Long-Distance Travel as an Extension of Everyday Life: Understanding Distinct Traveler Types

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ABSTRACT

With the growing relevance of long-distance travel and the resulting climate impacts, the understanding of long-distance travel next to everyday travel becomes relevant. In particular in urban areas, people often compensate short distances and the use of environmentally friendly means of transport in everyday life with a higher amount of long-distance travel. The question arises how to characterize the behavior of urban people considering both everyday and long-distance travel behavior. Of interest is, whether there are discrepancies or similarities between the both kinds of travel, especially regarding mode choice. The demand for a car may not only result from daily mobility needs but from the extension of everyday life with long-distance travel. With our paper, we present a typology of distinct travel types, that considers characteristics of everyday travel and long-distance travel as well as attitudes. By using data from a survey in Munich (Germany), we analyzed the relevance of long-distance journeys with short durations, such as weekend trips, as an extension of everyday life. For the segmentation, characteristics of everyday travel, long-distance travel and attitudes towards the car and public transit were simultaneously included in a cluster analysis. Seven traveler types were identified and compared to each other. The results show that traveler types exist that are very similar in everyday travel behavior but show completely different characteristics in terms of long-distance travel volumes and mode choice. Furthermore, we also see that for some traveler types, the car exclusively plays a role for trips that extend everyday life.

Keynotes: long-distance travel, everyday travel, traveler types, travel skeleton, car use, attitudes

INTRODUCTION

The investigation of long-distance travel is limited to a few studies. Nevertheless, an increasing importance became apparent, due to the growing awareness of the climate change and the emissions resulting from travel. The environmental impacts are particularly high when long distances are travelled, often using less environmentally friendly means of transport. The demand for long-distance travel is growing and in the case of Germany, trips with distances of more than 100 km explain 45% of the total mileage (*1*) and even more in terms of the climate impact (*2*). Therefore, it is essential for researchers and policymakers to understand long-distance travel to derive measures for influencing long-distance travel and thus to reduce the impacts caused by travel.

For everyday mobility an extensive body of literature and a detailed knowledge about influencing factors for travel and mode choice exist. For occasional long-distance travel this knowledge is comparatively low. However, the circumstances, such as the influences of sociodemographic characteristics, psychology and infrastructure are different in long-distance travel compared to everyday travel. Existing studies deal with certain types of long-distance travel, for example long-distance commuting or holiday travel, but they neglect the fact that certain long-distance events cannot be clearly assigned to specific types of travel. There is an overlap between everyday travel and long-distance travel, which is mainly given for long-distance leisure journeys with short durations and which occur on a regular basis. If people perform recurrent long-distance activities, this needs to be assessed and classified differently from single events such as holiday trips. People with typical long-distance events as an extension of their everyday life behave in a different manner than those who spend their leisure time at home.

Another relevant aspect in the context of long-distance travel is mode choice. For short-term long-distance trips, the car plays an important role, as it offers flexibility in terms of both the time it can be used and the accessibility to destinations. Especially people living in urban areas may use cars only for leaving the city as they are able to cope daily life without a car. As a result, the decision for owning a car may not only result from daily mobility needs but from the extension of their everyday lives with long-distance travel. In addition, attitudes and preferences allow to explain the mode choice of individuals. Whether people extend their everyday mobility by long-distance events and which means of transport they choose for this depends on the available transport options, their attitudes, but also on the destinations to be reached.

It becomes clear that people show diverse travel patterns with specific characteristics regarding regularity, mode choice and distance, in particular when focusing on long-distance travel as extension of everyday travel behavior. The following questions therefore arise: How often and how far do people undertake long-distance trips? What means of transport do people use for their daily mobility and for their long-distance trips? Do people undertake long-distance trips on a regular basis and extend their usual environment of everyday life? The added value of the investigation in this context lies in the ability to define targeted measures for groups of people with similar travel patterns and similar needs. These can help to influence behavior depending on the characteristics of the groups.

To answer these research questions, we analyzed data from a travel survey that took place in Munich, Germany. Its geographical location close to the Alps makes Munich an attractive location for excursions outside of the city with short durations, e.g. daytrips or weekend trips. To find and describe distinct groups of travelers in our data, we applied a cluster analysis. Therefore, we considered characteristics that describe long-distance trips with short durations, the everyday

travel behavior as well as psychological factors combined in one approach. Seven types of travelers were identified, which could be distinguished according to their specific characteristics.

The paper is structured as follows: First, we present the literature on long-distance travel. Second, the survey approach and the data used are described. Third, we present our methodology with the selection of clustering variables and the clustering approach. The resulting clusters are then described, interpreted and compared with each other. This is followed by a discussion of the results and a conclusion with references to further work.

LITERATURE REVIEW

In this section we present literature and studies on long-distance travel. First, the different definitions of long-distance travel in studies are discussed. Second, we describe the determinants influencing long-distance travel and the relevance of the car as a means of transport. Third, we describe methods to identify distinct mobility types.

