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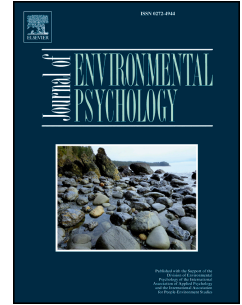
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# Accepted Manuscript

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## Preferences for car sharing services: Effects of instrumental attributes and psychological ownership

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**Abstract**

Car sharing services gain momentum as a potential alternative to various modes of transportation, including privately owned cars. This trend goes hand in hand with a renewed interest in the sharing economy, which has as essential premise that product ownership is of minor relevance. Using an online experiment, this study investigates if individual differences in psychological ownership influence the effects of well-known instrumental car attributes (price, parking convenience, and car type) on people's intention to select a shared car. Results confirmed that instrumental attributes generally impact preferences for car sharing services, and that a low psychological ownership may lead to a higher preference for a shared car under specific circumstances. This suggests that not only instrumental car attributes, but also psychological disposition, specifically psychological ownership, of potential customers need to be taken into consideration when developing measures to stimulate car sharing services in society.

**Key words:** Car sharing, sharing economy, pricing, parking, electric vehicle, psychological ownership

## 1. Introduction

The unwanted environmental consequences of fossil energy consumption have raised interest in sustainable and environmental alternatives for a wide range of application domains (Ketter, Peters, Collins, & Gupta, 2016; Noppers, Keizer, Bolderdijk, & Steg, 2014). Specifically for transportation, efforts have been made to introduce new engine technologies to facilitate the development of electric vehicles (Abrahamse, Steg, Gifford, & Vlek, 2009; Noppers, Keizer, Bockarjova, & Steg, 2014), and to stimulate the acceptance of novel transportation modes such as car sharing to reduce the environmental impacts of transportation in everyday life. Car sharing services allow people to access and use cars without the need to actually purchase them (Martin, Shaheen, & Lidicker, 2010), and – like many shared products and services – build on the economic principles of shared utilization of underused assets (Cohen & Kietzmann, 2014; Bardhi & Eckhardt, 2012; Schaefers, Lawson, & Kukar-Kinney, 2015) that are nowadays often addressed under the header of the sharing economy (Sundararajan, 2016).

Still, extant research mainly focuses on preferences for private car usage compared to other modes of – mostly public – transportation, showing that people prefer a private car to other alternatives when the car is not too expensive, located in close proximity, and is environmentally friendly (Gardner & Abraham, 2007; de Lorimier & El-Geneidy, 2013; Griskevicius, Tybur, & Van den Bergh, 2010). Few studies explicitly compare people's preferences for car sharing services with those for private cars, but never in relation to these well-known instrumental car attributes (Katzev, 2003; Martin et al., 2010). In the present study, we take the opportunity to fill this void by investigating the effects of price, parking convenience, and car type on people's intention to select a shared car instead of a private car. Moreover, we maintain that the effects of these instrumental car attributes on car sharing preferences are moderated by people's sense of psychological ownership. The notion of

psychological ownership stems from organizational behavior research, and refers to individuals' feeling that a target object is theirs (Pierce, Kostova, & Dirks, 2003). Growing evidence shows that people can develop strong possessive feelings with objects of choice, whether they are legally theirs or not, and that some people are more disposed towards experiencing psychological ownership towards target objects than others (see: Dawkins, Tian, Newman, & Martin, 2017; Jussila, Tarkiainen, Sarstedt, & Hair, 2015, for reviews). Given that in transportation research people often express their emotional attachment to their private car (Steg, 2005; Lord, Després, & Ramadier, 2011), it makes sense to predict that the disposition towards psychological ownership will influence people's preferences for car sharing in conjunction with the acknowledged instrumental car attributes.

In the following section, we will first introduce car sharing services as a specific application of the recently re-emerging notion of the sharing economy, then discuss the impact of the three instrumental car attributes, price, parking convenience and car type, on people's intention to select a shared or a private car, and finally address the moderating role of psychological ownership.

### **1.1 The sharing economy and car sharing service**

The sharing economy is an economic arrangement between actors who share underutilized assets – i.e., products that people own but do not frequently use – in the marketplace (Cohen & Kietzmann, 2014; Bardhi & Eckhardt, 2012; Sundararajan, 2016). Information technology has enabled the widespread adoption of sharing economy principles (Martin, 2016) by allowing individuals to communicate, coordinate and build trust with others in a large public arena (Albinsson & Perera, 2012). As a novel and sustainable alternative to traditional consumption models, the sharing economy, like related concepts such as “collaborative consumption” (Botsman & Rogers, 2010), and “market-mediated access-based consumption” (Bardhi & Eckhardt, 2012), has been suggested as an appropriate

response to the environmental challenges posed by overconsumption and overexploitation of resources (Hamari, Sjöklint, & Ukkonen, 2016). The adoption of sharing economy principles enables people to “leverage [their] lifestyles beyond individual possibilities” (Belk, 2007, p.134), which in the long term is assumed to result in improved societal welfare (Fraiberger & Sundararajan, 2015).

The recent interest in the sharing economy is visible in domains ranging from tourism (e.g. *Airbnb*) to consumer goods (e.g. *Pley*), but also in transportation through the introduction of car sharing services (e.g. *Car2Go*, *Zipcar*, and *Getaround*; cf. Belk, 2014; Bardhi & Eckhardt, 2012). The earliest car sharing program in history was the cooperative *Sefage*, introduced in Zurich, Switzerland in 1948 (Shaheen, Sperling, & Wagner, 1999). Other well-known European car sharing initiatives were introduced in the early 1970s, such as *Witkar* in Amsterdam, the Netherlands, and *Procotip* in Montpellier, France (Millard-Ball, Murray, Ter Schure, Fox, & Burkhardt, 2005). Yet, only recently, car sharing services have really become popular, with estimated car sharing memberships of 12 million in 2020 – a significant increase from 2.3 million that was reported in 2013 (Cohen & Kietzmann, 2014).

