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Carsharing users: socio-demographic characteristics, travel behaviour patterns and consumer preferences. A case study of the city of Poznań, Poland

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Abstract. The paper presents research on carsharing users in Poznań, Poland (an example of a large city in a macro-region of Central Europe, where carsharing is still an innovation to be popularised). The study is based on structured face-to-face interviews with a large sample of 892 drivers analysed using stepwise logit regression. We found that carsharing users are mainly young, educated, single and male; that they regularly use public transport and pay special attention to car equipment and accessories, but at the same time are less concerned about costs than are other drivers. Carsharing users drive cars with varying frequency and for a variety of reasons and feel curiosity towards the activity of driving. The results have practical implications for both local policy-makers (interested in promoting sustainable mobility modes, creating smart cities or transport strategies) and companies operating carsharing systems (formulating advertising strategies).

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1. Introduction

The end of the 20th century and the beginning of the 21st century brought a noticeable growth in the number of registered cars in many developed and developing countries. Cars have become one of the most significant of all aspirational goods, an indispensable attribute of households (Dicken, 2015), significantly improving the mobility of people in everyday life (Gleaser & Khan, 2004; Kołsut & Stryjakiewicz, 2023). But the advantages that cars afford to private individuals lead to many social, environmental and spatial problems in large cities and agglomerations, such as increased road congestion, air and noise pollution and lack of parking spaces (Sheller & Urry, 2000). One of the most promising solutions to tackle these problems (especially combined with efficient public transport and electromobility) is carsharing, where cars are rented in a simple way for short periods of time (Shaheen & Cohen, 2007, 2013; Le Vine & Polak, 2015). This is an innovative service made possible by the constant improvement in mobile ICT technologies – cars are searched for and rented via internet applications installed on mobile phones, and payments are also made online (as part of the constantly developing access-based consumption or collaborative consumption) (Belk, 2014; Bardhi & Eckhardt, 2012). The principle of carsharing is simple: individuals gain the benefits of using a private vehicle without the costs and responsibilities of owning one (Giesel & Nobis, 2016). People who use carsharing rent a car according to their own travel demands at any time and for any time (Sai et al., 2019). Estimates show that carsharing users often resign from owning cars, and one shared car may substitute for up to 15 private cars (Bondarová & Archer, 2017). Carsharing users better plan their journeys, which leads to reductions in kilometres travelled, CO_2 emissions, air and noise pollution, and time spent searching for parking spaces in urban areas (Nijland et al., 2015; Nijland & van Meerkerk, 2017; Li et al., 2020; Jochem et al., 2020). Carsharing services, both business-to-customer (B2C) and business-to-business (B2B), are operating under market conditions (as a part of commercial sharing systems), with transport policies providing tangible benefits to carsharing drivers (Lamberton, 2018) (*Note* 1). Carsharing, which has been constantly growing for the past several years in many developed countries, is believed to be a social innovation and element of the sustainable mobility paradigm, especially when combined with other, public or private, environmentally friendly travel modes (Banister, 2008; Shaheen et al., 2019; Esfandabadi et al., 2022; Zhu et al., 2023).

The aim of the paper is to characterise profiles of carsharing users among drivers. In particular, we tried to answer the three following research questions: RQ1: What are the socio-demographic characteristics – personal and household – of carsharing users? RQ2: What are the travel behaviour patterns of carsharing users? RQ3: Which preferences for buying and using cars are important for drivers inclined towards carsharing? Conclusions from the literature review were analysed using Poznań – the fifth largest city in Poland, with over half a million inhabitants within the city borders and one million in the metropolitan area – as a case study. The empirical research, based on face-to-face interviews with a large sample of 892 drivers, allowed us to identify who are or can become innovators and early adopters of carsharing – who the drivers are who can contribute to sustainable urban mobility.

This paper makes an important contribution to the literature. Firstly, the presented study gathers the most important, previously identified personal characteristics and travel behaviour patterns of carsharing users. Then, we analyse them jointly with consumer preferences. Although preferences are a complex issue, sometimes requiring an exploration of the psychological determinants of behaviour with separate research methods, here they are an element of connections with the socio-demographic situation of drivers, to enrich the inferences. Secondly, whereas carsharing users in Western European and North American cities have been the subject of some scientific studies, this issue has not yet been studied in cities in Poland and other Central European countries (including Czechia, Slovakia, Hungary, Romania, Bulgaria, Slovenia, Croatia). Due to the fact that the largest cities (metropolitan areas) in this macro-region are similar in terms of development level, living standards and public transport, our results can be a source of valuable regularities for the abovementioned countries. As such, the study provides valuable appliable information: the results have practical implications for local policy-makers (interested in promoting sustainable mobility modes as part of smart cities) and companies operating carsharing systems (which need information on target groups to formulate marketing strategies).

