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Article

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Consistency or contradiction? Mobility-Related Attitudes and Travel Mode Use of the Young 'New Generation'

Konsistenz oder Widerspruch? Mobilitätsbezogene Einstellungen und die Verkehrsmittelnutzung der jungen ‚New Generation'

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Abstract: In this paper, we examine the role of mobility-related attitudes in the travel mode use of young people, the extent to which young adults and teenagers behave consistently in relation to their attitudes, and the conditions on which the consistency of attitudes and behaviour depends. We thus continue the current discussion about the loss of importance of the car for young people in which various socio-demographic trends, but also changed attitudes, are used as explanatory factors, especially on a hypothetical level. Our contribution closes a research gap in that so far neither the relationship between attitudes and behaviour among young people has been empirically investigated nor has this relationship been empirically placed in a context of spatial, economic and socio-demographic conditions. We address this by means of differentiated correlation analyses and the calculation of correlation differences on the basis of a nationwide German survey of young people from 2013. This enables us to demonstrate that young people basically behave consistently in line with their attitudes. However, there are significant differences which confirm that certain spatial, economic and socio-demographic conditions are essential for the implementation of attitudes into corresponding travel mode use.

Keywords: Young people; new generation; loss of car importance; altered mode-related attitudes; travel mode use; end of the automobile society

Kurzfassung: In diesem Beitrag setzen wir uns mit folgenden Fragen auseinander: Welche Rolle spielen mobilitätsbezogene Einstellungen bei der Verkehrsmittelnutzung junger Menschen? Inwiefern verhalten sich junge Erwachsene und Jugendliche konsequent in Bezug auf ihre verkehrsmittelbezogenen Einstellungen? Von welchen Voraussetzungen und Rahmenbedingungen hängt eine Konsistenz von Einstellungen und Verhalten ab? Wir knüpfen damit an die aktuelle Diskussion um den Bedeutungsverlust des Autos für junge Menschen an, in der soziodemographische Trends, aber auch veränderte Einstellungen vor allem auf hypothetischer Ebene zur Erklärung herangezogen werden. Unser Beitrag schließt eine Lücke: Bislang wurde weder der Zusammenhang zwischen Einstellungen

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und Verhalten bei jungen Menschen empirisch untersucht, noch wurde dieser Zusammenhang empirisch in einen Kontext räumlicher, ökonomischer und soziodemographischer Rahmenbedingungen eingeordnet. Wir analysieren dies mittels differenzierter Korrelationsanalysen und der Berechnung von Korrelationsunterschieden anhand einer deutschlandweiten Befragung Jugendlicher und junger Erwachsener aus dem Jahre 2013. Damit können wir nachweisen, dass sich junge Menschen prinzipiell konsequent gemäß ihren Einstellungen verhalten. Dabei gibt es aber signifikante Unterschiede, die bestätigen, dass räumliche, ökonomische und soziodemographische Rahmenbedingungen dafür wesentlich sind.

Schlüsselwörter: Junge Erwachsene; New Generation; Bedeutungsverlust des Autos; veränderte Einstellungen zu Verkehrsmitteln; Verkehrsmittelnutzung; Ende der automobilen Gesellschaft

1 Introduction

The travel behaviour of young people has been one of the main topics of mobility research in the past few years. Studies dealing with this topic especially focus on the trends of young people's travel behaviour. As one main result, they find a decrease in licence holding and car use alongside increasing public transport use, cycling and multimodality. Against this backdrop, this generation of young people is also referred to as a 'new generation' (Kuhnimhof/Buehler/Dargay 2011) in order to describe their historically pioneering shift away from the automobile. As possible reasons for the decreasing car use among young people, recent studies suggest changing biographies, lower budgets, the wide availability of semester tickets, the high share of urban population (e.g. Kuhnimhof/Wirtz/Manz 2012), and changing mobility-related attitudes (e.g. Delbosc/Currie 2014b; Delbosc/Currie 2014c). Furthermore, the increasing use of information and communication technologies (ICT) and the wide availability of travel information are considered to make public transport more attractive and to unleash new mode options (Canzler/Knie 2016; Groth 2019). These explanations remain predominantly speculative and have not yet been systematically and empirically investigated.

As tomorrow's transport users and therefore the target group of today's transport planning, young people are a particularly interesting subject for mobility research. Recent studies express hope of a transition to more sustainable future transport (e.g. Geels 2012). This implies that today's young people will maintain their relatively sustainable travel behaviour over the life course, although it remains a matter of speculation whether this will actually be the case or whether they will switch to car-oriented mode use due to biographical shifts.

While the extrinsic factors (economic, socio-demographic and spatial factors) of travel mode use are well studied, the relevance of attitudes as intrinsic subjective factors is still largely unknown. For instance, we do not yet know whether a positive attitude towards sustainable travel modes is decisive for sustainable travel behaviour or if this is impaired by, for example, income effects or life stage effects. This leaves open the question as to what extent mobility-related attitudes and the behaviour of young people are consistent, including the extent to which environment-oriented attitudes reduce the significance of the car and the extent to which such an effect is overlaid by extrinsic factors (e.g. life stage, spatial context).

In this paper, we investigate whether young people's mobility-related attitudes are in conformity with their behaviour and put this in the context of external circumstances. Our analyses focus on the travel mode use of young people. In the following section, we summarize the state of research. Section 3 introduces the data and methods used. This is followed by the presentation of our findings in Section 4. We close the paper with a summary and conclusions.

2 State of research and research questions

As our interest and analyses focus on travel mode use as one aspect of travel behaviour and on young people, we largely limit our literature review to this. First, we give an overview of recent research on the travel behaviour of young people, specifically their travel mode use. The second focus is the connection between mobility-related attitudes and travel mode use.

2.1 Travel behaviour, travel mode choice and mobility trends of young people

In mobility research, there is a long tradition of studies dealing with the choice and use of travel modes by different population groups. Young people have played a prominent role here in recent years. Particularly in the context of digitization, which is increasingly interwoven with everyday mobility, young people have become a focus of interest as 'digital natives' and users of tomorrow's transport infrastructures and mobility offers (Konrad/Wittowsky 2018). Studies dealing with the mobility of young people focus on two main issues. Firstly, they examine the specifics of young people's mobility. Secondly, they discuss trends in the mobility of young people and the reasons for this.

2.1.1 Specifics of the mobility of young people

According to the German Mobility Surveys MiD 2002 and MiD 2008, children and teenagers (under 18) are below average in terms of mobility. Compared to people aged between 18 and 59, they make fewer trips, travel shorter distances and spend less time on trips (Krause 2009: 116; Follmer/Gruschwitz/Jesske et al. 2010: 74). Young people aged between 14 and 17 travel farther and longer than younger children. The age of 18 is a turning point, since most young people obtain their driving licences at this age. The distances travelled and the time spent travelling increase drastically (Follmer/Gruschwitz/Jesske et al. 2010: 74 ff.; Kuhnimhof/Buehler/Wirtz et al. 2012). This is in line with the use of transport modes. While for people up to the age of 17, travel by car as a passenger (41%) and walking (29%) are the most important travel modes; for people aged between 18 and 29, car driving is dominant (47% of all trips). It is also striking that children, youths and young adults have the highest share of public transport compared to other age groups (Follmer/Gruschwitz/Jesske et al. 2010: 77; Tully 2011: 14; Lenz 2013: 18).