Definition of long-distance travel

Against the background of the research question it is necessary to look on definitions of long-distance travel: There is no general criterion for defining long-distance travel, which means that the results of studies are often not comparable. Some surveys, such as the "Reiseanalyse" in Germany, only focus on holiday trips with overnight stays (*3*). In other studies the differentiation between everyday travel and long-distance travel is done by a distance criterion (*4*), as for example a cut-off at 100 km (*1*). This approach generally takes into account all trip purposes, e.g. long-distance commuting and leisure and business travel. However, these trips differ significantly as one takes place very regularly and to the same destination while the other is rarely and probably to different locations. Another definition for long-distance travel can be found in the context of tourism. Tourism is defined as the activities that take place outside the individual's usual environment (*5*). No minimum distance criterion is used and it is up to the subjective assessment of the surveyed person to decide whether a trip takes place inside the usual environment or outside.

An approach to derive the usual environment from travel survey data to differentiate between everyday and tourism-related travel is presented by Magdolen et al. (*6*). It was shown that the regularity, i.e. the routine, of trips is a relevant characteristic to describe the usual environment. In this context, trips with long distances can also be assigned as part of the usual environment if people do them frequently. This is also a relevant definition as it illustrates the continuous overlap between daily and long-distance travel: People increasingly integrate short holiday trips into their daily lives (*7*), which highlights the relevance of investigating long-distance trips with short duration as an extension to everyday travel.

Determinants of long-distance travel and the role of the car

Travel behavior of individuals is the result of several decisions and influences with sociodemographic, infrastructural and psychological factors as determinants (*8*). Although most studies refer to everyday mobility, there are also findings about the influencing variables in the context of long-distance travel and tourism. Level of education, sex and age were identified as important influencing characteristics (*9, 10*). Furthermore, the income is an important variable to explain the number of long-distance trips and mode choice (*2, 11*). Besides sociodemographic characteristics the psychology is identified as a main dimension, that influences the travel behavior

of individuals. This is proven in studies on everyday travel behavior (*12, 13*), but is also confirmed for long-distance travel (*14, 15*). Moreover, the aspect of the built environment was identified as an influencing factor. It was found, that people living in urban areas show a higher number of long-distance trips compared to rural population (*16*). It was also found, that shifting leisure activities to everyday life reduces the probability of urban people to travel to distant places (*15*). These results correspond to the compensation hypothesis, which describes the phenomenon of an increased travel demand of people from dense and urban areas due to a lack of parks and recreational opportunities in cities (*17*).

Regarding mode use, people in urban areas rather use environmentally friendly means of transport in everyday life compared to people from suburban or rural areas (*16*). In cities, where alternatives such as public transit (PT) or cycling and walking provide attractive alternatives, people not necessarily need a car for daily travel. However, when long-distance travel behavior is analyzed a different picture is revealed: next to long-distance travel by train, people from urban areas have a higher tendency to travel by air. In addition, the car use of urban populations in long-distance travel has the same extent as for rural populations (*16*). Overall, for more than half of the long-distance trips in Germany, the car is the chosen means of transport (*2*). The relevance of the car as main means of transport in long-distance travel was identified in several studies (*10, 18*). This relevance of cars may be due to the characteristics of long-distance trips, activities or locations: distances are generally too long to walk or cycle, complex trip patterns exist, and the destinations outside cities are frequently only accessible by car (*19*). In long-distance travel, mode choice and destination choice are closely linked (*18*). The car plays a special role here, as it is often easily available and has flexible characteristics that allow people to decide when and where to go. However, it should be noted that the car is only considered up to a certain distance. Since the present study considers long-distance trips of short duration, the car is to be seen as a relevant means of transport and is therefore examined in detail.

Segmentation of distinct mobility types

For policy makers it is important to identify possibilities to influence the individual decisions based on travel behavior studies. To derive targeted measures and to introduce specific products or policies, studies in travel behavior research carry out segmentations of distinct groups of people or user groups. A cluster analysis is an often used method for segmentation (*14*). In the context of describing distinct mobility types the consideration of psychology and attitudes is useful. Anable (*20*) and von Behren et al. (*21*) included attitudinal components as variables in their cluster analyses and identified distinct mobility types. This is of relevance since the psychology plays an important role in explaining travel behavior. Further, Magdolen et al. (*22*) also used the number of long-distance trips as a distinction variable in their segmentation approach next to attitudinal components and variables to describe everyday behavior. Two resulting clusters, namely the ‘Multimodals with affinity to long-distance travel’ as well as the ‘Multi-Locals without obligations’, are characterized by a high number of long-distance trips. The study shows that the consideration of long-distance travel in a cluster analysis is useful and people can be distinguished in this respect. Bacon and LaMondia (*23*) used a cluster analysis to find distinct types of travelers based on intercity travel patterns and identified six types of traveler segments. Interestingly, they uncovered that the sociodemographic characteristics are similarly distributed across the distinct clusters. This underlines the fact that in addition to sociodemographic characteristics, other aspects must also be considered to understand and describe long-distance travel behavior.