The paper is structured as follows: after the introduction, in the theoretical section we present features of carsharing users based on the literature review: their socio-demographic characteristics, travel behaviour patterns, and choices suggesting

preferences. Then we present the research design, followed by results. We end up with conclusions and a discussion that includes implications for practice and suggestions for further research.

2. Carsharing users: literature review

Several studies analysed below have attempted to define carsharing users – those drivers that have already used or intend to use carsharing as a mobility mode. The first analyses, conducted in the USA and Germany, were followed by studies from cities in other developed countries, especially in Western Europe, where the high purchasing power of consumers combined with relatively high and growing environmental consciousness have contributed to a noticeable popularity of this mobility mode. The literature on who chooses carsharing instead of a private car or other mobility modes – and why – allows three groups of factors to be distinguished that are explained in the sub-sections below. Taking diffusion of innovation theory as a framework, they can be called "innovators" and "early adopters", curious to try innovations before others, serving as opinion leaders, and making up respectively around 2.5% and 13.5% of every population (Rogers, 2003).

2.1. Socio-demographic characteristics

The first carsharing users have been reported as young drivers, studying or with a university degree, characterised by good or above-average salary or financial situation (Nobis, 2006; Becker et al., 2017; Wittwer & Hubrich, 2018). These features are among the most typical characteristics of early innovation adopters (Rogers, 2003).

Young and educated people are more open to gadgets or novel solutions, they are interested in the way innovations work and are ready to test them and put them into use, even if it is risky (Rogers, 2003). Carsharing is strongly linked to the use of technological novelties – not only the car (most new models are nowadays similar and easy to drive), but also smartphone applications commonly used to book, pay for and unlock or lock a shared car. Generation Y or Millennials (people born after 1980), also known as "digital natives", are more acquainted with technological solutions than are older generations: they process new technological information more quickly, which allows them to quickly learn how internet-related innovations work (Prensky, 2001; Szmelter, 2018). Moreover, the youth is generally more engaged in the sharing economy and collaborative consumption than are older people (John, 2013). Among younger generations, especially in large cities of Western Europe, the perception of car ownership as a necessity is changing – it is no longer a must, but increasingly an occasional, useful mobility solution (Focas & Christidis, 2017; Sanvicente et al., 2018). Young people are elastic in their travel choices and often do not need their own car to use daily. For them, occasional carsharing may be complementary to public transport, a bike, a scooter or walking (Rotaris et al., 2019). Conversely, older generations more often have trouble with the car rental process and cost management; they may also be more afraid of the risk related to potential car damage and of the very activity of driving an unfamiliar vehicle. Gaining carsharing customers among older drivers is more difficult because many mobility-related decisions are routinized with age and people are less open to new travel options, particularly when they are confident with their current travel routines involving a private car (Nobis, 2006; Wittwer & Hubrich, 2018).

Employment is another factor that characterises carsharing users. The status of a worker, especially related to being in a good financial situation, allows them to try out innovations, which are usually expensive before reaching a mass market (Wejnert, 2002; Kaminski, 2011). Usually, it is not the low cost that convinces drivers to use carsharing. The solution is financially beneficial only under certain circumstances, largely connected with specific travel behaviour patterns – especially occasional driving (Litman, 2000; Duncan, 2011).

The studies conducted so far are not conclusive concerning other social or demographic characteristics of carsharing users. In some, more males were reported among users, which can be explained by a higher number of men being interested in motorisation, treating driving as a hobby, and thus being willing to try new models or types of cars (Becker et al., 2017; Wittwer & Hubrich, 2018; Mavlutova et al., 2021). However, there is no clear evidence that women would be less inclined to carshare than men (Kawgan-Kagan, 2015). Some authors report that having children reduces willingness to use carsharing services (Nobis, 2006), while others prove that it depends on the age of children: the older they are, the higher the carsharing demand (Schmöller, 2015). Finally, some studies stress that, for potential carsharing users, the urban form and built environment near the driver's residence are relevant, with both affecting

the availability and accessibility of car rental points. Vibrant, central locations (including city centres) attract younger and higher-income people, who in turn make it attractive for carsharing providers to operate there (Stillwater et al., 2009; Kang et al., 2016; Münzel et al., 2020).

