

ONLINE AND APP-BASED CARPOOLING IN FRANCE: ANALYZING USERS AND PRACTICES



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ACKNOWLEDGEMENTS

We would like to thank BlaBlaCar for circulating the survey and making this study possible. Thanks also go to Nelson Chan and Dr. Elliot Martin of the Transportation Sustainability Research Center at the University of California, Berkeley, who also supported this research.

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ABSTRACT

This paper examines the characteristics and practices of ridesharing users in France. In May 2013 the authors surveyed members of BlaBlaCar, the largest online and app-based carpooling service in France, to analyze the socio-demographic characteristics and usage patterns of the respondents. The survey results identify correlations between socio-demographic characteristics and usage elements. Notably, users with a lower income level are more inclined to be passengers, while higher income users employ carpooling mainly as drivers. Students are shown to be more frequent users as well. These findings indicate some equity balancing effects, which may be unique to this shared mobility mode.

INTRODUCTION

Carpooling first appeared in France in 1958 under the name of “organized hitchhiking” (Vincent 2008). The original objective of carpooling was to provide mobility to young people with little money who could not afford to drive a personal vehicle. Despite its evolution, carpooling remained very affordable and is probably the most inexpensive transportation option in France today. It is typically three to four times cheaper than the train (Razemon 2013), and it offers more flexibility than public transit in terms of travel times and geography. These advantages explain in great part carpooling’s success in France, although the country is not equipped with high occupancy vehicles (HOV) lanes. HOV lanes are more typical in the United States and enable vehicles with higher occupancy (usually two to three occupants or more) to drive in a lane dedicated to carpooling during peak travel periods.

Information and communication technologies (ICT) have facilitated an evolution in ridesharing services (carpooling and vanpooling) in France and other parts of the world. During the late-1990s, there was a notable increase in the number of ridesharing websites that offered different forms of carpooling services. In 2007, the number of open-access carpooling websites in France was estimated at 78 (CERTU 2007). Chan and Shaheen (2012) estimated that there are 638 online ridesharing sites in North America; the majority of those sites support carpooling (612), and many serve both carpooling and vanpooling (127). Growth in the number of organizations made it challenging for any one provider to reach a critical mass, and the operators struggled financially (Vincent 2008).

BlaBlaCar, the focus of our analysis, was founded in 2006 (BlaBlaCar 2013). It rapidly became the most popular carpooling organization in France, and it supports about 90% of the market (L’Expansion.com 2012). The quality and efficiency of the online platform for identifying shared ride opportunities is a key success factor. In 2011, the organization transitioned from a free platform to a fee-based service. The company started to charge users a percentage of the trip fees (between 7.9% and 12.5%), as well as a fixed amount (between €0.7 and €1.2 or \$0.90 and \$1.50) for each trip, depending on when the reservation gets made (the earlier the cheaper). Although this transition was risky and contested by some users (Brouze 2011; Eve 2013; Evenstrood 2014), it was successful, and the number of users increased exponentially to reach 10 million across 13 different countries by 2014. In April 2015, BlaBlaCar bought competitors carpooling.com and AutoHop, increasing their user base to 20 million members across 18 markets (Dillet 2015).

The BlaBlaCar system is mainly based on occasional long distance or city-to-city trips, with an average trip distance of 300 km (186.4 miles). Passengers and drivers are connected through a website that is designed to combine social media with a reservations platform. These two associated elements enable a feeling of trust and safety that have contributed to the company’s growth. Given its notable success, BlaBlaCar provides an interesting case study for ridesharing.

This paper includes results from an online survey of BlaBlaCar of 618 members in France, conducted in May 2013. In this paper, we explore how this model of carpooling is used and by whom from an equal access perspective. The survey enables an analysis of the respondent profiles and insights into differences in their carpooling practices. We hypothesize that online-enabled carpooling attracts a relatively diverse population segment, and use of the service is reflected in socio-demographic characteristics of its customers.

The first section of this article reviews the ridesharing/carpooling literature. Next, we describe the study methodology and its limitations. The results are presented in the following section, including an analysis of respondent socio-demographic characteristics and how they relate to carpooling usage. Cross-tabulations and an ordinal regression model are the methods used in the analysis. Key findings are summarized and discussed in the conclusion.