Car sharing services hold great promise for sustainability and individual mobility alike. Studies estimate that a single shared car can replace between 9 to 13 private cars (Martin et al., 2010), given that a private car is primarily used for a mere 5% of the time (Ballús-Armet, Shaheen, Clonts, & Weinzimmer, 2014). Reducing – or even to some extent replacing – private car ownership would contribute to the reduction of air pollution, traffic congestion, and the increase of parking spots availability (Efthymiou, Antoniou, & Waddell, 2013). Car sharing services allow for rationalization of unnecessary trips, which contributes towards pollution reduction by as much as 56% (Shaheen & Cohen, 2013). Moreover, car sharing services can complement public transportation, particularly in providing mobility services in those trips which are typically only suited for car driving (de Lorimier & El-

Geneidy, 2013), reducing the need to have private cars and increasing the access to mobility to many.

## 1.2 Attributes of vehicle driving

Prior research has identified three major factors influencing people's preferences for vehicle use: price, parking convenience, and car type. For starters, transportation research reports that price is an important attribute for car users. Regardless of income level, people generally consider the cost for their choice of taking a car (Gardner & Abraham, 2007). The influence of price on transportation preferences equally applies to car sharing services (cf. Lamberton & Rose, 2012). Duncan (2011) indicates that it is generally cheaper to choose a shared car than to drive a private car. The total costs of driving a private car are high, due to the fixed cost of car purchase and variable costs of fuel, parking and maintenance costs. Car sharing services, in contrast, only charge membership and usage cost for an individual trip, and are in fact so cheap that they are financially within reach of many people who cannot afford a car, such as students and low-income individuals (De Luca & Di Pace, 2015). Most research, however, has focused on the characteristics of car sharing services without considering the possibility of making a trip with a privately owned car. As an exception, De Luca and Di Pace (2015) found that an increase in the price of a car sharing service reduces the willingness to switch from private car to a car sharing service. Price therefore plays a major role in the decision whether someone will select a car sharing service rather than a private car for an intended trip.

It is also well-documented that people are primarily attracted to those modes of transportation that are not too far away from them (Brown et al., 2016). In a car driving context, accessibility is typically translated into parking convenience; the more difficult it is to find a parking place the less likely people will take a car for a trip (De Lorimier & El-Geneidy, 2013). Applied to car sharing services, Litman (2000) suggested that to be a viable



alternative to a private car, car sharing services must be within walking distance from a user's location. Some anecdotal evidence exists that car sharing services are more attractive to a potential client, if parking places are included in the service (Kaspi, Raviv, & Tzur, 2014); people do not use a shared car service when the parking location of that shared car is further away (De Luca & Di Pace, 2015). It thus makes sense to predict that parking convenience will play a major role in the decision whether someone will select a car sharing service for an intended trip.

Car manufacturers, such as *BMW* and *Tesla*, invest in electric mobility (Hidrué, Parsons, Kempton, & Gardner, 2011) and several governments currently incentivize the use of EVs in the hope to overcome overdependence on fossil fuel (Carteni, Cascetta, & de Luca, 2016). In daily practice, however, people often express concerns against the electric vehicle type – among others regarding the less sustainable nature of its manufacturing process and electricity sources (cf., Hawkins, Singh, Majeau-Bettez, & Strømman, 2013). Contrary to such concerns, some scholars are now exploring the viability and environmental benefits of electric vehicles as an alternative to traditional internal combustion engine (ICE) cars in car sharing systems (Kim, Ko, & Park, 2015). The evidence on the contribution of electric car type on the willingness to select a car sharing service is mixed. A study by Carteni et al. (2016) suggests that EV fleets in car sharing services have a positive influence on people's decision to join the service. Given that some people are attracted to services that signal their 'green' identity (Griskevicius et al., 2010), we predict that similar considerations apply to car sharing, such that offering an EV as an alternative to the traditional ICE car type will play an important role in influencing people's intention to select a shared car.

### **1.3 Psychological ownership**

Pierce et al. (2003) define psychological ownership as a "state where an individual feels as though the target of ownership or a piece of that target is 'theirs'" (p.5). This concept

pertains to an individual's affection towards an object. People generally feel connected to their possessions (Dittmar, 1992), such that Belk (1988) suggests that possessions are part of people's extended self and eventually become part of their self-identity. Psychological ownership differs from legal ownership, as the latter is formally acknowledged by others, while psychological ownership is individually experienced (Pierce, Kostova, & Dirks, 2001). In other words, people can develop psychological ownership towards objects they do not own, or even have a low psychological ownership to their own possessions. Legal ownership thus is not a prerequisite for the development of psychological ownership.

The concept of psychological ownership was originally introduced in research on organizational behavior to explain the feelings of ownership people experience with companies they do not formally own (e.g. Pierce et al., 2001; 2003; Brown & Zhu, 2016; Brown, Pierce, & Crossley, 2014; see: Dawkins et al., 2017; Jussila et al., 2016 for reviews). The concept is also applied to other research domains ranging from consumer behavior (Shu & Peck, 2011; Peck, Barger, & Webb, 2013), information systems research (e.g. Karahanna, Xu, & Zhang, 2015), idea adoption (Baer & Brown, 2012), to management of natural resources (e.g. Matilainen, Pohja-Mykrä, Lähdesmäki, & Kurki, 2017). People can even develop psychological ownership to an object only by imagining that they touch that object (Peck et al. 2013).

Psychological ownership is partly innate and partly learned, and fulfills four individual needs: efficacy, self-identity, place (Pierce et al., 2003), and stimulation (Avey, Avolio, Crossley, & Luthans, 2009). The need for efficacy comes from people's general willingness to be in control over situations and circumstances. Applied to possessions, feelings of ownership towards a target object enable a person to exercise control over that object. Second, the motive of self-identity pertains to the basic belief that people identify themselves through their possessions. People define and express themselves through objects,

and they identify with the symbolic meaning of these objects via the psychological feeling of ownership (Weiss & Johar, 2016). Third, having a sense of home makes people feel secure and comfortable. In this case, possession offers a safe point of reference in everyday life (Jussila et al., 2016). Finally, people often are motivated by the approach-related need to seek activation and stimulation. Obtaining a target object provides a mechanism through which to fulfil this need (Pierce & Jussila, 2011).