2.2. Cars and carsharing: travel behaviour patterns

For many people in developing and developed countries, a private car significantly improves everyday life. Among its greatest advantages as a mobility option are convenience (comfort), speed (time savings), independence (autonomy), flexibility, freedom and reliability; for some, driving is a pleasure and hobby (Sheller & Urry, 2000; Steg, 2005). Not surprisingly, many drivers create travel routines when travelling for the same type of purposes, such as to/from work, driving children to school, or for weekly shopping (Gärling & Axhausen, 2003). Once used to driving their own car, including for leisure purposes, it is difficult to convince car users to switch to other mobility options, either private or public. Carsharing takes advantage of the fact that most cars remain unused more than 90% of the time (Bondarová & Archer, 2017). As part of access-based consumption (where market-mediated transactions happen with no transfer of ownership), carsharing vehicles are used only when needed (Bardhi & Eckhardt, 2012; Belk, 2014). It seems that subscription to carsharing services will not substitute for everyday commuting to work. Carsharing is financially beneficial for users who need a car occasionally and travel short annual distances, usually of no more than 10,000 km (Litman, 2000). Used this way, it may be an alternative for car ownership or a substitute for a second car in the household (Jochem et al., 2020).

Previous research has shown that an important target group for all carsharing system operators comprises persons with multi-modal mobility behaviour – those who use combined travel modes and make flexible decisions between different travel options (Kopp et al., 2015; Shaheen et al., 2019). Carsharing subscribers in developed countries use public transport, cycle or walk more often than others (Katzev, 2003; Nobis, 2006; Winter et al., 2020). From the transport policy perspective, it is of vital importance to create conditions for the switch from private cars to public transport and carsharing. One recent study suggests that it is several times more possible to switch from private cars to carsharing than to public transport, especially if public transport is not favourably assessed by drivers (Ceccato et al., 2021).

2.3. Consumer preferences for buying and using cars

To investigate motivations behind signing up for and using carsharing services, we will use the distinction between what marketing studies refer to as "utilitarian" and "hedonic" aspects of consumer decisions, which have recently also been analysed in the context of shared services (Lee & Kim, 2018). A utilitarian attitude is characterised by rational choices; it is based on instrumental and functional properties of the product or service. A hedonic attitude is characterised by the multi-sensory, aesthetic and emotional experiences that consumers have during the activity of purchasing or using services (Hirschman & Holbrook, 1982; Guido, 2006).

When deciding whether to choose carsharing or one's private car as a mobility mode, utilitarian factors include first of all costs and functionality under specific circumstances. Some research has proven that drivers willing to use carsharing were concerned about economic aspects of mobility – saving money on moving around (Lamberton & Rose, 2012). When the total costs of car ownership are summed up, then indeed, for some subscribers, carsharing is a way to save money on mobility (Katzev, 2003). This is possible when driving is only occasional, as the cost for a single drive is usually higher for a shared car than one's private car. With shared cars, maintenance, parking and insurance costs are reduced by the economy of scale, as each shared vehicle is exploited more efficiently than a singly owned car. This allows carsharing to potentially represent a cost saving over private ownership for those who need a car only from time to time (Litman, 2000; Duncan, 2011). Other studies suggest that carsharing users are practical travellers and choose carsharing because it is the best travel option given the circumstances (Burkhardt & Millard-Ball, 2006; Mattia et al., 2019). Carsharing seems a functional solution especially for time-sensitive drivers, who need a fast and convenient travel option (Winter et al., 2020). It is convenient because the carsharing provider takes care of insurance, vehicle maintenance, repairs and dedicated parking places.

Hedonic factors motivating car use are related mostly to personal appeal and the brand prestige or status of a car user. A private car was for decades one of the most aspirational goods of both affluent

and working-class persons in developed and developing countries (Dicken, 2015). Many car types and brands have for decades symbolised consumer identity and reflected drivers' personality (Ball & Tasaki, 1992; Muniz & O'Guinn, 2001). However, this approach is changing in the era of collaborative consumption. Rifkin (2000) first suggested that, in a hyper-capitalist economy, buying and owning things could become outmoded ideas. Rather, consumers come to want access to goods and prefer to pay for the experience of using a consumer item rather than buying and owning it. The access to and use of cars only when needed, the possibility of trying out new equipment or accessories in new models, are just a few examples of such an approach (Bardhi & Eckhardt, 2012). According to Kathan et al. (2016), in many developed societies, 20 years ago owning a car represented a means of expressing personal status: today it represents only a means of transportation (status may be expressed differently). Emerging evidence suggests that carsharing subscribers perceive using the service as a sign of being trendy, innovative, a "social activist" (Burkhardt & Millard-Ball, 2006). Carsharing users tend to show interest in new technologies (Hinkeldein et al., 2015; Becker et al., 2017), and short-time rental systems may therefore provide an opportunity to get to know and experience novel car types or brands, in a novel form.

Importantly, some studies suggest that environmental concerns about the negative impacts that excessive car use have on surrounding areas are important for using and re-using carsharing services (Meijkamp, 1998; Truffer, 2003; Burkhardt & Millard-Ball, 2006; Magno, 2021). This motivation is relevant for interest in hybrid or electric shared cars (Kawgan-Kagan, 2015; Liao & Correia, 2022), but in fact all shared cars are relatively new (usually up to two years) and used only for planned trips. Were it not for carsharing, many journeys would be made in older cars and over longer distances (because every minute and kilometre in a rented car costs) – thus polluting the environment more (Nijland & Van Meerkerk, 2017). Certainly, even when concerned about the environment, those using carsharing should still find the functionality of the novel mobility solution to be important (Guglielmetti Mugion et al., 2019).