BACKGROUND

The available literature on ridesharing is rather limited (Chan and Shaheen 2012; Teal 1987). In the United States, the literature is considered the most robust, as the “homeland of carpooling” (ICARO 1999). Indeed, large-scale organized ridesharing services first appeared in the U.S. in 1942 as part of the war effort (Chan and Shaheen 2012), and scientific publications on ridesharing practices and its users started to become available in the 1970s (Ferguson 1997).

Some of these publications document the ongoing evolution in ridesharing (Chan and Shaheen 2012; Teal 1987; Furuhata et al. 2013). In 1987, Roger F. Teal defined the use of ridesharing, in its broader sense, as “anyone who shares transportation to work in a private vehicle with another worker” (Teal 1987). Today, this definition seems rather restrictive, as new ICT technologies have enabled the organization of occasional ridesharing among unrelated individuals for purposes other than work, and the definition of ridesharing has progressively evolved to integrate these new practices. Chan and Shaheen (2012) provide the following definition of ridesharing: “It is the grouping of travelers into common trips by car or van. Ridesharing differs from for-profit taxis and jitneys in its financial motivation. When a ridesharing payment is collected, it partially covers the driver’s cost. It is not intended to result in financial gain. Moreover, the driver has a common origin and/or destination with the passengers.” The diversity of ridesharing systems and practice is also illustrated by the analysis of Furuhata et al. (2013), which highlights the existence of six classes of ridesharing matching systems: dynamic real-time ridesharing, ridesharing, long-distance ride match, one-shot ride match, bulletin board, and flexible carpooling.

Given ridesharing’s evolution, one can assume that its users have also changed. Roger Teal conducted one of the most in-depth studies on ridesharing users in 1987. He analyzed the factors determining the propensity to rideshare to and from work, using data from the 1977-78 Nationwide Personal Transportation Survey. His results show that ridesharing participants were more likely to have a lower income and be the “second worker” (typically women) of a household that had more workers than vehicles. Moreover, ridesharing users typically commuted longer distances and had a higher commute cost burden (with these two factors being correlated). Teal admits that these variables alone do not accurately predict ridesharing choice. He also recognized the importance of attitudinal factors to explain travel behavior. More recent data on ridesharing users comes from the 2000 US Census, the 2001 National Household Travel Survey (NHTS), and the 2005-2007 American Community Survey (ACS). This data show that carpoolers still tended to have a lower level of income in the 2000s. It also emphasizes that Hispanic Americans and African Americans carpool more than Caucasians and other populations (respectively 23%, 16% and 10% of their modal share). Some researchers also have focused on more specific forms of ridesharing. Burriss and Winn (2006), for instance, analyzed the profile of casual carpoolers (slugging users) and compared it with the profile of classical HOV lane users in Houston, Texas. Their results show that these two categories of carpoolers are quite distinct. Casual carpoolers are more likely to make commute trips vs. non-

commute trips (96% vs. 80%), are between the ages of 25 and 34, and are more likely to be single or married without children, while other HOV lane users tend to belong to larger households.

Even if these data do not enable a complete overview of the evolution of ridesharing users over the last decades, it provides insights into the socio-demographic factors that are likely to influence different forms of ridesharing use as a modal choice. In contrast, in France, there is very little information available on the profile of ridesharing users, and the recent literature on this topic is limited. There are no data on the modal share of ridesharing at a national level. However, in 2008, the average vehicle occupancy in France was 1.22 (Commissariat 2010). The literature on ridesharing in France is mainly comprised of reports and articles that are a few years old and may not be up to date (CERTU 2009). These sources provide a discussion of the different ridesharing services and their evolution, as well as opportunities for improvement and development, such as real-time ridesharing systems. While different forms of organized ridesharing exist in France, the key models are Internet-based, with either restricted-access (in the case of employer-based carpooling) or open-access websites (CERTU 2007). The focus of this article is on the second of these forms: Internet and app-enabled carpooling through an open-access website.