It follows from the above that people may strengthen their psychological ownership by controlling target objects, acquiring knowledge about them, or investing in them. For example, people may use, access or even manipulate a target object in order to exercise their control over it – i.e., driven by the motivated reasoning that objects that can be controlled will be psychologically experienced as theirs (Pierce et al, 2003). By contrast, people that feel attracted to the presumed symbolic meaning of a target object may wish to collect more information and knowledge about the object of possession to develop a deeper connection. Alternatively, people may invest in a target object as this may lead to an increase in their sense of identity (Belk, 1988). Each of these mechanisms allows for the development of feelings of possession of a target object, but from different points of departure. According to Pierce and colleagues (2003), people can develop strong feelings of psychological ownership when one of these mechanisms is activated, but that possessive feelings are usually stronger when triggered by multiple mechanisms at once (see also Matilainen et al., 2017).

Two main behavioral effects that can be observed in high psychological ownership individuals relate to personalization and protection. Personalization refers to the high degree of appropriation of possessions, in such a way that the target object serves as a showcase of the control that the owner has over the object; personalization is an expression of the owner's intimate relationship with the object (Pierce et al., 2003). Moreover, people high on psychological ownership typically feel accountable for their possessions. Being accountable

implies that a person feels the responsibility to protect, maintain, care for, and possibly even defend their possessions when necessary (Dawkins et al., 2017). Car ownership seems to be the quintessential manifestation of psychological ownership in the public domain, for examples abound on the public roads of highly customized cars as well as cars that are meticulously looked after. To the best of our knowledge, however, psychological ownership has not yet been applied to the study of individual's preferences for car sharing or private cars. This is surprising, given the increasing popularity of car sharing services as an alternative to private car driving. Bardhi and Eckhardt (2012) show that people are less reckless drivers in their private car than in a shared car – a finding that would make sense from the perspective of psychological ownership. This illustrates the necessity to account for psychological ownership in this area, because these two transportation modes differ mainly in people's feelings of psychological ownership to their own car.

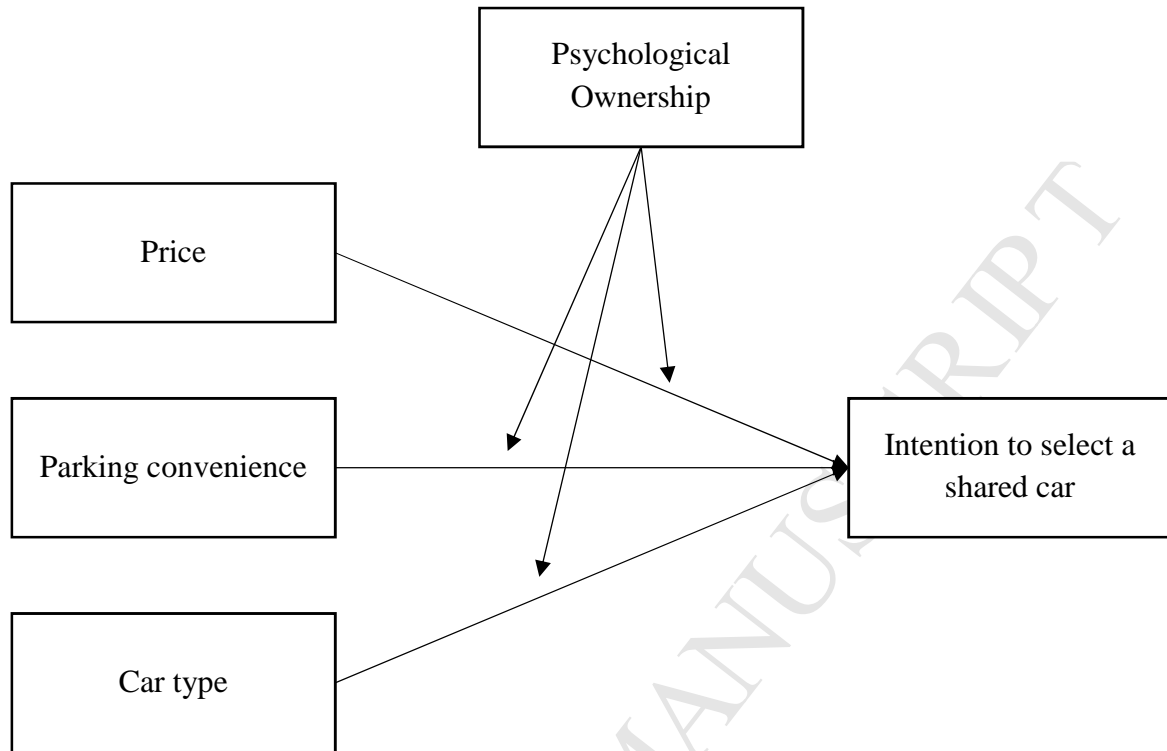
We expect that people high on psychological ownership will differ in their evaluation of the price, parking convenience, and type of a shared or private car from people low on this disposition. Private cars allow people to develop feelings of heightened attachment to their possession, whereas shared cars merely offer instrumental utility (Bardhi & Eckhardt, 2012; Beggan, 1992; Fraine, Smith, Zinkiewicz, Chapman, & Sheehan, 2007). It follows that people with high psychological ownership would value the possessive quality of the car (whether it is a privately owned car or shared with other people) more highly than the other instrumental car attributes. They would thus have a higher intention to select a private car even when it would be more costly, parked further away, or less environmentally friendly than a shared car. By contrast, people with low psychological ownership would perceive the shared and private car as close substitutes (Lamberton & Rose, 2012), and have a higher intention to select a shared car when it is cheaper, parked more conveniently, or more environmentally friendly than a private car. Overall, psychological ownership therefore

serves to moderate the impact of instrumental car attributes on people's intention to select a shared or private car.