2.1.2 Trends in young people's mobility

For several years, there has been a broad national and international discussion about a change in the mobility of young people. The focus is on the declining importance of the car, including licence holding, car availability and car use. For our analyses, which do not focus on trends, the reasons given for the trends described are of particular interest.

Driving licences

Studies dealing with driving licence ownership and car use by young people reveal mixed results. However, they refer to different age groups, spatial contexts and time periods. Various studies show that young people's possession of driving licences has declined since the beginning of the 1990s and stagnated since the beginning of 2000. Chatterjee, Goodwin, Schwanen et al. (2018:2) describe for Great Britain that among 17 to 20 year olds driving licence possession declines from 48% at the beginning of the 1990s to 29% in 2014. Among 21 to 29 year olds, driving licence possession falls from 75% to 63% (see also Kuhnimhof/ Armoogum/Buehler et al. 2012: 767). Driving licence possession decreases from cohort to cohort up to the 'early millennials' (born 1980-1984). The trend is weaker for women (Chatterjee/ Goodwin/Schwanen et al. 2018: 2).

Since the mid-1990s, driving licence holding for different age groups has been declining in Germany, France, Great Britain, Norway, the USA, Japan (Kuhnimhof/Armoogum/Buehler et al. 2012: 767; Sivak/Schoettle 2012) and Australia (Delbosc/Currie 2013). This decrease is mainly and in part exclusively observed for young men. For more recent years since 2002, however, the driving licence rate has tended to stagnate (ifmo 2011: 8 for Germany; Kunhimhof/ Armoogum/Buehler et al. 2012: 767 for Germany, Great Britain and USA; Hjorthol 2016: 142; Konrad 2016: 128 for West Germany). The results indicate that young men in particular are increasingly acquiring driving licences later in life (Konrad 2016: 128; see also Hjorthol 2016: 145).

Car availability and car use

In Sweden, the car use of young adults is declining. In 2009, they made 34% of their journeys as drivers, compared with 47% in 1985 (Hjorthol 2016: 142). Frändberg and Vilhelmson (2011) confirm this. For young adults in England between 1995/1999 and 2010/2014, Chatterjee, Goodwin, Schwanen et al. (2018) also report decreasing car use. The decrease is 44% for men and 26% for women. There has been an insignificant shift in the modal split share of transport modes. In the age group 21 to 29, public transport increased by 6 percentage points between 1995/1997 and 2012, car journeys fell by 5 percentage points and footpaths by 2 percentage points (Chatterjee, Goodwin, Schwanen et al. 2018: 3 ff.).

In the USA, the car mileage of young driving licence holders has fallen since the mid-1990s and the beginning of 2000 respectively, depending on the age group (Santos/McGuckin/Nakamoto et al. 2011: 43). This also applies to the metropolitan region of Washington D.C. (1994 to 2008), in which a shift of the modal split away from the car took place at the same time (Griffiths 2010).[1] The amount of time young people spend driving a vehicle is also decreasing (Santos/McGuckin/Nakamoto et al. 2011: 30). On the other hand, public transport is gaining in importance, as a slight increase in the modal split share shows. However, this can be observed in the USA for all age groups (Buehler/Pucher 2012).

In Germany, there have been signs of a decline in per capita car registrations among young adults since the 1990s, but also after the turn of the millennium (Shell Deutschland 2009: 21 ff.; Calmbach/Borgstedt/Borchard et al. 2016: 237). Various studies also document a decline in car availability (e.g. Statistisches Bundesamt 2003; Statistisches Bundesamt 2008; BMBF 2010: 22; Statistisches Bundesamt 2013). Car availability of 18 to 24 year olds fell by 8 percentage points between 2002 and 2008, whereby the decline was greatest in urban areas (Tully 2011: 14; Schönduwe/Bock/Deibel 2012: 21; Lenz 2013: 21. For Germany between 2002 and 2008, Schönduwe, Bock and Deibel (2012: 22) and Kuhnimhof, Buehler, Wirtz et al. (2012) report a decline in daily car use and Lenz (2013: 26) a slight increase in multimodality in the age groups 18 to 29/30. Declining car use has been observed for young men since 1976. Among women, this decline began in 2002 after their car use had previously increased (Konrad 2016: 194 ff.).

Reasons for trends in young people's mobility

Various trends are seen as reasons for the decreasing or later acquistion of driving licences and decreasing car use among young people. An important factor cited in many studies is the increasing proportion of students among young people (ifmo 2011; Statistisches Bundesamt 2016: 121 ff.), a group with low budgets that are stretched by the (rising) costs of automobility (Goodwin 2012: 9; Kuhnimhof/Wirtz/Manz 2012; Le Vine/Polak 2014). The students live predominantly in urban environments with good public transport, car-sharing services (Tully 2011: 14; Hjorthol 2016: 145 ff.) and cheap access to public transport (semester tickets in Germany) (ifmo 2011: 15; Kuhnimhof/Buehler/Wirtz et al. 2012: 449). They, due to their prolonged training phase, increasingly enter car-related life stages later (ifmo 2011: 15; Delbosc/Currie 2014a: 534 ff.; Hjorthol 2016: 141; Chatterjee/Goodwin/Schwanen et al. 2018: 26). The start of working life is postponed, with those employed having and using a car more frequently than those not in work (Konrad 2016: 205; Oakil/Manting/Nijland 2016: 232). Families are formed later, with parents by far the most likely group to have a car (Oakil/Manting/Nijland 2016: 232). Young people increasingly live in urban areas as relatively car-averse places (Oakil/Manting/Nijland 2016: 232).

Last but not least, it is also argued that the attitudes of young people are changing. This includes more environmentally friendly attitudes, increasing pragmatism and a decline in the role played by the car as a status symbol (Tully 2011: 14; Hjorthol 2016: 140).

2.2 Mobility-related attitudes and travel mode use

As described above, in mobility research attitudes are understood as intrinsic determinants of travel mode use. In most studies, this remains at the theoretical level. In traffic psychology research, which does not usually focus on young people, attitudes are also empirically taken into account. In the following, we present the relevant state of research on the relationship between attitudes and travel mode choice. Due to the limitations mentioned above, we also consider studies that do not focus on young people.

2.2.1 Theories on the relationship between attitudes and travel behaviour

In mobility research, it is assumed that attitudes are determinants of travel behaviour. Often, the Theory of Planned Behaviour (TPB) (Ajzen 1991), which assumes that behaviour is determined by intentions, is used as the theoretical foundation. Ajzen sees this under the premise of actual behaviour control, implying that a person must be able to translate his/her intention into behaviour in the first place. An intention is composed of the attitude towards a certain behaviour, the subjective norm and the perceived control of behaviour. Attitude describes the personal evaluation of behaviour. The subjective norm comprises the perceived social pressure to implement certain behaviour. Perceived behavioural control describes a person's conviction that they are able to realize a certain behaviour (Ajzen 1991: 183

1 See also https://www.mwcog.org/about-us/newsroom/2010/03/17/survey-shows-significant-shift-in-daily-travel-patterns-commuting-household-travel-survey-mode-share-travel-surveys-travel-patterns/ (29.05.2019).

ff.; Hunecke 2000: 47 ff.). Some studies also use the personal norm as a psychological construct to explain travel behaviour. Derived from the norm activation model (Schwartz 1977), the personal norm is also a determinant of travel behaviour. This refers to a person's own intrinsic obligation to implement morally correct behaviour (Hunecke/Haustein/Böhler 2010: 5).

