariate Statistics*, 6th ed.; Pearson Education Limited: Harlow, UK, 2013.
94. Piedmont, R.L. Inter-item Correlations. *Encycl. Qual. Life Well-Being Res.* **2014**, 3303–3304. [CrossRef]
95. Hu, L.T.; Bentler, P.M. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct. Equ. Model.* **1999**, *6*, 1–55. [CrossRef]
96. Hair, J.F.; Black, W.C.; Babin, B.J.; Anderson, R.E. *Multivariate Data Analysis*, 7th ed.; Pearson Education Limited: New York, NY, USA, 2010; ISBN 9781292021904.
97. Kolenikov, S.; Bollen, K.A. Testing Negative Error Variances: Is a Heywood Case a Symptom of Misspecification? *Sociol. Methods Res.* **2012**, *40*, 124–167. [CrossRef]
98. Gaskin, J. *AMOS CFA Standardized Regression Weight Greater than 1.00 [Video File]*; 2015; Available online: https://www.youtube.com/watch?v=Vx24KFf-rAo (accessed on 24 February 2021).
99. Sheeran, P.; Webb, T.L. The Intention-Behavior Gap. *Soc. Pers. Psychol. Compass* **2016**, *10*, 503–518. [CrossRef]
100. Mannering, F.L.; Shankar, V.; Bhat, C.R. Unobserved heterogeneity and the statistical analysis of highway accident data. *Anal. Methods Accid. Res.* **2016**, *11*, 1–16. [CrossRef]
101. Saeed, T.U.; Hall, T.; Baroud, H.; Volovski, M.J. Analyzing road crash frequencies with uncorrelated and correlated random-parameters count models: An empirical assessment of multilane highways. *Anal. Methods Accid. Res.* **2019**, *23*, 100101. [CrossRef]
102. Jurkovič, N.B. Perception, experience and the use of public urban spaces by residents of urban neighbourhoods. *Urbani Izziv* **2014**, *25*, 107–125. [CrossRef]