#### **1.4 The present study**

Prior research typically supports the claim that car driving attributes influence people's intention to select a shared car. However, psychological ownership theory suggests that people tend to evaluate possessions, such as a car, more favorably than other objects to which they do not feel similar attachment. This study investigates the way in which people evaluate the instrumental car driving attributes of a shared car, and explores the moderating influence of people's disposition of psychological ownership on the intention to select a shared car rather than a private car, as shown in Figure 1. Using an online experimental study, we started our investigation by testing the influence of the abovementioned instrumental car driving attributes on the intention to select a shared or a private car. We then examined the moderating role of psychological ownership on these relationships. The advantage of an experimental setting was that these attributes could be put under experimental control, explored for associations, and tested for causality.

**Figure 1.**  
**Conceptual Model**



## 2. Method

### 2.1 Participants and Design

The experiment was a 2 (Price: low, high) x 2 (Parking Convenience: nearby, further away) x 2 (Car Type: electric, combustion) between-subject design on the intention to select a shared car. Psychological ownership was added to this design as a covariate. The initial sample consisted of 592 Dutch undergraduate university students enrolled in an applied statistic course (370 men, 220 women, 2 unspecified;  $M_{\text{age}} = 22.04$  years,  $SD = 2.15$ ). Participation was voluntary (no incentives were given), but the data generated were used for educational purposes – i.e., they served to practice statistical techniques – as a result of which many questionnaire items that were irrelevant for the present study complemented the materials and experimental design. The study was developed to be completed in 30 minutes ( $M_{\text{duration}} = 26.98$  minutes,  $SD = 14.21$ ). Respondents who completed the study in less than 10 minutes (an indication of random answering patterns) were excluded (16 men, 5 women;  $M_{\text{age}} = 22.00$  years,  $SD = 2.32$ ). Given our focus on car usage and sharing in the present study, we also filtered out participants not in the possession of a driving license (46 men, 32 women;  $M_{\text{age}} = 21.44$  years,  $SD = 2.02$ ). This led to a usable sample of 493 participants (308 men, 183 women, 2 unspecified;  $M_{\text{age}} = 22.14$  years,  $SD = 2.15$ ), which was used for the analyses reported below. The general descriptions of our sample regarding car usage and car sharing are summarized in Table 1.

**Table 1.**  
**Sample Descriptions**

Sample descriptions	Summary	N (Total = 493)
Travelling by car	Last week	418
	Last Month	60
	Last Half year	11
	Last Year	1
	Never	3
Driving frequency	4 days per week or more	103
	1-3 days per week	223
	1-3 days per month	133
	6-11 days per year	23
	Less than 6 days per year	11
Reason to drive	Work	114
	School	62
	Family or friend visit	268
	Leisure	49
Car ownership	Own a car	101
	Do not own but have access	376
	Do not own and have no access	16
Used a shared car before	Yes	35
	No	458

## 2.2 Procedure

The experiment was conducted online. Participants were given an introduction to the emerging trend of car sharing in transportation reading as follows:

*In the past, if you wished to travel by car, you could take your own car or rent a car for the entire day. Nowadays, companies also offer car sharing as a service. A car sharing service is more customized and short-term than the traditional car rental:*

*With the specialized company, you become member of the service, book a car with them, use it for as long as you need to, and pay the fee associated with your usage. Of*



course, car sharing has its pros and cons relative to driving your own car, and below you'll find the most important ones:

*Your own car - Your own car is always there for you. Your own car contains your own belongings (sunglasses, candy). Your own car is serviced (cleaned, fuelled) to your own preferences. You will find your own car where you last parked it. On the other hand, you pay a lot of money for maintenance, insurance, fuel, and parking tickets. The longer you own your car, the more it will depreciate in value.*

*A shared car – You book the shared car with an agency. The shared car does not contain your own belongings (sunglasses, candy). The shared car is not serviced (not cleaned, not fuelled) to your preferences. You do not know in advance where the shared car is parked. On the other hand, you do not have to pay any money for maintenance, insurance, fuel, and parking tickets. You do not own the shared car, so you need not worry about depreciation in value.*

Following this introduction, participants were invited to state their intention to select the shared car for a trip. After this, participants went through a set of course-related material, and also the psychological ownership measure (see below), until they were provided with a car sharing scenario. Specifically, participants were asked to imagine to be in the process of planning their next trip and to consider taking a private car or a shared car. The attributes of the private car were held constant throughout the study, but those of the shared car varied depending on experimental condition. For example:

*Please consider the following scenario: Imagine you are planning your next trip. You have the choice between taking Car A or Car B for this trip. The differences between those two cars are the following:*

*Car A. This is your own car, and it runs on fuel. Car A is fueled completely. With car A, this trip will cost you €8 in total. Car A is parked 5 minutes away from where you live.*

*Car B. This is a shared car, and it runs on electricity. Car B is charged completely. With Car B, the trip will cost you €6.50 in total. Car B is parked 5 minutes away from where you live.*

Again, participants were invited to state their intention to select a shared car for a trip. Finally, participants received a questionnaire assessing manipulation checks, and demographics. The participants were debriefed in the lecture series that followed.

### **2.3 Manipulations**

**Price.** Previous studies tested the effect of free fare, promotion and reduced ticket prices on people's preference for a particular mode of transport (Redman, Friman, Gärling, & Hartig, 2013). In line with this, we approximated the cost of a trip in the Netherlands with a private car or a shared car based on data available from existing car sharing service providers and the Dutch Touring Club (ANWB) at the time of study. Participants thus could choose between a shared car that was either priced at €6.50 (low price) or €9.50 (high price) depending on the experimental condition, whereas the private car was kept at €8.00 by default. Note that, even though the price differences between conditions were small, they were nevertheless realistic estimates of the cost of the trip for the Netherlands.

**Parking Convenience.** Prior research showed that the accessibility of a transportation mode is affected by people's valuation of time and speed of getting into that particular mode, and that the impact of the accessibility is significant with an increase at the increment of 5 minutes (Redman et al., 2013). Taking this 5-minute increment as a reference point, participants could choose between a shared car that was either parked 5 or 10 minutes away

from home depending on the experimental condition, whereas the private car was always parked 5 minutes away from home.

**Car Type.** In their study on car preferences, Hoen and Koetse (2014) made an inventory of the possible alternatives to the traditional vehicle with combustion engine, concluding that the electric car was the most interesting option available. Consistently, for this study we operationalized the car type manipulation as: traditional combustion car versus electric car. Participants could choose between a shared car that was either a combustion car or an electric car depending on the experimental condition; the private car was a combustion car by default.