The literature on Internet-enabled carpooling is scarce, but there is one interesting source of data. In 2009, an insurance company (Maif 2009) conducted a survey among BlaBlaCar users to analyze user behavior and motivations. Their results provide an overview of the user profile and how it relates to their usage. It also provides early insights into the possibility of varying usage practices through a distinction between passengers and drivers. Nevertheless, some elements are missing to enable a deeper analysis, such as level of income or cross tabulations between socio-demographic characteristics and carpooling practices.

Some researchers in France also studied carpooling as means to broaden the transportation options of disadvantaged populations and to foster accessibility. Carpooling is recognized in France as a mobility solution for disadvantaged populations (e.g., elderly, disabled, or unemployed individuals) (CERTU 2007). Yet, there is little evidence that these individuals are using organized carpooling (Maif 2009). Some other forms of carpooling have been described as more adaptive to the needs of lower-income populations in France. One example is informal carpooling, which takes place among relatives or coworkers, usually for regular trips. Informal carpooling does not include slugging or casual carpooling, as this phenomenon is practically non-existent in France. These informal practices are considered more common than organized carpooling services among lower-income populations, although there is no data to support this assertion. Some experts believe that real-time carpooling (i.e., carpooling organized on very short notice using smartphones and GPS technologies) has a higher potential than more traditional forms of organized carpooling services that are planned in advance (Meissonnier 2011). Real-time carpooling is closer to informal and spontaneous carpooling and implies a high level of flexibility, as people are matched instantaneously a few minutes before the trip (CERTU 2009). In contrast, the potential of classical carpooling is perceived to be lower for disadvantaged populations (mostly lower-income workers in this case), as it does not offer enough flexibility for individuals that work variable hours or in remote places, for instance. Thus, classical carpooling is perceived as a solution for those with more regular schedules (Chevallier 2002).

In this paper, we focus on a more dynamic carpooling service, BlaBlaCar, which serves longer distances or city-to-city trips. We examine the equity impacts of this service based on socio-

demographic characteristics, particularly income level and service use. Equity is an important concept in transportation, as mobility impacts one's ability to access economic and social opportunities (Litman 2013) including: rights, liberties, powers, opportunities, income, wealth, and self-respect, or "primary goods" as defined by Rawls (1971). Our BlaBlaCar survey was designed to help us understand how Internet and app-enabled carpooling provides mobility and accessibility across a wide variety of users.

METHODOLOGY

This paper is based on an online survey that we launched in May 2013 among the users of BlaBlaCar, the primary carpooling service in France, which represents 90% of the market (L'Expansion.com 2012). The objective of the survey was to understand the socio-demographic profile of BlaBlaCar carpooling users in France and their overall usage patterns. The survey was composed of two main sections: one focused on an individual's carpooling practices and transportation behavior and the other requested socio-demographic information. Most of the questions listed a range of specified responses; however, certain questions were open ended.

BlaBlaCar circulated the survey through automatic e-mails that they sent to their users. There was no obligation to answer, and the responses were anonymous. All the respondents were subscribers of BlaBlaCar and included both regular (daily or weekly) and less frequent (monthly or less) users. BlaBlaCar ceased recruitment after approximately 500 surveys were completed. The final survey population included 618 responses, including 471 completed surveys. Both complete and incomplete responses were used when possible.

Study Limitations

The main limitation of this research is that the representativeness of the results cannot be validated. Also, no survey incentives were provided. Thus, there is likely a self-selection bias among respondents. We noticed a gap between our socio-demographic results and the gender data reported by BlaBlaCar, as the company provides these statistics. While our results reflect a respondent population of 54% women, they only represent 46% of the BlaBlaCar user population in France. Another survey limitation is associated with question phrasing regarding income level. We chose not to ask for a precise figure regarding income level, as we thought this might discourage a response. This made it more challenging to compare the survey data with corresponding national data.

RESULTS

As part of our results discussion, we highlight three key areas of our analysis including: socio-demographic characteristics, socio-demographics and carpooling usage, and BlaBlaCar use frequency and ordinal regression analysis.