Symbolic-affective valuations of mobility also matter particularly with regard to travel mode use. According to this approach, the valuation of mobility and the affinity to certain behaviour result from the perception of different quality dimensions. These include, for example, means of identification, control, superiority, fun, adventure, regeneration and escapism (Dick 2004: 106 ff.). Hunecke (2000: 125 ff.) identifies autonomy, excitement, status and privacy as the four essential symbolic dimensions of mobility. These dimensions can be used to operationalize attitudes towards travel modes (Anable/Gatersleben 2005; Steg 2005; Hunecke/Haustein/Grischkat et al. 2007).

The Theory of Interpersonal Behaviour (TIB) repeats the aforementioned aspects. This theory also assumes that behaviour is essentially determined by intentions. An appropriate context can contribute to whether intentions are translated into behaviour or not. Habits also play a role in the implementation of intentions into behaviour. Intentions in turn consist of attitudes, a social factor (roles, norms and self-image) and an emotional-affective factor (Triandis 1977; Domarchi/Tudela/González 2008: 588). The Theory of Interpersonal Behaviour has not established itself in mobility research and is criticized for its basic assumption of rational decisions based on complete information (Domarchi/Tudela/González 2008: 588).

The concept of cognitive dissonance refers to contradictions between behaviour and attitudes. Accordingly, this gap is compensated by justifying and better evaluating one's own behaviour. According to this approach, behaviour affects attitudes (Domarchi/Tudela/González 2008: 588). The present study uses proven constructs from the symbolic-emotional evaluation processes of transport modes (autonomy, privacy and excitement) and from the Theory of Planned Behaviour (here in particular, norms and intentions).

2.2.2 Empirical findings on the relationship between attitudes and travel behaviour

On the basis of the Theory of Planned Behaviour, several studies show that attitudes, subjective norms, perceived behavioural control and intentions contribute to the explanation of travel mode use (overview in Hunecke/Haustein/Böhler et al. 2010 and Bamberg/Ajzen/Schmidt 2003). Compared to models that explain travel behaviour using socio-demographic and infrastructural factors, models supplemented by psychological factors have higher explanatory power (Kuppam/Pendyala/Rahman 1999: 74 ff.: van Wee/Holwerda/van Baren 2002: 312 ff.; Hunecke/Schweer 2006; Hunecke/Haustein/Böhler et al. 2010: 19). The impact of the personal norm (in addition to the components of the TPB) on travel mode use is also empirically proven (Harland/Staats/Wilke 1999: 2516 ff.; Hunecke/Blöbaum/Matthies et al. 2001: 839 ff.).

Taking German commuters as an example, Paulssen, Temme, Vij et al. (2014) estimate a mode choice model that takes into account values, attitudes, socio-demographics and the supply aspects of transport alternatives. Thus, the desire for flexibility contributes to the exclusive use of cars and to the avoidance of public transport, while the desire for a comfortable journey increases the probability of using public transport. Johansson/Heldt/Johansson (2006: 513 ff.) find the same for Swedish commuters. Paulssen, Temme, Vij et al. (2014: 882 ff.) come to the conclusion that attitudes are more important for travel mode choice than objective service standards.

Some studies show the effect of symbolic-affective evaluations on car use (e.g. Ellaway/Macintyre/Hiscock et al. 2003; Lois/López-Sáez 2009). Thus, in addition to objective, instrumental factors (e.g. costs), symbolic and affective aspects such as prestige and the excitement value of driving influence the attractiveness of the car. On the basis of two Dutch cities, symbolic-affective factors even prove to be more influential than instrumental factors for car use on the way to the workplace (Steg 2005). Anable and Gatersleben (2005) show that objective factors dominate travel mode use on business trips, whereas objective and symbolic-affective factors are equally important on leisure trips. However, it has been shown that the more directly respondents are confronted with the symbolically effective dimensions of transport use, the more they respond in terms of social desirability and rationalize their personal choice of transport through instrumental motives (Hunecke 2015: 19). For example, people tend not to admit that they want to express their social status by owning a prestigious car (Hunecke 2015: 19). In order to avoid the effects of social desirability, it can be helpful to fall back on successfully tested constructs used in psychological mobility research. However, all these results should be seen against the backdrop of attitudes not necessarily having a one-sided effect on

travel mode use. On the one hand, the assessment of a travel mode is likely to be better by its users than by non-users, since users have more information. On the other hand, attitudes can be adjusted if the realized behaviour and original attitudes are not compliant, e.g. due to external restrictions. This cognitive dissonance is compensated by justifying the realized behaviour (Domarchi/Tudela/González 2008: 592).

Studies that explicitly deal with the connection between the attitudes and travel behaviour of young people are rare. In addition, prominent studies on this topic refer to periods before the aforementioned mobility trends of young people arose. One study dealt with mobility in adolescence and adulthood, taking environmental and technological attitudes into account. It points out that in young people a low humanistic orientation and, conversely, a high traditional value orientation go hand in hand with a low willingness to use sustainable travel modes and, conversely, higher car use (Gawronski 2002: 150 ff.). Calmbach, Borgstedt, Borchard et al. (2016) state in their 2016 study on young people in Germany that the frequent use of public transport results primarily from their dependence on this mode. Environmental considerations and attitudes do not play a role. When considering the later purchase of a car, on the other hand, environmental aspects are certainly addressed. In addition to the costs, young people most likely cite environmental concerns as reasons against obtaining a driving licence or driving a car (Calmbach/Borgstedt/Borchard et al. 2016: 234, 237).

Changing attitudes of young people are considered in various studies as reasons for the trends in young people's travel behaviour described above. However, there is hardly any empirical evidence for this. One exception is the project U.Move with its successor project U.Move 2.0 from the German context (surveys in 1999 and 2013). These projects focused decisively on the psychological, sociological and environmental dimensions of young people's transport use (e.g. Hunecke/Tully/Bäumer 2002). Initial analyses of the mobility-related attitudes of young people of the latest U.Move study show considerable growth in young people's conviction that they can handle their everyday lives without a car, using public transport instead. Ecological responsibility is also relevant here (see Konrad/Wittowsky 2016).

2.3 Research questions

As the state of research reveals, there is no recent empirical evidence for and no contextualization of the consistency or inconsistency of attitudes and travel behaviour among young people (in Germany). This is where the analyses of this paper come in. Here, we focus on the role played by attitudes for the travel mode choice of young people. We set this in a wider context of restrictions, spatial conditions and life stages. We formulate the following research questions:

- Do mobility-related attitudes and travel mode choice for young people correspond? Is a specific setting necessary for mobility-related attitudes to be translated into an appropriate travel mode choice?
- Is the relatively low car use of young people actually a question of corresponding car-related attitudes? Or is it rather a phenomenon of urban spaces, life stages or mobility-related restrictions?

The answers to these questions provide information on the extent to which more sustainability-oriented attitudes of young people can contribute to long-term behavioural changes in the life course and how extrinsic factors may overshadow or override the behavioural impact of attitudes.

The analyses focus on selected factors that describe the setting of the travel mode use of young people. This focus follows the discussion presented in the state of research where the factors 'budget', 'spatial context' and 'life stage' emerge as key dimensions. We assume that, within different spatial and biographical contexts, there are considerable differences with regard to the connection between attitudes and realized behaviour. Differences between different contexts would confirm our assumption that, although attitudes have an influence on the use of travel modes, they are essentially framed by extrinsic factors.