METHODS

In the present study we investigate the extension of everyday mobility through long-distance travel by segmenting people into travel groups of similar characteristics. The data for this study was collected by using the concept of the travel skeleton. For the segmentation approach a cluster analysis was chosen. Therefore, cluster-forming variables were compiled, which include both attitudes towards means of transportation and travel behavior. On this basis, we finally performed the cluster analysis. In the following, the individual steps are explained in detail.

Study area and data collection

The study area was the city of Munich. The geographical location of Munich is characterized by an attractive surrounding area due to its closeness to the Alps and many surrounding lakes. Munich is connected to its surrounding by several motorways and regional trains. People living in urban Munich are attracted by these nearby destinations and undertake leisure activities on weekends. In addition to the special characteristics of Munich's surrounding area, the comparably high degree of motorization in Munich is a relevant determinant that distinguishes the city from others. With 540 cars per 1,000 inhabitants Munich is much more motorized than other large cities in Germany (*24*).

The data collection was realized by means of a travel skeleton approach, which has already been applied in several surveys in an international context (*21, 22*). This design was developed as an alternative to time-consuming longitudinal travel diaries. It captures the typical travel behavior of individuals and comprises elements on everyday travel as well as sociodemographic data. It further includes detailed questions about long-distance travel. The travel skeleton does not record characteristics of individual trips such as distance or duration. It rather captures everyday travel in a broader context by questioning the respondents to assess their individual travel behavior with regard to relevant activities (work, leisure, chauffeuring, errands and shopping) and their mode choice in a “typical” week. Therefore, the concept can be understood as “pseudo-longitudinal” approach. Long-distance travel is determined by questions regarding people’s last two daytrips and three trips with overnight stay. In detail, they reported the name of the destination or activity, the one-way distance travelled, the means of transport as well as the date and the length of the trip. In the special case of Munich the approach was extended with an extra question about the existence of typical trips to record the regularity of long-distance events. In addition, a standardized and well-tested psychological item set about the attitudes and norms towards different means of transport, developed by Hunecke et al. (*13*) was included.

For efficiency reasons the survey has been implemented and carried out as a web-based survey. The sample was obtained using an online access panel. The questionnaire was distributed between February and March 2020 to a representative sample controlled by means of official statistics.

Survey sample

The collected data was subject to a comprehensive plausibility process in which we checked missing values, reported information given in form of text or numbers and the duration for filling in the survey. Due to missing values for relevant variables, e.g. the psychological items, and due to the identification as outliers during the cluster procedure further data had to be excluded. At the end, a sample of 404 persons remained, which was segmented into groups and can be regarded as reasonably representative for Munich.

Figure 1 gives an overview of the sample, which will be segmented, and presents characteristics at the personal as well as at the household level. When interpreting the following results, the high proportion of households with car ownership should be considered.