Socio-Demographic Characteristics

In our analysis, we employed socio-demographic data to understand the user profile and how this profile impacts carpooling use. The respondents were asked to provide their individual level of income per year among different categories. Monetary values used in this paper are in May 2013 Euros, as is the EUR/USD exchange rate used for comparison purposes. The lower category (<€10,000 per year or <\$13,449) was designed to correspond approximately to the first quartile of the income distribution in 2010 in France, which was €9,370 (or \$12,602). As a consequence, this category represents about 25% of the French population, and 23% of the respondents. The results for the

median income are also quite similar for the sample and the French population. For the sample, the median is situated between €15,000 and €20,000 (\$20,173 and \$26,896); for France, the median was €17,510 (\$23,546) in 2010. Thus, there are no major differences between the sample and the French population with respect to income. Nevertheless, it is important to note that the income levels are very diverse, spreading from very low to very high. Later, we analyze the impact of this diversity on carpooling usage.

Table 1. Socio-Demographic Variables for Respondents and France.

Individual Income per Year	France¹	Survey
Less than €10,000	-	23%
Between €10,001 and €15,000	-	11%
Between €15,001 and €20,000	-	16%
Between €20,001 and €25,000	-	16%
Between €25,001 and €30,000	-	9%
Between €30,001 and €35,000	-	8%
Between €35,001 and €40,000	-	6%
Between €40,001 and €45,000	-	3%
Between €45,001 and €50,000	-	2%
More than €50,001	-	5%
Education	France	Survey
Primary School Certificate or less	21%	2%
Secondary School Certificate	7%	1%
Certificate of Vocational Proficiency	25%	10%
Baccalaureate (Highschool certificate)	17%	15%
2 Years of College	13%	25%
Superior diploma (Undergrad to PhD)	17%	47%
Age	France	Survey
18-24	11%	22%
25-34	16%	23%
35-44	17%	12%
45-54	17%	20%
55-64	16%	18%
65 years or older	23%	4%
Gender	France	Survey
Male	48%	46%
Female	52%	54%
Socio-professional Category	France	Survey
Tenant farmer	1%	0%
Craftsman, merchant, entrepreneur	3%	4%
Executive, superior intellectual	10%	27%
Intermediate profession	13%	11%
Employee	16%	23%
Worker	12%	2%
Retired	27%	10%
Student	9%	18%
Other with no professional activity	9%	4%
Location	France	Survey
Rural	14%	23%

Urban	86%	77%
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¹Data not applicable; however, other means were used to enable a comparison, such as quartile and median.

As shown in Table 1, with respect to education, the survey reveals an important distinction from the French population. We used the same categories as the French National Institute of Statistics (INSEE) to make comparisons, and see an overrepresentation of individuals with a high diploma level from our survey. Most of the respondents have a university diploma (72% of the respondents in contrast to only 30% for France), and overall, their level of education is greater than the French population in general, no matter which age category is examined (INSEE 2011). Interestingly, the previous BlaBlaCar survey launched in 2009 demonstrated the same education trends. While Maif (2009) does not mention the education level of respondents, the report gives the respondents' socio-professional categories with Executives and Superior Intellectual Professions and Intermediate Professions (professions that usually require a high level of education), representing 46% of the respondents. If we add Students to that grouping, 73% of respondents have higher education levels.

With respect to participant age, the results show that carpooling respondents are on average much younger than the French population. Young people seem to be very well represented among carpooling users, with 45% of respondents under 35. However, carpooling gathers a larger age distribution than one might expect, as these results show that the practice is not only reserved to young people. Those aged 45 years and older are well represented in the survey (42% of the respondents). Not surprisingly, the category that is least represented is 65 years and older. Interestingly, the category 35 to 44 is under-represented in the survey, perhaps due to child care responsibilities and needs associated with younger children, as supported by the literature (Teal 1987; Chevallier 2002; Litman 2013; Rosenbloom and Burns 1994). Parents, nevertheless, are well represented in our survey, but their children are perhaps older in age.