**Manipulation check.** To test whether the manipulation of each of the three instrumental attributes (price, parking convenience, car type) was successful, we used three items that asked participants to select and recall the description that best described the experimental condition they had been in. For price, participants could select whether their task description had described a low or high price situation. For parking convenience, they could indicate whether their task description had been about a car that was parked nearby or further away. For car type, they could indicate whether their task description had been about an electric or traditional combustion car situation. Thus, for each manipulation, a single item served as a manipulation check, respectively.

## 2.4. Measures

**Selection of a shared car.** The measurement of a participant's intention to select a shared car was on a 7-point Likert scale ( $1 = \text{very unlikely}$ ,  $7 = \text{very likely}$ ). Participants were asked to answer the question "Based on information from the previous page, how likely would you take the shared car for your trip?" before and after the manipulation. The overall score for intention to select a shared car was taken by subtracting the post-manipulation score with the pre-manipulation score, and varied from -6 to 6 ( $M = 0.17$ ,  $SD = 1.82$ ).

**Psychological ownership.** The psychological ownership scale was derived from van Dyne and Pierce (2004), who developed a widely used one-dimensional scale for applications in the organizational behavior domain. The original seven items in their scale are specifically formulated to assess feelings of possession with the organization a person is affiliated with, and tap into instances of individual and collective psychological ownership. Because collective psychological ownership was beyond the scope of our research, we selected the four items that accounted for individual feelings of psychological ownership. For each of these items, we replaced ‘the organization’, which served as the target of ownership, with ‘this car’ – the object of ownership that we were targeting. For example, the original van Dyne and Pierce item “I feel a very high degree of personal ownership for this organization” was modified into “I feel a very high degree of personal ownership for this car”. The other three items we thus created read: “This is MY car”, “I sense that this is MY car”, and “It is hard for me to think about this car as MINE” (reversed;  $1 = \textit{strongly disagree}$ ,  $7 = \textit{strongly agree}$ ). Note that the boldface was a defining feature of the original psychological ownership scale. The Cronbach’s  $\alpha$  for the four item scale was 0.81.

### 3. Results

Regression analyses were conducted to evaluate the hypotheses. The experimental factors were dummy coded into -1 and +1, and our measure of psychological ownership was mean-centered. The cross-products for the higher-order interactions were computed and all factors were entered into the equation (Aiken & West, 1991).

#### 3.1 Manipulation checks

A chi-squared test of independence was calculated to check the recollection of the experimental manipulation of price, parking convenience, and car type. Participants in the price condition successfully recalled the price of their car ( $\chi^2 = 14.25$ ,  $p < .01$ ); participants in the high price condition ( $M = .44$ ,  $SD = .50$ ) and in the low price condition ( $M = .27$ ,  $SD =$

.45) indeed differed in their focus on price. Second, participants in the parking convenience condition successfully recalled their parking convenience ( $\chi^2 = 19.67, p < .01$ ); participants in the nearby condition ( $M = .06, SD = .24$ ) and in the further away condition ( $M = .19, SD =$

.40) indeed focused on different levels of parking convenience. Lastly, participants in the car type condition successfully recalled their type of car ( $\chi^2 = 11.05, p < .01$ ); participants in the electric car condition ( $M = .08, SD = .22$ ) and in the combustion car condition ( $M = .02, SD = .13$ ) indeed focused on different car types. The manipulations were therefore effective.

### 3.2 Correlation Analysis

Table 2 shows the bivariate correlations between price, parking convenience, car type, psychological ownership, and the intention to select a shared car. All experimental manipulations positively correlated with the intention to select a shared car – i.e., with lower price, more convenience parking, and cars of the electric type linked to higher intention to select a shared car. Psychological ownership was uncorrelated with the selection of a shared car.

**Table 2.**  
**Means, Standard Deviations and Correlations (N = 493)**

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7
1 Gender	1.37 <sup>a</sup>	.49	-						
2 Age	22.13	2.15	-.04	-					
3 Price	.48 <sup>a</sup>	.50	.01	-.01	-				
4 Parking convenience	.50 <sup>a</sup>	.50	-.08	-.01	-.03	-			
5 Car Type	.53 <sup>a</sup>	.50	-.03	-.06	.06	.04	-		
6 Psychological Ownership	5.72	.97	-.07	.09 <sup>*</sup>	-.04	.05	.06	-	
7 Intention to select a shared car	.17	1.82	.01	-.04	.34 <sup>**</sup>	.19 <sup>**</sup>	.13 <sup>**</sup>	.00	-