Finally, carsharing – as with all other innovations – may be used more after recommendation by others. In the diffusion of innovations theory, the opinions of other members of a social system are an important element encouraging the "early majority" (deliberate consumers) to adopt a novel solution. Whether by "word of mouth" (face to face) or via social channels (the media), early innovation adopters invite others to new solutions, opening them up to a mass market (Rogers, 2003). At the same time, for those used to driving their private car, especially on repetitive routes, it could be stressful to use an unfamiliar shared vehicle (considering potential damage and insurance issues). Those who decide to sign up to and use carsharing services should therefore be confident of their driving capabilities and accept the risk within the carsharing provider's insurance policy (Shaheen et al., 2016). They should have positive feelings when driving, take pleasure in the driving and be open to new car types, including electric vehicles (cf. Liao & Correia, 2022).

3. Empirical study design

3.1. Study area

The Polish car market, like others in Central Europe, has experienced a real revolution in the car market over the past 30 years. Following Poland's transformation to a free-market economy after 1990 and its accession to the European Union in 2004, which opened up the possibility of importing used old cars from Germany and other Western European countries and allowed social prosperity to grow, the number of cars per 1,000 inhabitants more than quadrupled to 470 by 2020 (Kudłak et al., 2023; Dyba & Stryjakiewicz, 2023). In 2023, with over 17 million active personal vehicles on roads, Poland is already among the largest car markets in Europe, but according to experts, the number of cars on roads in the country will still be growing in the upcoming years and peak motorisation is still ahead (EU Transport in figures, 2020; Focas & Christidis, 2017). Not surprisingly, the number of cars on roads, especially in large cities, is becoming too large for efficient traffic levels and parking. Although carsharing may help to mitigate the typical consequences of high motorisation levels and reduce pollution, congestion and parking problems, in Poland it is still a novel solution, unknown to most drivers.

Since 2016, a dozen or so company carsharing systems has begun operating in large cities in Poland (*Note* 2). The first experiences of carsharing operators in Poland show that it is difficult to survive on the domestic market, especially when competing with other operators and other forms of shared mobility in large cities (including

increasingly available ride-hailing and taxi services, such as Uber and Bolt). Entities appear and disappear, and sometimes change the spatial scope of their operations (Kuźma et al., 2022). For the purpose of this study, we selected Poznań – a large city in western Poland – as the research site. The Poznań agglomeration of ~1 million inhabitants is characterised by high motorisation indicators and noticeable problems with traffic, lack of parking spaces, and air and noise pollution (Dyba & Doszczeczko, 2023). In the years 2019–2023, three main carsharing companies were in operation in the city: Panek Carsharing, Traficar and 4Mobility. All of these represented the free-floating carsharing type, allowing cars to be rented straight off the street and, after the drive, to be left in any parking place within a designated zone (Rodenbach et al., 2018; Münzel et al., 2020) (*Note* 3). All operators created dedicated smartphone applications and had a total of 300–500 cars for rent in Poznań at the time of analysis (internal combustion cars – in operation for up to two years and meeting the latest emission standards; and hybrid or electric vehicles). Users benefit from the typical advantages afforded to carsharing subscribers by public transport policies (Chicco et al., 2018): the use of lanes normally closed to regular car traffic, charge-free use of pay parking places or the use of parking places reserved exclusively for shared cars (an especially valuable solution in the areas of greatest parking problems).

3.2. Sample and interview questionnaire description

The research is based on a quantitative, structured interview among car users. The data collection took place in face-to-face (F2F) mode as part of a larger research project on changes in the car market carried out in the years 2018–2023. In order to obtain results from those groups in which driving car is statistically more common, quota sampling (a non-probabilistic version of stratified sampling), was employed controlling for: the representativeness of gender (male/female); five age groups of respondents (in the analysis the youngest additionally divided into two equal subgroups, 18–24 and 25–29); and five city districts. In total, we collected a large sample of 1,016 completed questionnaires among car users living within Poznań city borders. After excluding answers of respondents who had not driven a car in the previous year or did not give full answers to all questions, we finally used the responses of 892 active car drivers in our analysis, which (assuming 95% level of confidence) allows us to draw conclusions with a margin of error of 3%.

The questionnaire contained 15 questions that were divided into three main parts: travel behaviour, consumer preferences for buying and using cars, and personal information (with questions on socio-demographic situation – personal and household characteristics, see Table 1). From this research perspective, the question that allowed the identification of dependent variable was: When planning your trips, do you use, or would you consider using, carsharing? The respondents had options "use regularly", "use occasionally", "considering using" or "don't use and don't consider using".