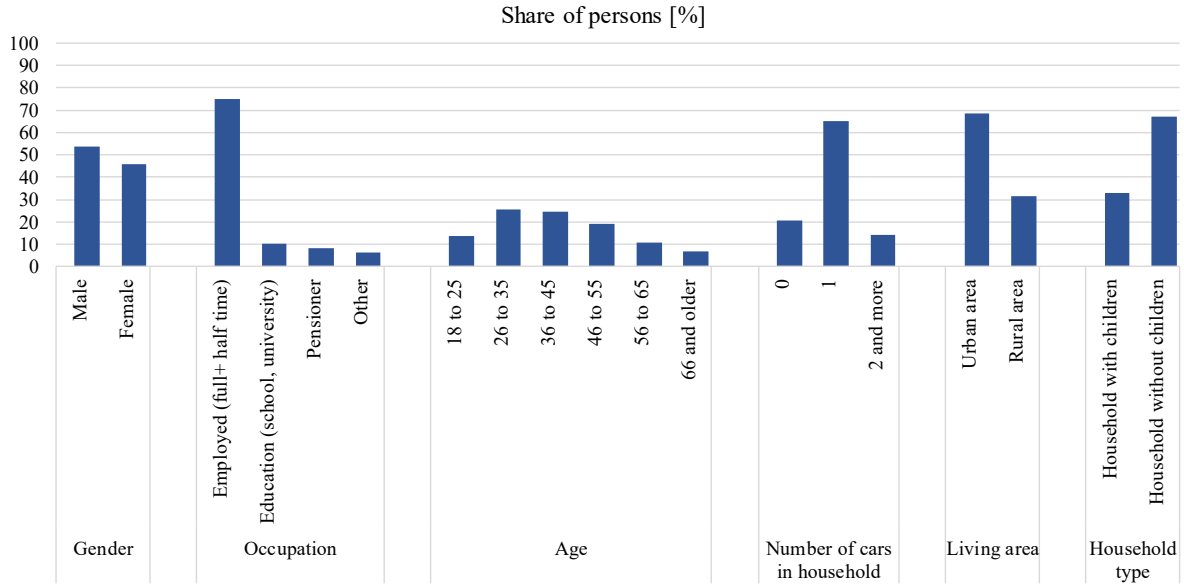

Figure 1 Sample characteristics

Determination of cluster-forming variables

In cluster analysis, both attitudes and behavior are usefully input variables to identify mobility types (*14, 20*). Since the skeleton approach provides information on behavior regarding both everyday and long-distance travel as well as attitudes, we defined cluster-forming variables in these dimensions. Although the focus of segmentation is mainly on identifying group-specific differences related to long-distance travel activities, including everyday travel behavior and attitudes improves the analysis. The combined approach allows to determine clusters that show specific characteristics in a behavioral and psychological dimension at the same time (*21*).

Attitudes towards car and public transit

To include the psychological dimension into the segmentation and with the aim to consolidate the information from the attitudinal items, a principal component analysis (PCA) was performed. For this study, we included 14 items that focus on the attitudes towards car and PT as well as the intention and autonomy to use PT in everyday life, as these two means of transport are relevant for both everyday and long-distance travel. As a result, we obtained a 3-component-solution using Kaiser's Criterion, which requires an eigenvalue above one (*12, 13*), Scree-Test and parallel analysis as criteria for the number of components to be extracted. As measure for intern consistency, we also calculated Cronbach's Alpha. This criterion is also often used for the extraction of components (*14, 25*) and requires at least a value above 0.65 (*20*). Table 1 shows the psychological questions (items) used and the result of the PCA. Only the highest loadings of each item on a component are indicated and values less than 0.5 are not displayed.

All three components have sufficient values for Cronbach's Alpha. Further, the quality of the PCA was confirmed by a meritorious value for the Kaiser's Measure of Sampling Adequacy (MSA) and significance for the Bartlett's Test of Sphericity (*21*).

Table 1 Principal Component Analysis (PCA) - Varimax Rotated Factor Pattern

Components	*PT Skepticism*	*PT Unsuitability*	*Car Orientation*
Cronbach´s Alpha	α = 0.82	α = 0.87	α = 0.84
Indicators in PCA			
I can relax well in public transportation.	0.853*		
I appreciate public transportation, because there is usually something interesting to see there.	0.842*		
I can easily use the traveling time on the bus or train for other things.	0.749*		
I like to ride buses and trains, because I don't have to concentrate on traffic while doing so.	0.674*		
I have resolved to travel the ways I need to go in everyday life using buses and trains.	0.574*		
It is difficult for me to travel the ways I need to go in everyday life with public transportation instead of by car.		0.769	
If I want, it is easy for me to use public transportation instead of a car to do my things in everyday life.		0.763*	
I can structure my everyday life very well without a car.		0.736*	
It is my intention to use public transportation instead of a car for the things I do in everyday life.		0.622*	
I can take care of what I want to with public transportation.		0.615*	
Driving a car means fun and passion for me.			0.855
When I sit in the car I feel safe and protected.			0.838
Driving a car means freedom to me.			0.823
Being able to use my driving skill when driving a car is fun for me.			0.739

* This item has been inverted due to its meaning. *Printed is the maximum loading of each item.*

Criteria of extraction and quality for PCA		
Criteria of extraction	*# Factors*	
Kaiser's criterion	3	
Scree-Test	3	
Parallel analysis	3	
Criteria of quality	*Value*	*Pr > Chi-Square*
Kaiser´s measure of sampling adequacy (MSA)	*0.876 > 0.80*	
Bartlett's test of sphericity	χ^2 (91) = 3023.208	p***

n = 444 used in PCA

Consequently, the following three cluster-forming variables were obtained from the attitudinal data: The first component *PT Skepticism* describes the negative perception of PT as a means of transport and a missing excitement during its use. The second component *PT Unsuitability* combines the autonomy that PT is not able cover in relation to the car, or in other words if PT is unsuitable to meet the daily travel needs, and the missing intention to use PT in everyday life. *Car Orientation* includes all items of the positive attitude towards a car. For all three components, a high value reflects a pro-car attitude and a low value reflect a pro-PT attitude.

Travel behavior

With the focus on the extension of everyday travel by long-distance events, the travel-related aspects in our analysis were represented by variables concerning both everyday travel and long-distance travel. Everyday travel was represented by the *Days with Car Use* and the *Days with Public Transit Use* within a typical week. Both values were recorded as categorical frequencies in the survey and were converted to the number of days this means of transportation is used ranging from 0 to 7.