3 Data and methods

3.1 Data description

We collected our data within the project U.Move 2.0, which primarily analyses the influence of information and communication technologies (ICT) on the everyday life and daily mobility of teenagers and young adults, but also discusses the connection between lifestyles, attitudes and travel behaviour. The data were collected in two survey periods using different survey designs. Our interviewees were young people between 14 and 24 years old. First, 180 personal interviews with paper and pencil elements were conducted in spring/summer 2013 in the Rhine-Ruhr area in Germany. Second, an

Table 1: Selection of explanatory variables of travel mode use available in U.Move 2.0 data

main activity	Life stages
housing and private situation[a]	
monthly net household income (for age group 18-24)[b]	Restrictions
monthly personal available budget (for age group 14-17)[b]	
number of inhabitants in the municipality of residence	Spatial context
perceived behavioural control (• Organizing my everyday life requires a high level of mobility. • To meet my obligations, I have to be mobile all the time.)	Attitudes[c]
personal ecological norm (• Due to my principles, I feel obliged to use environmentally friendly transport modes on my daily trips. • I feel obliged to contribute to climate protection by my travel mode choice.)	
public transport intention (• It is my intention to use public transport instead of the car for my daily trips. • I plan to use public transport for my daily trips.)	
car attitude (• Driving a car means freedom to me. • I enjoy applying my driving skills. • When I'm sitting in the car, I feel safe and protected. • Driving a car means fun and passion to me.)	
public transport autonomy (• It's hard for me to conduct my daily trips with public transport instead of the car. • I can easily organize my everyday life without a car. • I can carry out all activities that I want to do by using public transport. • If I want to, it is easy for me to use public transport instead of the car for my daily trips.)	
bicycle weather resistance (• In cool weather I don't like cycling. • I cycle even in bad weather.)	
bicycle excitement (• I cycle because I enjoy physical activity. • I like to ride a bike.)	

[a] This variable was combined from the original variables 'Housing situation' and 'Children under 10 in the household'.
[b] The categorical variables were summarized into three categories: If aged 14-17: i. <50 EUR, ii. 50-100 EUR, and iii. >100 EUR. If aged 18-24: i. <1,000 EUR, ii. 1,000-2,000 EUR, and iii. >2,000 EUR
[c] All attitudinal variables were queried on a five-point scale.

online-survey with 1,273 respondents was conducted in winter 2013/2014 nationwide. The online-survey was conducted by a commissioned survey institute that used a nationwide German online access panel. Persons aged 14 to 24 years old were selected from this panel and questioned with an online-based questionnaire (further information in Konrad/Wittowsky 2018). For this paper, we use the data from the online survey. The nationwide data allow us to consider spatial differences.

The data contain four main modules: general information (mobility options, socio-demographic and economic aspects, social milieu, residential location); one-day (winter) and three-day (spring) trip diaries; ICT diaries; and general and mobility-related attitudes.

3.2 Variables and sample description

The variables which are behaviourally relevant for young people's travel mode use can be categorized into socio-demographic factors, life stage, mobility options and restrictions, spatial context and attitudes. As described above, we focus on the factors of budget, spatial context and life stage as context for the connection between attitudes and travel mode use. Table 1 shows the selection of corresponding variables. This combination of information allows an outstanding empirical contextualization of travel mode use determinants.

Measurement of the attitude dimensions is based on constructs of action theory, namely: i. perceived behavioural control, ii. personal ecological norm, iii.

Table 2: General frequency of travel mode use

	walking	bicycle	public transport	car	car-sharing
(almost) every day	81%	19%	40%	23%	0%
4 to 5 times a week	7%	10%	15%	12%	0%
2 to 3 times a week	6%	15%	11%	20%	1%
once a week	3%	11%	10%	15%	2%
once a month or less often	3%	34%	20%	16%	7%
not at all	0%	12%	4%	15%	88%
n	1,273	1,273	1,273	1,273	1,273

intention (to use public transport), iv. car attitudes, v. public transport autonomy, vi. bicycle weather resistance, and vii. bicycle excitement. In order to avoid social desirability playing a role in the respondents' response behaviour, we drew on successfully tested constructs of psychological mobility research (e.g. Hunecke/Haustein/Grischkat et al. 2007).

The fact that the survey took place in winter creates a bias on the travel mode use reported in the trip diaries. Therefore, we analyse the travel mode use in the sense of a behavioural routine using the general frequency of use rated on a six-stage scale (Table 2). The frequency of use was enquired about for walking, cycling, public transport, car and car-sharing. There is little variation for walking and car-sharing. This is why we focus our analyses on cycling, public transport and the car. In the analyses, the scale used in the questionnaire is taken as the corresponding index for the mode choice. Here, the following principle applies: the higher the index value, the more frequently the mode is used.

3.3 Methods

Depending on the scale level of the variables, we calculate Spearmans Rho as a measure of correlation. These correlations between attitudes and travel mode use are compared between the categories of differentiating features (spatial context, budget and life stage) by means of a Z-transformation according to Fisher. This tests whether the correlations differ significantly. At this point, we avoid multivariate methods in order to place the relationship between attitudes and behaviour in a broader context independently of intercorrelations.

In interpreting the correlations, it should be stressed that they cannot be offset against each other in the sense of quantifiable shifts between the different travel modes. It can only be stated that, for example, a pronounced ecological norm goes hand in hand with increased use of bicycles and, in turn, less frequent use of cars, without being able to speak of a one-to-one shift.

4 Results

As shown in Table 3, positive attitudes towards one travel mode are also accompanied by frequent use, while other modes are used correspondingly less frequently. Perceived behavioural control goes hand in hand with increased car use, while the personal ecological norm reduces car use and in turn increases the use of public transport and bicycles.

It remains unclear whether and to what extent these very clear connections are context dependent. For example, it can be assumed that a positive attitude towards public transport ('intention' and 'public transport autonomy') manifests itself in frequent public transport use where a corresponding offer permits this, namely in urban areas. On the other hand, however, it is also conceivable that cognitive dissonance can be compensated for by adjusting one's own attitudes or external conditions (e.g. choice of place of residence). People with a preference for public transport who live in areas with poor public transport services and are dependent on car use, could justify this behaviour and thus adapt their attitudes. Likewise, cognitive dissonance could be resolved by choosing a place of residence in the sense of residential self selection that allows one's own mobility-related attitudes to be translated into corresponding behaviour. In this case, there would be no significant correlation differences, for example between different spatial contexts.