The majority of respondents are women, although this does not correspond to the actual proportion of overall users provided by BlaBlaCar. Our survey results contain 54% women in contrast to 46% men, while the actual proportions of Blablacar users are the opposite with 54% men and 46% women. Finally, respondents were asked their postal codes, to determine if they come from rural or urban areas. The results show that 77% of respondents are from urban areas in contrast to 86% overall for France. To summarize, the survey results suggest that BlaBlaCar users have an average level of income similar to the French population, but they tend to be younger, more educated, and more frequently reside in rural municipalities.

Socio-Demographic Characteristics and Carpooling Usage

In this section, we focus mainly on the question of financial resources, although other socio-demographic characteristics are studied to present a more complete analysis. As noted earlier, the level of respondent income is rather diverse, so it is interesting to understand how this diversity relates to usage. To analyze carpooling use relative to income, we divided the respondents into three categories, those who have an income: 1) less than €10,000 (\$13,449), 2) between €10,000 and €25,000 (\$33,620), and 3) above €25,000 (\$33,620). This enables a comparison of the use of low-income, middle-income, and high-income users. The limit of €10,000 corresponds approximately to the 1st quartile of income in France. The limit of €25,000 is designed to match the 3rd income quartile (that is €24,590 or \$33,067) and also corresponds to the upper bound of the middle class, as defined by the Inequalities Observatory (Observateur 2011). The first category represents 23% of

survey respondents, the second 43%, and the third 34%. It is important to note that 74% of the low-income users are students. Students have specific mobility needs and options. The existing literature documents that despite their relatively low financial resources (which often depend on their parents' resources), their mobility patterns are diverse and often reflect experimentation (Vincent 2008). From our survey, carpooling appears to be an important transportation option for students.

Table 2. Carpooling Use and Car Ownership as a Function of Income Level (Individual Net Income per Year).

	Less than €10,000 (n= 98)	Between €10,000 and €25,000 (n= 185)	Above €25,000 (n= 147)
Frequency of Use			
Every day or two	2%	1%	1%
About once a week	17%	7%	7%
About once a month	34%	24%	25%
Occasionally	46%	65%	64%
Never	1%	3%	3%
		Between	Above
	Less than	€10,000 and	€25,000
	€10,000	€25,000	€25,000
	(n=98)	(n=183)	(n=147)
Role			
Passenger	54%	26%	12%
Driver	17%	36%	51%
Both	29%	38%	37%
		Between	Above
	Less than	€10,000 and	€25,000
	€10,000	€25,000	€25,000
	(n=95)	(n=180)	(n=143)
Purpose of trips			
Work only	17%	8%	11%
Leisure only	58%	81%	71%
Both	25%	12%	18%
		Between	Above
	Less than	€10,000 and	€25,000
	€10,000	€25,000	€25,000
	(n=98)	(n=185)	(n=147)
Number of cars in the household			
No car	13%	9%	6%
1 car	31%	46%	37%
2 cars	26%	31%	44%
3 cars or more	31%	14%	14%
		Between	Above
	Less than	€10,000 and	€25,000
	€10,000	€25,000	€25,000
	(n=98)	(n=185)	(n=143)
Alternative to carpooling			
Public transportation	48%	29%	24%
Personal car	41%	63%	69%
Rental car	1%	0%	2%
No alternative (I wouldn't have done this trip)	8%	4%	3%
Other	2%	4%	2%

Key sections of this analysis include: frequency of carpooling use, trip purpose, passenger vs. driver role, motivations, and transportation modes that would have been used in the absence of carpooling.

Frequency of Carpooling Use

The survey results show that respondents with a relatively low-income level (< €10,000) are more likely to use BlaBlaCar on a regular basis (once a day or once a week): 19% in contrast with 8% for the high-income users. Please note that while some association between income and frequency is evident, income was not found to be a statistically significant predictor of usage frequency in the ordinal regression analysis, discussed later.

BlaBlaCar is more associated with occasional use as it is more focused on long distance and city-to-city travel. Thus, it is not surprising that most of the respondents use it only occasionally. More regular use, however, can be interpreted in several ways. This could mean that carpooling is a convenient and reliable transportation solution for some users, such as students, as they must travel further or they do not have many other options available. Our analysis of trip purpose and alternative transportation modes below helps to explain how carpooling use corresponds to a choice or necessity.