Besides the indicators of everyday travel, four indicators were calculated to represent different aspects of long-distance travel behavior. For the selection of these indicators previous research (*21*) was considered and relevant aspects of travel behavior were described: activities, mode choice, and trip volume. First, we used the number of *Trips* O*utside the Usual Environment* (*OEM trips*), calculated as sum of the reported daytrips and trips with overnight stays with a maximum length of two nights. We did not consider holiday trips with longer duration in this variable as we delimited our analysis on events close to everyday life. In the survey we characterized this kind of trips as "activities that extend everyday mobility, such as weekend trips or (short) holidays". The values for *OEM trips* range from 0 to 5. Further, we calculated the *Share of Car Use for Trips.* This indicator represents the proportion of all trips done by car (driver, passenger and on-demand services by car) of the total number of *OEM trips*. This indicates the importance of the car for long-distance travel in a range between 0 (no car usage) and 1 (car always used). Another indicator is the *Maximum Distance* in kilometer reported for the trips included to the analysis. Values were converted from a categorical format into kilometers with 19 as lowest and 999 as highest value. The last indicator is the sum of *Long-Distance Travel Activities* per year comprising the reported annual number of overnight stays and number of daytrips within the last three months. This variable represents the general long-distance travel behavior of persons within a year and has values between 3 and 40 activities. Since all six indicators were not strongly correlated with each other and showed a certain interpersonal variation across all participants, they were considered as cluster-forming variables next to the three psychological components in the segmentation.

Clustering approach

For the identification of distinct travel types, we performed a two-step clustering approach (*20, 25*). For the procedure, the three psychological components and the six calculated behavioral variables were included simultaneously into the analysis. All persons who have no missing values for the cluster-forming variables were considered. In the first step, the Ward Method as hierarchical clustering approach served to identify the structure of the data and to determine the optimal number of clusters. To face different scales and distributions of the variables, we applied a linear transformation to the nine cluster-forming variables. This is done to obtain a spherical within-cluster covariance matrix and to compute canonical variables, which are then included in the

cluster procedure. As the Ward Method is sensitive regarding outliers, we applied different trims, which defines the percentage of observations to be excluded. After running and comparing numerous cluster-solutions with different settings, a 7-cluster solution turned out as the best solution, regarding to the quality criteria Cubic Cluster Criterion (CCC) as well as the values for Pseudo t^2. In addition, the 7-cluster solution was obtained as most suitable solution taking into account the interpretability. For this solution, a trim of 5% was applied. 404 observations remained in the data and are included in the second step of the clustering approach for which we used K-means. This method, is often applied in segmentation approaches (*14, 20*) and leads to a more stable solution. K-means performs an optimization of the allocation of the participants to the seven clusters. As input, we calculated the cluster seeds out of the seven identified clusters from the first step. After running this procedure the stability of the solution was assessed by comparing the assignment of persons to the seven clusters with the Ward and K-means method using a cross tabulation. Only 3% of the observations were assigned to another cluster through K-means, which confirms the robustness of the solution. The cluster analysis was performed by using the software SAS. The resulting seven traveler groups are presented and discussed in the next section.

RESULTS

The cluster analysis revealed seven clusters of different sizes, ranging from 18 to 145 individuals. These distinct groups of travelers each show specific characteristics that need to be considered in the interpretation. The use of attitudes and behavioral variables for both everyday travel and long-distance travel allows us to uncover differences among groups of people with respect to these three dimensions. Table 2 summarizes important characteristics of each cluster in three thematic sections. The first section consists of the travel behavior within and outside of everyday life. The second section shows the components representing the attitudes. In section three various sociodemographic characteristics are given ranging from a personal level, e.g. age and occupation, to details on household level, e.g. number of cars in the household. The cluster-forming variables are printed in bold.

For the evaluation of the clusters it is relevant to compare the clusters to each other. Out of the specific characteristics, we provide short descriptions and a name for each distinct traveler type in Table 3. It is noticeable that small clusters resulted, such as CL2 and CL7. Both clusters are characterized by an active travel behavior, which is either characterized by the long distances for OEM trips or the high frequency of long-distance activities. For the *Car independent long-distance travelers* (CL2) plane and train are the most relevant means of transport used to reach their destination as they travel considerable long distances. This is enhanced by the strongly negative attitude towards cars. For the *Car captive high-mobiles* (CL7) the sociodemographic characteristics are worth mentioning as they are young, urban living, and have a high-income. Further, this cluster includes only employed people from mostly childless households which are all equipped with one or more cars. Their travel behavior is characterized by daily car use and on average the highest number of trips per day (6.22) as well as a large average number of long-distance activities per year and OEM trips. Although bicycles and public transport are used in everyday life, the car is the central means of transport when it comes to OEM trips (0.90). Both examined clusters (CL2 and CL7) describe traveler groups with an extreme behavior that is highly relevant when considering long-distance travel, even if these are small groups.