\* $p < .05$ . \*\* $p < .01$ . <sup>a</sup>These items take only two values

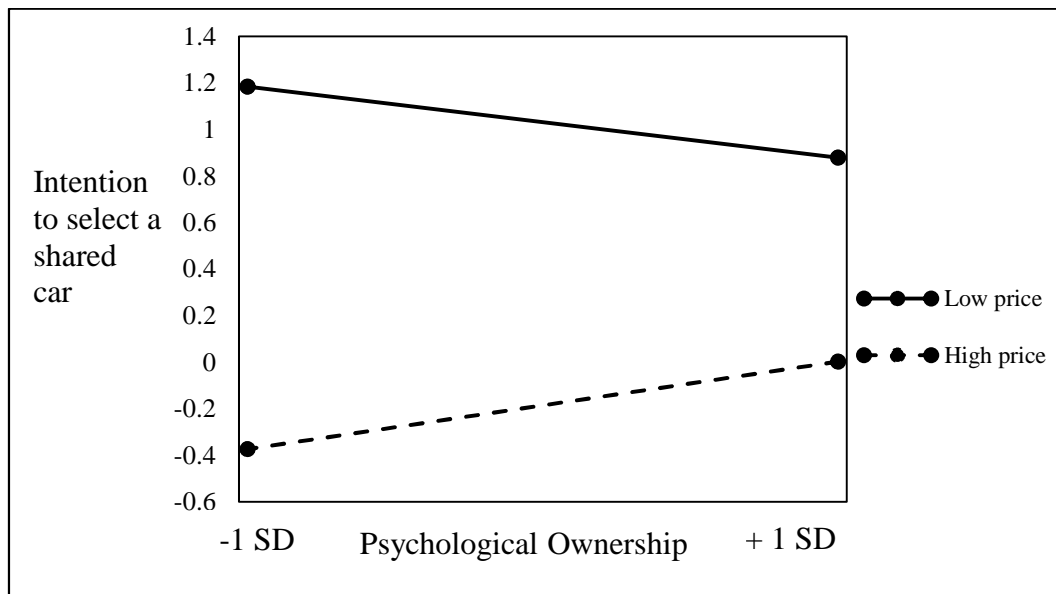
### 3.3 Hypotheses testing

**Intention to select a shared car.** We conducted a regression analysis on the intention to select a shared car. A significant regression coefficient was found,  $R^2 = .19$ ,  $F(21, 471) = 5.35$ ,  $p < .01$ . In support of extant theorizing, the analysis showed significant main effects of price,  $\beta = .61$ ,  $t(471) = 7.90$ ,  $p < .01$ , 95% CI [.46, .76], parking convenience,  $\beta = .36$ ,  $t(471) = 4.66$ ,  $p < .01$ , 95% CI [.21, .51], and car type,  $\beta = .19$ ,  $t(471) = 2.39$ ,  $p = .02$ , 95% CI [.03, .34], which indicated that a lower price, a higher parking convenience, and the presence of an EV type positively influenced the decision to select a shared car.

The regression analysis also revealed that psychological ownership moderated the effect of price on the intention to select a shared car,  $\beta = -.18$ ,  $t(471) = -2.14$ ,  $p = .03$ , 95% CI [-.34, -.01]. Simple slope analysis (Figure 2) showed that for respondents with low psychological ownership, the price of a service was relatively important ( $\beta = .78$ ,  $t(471) = 6.91$ ,  $p < .01$ ), while for those with high psychological ownership, the price importance was less pronounced although still significant ( $\beta = .44$ ,  $t(471) = 4.03$ ,  $p < .01$ ). We found no support for the moderation effect of psychological ownership on parking convenience,  $\beta = -.08$ ,  $t(471) = -.91$ ,  $p = .36$ , 95% CI [-.24, .09]. Parking convenience did affect the intention to select a shared car, but its effect was not subject to a person's high or low sense of psychological ownership.

**Figure 2.**

**Simple slope analysis for the interaction of Price and Psychological Ownership on the intention to select a shared car**

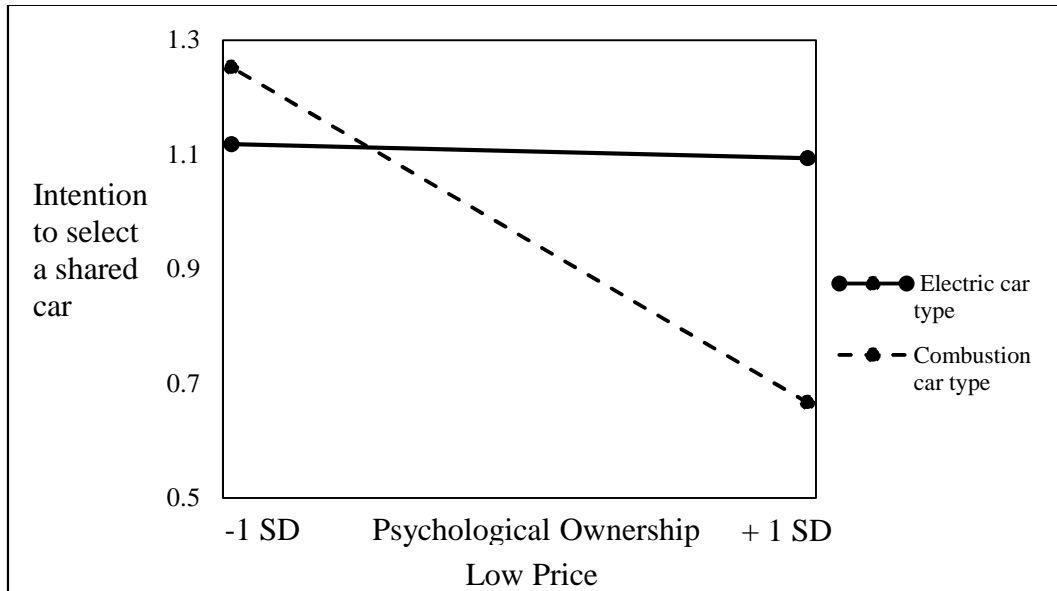


Analyses further revealed a significant three-way interaction between price, car type, and psychological ownership on the intention to select a shared car,  $\beta = .19$ ,  $t(471) = 2.29$ ,  $p = .02$ , 95% CI [.03, .35]. Simple slope analysis (Figure 3 (a) and (b)) showed that in the high price group, respondents with low psychological ownership considered an electric car to have significant effect on their intention to select a shared car ( $\beta = .53$ ,  $t(471) = 3.25$ ,  $p < .01$ ), an effect that was not observed for respondents with high psychological ownership ( $\beta = .07$ ,  $t(471) = .46$ ,  $p = .64$ ). Meanwhile, in the low price group, no significant influence of car types was observed for respondents with low psychological ownership ( $\beta = -.07$ ,  $t(471) = -.42$ ,  $p = .67$ ) and with high psychological ownership ( $\beta = .21$ ,  $t(471) = 1.36$ ,  $p = .18$ ) on the intention to select a shared car. The full regression results are summarized in Table 3.