3.3. Methods

For the purpose of our analysis, we ran a stepwise logit regression analysis to assess which socio-demographic characteristics, travel behaviour patterns and consumer preferences affect carsharing (i.e., which variables are predictive for carsharing use treated as a dependent variable). For categorical variables, we coded the answers referring to the first or last variable (Introduction to SAS, 2022). Due to the fact that the number of respondents who had already used carsharing (n=136) was too small to obtain robust regression results, the group of "carsharing users" (n=250) also included drivers who expressed a strong intention to use carsharing as a mobility option (n=114). The remaining respondents, who clearly stated that they would not use carsharing, are referred to in this paper as "not interested" (n=642).

In the primary, full regression model, we used all the variables presented in Table 1; in the results section, we refer only to those statistically significant after the stepwise regression. Due to its novelty and potential usefulness for policy and practice, in the next step we used descriptive statistics to examine separately the responses to questions about drivers' consumer preferences.

4. Results

4.1. Factors explaining carsharing use

The research allowed the following profile of carsharing users in Poznań to be defined (that differed from that of drivers not interested in

Table 1. Conceptual framework of the research

Factors explaining carsharing use (with available options in brackets)		Research questions
Socio-demographic characteristics	Gender (male, female) Age (18-24, 25-29, 30-39, 40-49, 50-59, 60+) Higher education (yes, no) Employment status (student, working full-time, unemployed/ retired/ house-making/other) Type of residence (flat, house) Up to 10 years since obtaining driving licence (yes, no) Number of cars in household (0, 1, 2+) Children in household (yes, no) Material situation (good, average, bad) Life satisfaction (high, average, low)	**RQ1**
Travel behaviour	Car use frequency (almost every day, several times a week, less frequent) Frequency of public transport use (regularly, occasionally, never)	**RQ2**
Consumer preferences for using and buying cars	Reasons for driving, REAS (comfort, travel time, no other option, work-related duties, travel cost, prestige – select up to 3) Dominant feeling when driving, FEEL (joy, sense of freedom, curiosity, nothing, stress, feeling of wasting time) Factors considered when buying/using cars, BUY (low price, equipment/accessories, ecological solutions, opinions in the media – all assessed on a 1-7 Likert scale)	**RQ3**

Source: authors' work

carsharing) in terms of socio-demographic features (RQ1, see Table 2). They are: male (more often than female), young or middle-aged (the older, the less likely to use carsharing), more educated (with university degree) and without children (the more children, the less likely to use carsharing). Therefore, those that have used or are interested in the service have many similar characteristics to those of early adopters of this innovative mobility solution in the USA and Western Europe previously identified in the literature (Burkhardt & Millard-Ball, 2006; Wittwer & Hubrich, 2018). Interestingly, drivers' residence type (flats or houses) was not important for the interest in carsharing in Poznań, while the literature suggests that density of built environment usually influences carsharing use. This may be related to the fact that, in Poland, richer citizens (potential carsharing drivers) live in houses, including in the suburbs, while the carsharing zones are often limited only to districts within city borders where blocks of flats and tenement houses dominate. Also, employment status was not statistically significant for carsharing – probably because both full-time workers and students expressed their interest. Moreover, other investigated factors, including driving experience (years since obtaining driving licence), material situation (high, average, low) or life satisfaction (high, average, low) were also not statistically significant factors in carsharing services utilisation. At this early stage of carsharing systems' development, carsharing seems plausible for drivers irrespective of working status, place of living and number of cars owned (all three of which are related to financial situation) for those who are satisfied with their life and those who are not.

Taking into consideration the travel behaviour patterns (RQ2), the analysis allowed it to be proven that carsharing users do not differ significantly from those not interested in terms of car use frequency: similar percentages of both groups drive every day, several times a week or occasionally. Together with the fact that years since obtaining driving licence were not statistically important for carsharing use, this suggests that carsharing systems can be a solution for all drivers, irrespective of their driving experience and travel routines. However, a statistically significant difference between users and those not interested lies in public transport usage:

Table 2. Factors explaining carsharing use in Poland: result of a stepwise logit regression

		coefficient	p-value	significant
	Const	0.534124	0.2439	
Gender - male	base category			
Gender - female	GENDER_1	-0.358592	0.0379	**
Age 18-24	base category			
Age 30-39	AGE_3	-0.418684	0.0807	*
Age 40-49	AGE_4	-0.856	0.0016	***
Age 50-59	AGE_5	-1.02723	0.0004	***
Age 60+	AGE_6	-1.89445	0.0000	***
Higher education - no	base category			
Higher education - yes	HIGH_EDU	0.583975	0.0009	***
No children	base category			
One child or more	N_CHILD_1	-0.325099	0.0715	*
Public transport use: regularly	base category			
Public transport use: occasionally	PUBLT_2	-0.38153	0.0424	**
Public transport use: never	PUBLT_1	-0.877658	0.0003	***
Reasons for using cars instead of car alternatives				
Work-related duties	REAS6	0.498693	0.0278	**
Feelings when driving a car				
Curiosity	FEEL5	0.795579	0.0051	***
Nothing	FEEL6	-0.551755	0.0528	*
Factors taken into consideration when buying / using a car				
Low purchase price	BUY1	-0.142876	0.0015	***
Equipment / accessories	BUY4	0.10986	0.0644	*
Opinions in the press / on the Internet	BUY6	-0.122742	0.0074	***

Source: authors' work

public transport is used much more regularly by carsharing users. The results seem to prove that carsharing users are open to multi-modal travel options (Kopp et al., 2015; Winter et al., 2020), willing to combine public transport with other mobility options, including free-floating carsharing (Becker et al., 2017; Ferrero et al., 2018).

Finally, considering consumer preferences for using and buying cars (RQ3), the research allowed it to be shown that carsharing users use cars for work-related duties more often than did those not interested in this mobility option. This may be related with the observation that carsharing is popular among those who drive a lot, so trying out new cars may constitute a hobby of sorts. For the other categories analysed, no statistical differences were observed between carsharing users and those not interested.

4.2. Consumer preferences for using and buying cars

Analysing the reasons for driving cars instead of using other mobility options, for all investigated drivers (Fig. 1) more than three quarters of respondents declare they use cars for their own comfort, and more than half say they drive because of travel time, as it is indeed the fastest possible option to get from one place directly to another. It would be difficult or impossible to talk those groups of drivers into resigning from cars entirely. Analysing reasons for driving, carsharing users declare 6.4% more work-related duties and 4.9% more travel time compared to the uninterested (suggesting that carsharing is a way to optimise city routes). Drivers not interested in carsharing report

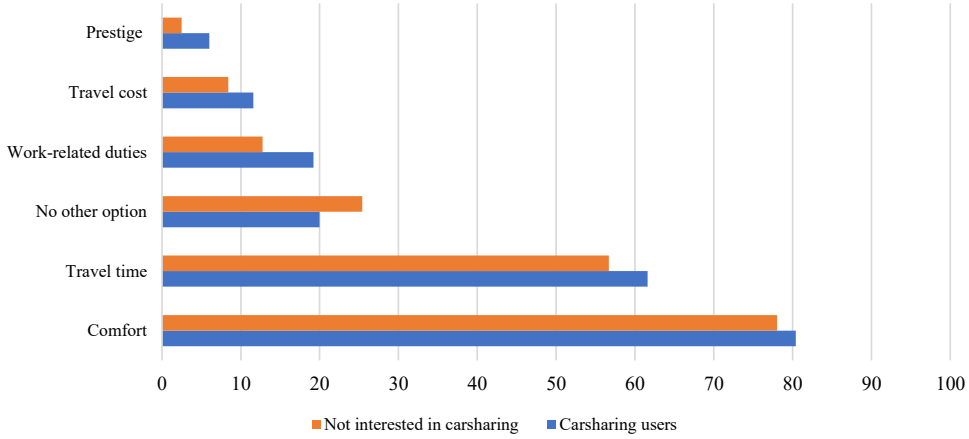

Fig. 1. Reasons for driving cars instead of using other mobility solutions (in %)
Source: own elaboration based on the results of interviews (n=892)

5.4% more that they drive a car because they see no other mobility option (proving that carsharers are more open to multi-mobility travel behaviour).

The analysis allowed it to be shown that the investigated drivers more often have positive feelings accompanying driving than negative ones (Fig. 2), suggesting again that it would be difficult to convince them to stop driving entirely. Carsharing drivers slightly more often than drivers not interested in this solution report positive emotional states: joy (29.6% vs. 24.2%), higher sense of freedom (27.1% vs. 23.9%) and in particular, curiosity (12.8% vs 5.4%, factor statistically significant, see Table 2). Positive feelings towards the activity of driving among carsharing users suggest they will not be afraid of using unfamiliar rented cars, but rather show willingness to try new car types or latest models. Curiosity should also create awareness of the positive environmental effects of new cars and of optimising car use. Conversely, drivers confident in their own car and not interested in carsharing report more neutral or negative feelings towards driving (especially nothing – 8.2% more often, see: Table 2, but also stress and the sense of wasting time).