Table 2 Cluster description

		CL 1 N=45	CL 2 N=32	CL 3 N=145	CL 4 N=48	CL 5 N=44	CL 6 N=72	CL 7 N=18	Total
Travel behavior									
Long-distance travel									
OEM trips	*mean*	**2.49**	2.13	**1.29**	1.81	2.20	**1.61**	**2.50**	1.76
Share of Car Use for Trips*	*mean*	0.81	**0.29**	**0.54**	0.73	0.45	**0.86**	**0.90**	0.64
Share of PT Use for Trips	*mean*	0.15	**0.56**	0.38	0.23	**0.41**	**0.06**	**0.03**	0.28
Share of Plane Use for Trips	*mean*	**0.01**	**0.14**	0.01	0.01	**0.04**	**0.00**	0.02	0.02
Share of Other Modes for Trips	*mean*	0.04	**0.01**	0.07	**0.03**	**0.11**	**0.08**	0.05	0.06
Maximum Distance [km]	*mean*	140.31	**726.34**	**74.86**	113.83	**400.00**	**112.85**	147.94	183.82
Typical Occasional Activities	*in %*	**51.11**	31.25	**20.69**	33.33	29.55	**27.78**	**38.89**	29.46
Long-Distance Activities	*mean*	**24.93**	10.41	**8.05**	9.29	9.25	**8.78**	**25.00**	11.30
Everyday travel									
Kilometer per day**	*mean*	23.21	22.46	**19.76**	**34.81**	**15.85**	**49.06**	30.09	27.40
Trips per day**	*mean*	3.96	4.09	**3.87**	5.14	**3.53**	**5.70**	**6.22**	4.44
Days with Car Use	*mean*	1.24	0.93	**0.46**	3.00	**0.69**	**7.00**	**7.00**	2.37
Days with PT Use	*mean*	**4.19**	3.40	**3.75**	2.43	2.61	**0.98**	**1.15**	2.88
Days with Bicycle Use	*mean*	**2.11**	**1.05**	1.41	1.58	1.74	**0.87**	**2.08**	1.45
Attitudes									
PT Skepticism	*mean*	**0.27**	-0.10	**-0.12**	**-0.13**	0.04	**0.18**	0.18	0
PT Unsuitability	*mean*	**-0.59**	-0.25	**-0.33**	0.34	-0.21	**0.84**	**0.64**	0
Car Orientation	*mean*	**0.35**	**-0.41**	**-0.35**	0.20	-0.08	**0.50**	0.20	0
Selected sociodemographic characteristics									
Gender (male)	*in %*	55.00	**58.54**	**58.87**	52.08	**44.19**	48.61	**47.37**	53.71
Age 18-35	*in %*	40.00	40.63	**42.76**	**37.50**	**18.18**	40.27	**55.55**	39.11
Age 36-55	*in %*	44.44	**37.49**	37.93	**54.17**	**52.28**	48.61	**27.78**	43.56
Age > 56	*in %*	15.56	**21.88**	19.31	**8.33**	**29.54**	**11.12**	16.67	17.33
Employed (FT+PT)	*in %*	**64.45**	81.26	**63.45**	83.33	81.82	**88.89**	**88.89**	75.00
Pensioner	*in %*	6.67	**3.13**	**11.03**	6.25	**13.64**	6.94	**0.00**	8.42
Cars per household	*mean*	1.13	**0.78**	**0.66**	1.21	0.84	**1.38**	**1.50**	0.97
Car-less households	*in %*	11.11	**28.13**	**40.00**	**0.00**	27.27	**0.00**	**0.00**	20.79
Premium vehicles***	*in %*	40.00	**30.43**	33.33	**50.00**	**28.13**	**52.78**	**50.00**	41.25
Household size	*mean*	**2.47**	**1.91**	2.19	2.38	**1.95**	**2.43**	2.17	2.23
Households with children	*in %*	26.67	31.25	27.59	**47.92**	**25.00**	**45.83**	**22.22**	32.92
Net Income Class****	*mean*	**2.69**	2.13	1.90	2.46	**1.95**	2.63	**2.78**	2.24
Urban living area	*in %*	**82.22**	75.00	**62.07**	**62.50**	72.73	68.06	**83.33**	68.56

* differs from the cluster-forming variable as this car share refers only if trips were reported | ** Km and Trips per Day: calculated from the information given in the travel skeleton | *** Premium vehicles: proportion of premium vehicles (Audi, BMW, Cadillac, Corvette, Infiniti, Jaguar, Lexus, Mercedes, MINI, Porsche, Range Rover, Tesla), only related to existing cars | **** Net Income Class (of household): 1 = up to 2,000€, 2 = 2,000-4,000€ , 3 = 4,000-6,500€ , 4 = more than 6,500€