Trip Purpose

Trip purpose results show that people use carpooling for different purposes, depending on income. Respondents were asked if they carpool for leisure, work, or both. We used this difference between work and leisure to represent roughly the distinction between mandatory and non-mandatory mobility. The data reveal that people with a lower income (<€10,000 or <\$13,449 a year) are more inclined to use carpooling for work/school than people with a higher income level (>€25,000 or >\$33,620 a year). As shown in Table 2, 17% of respondents with a lower income use carpooling for work only (both regularly or occasionally) in contrast to just 11% of respondents with a higher income. The low-income users who carpool for work/studies only are all under the age of 24.

Given BlaBlaCar's focus on serving occasional and long-distance trips, it is not surprising that the majority of respondents use BlaBlaCar for leisure purposes. Nevertheless, those that use BlaBlaCar for work/study trips are on average younger and less wealthy than leisure users. This confirms a dual practice among different user groups.

Passenger vs. Driver Role

We also observe a difference in the role taken in a carpool, as users with a lower income level tend to be passengers, while carpooling users with a higher income are mainly drivers (51% are drivers only). This is related to car ownership. In our survey, the propensity to have no automobile increases with lower income levels (13% have no car among lower-income respondents in contrast 9% among middle-income and 6% among higher-income users).

Naturally, the roles of passenger and driver do not imply the same level of comfort and autonomy. The passenger faces the first mile and last mile problem in getting to the carpooling meeting point and his/her final destination. Moreover, a passenger is typically perceived as a guest in the driver's car (Laurier 2008). A closer look at our results show that the majority of drivers belong to the socio-professional categories of "Executives and Superior Intellectual Profession" (34%) or "Employees" (21%). Passengers on the other hand belong primarily to the category of students (32%), followed by employees (26%).

Motivations

In our results, the motivation ranking does not vary notably from one income category to another, but there are still some interesting differences to be emphasized. To assess participant motivations, the respondents were asked to rank a series of statements on a scale from 0 to 100. These statements varied depending on the role held in the carpool formation: driver or passenger. See Table 3 below.

Table 3. Motivations to Carpool on a Scale from 0 to 100 as a Function of Income Level (Individual Net Income Per Year).

Motivations to carpool (0 to 100)	Less than €10,000	Between €10,000 and €25,000	Above €25,000
As a passenger			
Save money	92	89	87
Make my trips more pleasant and social	65	66	59
Help the environment	64	69	66
Save time	47	39	24
Make my trips less tiring	49	44	31
Because I have no choice	46	29	19
As a driver			
Save money	97	83	76
Make my trips more pleasant and social	71	71	64
Help the environment	68	73	65
Help others to get around	61	75	66
Make my trips safer	45	40	35

The results show that online carpooling is economically attractive to respondents. Even individuals who can afford other transportation modes seem to prefer carpooling to reduce their overall mobility costs. As a consequence, saving money is the more important motivation across income categories. Indeed, among people who earn more than €25,000 (\$33,620) a year, “saving money” is still ranked as the most important motivation, with a rating of 87 in contrast to 92 (still on a scale of 0 to 100) for people earning less than €10,000 (\$13,449) a year. However, the results also show that users with a low income rank the motivation “Because I have no other choice” higher than users with higher incomes, with a rating of 46 in contrast to 29 and 19 for the middle- and high-income categories. This is evidence of a constrained practice, which is examined further with respect to other available transportation options in the next section.

Alternative Mode in the Absence of Carpooling

Respondents were asked what kind transportation mode they would use in general, for the trips they now make using carpooling. The results show that people earning less than €10,000 (\$13,449) would use public transportation the most (48%), while the majority of respondents with a higher income level would drive alone (69%). This is also associated with carpooling role; 88% of the drivers would use a personal car, while 65% of the passengers would use public transportation.