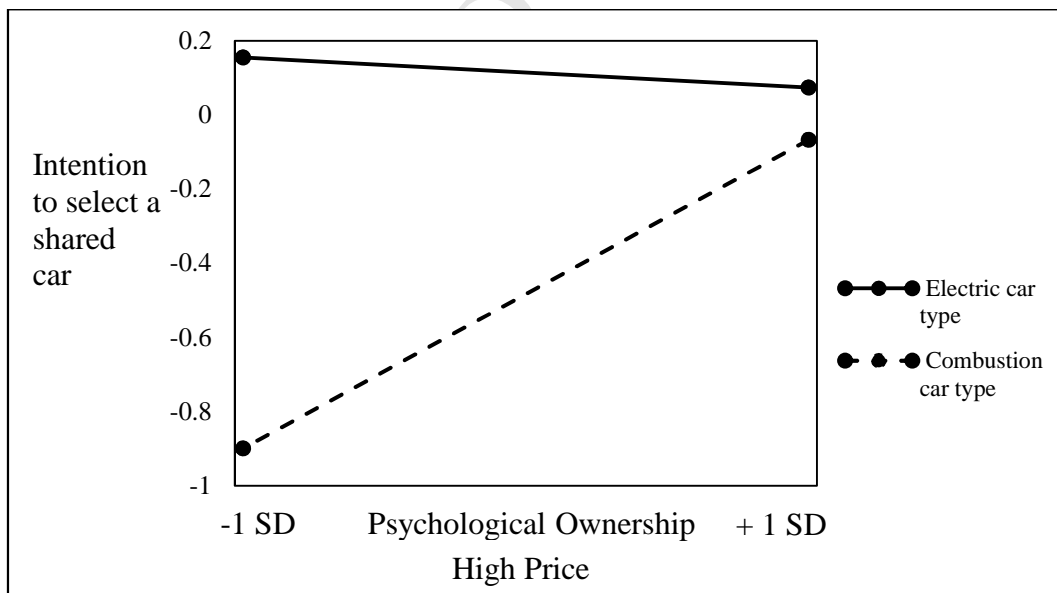
Figure 3.

Simple slope analysis for the interaction of Price, Car Type, and Psychological Ownership on the intention to select a shared car

(a)



(b)





**Table 3.**  
**Regression table**

Variable	Intention to select a shared car				
	<i>B</i>	<i>t</i>	<i>P</i>	LLCI	ULCI
Constant	.43	.40	.69	-1.66	2.51
Gender	.11	.70	.49	-.20	.42
Age	-.03	-.66	.51	-.10	.05
Travel by car	.17	1.02	.31	-.15	.48
Driving Frequency	-.05	-.54	.59	-.23	.13
Ownership of a car	.14	.27	.79	-.86	1.14
Access to a car	.05	.10	.92	-.88	.97
Price	.61	7.90	.00	.46	.76
Parking convenience	.36	4.66	.00	.21	.51
Car type	.19	2.39	.02	.03	.34
Psychological Ownership (PO)	.02	.22	.83	-.15	.18
Price x Parking convenience	.01	.16	.87	-.14	.16
Price x Car type	-.11	-1.46	.15	-.27	.04
Parking convenience x Car type	-.12	-1.53	.13	-.27	.03
Price x PO	-.18	-2.14	.03	-.34	-.01
Parking convenience x PO	-.08	-.91	.36	-.24	.09
Car type x PO	-.05	-.55	.59	-.21	.12
Price x Parking convenience x Car type	-.03	-.41	.68	-.18	.12
Price x Parking convenience x PO	.04	.54	.59	-.12	.21
Price x car type x PO	.19	2.29	.02	.03	.35
Parking convenience x Car type x PO	-.01	-.15	.88	-.17	.15
Price x Parking convenience x Car type x PO	.01	.14	.89	-.15	.17
<i>R</i> <sup>2</sup>				.19	
<i>F</i>				5.35	
<i>P</i>				< .01	

Note: *N* = 493. *B* = Unstandardized beta coefficient. LLCI = Lower limit 95% confidence interval. ULCI = Upper limit 95% confidence interval.

#### 4. Discussion

The aim of this research was to investigate if individual differences in psychological ownership moderated the effects of instrumental car attributes – price, parking convenience, and car type – on people’s intention to select a shared car. Our results confirm previous findings that the intention to select a shared car is influenced by price (Lamberton & Rose, 2012), parking convenience (De Luca & Di Pace, 2015), and car type (Carteni et al., 2016), and extend these findings by showing that the psychological disposition of psychological ownership, indeed, moderates them. Once people’s attitude towards a car that can be owned, as measured by their psychological ownership, is known, one can better predict and explain their intention to select alternative shared car services with a given set of instrumental attributes.

We found evidence for the moderating role of psychological ownership on the influence of price on the intention to select a shared car. For people with low psychological ownership, price was an important factor influencing intention to select a shared car, as their main concern was to profit from taking the shared vehicle (cf. Lamberton & Rose, 2012; Lind, Nordfjærn, Jørgensen, & Rundmo, 2015). For people high on psychological ownership, the influence of price was less pronounced. Given their strong possessive feelings regarding target objects such as cars, these individuals preferred a private car to a shared car, regardless of the low price of the shared car. This is consistent with the theory on psychological ownership (cf., Dawkins et al., 2017; Pierce et al, 2003), and illustrates how individual needs like efficacy, self-identity, place, and stimulation may steer preferences in the setting of car sharing away from instrumental attributes. As a consequence, by considering (potential) car drivers’ psychological ownership, we would be able to better understand and predict how these people would react to pricing strategy and monetary incentives offered by car sharing companies.

On a similar note, both from a theoretical and societal perspective, services based on the principles of the sharing economy potentially enable people to gain access to environmentally friendly products and services that were previously beyond reach due to high prices (cf. Haws, Winterich, & Naylor, 2014). A fascinating outcome of our study is that this may hold some promise for car sharing services that offer electric vehicles instead of traditional combustion cars – even when their prices are higher than the traditional alternative. This finding seems to contradict the prior result that price limits the likelihood of purchasing an electric vehicle (Noppers et al., 2015). It is emphasized, however, that we can only make such a claim by accounting for individual differences in psychological ownership – that is, only people low on psychological ownership are willing to pay more for an electric shared car service. This finding expands the range of applications of psychological ownership theory to the domain of transportation in general and car sharing in particular, and has practical implications for car sharing companies in the sense that offering electric shared car services may be a viable differentiation strategy, but only if managers consider their (future) clients' characteristics in terms of psychological ownership. Car sharing companies should target customers with low psychological ownership, for instance existing car sharing users, when introducing such packages as a premium service.