Table 3: Correlations between attitudes and travel mode use frequency (n = 1,273)

	perceived behavioural control	personal ecological norm	public transport intention	public transport autonomy	car attitude	bicycle weather resistance	bicycle excitement
bicycle	.010	.180**	.001	.074**	-.076**	.313**	.518**
public transport	.009	.070*	.410**	.334**	-.083**	-.024	-.053
car[a]	.217**	-.183**	-.416**	-.602**	.313**	-.075	-.187**

[a] only respondents with a driver's licence (n = 620)

Table 4: Correlations between attitudes and travel mode use frequency by spatial context (n = 1,273)

travel mode	municipality size (inhabitants)	perceived behavioural control	perceived ecological norm	public transport	public transport autonomy	car attitude	bicycle weather resistance	bicycle excitement
bicycle	< 50,000	-.025	.126**	.012	.108**	-.111**	.319**	.456**
	50,000-99,999	.110	.305**	.108	.015	-.028	.303**	.568**
	100,000 or more	.032	.212**	-.070	.044	-.029	.307**	.589**
public transport	< 50,000	.004	.066*	.414**	.296**	-.040	-.046	-.068
	50,000-99,999	-.067	.166*	.305**	.248**	-.111*	-.113*	-.085
	100,000 or more	.037	.013	.537**	.453**	-.183*	-.104	-.005
car[a]	< 50,000	.304**	-.123*	-.255**	-.465**	.248**	.044	-.126*
	50,000-99,999	.224	-.330**	-.494**	-.500**	.421**	-.059	-.024
	100,000 or more	.157*	-.174**	-.363**	-.541**	.336**	-.148*	-.240**

[a] only respondents with a driver's licence (n = 620)

4.1 Spatial context

The correlation matrix (Table 4), differentiated by municipality size classes (number of inhabitants in the place of residence), shows various correlation differences. In the following, only significant differences (brackets) are discussed.

Perceived behavioural control is associated with frequent car use, especially in smaller cities (up to 50,000 inhabitants). This is plausible due to the relatively poor public transport and long distances, which make cycling unreasonable in everyday mobility.

Conversely, a strong personal ecological norm barely exists in these small cities while it manifests significantly more in medium-sized cities (50,000 to 100,000 inhabitants), accompanied by reduced car use. On the other hand, people with a strong ecological norm only use public transport significantly more in medium-sized cities. The relationship between ecological norms and bicycle use is also significantly strongest here. Overall, correlations do not systematically increase or decrease with the size of municipality. Instead, medium-sized cities significantly stand out. This is certainly due to their shorter distances and better public transport services compared to smaller cities. In large cities, public transport use is likely to be the norm and thus independent of ecological norms, and cycling could be either standard as well or less attractive due to high traffic densities.

The correlations between attitudes related to public transport (intention and public transport autonomy) and public transport use vary significantly. Positive attitudes towards public transport contribute significantly more to frequent public transport use in large cities than in smaller ones (under 100,000 inhabitants). A good public transport offer in large cities seems to support the conversion of attitudes into corresponding behaviour. Small towns with up to 50,000 inhabitants stand out when it comes to car

Table 5: Correlations between attitudes and travel mode use frequency by main activity (n = 1,273)

travel mode	life stage - main activity	perceived behavioural control	personal ecological norm	public transport intention	public transport autonomy	car attitude	bicycle weather resistance	bicycle excitement
bicycle	in education	.025	.182**	-.044	.024	-.042	.338**	.510**
	working	-.043	.152	.095	.211**	-.144	.090	.571**
public transport	in education	.035	.038	.359**	.265**	-.019	-.051	-.084**
	working	-.219**	.198*	.599**	.613**	-.392**	-.049	.040
car [a]	in education	.202**	-.158**	-.377**	-.568**	.270**	-.087	-.172**
	working	.240**	-.196*	-.403**	-.616**	.400**	.054	-.166

[a] only respondents with a driver's licence (n = 620)

use: certainly also due to the limited public transport offer, a high intention to use public transport is barely accompanied by less frequent car use.

A positive attitude towards cars goes hand in hand with increased car use everywhere to a similar degree. The strongest negative correlation between car attitude and public transport use exists in the major cities. The fact that car attitude and public transport use are independent of each other in the smallest municipality size class is probably again an expression of a restriction – without an appropriate public transport offer, public transport use is inevitably low, largely independent of attitudes. In large cities with an appropriate public transport network, however, public transport is a practicable alternative to the car. If the attitude to the car is positive here, public transport is used less frequently.

Bicycle weather resistance correlates equally strongly with bicycle use in all municipality size classes. People with high weather resistance use bicycles more frequently. In medium-sized cities, this is significantly at the expense of public transport; in large cities, cars are used significantly less frequently.

A positive attitude towards cycling (bicycle excitement) is connected with frequent use of bicycles, but in large cities this connection is significantly strongest. Conversely, only in major cities does high cycling excitement go hand in hand with less car use. Due to the shorter distances, a positive attitude towards cycling in large cities seems to be converted into correspondingly frequent cycling as a substitute for driving by car.

The findings of the spatial correlation differences described shows that the specifics of different spatial structures (e.g. distances and public transport service) are an important framework influencing whether and to what extent mobility-related attitudes are implemented in corresponding behaviour. There is no (complete) adjustment of attitudes to behaviour in order to balance cognitive dissonance. Such an adjustment is apparently also not (completely) made in the sense of residential self-selection by choosing a place of residence that best corresponds to one's own mobility-related attitudes.

4.2 Life stage

Life stages are operationalized by the main activity and residential situation. The analysis, differentiated according to main activity, only considers the two sufficiently represented categories 'still in education' and 'already working'. The analysis by housing situation only compares the two adequately represented groups: people who still live with their parents and those who have established their own households but not yet a family.

The correlations between attitudes and car use do not differ significantly between those in employment and those still in education (Table 5). It should be emphasized that only persons with a driving licence are included in the calculations, i.e. a restrictive effect of different proportions of licence holders is excluded.

Stronger perceived behavioural control is significantly related to less frequent public transport use among the working population only. This is due to the fact that those in employment more often have a driving licence than people in education (82% compared to 44%), public transport is not the standard travel mode for them and their life stage has less affinity with and is less compatible with public transport. Conversely, only employed people use public transport significantly more often if their personal ecological norm is very high. For

Table 6: Correlations between attitudes and travel mode use frequency by private life stage (n = 1,273)

travel mode	life stage private	perceived behavioural control	personal ecological norm	public transport intention	public transport autonomy	car attitude	bicycle weather resistance	bicycle excitement
bicycle	living with parents	-.001	.175**	-.073*	.033	-.071*	.324**	.484**
	own household - no children	.069	.186**	.146**	.176**	-.086	.301**	.591**
public transport	living with parents	.047	.006	.336**	.263**	-.035	-.063	-.102**
	own household - no children	-.074	.206**	.587**	.493**	-.193**	.053	.020
car [a]	living with parents	.235**	-.120*	-.296**	-.498**	.255**	.034	-.097
	own household - no children	.219**	-.236**	-.469**	-.643**	.347**	-.171**	-.229**

[a] only respondents with a driver's licence (n = 620)

those still in education, public transport is the standard and therefore independent of attitudes.

The same applies to the attitudes 'intention' and 'public transport autonomy'. Especially among those employed, the attitude towards public transport plays a role and the more positive the attitude, the more frequently public transport is used. In addition, a high degree of public transport autonomy among the working population goes hand in hand with more frequent bicycle use. They probably use the bicycle as a feeder to public transport. In line with the results described so far, a positive car attitude is only associated with less frequent use of public transport among the working population, while people in education use public transport largely independently of their public transport and car preferences.

Bicycle weather resistance only plays a role in the bicycle use of people in education. A possible explanation might be that they use bicycles more often than young people in work especially on everyday trips. Weather resistance is likely to have a different meaning for everyday trips than for leisure trips (cycling as a sport), which mainly take place in good weather.

There are significant differences between people who still live with their parents and those who already have their own households (but no children yet) in terms of the correlations between attitudes and travel mode use (Table 6). This is most evident in the use of public transport.