The results also indicate that 38% of the lower-income users consider carpooling as a good alternative to car ownership in contrast to only 20% and 18% of middle- and high-income users. These results show that for some of the users, including those with low financial resources, carpooling is an effective mobility option and not necessarily one chosen by default. However, we also observe that 8% of users belonging to the lower-income category would not have made the trip

in most cases (in contrast to 4% of middle-income and 3% of higher-income respondents). To summarize, for most respondents carpooling is a solution among other available options that are more or less convenient. However, the survey highlights the existence of more constrained users who do not have other options.

BlaBlaCar Use Frequency and Ordinal Regression Analysis

To better understand which respondent factors directly influence BlaBlaCar usage frequency, an ordered logistic regression was performed with usage frequency as the dependent variable. The categorical usage frequency responses are: 1) Every day or two, 2) About once a week, 3) About once a month, and 4) Occasionally (irregular trips). The roughly 3% of completed survey respondents answering “Never” to this question were omitted from the regression analysis, amounting to 460 respondents used in the analysis. The majority of these respondents (62%) reported only using BlaBlaCar occasionally, while 28% reported about once a month, 9% once a week, and 1% every day or two. It should be noted that the lack of spread in frequency led certain variables to not be statistically significant, as discussed later in this section. The results of the regression are shown in Table 4 below.

Table 4. BlaBlaCar Usage Frequency Ordinal Regression.

Intercepts (Frequencies)	Value	Std. Error	t-value
Every day or two About once a week	5.207	0.801	6.499
About once a week About once a month	2.918	0.703	4.149
About once a month Occasionally ³	0.982	0.684	1.436
Coefficients	Value	Std. Error	t-value
Trip Purpose – Work	1.623	0.233	6.965
Alternative Mode – Public Transit	-0.629	0.271	-2.323
Role – Driver ⁴	-0.465	0.281	-1.655
Mobile Application Use - Yes	0.818	0.219	3.742
Student	0.774	0.345	2.240
Age ³	-0.0947	0.0911	-1.040
Income ³	0.0393	0.0566	0.694
Education ³	0.0604	0.102	0.591

³Not statistically significant at the 90% level

⁴Statistically significant at the 90% level, but not 95% level

The intercept values between frequency levels indicate cutoff values that dictate what frequency category the model output falls into. For example, if the model outputs a value of 4, it estimates that this respondent would most likely use BlaBlaCar “About once a week,” since 4 falls between cutoff values 2.918 and 5.207. The coefficients are the independent predictor variables of the model, some of which are factor (categorical) variables, and others are covariates (continuous variables). Factor variables include: Trip Purpose – Work, Alternative Mode – Transit, Role – Driver, Mobile Application Use – Yes, and Student. These variables are all binary and correspond to: work trip purposes (vs. leisure trips), public transit as an alternative mode if BlaBlaCar were not available (vs. car and other modes), role as a driver (vs. passenger), use of BlaBlaCar’s mobile application (vs. no app use), and student (vs. other professions), respectively. Continuous variables used are Age, Income, and Education. These variables all have an increasing scale and were treated as continuous instead of factor variables. A goodness of fit test on the model using the chi-square test of the residual deviance produced a very small p-value (<0.01), indicating a poor overall model fit. This is due to the large

number of respondents (62%) that fell into the occasional use frequency category. Even though the goodness of fit is low, the model coefficients are useful to analyze since their magnitudes and directions provide additional insight into user behavior.

The regression results uncover some points we could not discern from socio-demographic statistics alone. Since the intercepts of the model increase with increasing frequency, positive coefficient values lead to higher predicted BlaBlaCar usage, and negative coefficients lead to lower predicted usage frequency. Following this logic, we see that work trip purpose, mobile application use, and student status are all factors influencing higher usage frequency in differing degrees. Work trip purpose has the highest value coefficient of the three, indicating that respondents that use BlaBlaCar for work trips tend to use it more often than those who use it for leisure trips only. Members who have used BlaBlaCar's mobile application tend to take more trips, since downloading and using a smartphone app generally warrants a higher level of commitment to the service. Finally, students take more frequent trips than non-students, which may be due to generally higher comfortability with new transportation options and lower student vehicle access.