People with high and low psychological ownership did not differ in their evaluation of parking convenience. However, our finding that people prefer a car sharing service when it is conveniently located nearby is in accordance with extant research suggesting that people prefer transportation modes when they are in close proximity (Brown et al., 2016), and extends this to shared transportation modes. One reason for the non-significant interaction finding in our study may be that the majority of our participants did not in fact own a car (i.e., only 20.4% of our participants actually reported to be a car owner). As we did find a significant main effect of parking convenience on the intention to select a shared car,

consistent with prior research (f.i., Reimers, 2013), this leaves us to conclude that the participants in our sample probably did not fully appreciate the value of parking convenience. Conceptually, this finding would be in line with the costly signaling argument, suggesting that the effort of accessing the shared car is not easily observable by others (i.e., private), as a result of which people have no clear incentive to use the shared car as a signal of their 'green' identity (Griskevicius et al., 2010).

A practical implication of our research is that car sharing companies should consider people's psychological ownership when developing marketing strategies aimed at the promotion of car sharing service packages. Promotion and pricing strategies that highlight the superiority of car sharing services – for instance by emphasizing its lower price or its environmentally friendly nature – work well when the intended customer is low on psychological ownership. However, the same message may backfire when targeted at people with a high disposition towards psychological ownership (Murtagh, Gatersleben, & Uzzell, 2012). Matilainen and colleagues (2017) point to the negative side-effects of psychological ownership – i.e., people's unwillingness to let go of their possessions due to their strong identification with it – that can also be understood in terms of resistance to change (cf. Oreg, 2003). One way for companies to circumvent this is by promoting the shared car service as an alternative that can fulfill a need when their private car is not available (i.e. additive change) rather than serve as a replacement for their private car (i.e. subtractive change; cf. Baer & Brown, 2012). Hence, the concept of psychological ownership can be used as a marketing tool to move people out of their own car and into a shared car, but under the right circumstances.

Naturally, this research has some limitations. First, our experiment was conducted online and did not involve general commuters in an actual travel setting. Even though experimental studies aim at establishing causality with a high level of internal validity and are

not conducted to establish external validity (Brown & Lord, 1999; Mook, 1983), this may raise the question whether the same relationships are observable in the commuting setting. Commuting activities are not a single time activity, but are developed based on habit (Verplanken, Walker, Davis, & Jurasek, 2008). Thus, people may change their behavior over time or when new transportation mode choices become popular in their area. In addition, our findings have been derived from a single study. The respondents in our sample, for example, scored relatively high on psychological ownership ( $M = 5.72$ ), which may have impacted the strength of the moderation effects reported in the present study. On the other hand, average scores higher than 5 are not uncommon in the literature, and have been observed ever since the introduction of the psychological ownership measure (see van Dyne & Pierce, 2004). Still, the generalization of the experimental research should be based on tested theoretical relationships, and not on the concrete results of a single study (Driskell & Salas, 1992).

It would make sense to aim at longitudinal investigation of car sharing preferences in future research. Bardhi and Eckhardt (2012) suggest that factors such as membership and appreciation of car sharing service programs are only observable over longer time periods. Likewise, researchers in psychological ownership increasingly point to the dynamic nature of psychological ownership (Dawkins et al., 2017). Future work should therefore acknowledge that feelings of psychological ownership to a private car may fluctuate over time – for instance, unpredictable events such as engine failure, malfunctioning of equipment or car accidents frustrate existing feelings of efficacy, self-identity, and sense of belonging with the private car, and may lead to a reevaluation of alternatives such as car sharing. It would, further, be interesting to look into the collective psychological ownership among shared car users at a group level. Pierce and Jussila (2010) first suggested that psychological ownership could be a group-level construct, and it would make sense to explore the role of group-level psychological ownership for a special branch of car sharing services aiming at attracting

groups of commuters in carpooling programs. Perhaps, such commuters would not develop feelings of ownership towards the shared car, but towards the car sharing group instead. This would be in line with the call to develop multilevel perspectives on psychological ownership (Dawkins et al., 2017).

Further research may consider a cross-cultural perspective of transportation services and psychological ownership. Some research shows that commuters in, for instance U.S. and Switzerland, have different transportation mode preferences (Abou-Zeid & Ben-Akiva, 2012), and that people in countries, such as Italy, Belgium, and Denmark, differ in their preferences for adopting electric vehicles (Barbarossa, Beckmann, De Pelsmacker, Moons, & Gwozdz, 2015). Likewise, researchers on psychological ownership have begun to explore the role of culture on perceived ownership (Peng & Pierce, 2015). The study of cross-cultural differences in psychological ownership is still in its infancy, but Dawkins and colleagues (2017) launch the idea that collective-level psychological ownership would be higher in collectivistic cultures that put more emphasis on the community, as opposed to the individual level psychological ownership that would be stronger in individualistic cultures. Understanding these cross-cultural differences in psychological ownership, and how they affect car sharing preferences will be an important future extension. Finally, transportation modes in many developing countries are more informal than in developed countries, because they are owned by individuals and lack any proper regulations. The relevance of psychological ownership in this kind of setting will also be of interest for future studies. We therefore propose to also explore in future research the formal and informal transportation modes in conjunction with cross-cultural differences in a wider range of geographic settings.

## **5. Conclusion**

In conclusion, this research investigated to what extent psychological ownership moderates the influence of well-known instrumental attributes such as price, parking

convenience, and car type on the intention to select a shared car. Our results provided first evidence that research based on the premise of the sharing economy must pay closer attention to the notion of psychological ownership to explain individual differences in intention to select car sharing services and other access-based products. Given the increasing popularity of a variety of services based on the principles of sharing economy, it would, therefore, be particularly relevant to further explore how individual differences in psychological ownership influence people's intention to select these and other shared services.

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ACCEPTED MANUSCRIPT

**Highlights**

- We investigated the influence of price, parking convenience, and car type
- These instrumental attributes influence people's intention to select a shared car
- Psychological ownership concept is important when comparing shared and private car
- High and low psychological ownership people evaluate car attributes differently