Cycling frequency is predominantly positively related to 'intention' and 'public transport autonomy' among people with their own households. This should again reflect the feeder trips to public transport, which are also positively related to public transport attitudes especially among those with their own households. 'Bicycle excitement' is also related significantly more strongly to bicycle use for people with their own households. People living with their parents are more often still in education and use bicycles quite often anyway, with less dependence on their attitudes.

With the exception of bicycle-related attitudes, the relationship between attitudes and public transport use is significantly stronger among those living in their own households. Especially for this group, a high ecological norm and positive public transport attitudes go hand in hand with more frequent public transport use; conversely, a positive car attitude is linked to less frequent public transport use. People who live with their parents are still in a life stage with less affinity towards the car and are often dependent on public transport due to restrictions (age, driving licences or income). For them, public transport is the standard travel mode and its use is comparatively independent of attitudes. Cycling excitement, on the other hand, reduces public transport use (in favour of cycling) more sharply for those still living with their parents. This shift is probably more practicable in this life stage than for people with their own households.

Car use depends, above all among those with their own households, on attitudes. It is to be noted here that only driving licence holders are considered in

Table 7: Correlation between attitudes and travel mode use frequency by budget/income (n = 1,273)

travel mode	Net household income / personal available budget	perceived behavioural control	personal ecological norm	public transport	public transport autonomy	car attitude	bicycle weather resistance	bicycle excitement
bicycle	< 50€ / < 1,000€	.061	.125**	-.092	-.002	-.003	.345**	.551**
	50-100€ / 1,000-2,000€	.009	.189**	.049	.083	-.164**	.313**	.465**
	> 100€ / > 2,000€	-.091	.185**	.088	.151**	-.100	.301**	.503**
public transport	< 50€ / < 1,000€	.070	.082	.385**	.237**	-.005	-.079	-.037
	50-100€ / 1,000-2,000€	.043	.003	.384**	.296**	-.086	-.079	-.093
	> 100€ / > 2,000€	-.019	.073	.435**	.433**	-.144**	.077	-.037
car[a]	< 50€ / < 1,000€	.109	-.179*	-.386**	-.598**	.316**	-.132	-.207**
	50-100€ / 1,000-2,000€	.258**	-.183*	-.387**	-.542**	.243**	.024	-.128
	> 100€ / > 2,000€	.245**	-.275**	-.460**	-.578**	.369**	-.101	-.249**

[a] only respondents with a driver's licence (n = 620)

both groups. Especially for respondents with their own households, positive attitudes towards public transport are accompanied by a reduction in car use (in favour of other transport modes). Here again, people living with their parents are in a life stage which is strongly related to public transport and attitudes play a subordinate role. This can also be applied to the negative correlations between bicycle-related attitudes and car use, which are significantly stronger for people with their own households.

In summary, life stage is an essential condition for the extent to which attitudes and travel mode use are connected. As with differentiation according to spatial context, there is cognitive dissonance. Certain circumstances seem to limit the possibilities of translating personal attitudes into appropriate behaviour. Thus, the biographical phases 'still in education' and 'still living with parents' seem to represent a restriction for translating mobility-related attitudes into corresponding behaviour. In these life stages, there are still comparatively strong restrictions in the form of relatively low budgets, low driving licence rates and limited car availability. In addition, young people who are still in education often have reduced-price tickets for public transport (e.g. semester tickets), which contribute to a strong focus on public transport with a relatively low dependence on attitudes.

4.3 Budget

To simplify matters, the available budget (collected for 14 to 17 year olds) and net household income (collected for 18 to 24 year olds) was combined for both age groups (Table 7). This compares the correlations of attitudes and travel mode use between people with low, medium and high budgets. The grouping of the categories was chosen to achieve an almost balanced division into the third with the highest budget, the third with the lowest budget and the middle third.

Depending on the financial budget, the correlations of attitudes and travel mode use differ only in a few cases. The group with the highest budget stands out significantly in terms of public transport autonomy. Especially in this group, public transport autonomy is positively related to public transport and bicycle use (at the expense of car use). This is obviously an expression of financial restrictions because people with a low budget are more dependent on public transport, use it largely independently of their attitudes and probably often combine it with a bicycle.

Conversely, a positive attitude towards cars is significantly accompanied by low public transport use only for people with high budgets. In contrast to people with a lower budget, they are apparently more likely to switch to cars at the expense of public transport. People with a medium budget in particular reduce bicycle use if they have a positive attitude towards cars.

Basically, this analysis shows that (financial) restrictions provide a framework for the extent to which

mobility-related attitudes are translated into behaviour. Although there are only a few clear, significant correlation differences, there is apparently no (complete) dissolution of cognitive dissonance in terms of adapting attitudes to practicable behaviour.

5 Summary and conclusions

Referring to the first research question, we conclude that yes, mobility-related attitudes and travel mode use correspond among young people. And yes, under certain conditions, attitudes are translated into corresponding behaviour much more consistently. There is a clear consistency between attitudes and behaviour: perceived mobility constraints are positively related to car use while the higher the personal ecological norm, the more frequently public transport and bicycles are used and the less frequently the car. As expected, positive attitudes towards a travel mode are accompanied by more frequent use of that mode. When the analysis is differentiated according to extrinsic conditions it emerges that in some groups a positive attitude towards public transport is accompanied not only by more frequent use of public transport, but also by more bicycle use. In addition, some shift effects can be observed whereby more frequent use of one travel mode leads to less use of other travel modes.

The framework conditions (life stage, spatial context and budget) that form the basis of the broader context for the connection between attitudes and travel mode use are relevant, as suggested by previous research. In fact, there are circumstances that promote or inhibit the implementation of mobility-related attitudes into corresponding behaviour. Table 8 summarizes the significant correlation differences according to the three conditions considered.

Large cities represent the spatial context in which attitudes and travel mode use are most strongly related. Positive attitudes towards public transport and cycling are particularly translated into increased use of both in large cities. On the other hand, perceived behavioural control, especially in small towns, goes hand in hand with frequent car use. If the necessary conditions with regard to spatial structure, distances and the public transport system are in place, young people with sustainable attitudes behave sustainably in their travel mode use.

By far the most correlation differences exist according to the *life stage*. Those employed stand out. For them, attitudes play a much greater role in their travel mode use (here regarding public transport use). People who are still in education often use public transport anyway; their attitudes play a secondary role compared to those of young working people.

With regard to the housing situation, persons with their own households are distinct. For them, attitudes play a much greater role in travel mode use than for young people who still live with their parents. Young people still living in their parents' households are already a public-transport-oriented group, and often use public transport and bicycles but rarely use the car, relatively detached from their attitudes.

In particular or exclusively among people with a high *budget*, public transport and bicycle use are positively related to public transport autonomy and negatively related to car attitude. People with a lower budget use public transport much more frequently and cars less frequently anyway, and attitudes obviously play a subordinate role compared to financial restrictions. Budget thus provides a framework for the consistency of attitudes and behaviour. With regard to the sustainable use of transport, a high budget seems to increase freedom of choice and attitude-based use of travel modes, whereas the mode use of young people with a low budget is inevitably more sustainable.

The following should be noted with regard to the second research question of this paper: 'Is the relatively low car use of young people actually a question of corresponding car-related attitudes? Or is it rather a phenomenon of urban spaces, life stages or mobility-related restrictions?'