Factors leading to lower usage frequency include: choosing to use public transit in the absence of BlaBlaCar and having the role of driver. The model predicts that those who would have taken public transportation in the absence of BlaBlaCar use the service less frequently than those who would have used a car or other mode to make the trip. This is likely due to the transit accessibility or inaccessibility of an individual's trip. If good public transit options exist from a respondent's origin to destination, it is much easier for them to replace a BlaBlaCar trip with public transit, thus explaining the lower usage frequency seen among these members. If the respondent's origin or destination does not have good public transit options, they are more likely to rely on a car to make the trip. It then follows that these members use BlaBlaCar more frequently because they would make the trip with their private vehicle anyway, and if they are a passenger they may have limited alternatives to carpooling. The other factor that predicts lower usage frequency is being a driver. This an interesting finding because BlaBlaCar operations depend on drivers posting rides, yet drivers are less likely than passengers to be frequent users. This finding makes sense considering that passengers (who may not own a car) are more dependent on the service and therefore use it with more frequency than drivers. This also relates to the finding that higher-income individuals are more often drivers, highlighting that these individuals may not be as financially incentivized to use BlaBlaCar with high frequency.

It should be noted that age, income, and education are not statistically significant at the 90% level in the model. Inclusion of these variables is important, however, since they are key socio-demographic factors that are included in most modeling efforts. They are not statistically significant here mostly due to the homogeneity in BlaBlaCar trip frequency of the respondents. Since 62% of respondents indicated that they use BlaBlaCar occasionally even though our sample contained a generally younger, well-educated population, these factors did not significantly influence usage frequency because the majority of these users fell into this frequency category. Income did not seem to affect frequency either, as both low- and high-income individuals use the service with similar enough frequencies that income was not statistically significant as a predictor variable. Although we found some association in the previous section that low-income members use BlaBlaCar with slightly higher frequency than middle- and high-income members, the regression model shows that income alone is not a significant predictor of usage frequency.

CONCLUSION

Carpooling appeared in France in 1958 and grew to become an important transportation mode. Despite its importance in the French transportation landscape (over three million users), there is limited research on this subject. For this reason, we implemented a survey with BlaBlaCar users to better understand this form of carpooling. Our research is focused on the analysis of the user's socio-demographic characteristics to evaluate what segments of the French population use carpooling and how their usage varies relative to these characteristics.

The survey showed that carpooling users are on average more educated and younger than the French population (87% of the respondents have a baccalaureate level or more in contrast to only 47% for France, and 45% are under 34 years of age in contrast to 27% for France), although their level of income is relatively similar to the general population. People with a low-income level (defined here as < €10,000 or <\$13,449 a year) are represented among carpooling users, along with individuals with an intermediate income level (between €10,000 and €25,000 or \$33,620) and a high-income level (> €25,000 or >\$33,620). Further analysis reveals some differences in their usage practices. Although not found to be a statistically significant predictor of usage frequency, carpoolers with a lower-income level tend to carpool slightly more frequently than carpoolers in the higher-income groups. They also have, on average, fewer alternatives available to them than wealthier users: 8% would not have taken the trip, if carpooling did not exist in contrast to 4% for middle-income and 3% for high-income users. Moreover, respondents with a low-income level are most frequently passengers (54% of them carpool only as passengers), while people with a high-income level are more often drivers (51% carpool only as drivers) and rarely only passengers (12%). The ordinal regression analysis reveals that factors such as work trip purpose, mobile application use, and student status lead to higher BlaBlaCar usage frequency. Meanwhile, respondents in the driver role and those choosing public transit as an alternative mode experience lower usage frequency. Socio-demographic factors, such as age, income, and education, are not statistically significant predictors of frequency, emphasizing that even though many BlaBlaCar members are younger and well educated, these factors alone have little to do with how often individuals use the service.

Because of these differences in carpooling use, we suggest that long-distance carpooling in France reflects a dual practice relative to different population and user segments. Even though it seems safe to say that lower-income users as well as higher-income users gain mobility and accessibility due to carpooling, all categories of income do not have the same range of choice, and for some users, carpooling appears to be the only option. Future research is needed to better understand carpooling in France and how it could be extended to more socio-demographic groups, along with its social and environmental impacts.

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