Table 3 Cluster profiles

CL	Cluster Name	%	Cluster Description
1	Weekend car travelers	11.14	■ Frequent and regular OEM trips with medium distance by car ■ Use of PT and bike for daily travel, although car orientation exists ■ Urban high-incomes in large households with mostly one car ■ Car use exclusively for long-distance travel ■ Extension of everyday life through regular "city escapes" for which the car is needed
2	Car independent long-distance travelers	7.92	■ For long-distance trips large distances are covered using plane or PT ■ Car is negatively seen and seldom used in everyday life ■ Students or older aged employees with middle-income in small households with low motorization ■ Distant destinations are chosen even for trips of shorter duration
3	Low-mobiles with PT-affinity	35.89	■ Few long-distance trips and also low level of everyday mobility ■ PT is seen positively and is relevant in everyday life and for OEM trips ■ Suburban living and low-income households, e.g. students, pensioners and families with several children ■ Income and car availability determine long-distance travel
4	Car-affine multimodals within usual range	11.88	■ Average travel intensity with OEM trips in medium range ■ Multimodal behavior in everyday life and positive attitude to car and PT ■ Suburban families with children and high motorization including premium vehicles ■ Behavior appears to be shaped by pragmatism as car is preferred, but PT is used to a certain extent
5	Long-distance PT-travelers	10.89	■ Average long-distance trip frequency but with distant destinations ■ Car is rarely used in life but (besides PT) relevant for OEM trips ■ Low everyday mobility and varying attitudes towards modes ■ Pensioners and older employees in small low-income households ■ OEM trips with distant destinations reached by PT or car
6	Car enthusiasts with extensive everyday life	17.82	■ Few long-distance travel activities mainly in the surrounding region ■ Highly car-oriented and extensive everyday mobility regarding trip volume and traveled distances ■ Young and high-income families with children and high motorization including premium vehicles ■ No need for additional long-distance travel next to complex everyday life
7	Car captive high-mobiles	4.46	■ Frequent and regular OEM trips by car with medium distance ■ Intense and car-oriented everyday mobility ■ Young, employed, urban high-incomes living in households with high motorization including premium vehicles ■ Depending on car to meet the needs of everyday and long-distance travel

Except for CL2, the relevance of the car for excursions and trips with a maximum of two overnight stays is high for all clusters. This underlines the universal applicability of the car as a flexible means of transport for trips with short duration. Even if long-distance events are rare, see CL6, or car availability in households is low, see CL3, the car explains at least half of the mode share for this kind of trips. The car is particularly important for the cluster *Weekend car travelers* (CL1). Similar to CL7, a high level of travel activity, which extends the usual environment and thus everyday life, is observable. For CL1 and CL7, the high number of long-distance activities is further explained by the high share of respondents that reported to undertake typical occasional activities. This confirms that regular long-distance travel activities can extend the usual environment. Additionally, CL1 stands out regarding a behavioral discrepancy. This is characterized by a high level of PT use in everyday life, whereas for long-distance travel, the car is used almost exclusively. Similar to CL7 and also CL6, the strongly positive car orientation is a contributing factor, which may explain the high share of car use in long-distance travel. In comparison, people from the cluster *Car enthusiasts with extensive everyday life* (CL6) conduct relatively few excursions and short holiday trips, but if they do so they use the car because of their pro-car attitude.

A considerable share of PT use can be registered for CL3 and CL5. *Low-mobiles with PT-affinity* (CL3) use PT for 38% of their trips outside everyday life, but overall people from this cluster have only low travel activity. People from the cluster *Long-distance PT-travelers* (CL5) travel longer distances with on average 400 km for OEM trips either by car or by PT. Both clusters (CL3 and CL5) are characterized by low income and a high proportion of pensioners and students or households with many children compared to the other clusters. It becomes clear that from sociodemographic characteristics of the segmented traveler types behavioral reasons can be identified. Nevertheless, also groups with similar sociodemographic characteristics, such as CL4 and CL6, show different travel behavior. The attitude towards PT accounts for these differences, making CL4, the *Car-affine multimodals within usual range,* a PT user both in everyday life and in long-distance travel, whereas CL6 is oriented towards cars.

Furthermore, the results indicate that a similar long-distance travel behavior of individuals can be attributed to different causes: CL3 and CL6 both show a low activity of OEM trips and on average low distances for such trips. For CL3 the income and the low car availability may be decisive for the fact that few trips take place outside of the usual environment and also in everyday life. In contrast, for CL6 everyday travel is dominant. High values for kilometer per day and trips per day are observable. The sociodemographic characteristics indicate large households with children in rather suburban areas. Both the complex everyday life and living in a suburban area are indicators for less additional long-distance travel. Moreover, we can determine a similar behavior regarding everyday mobility at first sight, but different behavior when considering travel for OEM trips. Regarding the attitudes and everyday travel behavior, CL6 and CL7 are similar. However, when considering the volume of long-distance travel, people from CL6 travel only rarely, whereas people from CL7 are highly active. Similarly, this can be observed for CL1, CL2 and CL3. For them, rather high levels of PT use and low car use in everyday life can be seen. However, the travel behavior outside the usual environment of all three groups is completely different regarding frequency, distances and mode choice. The added value of the attitudes becomes also visible at this point, as CL1 is characterized by a positive car orientation, while CL2 and CL3 are positive towards PT.