Car attitude has the highest value within the sample behind public transport autonomy; the car has a comparatively positive connotation. Nevertheless, it is used below average, while young people use public transport and bicycles above average. Statistically, car settings and car use are consistent; weak car settings are accompanied by less frequent car use and vice versa. As explained above, the extrinsic factors (spatial context, life stage and budget) considered in this paper represent essential conditions not only for travel mode use, but also for the relationship between attitudes and mode use. However, the following applies explicitly to cars: although spatial context, life stage and budget are essential factors for car use, the relationship between car attitude and car use is independent of these framework conditions.

Thus, our results confirm the assumptions made in the literature that less frequent car use is associated with a lower budget, urban housing and the (extended) education phase. The general relationship between car attitudes and car use can also be confirmed, as is often

Table 8: Overview of the relevance of framework conditions for the relationship between attitudes and travel mode use

Attitude	Correlation	Specific correlations
Spatial context		
Perceived behavioural control	+ car use	especially in small towns
Intention and public transport autonomy	+ public transport	especially in big cities
Bicycle excitement	+ bicycle	especially in big cities
Life stage		
Life stage – working vs. in education		
Perceived behavioural control	- public transport	only for employed persons
Personal ecological norm	+ public transport	only for employed persons
Public transport intention	+ public transport	especially for employed persons
Public transport autonomy	+ public transport	especially for employed persons
Car attitude	- public transport	especially for employed persons
Bicycle weather resistance	+ bicycle	only for students
Life stage – own household vs. parents' household		
Personal ecological norm	+ public transport	only for persons with own household
Intention	+ public transport	especially for persons with own household
	+ bicycle	especially for persons with own household
	- car	especially for persons with own household
Public transport autonomy	+ public transport	especially for persons with own household
	+ bicycle	especially for persons with own household
	- car	especially for persons with own household
Car attitude	- public transport	only for persons with own household
Bicycle weather resistance	- car	only for persons with own household
Bicycle excitement	+ bicycle	especially for persons with own household
	- public transport	only for persons in parents' household
	- car	only for persons with own household
Budget		
Public transport autonomy	+ public transport	especially for persons with high budget
	+ bicycle	especially for persons with high budget
Car attitude	- public transport	only for persons with high budget

assumed in the literature but not empirically proven. However, the fact that this relationship is independent of spatial context, life stage and budget shows that car attitudes and extrinsic conditions do not override each other. The car use of young people is thus both a question of car-related attitudes and, at the same time, a phenomenon of external conditions.

This is an important new observation for the overarching debate on a transition to more sustainable future transport, which seems to be essentially driven by young people as the 'new generation' (Kuhnimhof/Buehler/Dargay 2011). This observation can be made fruitful in two ways for ecologically normative policy approaches. First, by satisfying the more often positive attitudes towards alternatives to the private automobile with new external supply structures (e.g. improved bicycle infrastructure, improved public transport through the integration of bike sharing and car sharing); second,

by directly triggering alternative behaviours to the use of private cars through new external supply structures, in particular in those spaces more strongly associated with the automobile. In this respect, it can be assumed that for the first time major successes in accelerating the renunciation of the automobile society are possible, starting with the younger generation.

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Literature

Ajzen, I. (1991): The Theory of Planned Behavior. In Organizational Behavior and Human Decision Processes 50, 2, 179-211. doi: 10.1016/0749-5978(91)90020-T

Anable, J.; Gatersleben, B. (2005): All work and no play? The role of instrumental and affective factors in work and leisure journeys by different travel modes. In Transportation Research Part A: Policy and Practice 39, 2-3, 163-181. doi: 10.1016/j.tra.2004.09.008

Bamberg, S.; Ajzen, I.; Schmidt, P. (2003): Choice of Travel Mode in the Theory of Planned Behavior: The Roles of Past Behavior, Habit, and Reasoned Action. In: Basic and Applied Social Psychology 25, 3, 175-187. doi: 10.1207/S15324834BASP2503_01

BMBF – Bundesministerium für Bildung und Forschung (2010): Die wirtschaftliche und soziale Lage der Studierenden in der Bundesrepublik Deutschland 2009. 19. Sozialerhebung des Deutschen Studentenwerks durchgeführt durch HIS Hochschul-Informations-System – Ausgewählte Ergebnisse. Bonn.

Buehler, R.; Pucher, J. (2012): Demand for Public Transport in Germany and the USA. An Analysis of Rider Characteristics. In Transport Reviews 32, 5, 541-567. doi: 10.1080/01441647.2012.707695

Calmbach, M.; Borgstedt, S.; Borchard, I.; Thomas, P.M.; Flaig, B.B. (2016): Wie ticken Jugendliche 2016? Lebenswelten von Jugendlichen im Alter von 14 bis 17 Jahren in Deutschland. Wiesbaden. doi: 10.1007/978-3-658-12533-2

Canzler, W.; Knie, A. (2016): Mobility in the age of digital modernity: Why the private car is losing its significance, intermodal transport is winning and why digitalisation is the key. In: Applied Mobilities 1, 1, 56-67. doi: 10.1080/23800127.2016.1147781

Chatterjee, K.; Goodwin, P.; Schwanen, T.; Clark, B.; Jain, J.; Melia, S.; Middleton, J.; Plyushteva, A.; Ricci, M.; Santos, G.; Stokes, G. (2018): Young people's travel – what's changed and why? Review and analysis. Bristol.

Delbosc, A.; Currie, G. (2013): Causes of Youth Licensing Decline. A Synthesis of Evidence. In Transport Reviews 33, 3, 271-290. doi: 10.1080/01441647.2013.801929

Delbosc, A.; Currie, G. (2014a): Changing demographics and young adult driver license decline in Melbourne, Australia (1994-2009). In Transportation 41, 3, 529-542. doi: 10.1007/s11116-013-9496-z

Delbosc, A.; Currie, G. (2014b): Impact of Attitudes and Life Stage on Decline in Rates of Driver's License Acquisition by Young People in Melbourne, Australia. In: Transportation Research Record 2452, 1, 62-70. doi: 10.3141/2452-08

Delbosc, A.; Currie, G. (2014c): Using discussion forums to explore attitudes toward cars and licensing among young Australians. In: Transport Policy 31, 27-34. doi: 10.1016/j.tranpol.2013.11.005

Dick, M. (2004): Fahren – die unterschätzte Erlebnisdimension des Verkehrs. In Schiefelbusch, M. (ed.): Erfolgreiche Eventverkehre. Analysen und Fallstudien. Mannheim, 101-114. = Studien zur Mobilitäts- und Verkehrsforschung 7.

Domarchi, C.; Tudela, A.; González, A. (2008): Effect of attitudes, habit and affective appraisal on mode choice: an application to university workers. In Transportation 35, 5, 585-599. doi: 10.1007/s11116-008-9168-6

Ellaway, A.; Macintyre, S.; Hiscock, R.; Kearns, A. (2003): In the driving seat: psychosocial benefits from private motor vehicle transport compared to public transport. In Transportation Research Part F: Traffic Psychology and Behaviour 6, 3, 217-231. doi: 10.1016/S1369-8478(03)00027-5

Follmer, R.; Gruschwitz, D.; Jesske, B.; Quandt, S.; Lenz, B.; Nobis, C.; Köhler, K.; Mehlin, M. (2010): Mobilität in Deutschland 2008. Ergebnisbericht. Struktur – Aufkommen – Emissionen – Trends. Bonn.