When choosing cars to buy or use (Table 2, Fig. 3), carsharing drivers, more often than those not interested, pay attention to equipment and accessories. This suggests that carsharing represents the opportunity to drive new car models or types including hybrid/electric and the latest models of known brands. At the same time, carsharing users less often than other drivers pay attention to costs and the recommendations of others. This suggests that early adopters of this solution in Poland want to play an independent, trendsetter's role in terms of mobility and car use, standing out from the others, even for a certain cost (Burkhardt & Millard-Ball, 2006; Hinkeldein et al., 2015). Concern about the environmental effects of car use is rather moderate for all drivers (at similar, rather low levels for carsharing users and those not interested in carsharing). According to our research, at this moment in growing car markets, sustainability can only be considered a side effect of growing carsharing popularity – differently than among some conscious local societies, as suggested by Burkhardt, Millard-Ball (2006) or Magno (2021). Drivers choose carsharing as a travel mode for a combination of reasons, and sustainability can only be treated as "a nice bonus" to this travel option (as in: Hartl et al., 2018; Ramos et al., 2020). This may be related to lower environmental awareness and lower affluence in the societies of Central Europe than in the most developed ones. In the recent Eurobarometer study "Attitudes of European citizens towards the environment", protecting the environment was personally "important" or "fairly important" to only 88% of Poles, while the EU average was 94% (European Commission, 2020).

5. Conclusions and implications for practice

The presented empirical research is the first scientific study on carsharing users in Poland, and at the same time a response to the noticeable interest in this innovative mobility solution in the country, which

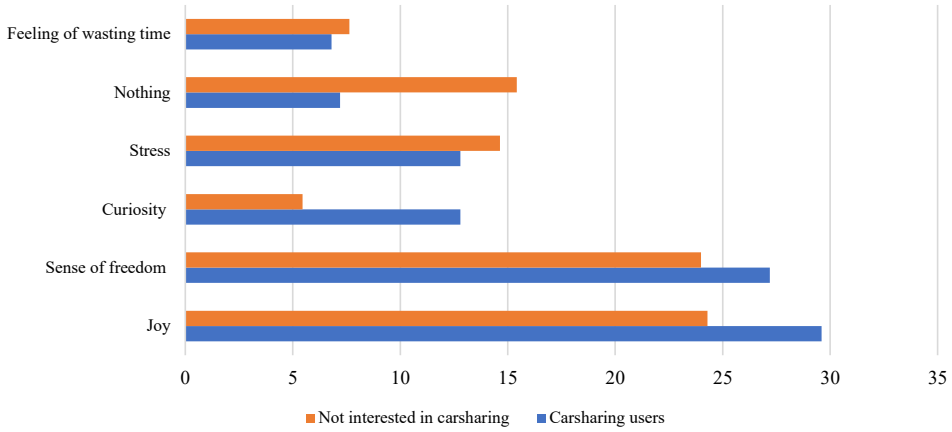

Fig. 2. Dominant feelings when driving a car (in %)
Source: own elaboration based on the results of interviews (n=892)

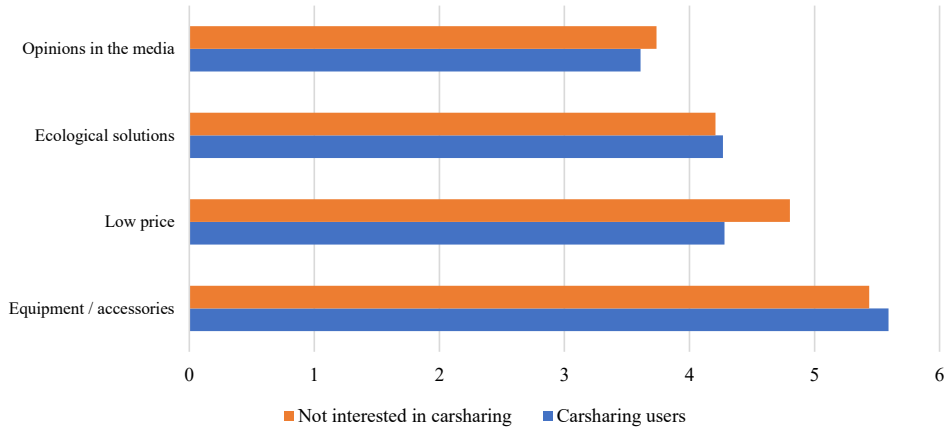

Fig. 3. Factors important when buying or using cars (average, on a 1–7 scale)
Source: own elaboration based on the results of interviews (n=892)

has a large and growing car market (Szmelter, 2018; Dyba & Doszczeczko, 2023). Research to date has mainly focused on subscribers to carsharing systems in highly developed countries; hence, the results fill a research gap observed in Central Europe – where the widespread use of the car is more recent, but is growing at a uniform pace across countries.