The typology of the distinct travel groups allows to study the relevance of the car as means of transport especially for long-distance events but also in the context of everyday life. By putting

this into context with the attitudes, we aim to discuss relevant findings and initial interpretations regarding the role of the car. We identified travel types, that highly use the car both in everyday travel and long-distance travel, whereby people from CL6 have a high car orientation and CL7 have a medium car orientation. The latter indicates that there might be objective reasons for the extensive car use in addition. Even if these people live in urban neighborhoods and alternatives to the car are present, the car is used daily. Considering further characteristics, such as the high number of trips, it becomes clear that these people have complex daily routines and a need for mobility through frequent and regular long-distance trips which can be meet by the flexibility of the car. Since they also evaluate PT as unsuitable, extensive car use results despite the moderate car orientation.

CL1 describes these relationships vice versa. People in this cluster show a high car orientation and a high skepticism towards the PT. However, they show the highest PT use in everyday travel of all identified clusters. People in this cluster live in urban areas and use the PT probably for commuting to work or other regular activities. For some reasons, such as a lack of parking spaces or traffic jams, these people do not use the car in their everyday behavior. This context is also evident in the attitudes, as people see PT as a suitable means of transport for managing their daily lives. However, the car orientation is revealed in the extension of everyday life with long-distance trips. For the frequent and regular long-distance events, the car is used particularly often. This provides an initial insight into why people living in urban areas own a car without using it in everyday travel behavior. In these cases, the car serves as an instrument with flexible characteristics to extend the usual environment of everyday life.

CONCLUSIONS

This study presents a segmentation of people into traveler types, to better understand long-distance travel behavior as an extension of everyday life. Therefore, we used data from a survey in Munich that is based on a travel skeleton approach including information on everyday mobility, long-distance travel and psychological factors at the same time. Subsequent to data preparation processes, we performed a clustering approach. Based on the resulting 7-cluster solution, we analyzed traveler types regarding their specific characteristics.

An extreme cluster that we identified are the *Car captive high-mobiles* (CL7). People in this cluster are young, employed, urban, frequent travelers and live in households without children, but with high income and high motorization (even with premium vehicles). Even though the group is relatively small, these people are responsible for a relevant share of travel in everyday life and especially in long-distance travel and thus for greenhouse-gas emissions, as they undertake long-distance trips on a regular basis. Additionally, the *Weekend car travelers* (CL1) are of special interest as they also need the car for frequent and regular long-distance trips to extend their everyday life. It becomes clear that regularity can be used as one (of several) attributes of long-distance trips to identify different groups of travelers with specific mobility needs that go beyond their everyday needs. Both clusters show an intense and highly car-oriented long-distance travel. However, if only their everyday travel behavior is considered, the relevance of the car remains to some extent unexplained. In particular, CL1 is noticeable in this respect, since everyday life is characterized by a high level of PT use and a positive perception of the PT as suitable means of transportation for everyday life. For people living in cities, existing alternatives provide an option to conduct trips in daily life with environmentally friendly means of transport, such as PT, or to avoid traffic jams and long travel times. At the same time, people may also have extensive long-

distance travel at weekends for which a car is used and required. The additional consideration of attitudes indicates that people with pro-car attitudes use the car especially for weekend trips. Having in mind that people use the car as a flexible means of transport for different purposes, this can explain why people living in urban areas with many alternatives hold on to their cars even if they don't need it for their daily travel needs.

Overall, it was shown that with the chosen approach and the data from the survey in Munich, we were able to prove that people extend their everyday life through long-distance trips, and some people do so regularly. The differentiation into the traveler types allows us to gain a deeper understanding and to derive specific measures to influence behavior. We highlight the relevance of considering not only the everyday travel behavior of people but also their long-distance travel, especially regarding regular trips extending the usual environment. This illustrates that for understanding travel behavior a longitudinal perspective is a must. Even multi-day travel diaries are not sufficient to make detailed differences in the travel behavior of people visible. In addition, the inclusion of attitudes is important, when assessing the reasons for car ownership. When it comes to characterizing travel behavior that extends everyday life, the identified clusters indicate that people who behave similarly in everyday life can be very different in their long-distance travel behavior. In this context, psychological components such as attitudes also provide a relevant explanatory contribution and should be taken into account when investigating long-distance travel. It has to be emphasized that we did not analyze urban mobility types in general, but rather focused on the extension of everyday travel and primarily on the relevant means of transport, i.e. PT and car. Further research should consider additional aspects of travel behavior. Among others, the inclusion of the environmental orientation and of ecological norms could improve the cluster solution. Furthermore, future research should focus on the role of the car for long-distance travel as a reason for car ownership in urban areas.

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AUTHOR CONTRIBUTION

The authors confirm contribution to the paper as follows: survey concept: L. Bönisch, B. Chlond; literature review: M. Magdolen; data preparation: L. Bönisch; data analysis: M. Magdolen, L. Bönisch; interpretation of results: M. Magdolen, L. Bönisch, B. Chlond, P. Vortisch; draft manuscript preparation: M. Magdolen, L. Bönisch. All authors reviewed the results and approved the final version of the manuscript.

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