In our study, we explored which personal characteristics, travel behaviour patterns and consumer preferences of drivers are related to interest in carsharing services. Out of the investigated personal, socio-demographic features (RQ1), we proved that in Poznań carsharing users are predominantly young (in particular aged up to 39) and educated (with higher education degree), single and male. Concerning travel behaviour patterns (RQ2), Polish carsharing users drive cars with varying frequencies, drive for a variety of reasons (including in particular work-related ones) and feel curiosity towards the activity of driving. The study clearly shows also that they use public transport much more often than do drivers not interested in carsharing. At the same time, our study allowed us to confirm that drivers use cars because of comfort and travel time, and that driving means joy and a sense of freedom for them. It seems implausible in the foreseeable future to convince drivers to stop driving entirely – and that is why carsharing combined with public transport can be a good mobility option in cities (both for drivers and other citizens). Finally, an analysis of preferences (RQ3) showed that drivers positively disposed to carsharing services in the analysed large

city in central Europe pay special attention to car equipment and accessories (suggesting willingness to try new car models), but are less concerned about travel costs and the opinions of others than are other drivers (suggesting that the favourably disposed are richer and independent decision-makers). People with all the abovementioned features and attitudes can become early adopters of carsharing in Poland, in terms of the categories of innovation adopters of Rogers (2003).

Due to its novelty, in Poland and neighbouring countries, there is a need for the public transport policies of large agglomerations to further develop and promote carsharing as a sustainable mobility solution (Golalikhani et al., 2021, 2023). However, the meaningful, positive effects of carsharing on cities and the environment will come about only if the number of customers grows to a certain amount of users resigning from one or more of their privately owned cars (Shaheen & Cohen, 2007; Li et al., 2020). From the perspective of carsharing operators, these systems are profitable only if there is a large number of subscribers willing to frequently use the service to pay off the fixed costs (Prieto et al., 2017). Therefore, the profiles of users identified in our analysis should be considered in marketing activities and training plans by policy-makers and carsharing providers (Esfandabadi et al., 2022). Our results on the relevance of selected consumer preferences of Polish carsharing users or drivers not interested in carsharing could be useful to target communication and advertising to reach the desired customer segments (Hahn et al., 2020). Also, new locations for carsharing stations or operation zones can be planned in places that concentrate people with identified socio-demographic characteristics (younger, male, single, studying or with higher education degree) and good public transport accessibility. This will allow a balance to be achieved between shared-car supply and demand (Nansubuga & Kowalkowski, 2021; Liao & Correia, 2022).

To spur changes in the use of shared cars and resigning from one or more privately owned cars in a household, further incentives should be adopted under "smart" public transport policies, especially on a city level (Huwer, 2004; Cohen, 2019). We believe that more designated and free-of-charge parking places and more dedicated lanes for privileged vehicles, including shared cars, should be assigned in large cities in Central Europe. These could be included in novel "Mobility as a service" (MaaS) schemes, where the best travel options for a given time of day, traffic level, or set of available travel options can be identified via dedicated phone or internet applications (Jittrapirom et al., 2017). Drivers carrying a private car registration card could be subsidised to use carsharing from public funds at this early stage of carsharing market development. Lower prices and larger availability of shared cars would probably further increase carsharing popularity (Rotaris et al., 2019). As Western European examples show, only a combination of incentives and clear communication of benefits to the public can encourage the use of carsharing as part of sustainable mobility transitions (Sjöman et al., 2020).

Carsharing system functionality and effectiveness (which are often related to fleet size and deployment, car return zones, mobile application) may impact recognisability and customer satisfaction, which in turn influences the intention to re-use the service (De Luca & Di Pace, 2014; Namazu & Dowlatabadi, 2018). As it was not analysed in our study, further research could investigate how the actions of carsharing operators and the functionality of different carsharing systems (applications, return zones, payments) affect the interest and growth in the actual uptake of this innovative mobility solution in different areas.

Furthermore, our research focused on identifying carsharing users among a general sample of active drivers and was based on drivers' declarations. However, when car purchases or car use are concerned, consumers' declared preferences are often ultimately not borne out in reality (which is referred to as an "attitude-action gap", Coffman et al., 2016). Therefore, further research could also compare profiles obtained in our research with characteristics of actual subscribers to carsharing systems (as long as the data are provided by operators, which is often problematic).

Notes

1. A different carsharing type is person-to-person (P2P) carsharing – part of the sharing economy paradigm, where drivers themselves lend their own, private cars when unused to other drivers from the same community (Cohen & Kietzmann, 2014). This type of carsharing is so far a rare phenomenon that works only in the most-developed countries and societies characterised by a high level of trust. In the foreseeable future, it is difficult to expect such systems to work in Poland and most countries in the world.
2. The actual map of carsharing operators in Poland and Europe can be found at the

portal https://autonaminuty.org/mapa-cs/ (Accessed: 18.09.2024).

3. Less popular so far in Poland are station-based carsharing types, where cars are rented and returned to dedicated car parking stations (Rodenbach et al., 2018; Münzel et al., 2020).

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