Frändberg, L.; Vilhelmson, B. (2011): More or less travel: Personal mobility trends in the Swedish population focusing gender and cohort. In Journal of Transport Geography 19, 6, 1235-1244. doi: 10.1016/j.jtrangeo.2011.06.004

Gawronski, B. (2002): Allgemeine Wertorientierungen: Struktur, längsschnittliche Stabilität und Verhaltenswirksamkeit. In: Scholl, W.; Sydow, H. (eds.): Mobilität im Jugend- und Erwachsenenalter. Eine fünfjährige Längsschnittstudie zu Mobilitätsformen, Fahrzeugvorlieben, Freizeit- und Risikoverhalten und deren Abhängigkeit von Umwelt- und Technikeinstellungen, Werten und Persönlichkeit. Münster, 149-172.

Geels, F. (2012): A socio-technical analysis of low-carbon transitions: Introducing the multi-level perspective into transport studies. In: Journal of Transport Geography 24, 471-482. doi: 10.1016/j.jtrangeo.2012.01.021

Goodwin, P. (2012): Peak travel, peak car and the future of mobility: Evidence, unresolved issues, and policy implications, and a research agenda. London. = International Transport Forum Discussion Papers 2012/13.

Griffiths, R.E. (2010): 2007/2008 Household Travel Survey. Changes in Daily Travel Patterns 1994 to 2007/2008. Washington, D.C.

Groth, S. (2019): Multioptionalität: Ein neuer („alter") Terminus in der Alltagsmobilität der modernen Gesellschaft? In: Raumforschung und Raumordnung | Spatial Research and Planning 77, 1, 17-34. doi: 10.2478/rara-2019-0003

Harland, P.; Staats, H.; Wilke, H.A.M. (1999): Explaining Proenvironmental Intention and Behavior by Personal Norms and the Theory of Planned Behavior. In Journal of Applied Social Psychology 29, 12, 2505-2528. doi: 10.1111/j.1559-1816.1999.tb00123.x

Hjorthol, R. (2016): Decreasing popularity of the car? Changes in driving licence and access to a car among young adults over a

25-year period in Norway. In: Journal of Transport Geography 51, 140-146. doi: 10.1016/j.jtrangeo.2015.12.006

Hunecke, M. (2000): Ökologische Verantwortung, Lebensstile und Umweltverhalten. Heidelberg.

Hunecke, M. (2015): Mobilitätsverhalten verstehen und verändern. Psychologische Beiträge zur interdisziplinären Mobilitätsforschung. Wiesbaden. doi: 10.1007/978-3-658-08825-5

Hunecke, M.; Blöbaum, A.; Matthies, E.; Höger, R. (2001): Responsibility and Environment. In Environment and Behavior 33, 6, 830-852.

Hunecke, M.; Haustein, S.; Grischkat, S.; Böhler, S. (2007): Psychological, sociodemographic, and infrastructural factors as determinants of ecological impact caused by mobility behavior. In: Journal of Environmental Psychology 27, 4, 277-292. doi: 10.1016/j.jenvp.2007.08.001

Hunecke, M.; Haustein, S.; Böhler, S.; Grischkat, S. (2010): Attitude-Based Target Groups to Reduce the Ecological Impact of Daily Mobility Behavior. In Environment and Behavior 42, 1, 3-43. doi: 10.1177/0013916508319587

Hunecke, M.; Schweer, I. (2006): Einflussfaktoren der Alltagsmobilität. Das Zusammenwirken von Raum, Verkehrsinfrastruktur, Lebensstil und Mobilitätseinstellungen. In: Beckmann, K.J.; Hesse, M.; Holz-Rau, C.; Hunecke, M. (eds.): StadtLeben – Wohnen, Mobilität und Lebensstil. Neue Perspektiven für Raum- und Verkehrsentwicklung. Wiesbaden, 148-166. doi: 10.1007/978-3-531-90132-9

Hunecke, M.; Tully, C.J.; Bäumer, D. (eds.) (2002): Mobilität von Jugendlichen. Psychologische, soziologische und umweltbezogene Ergebnisse und Gestaltungsempfehlungen. Opladen.

ifmo – Institut für Mobilitätsforschung (2011): Mobilität junger Menschen im Wandel – multimodaler und weiblicher. München.

Johansson, M.V.; Heldt, T.; Johansson, P. (2006): The effects of attitudes and personality traits on mode choice. In Transportation Research Part A: Policy and Practice 40, 6, 507-525. doi: 10.1016/j.tra.2005.09.001

Konrad, K. (2016): Mobiler Alltag im Wandel des Geschlechterverhältnisses. Wiesbaden. = Studien zur Mobilitäts- und Verkehrsforschung 29. doi: 10.1007/978-3-658-11282-0

Konrad, K.; Wittowsky, D. (2016): Digitalisierung der Lebenswelten junger Menschen – der Zusammenhang von virtueller und physischer Mobilität. Dortmund. = ILS-Trends 1/16.

Konrad, K.; Wittowsky, D. (2018): Virtual mobility and travel behavior of young people – Connections of two dimensions of mobility. In Research in Transportation Economics 68, 11-17. doi: 10.1016/j.retrec.2017.11.002

Krause, J. (2009): Mobilität von Kindern und Jugendlichen im öffentlichen Raum. In: Friedrich, B. (ed.): Bewegung im Raum – Raum in Bewegung. Frankfurt am Main, 111-133. = Stadt und Region als Handlungsfeld 6.

Kuhnimhof, T.; Buehler, R.; Dargay, J. (2011): A New Generation? Travel Trends for Young Germans and Britons. In: Transportation Research Record: Journal of the Transportation Research Board 2230, 1, 58-67. doi: 10.3141/2230-07

Kuhnimhof, T.; Armoogum, J.; Buehler, R.; Dargay, J.; Denstadli, J.M.; Yamamoto, T. (2012): Men Shape a Downward Trend in Car Use among Young Adults. Evidence from Six Industrialized Countries. In: Transport Reviews 32, 6, 761-779. doi: 10.1080/01441647.2012.736426

Kuhnimhof, T.; Buehler, R.; Wirtz, M.; Kalinowska, D. (2012): Travel trends among young adults in Germany: increasing multimodality and declining car use for men. In: Journal of Transport Geography 24, 443-450. doi: 10.1016/j.jtrangeo.2012.04.018

Kuhnimhof, T.; Wirtz, M.; Manz, W. (2012): Decomposing Young Germans' Altered Car Use Patterns. Lower Incomes, More Students, Decrease in Car Travel by Men, and More Multimodality. In: Transportation Research Record 2320, 1, 64-71. doi: 10.3141/2320-08

Kuppam, A.R.; Pendyala, R.; Rahman, S. (1999): Analysis of the role of traveler attitudes and perceptions in explaining mode-choice behavior. In Transportation Research Record 1676, 1, 68-76. doi: https://doi.org/10.3141/1676-09

Lenz, B. (2013): Zukunftsperspektive individuelle Mobilität – Anforderungen, Erwartungen und Bedürfnisse. In Jochem, P.; Poganietz, W.-R.; Grunwald, A.; Fichtner, W. (eds.): Alternative Antriebskonzepte bei sich wandelnden Mobilitätsstilen. Tagungsbeiträge vom 08. und 09. März 2012 am KIT, Karlsruhe. Karlsruhe, 13-33.

Le Vine, S.; Polak, J. (2014): Factors associated with young adults delaying and forgoing driving licenses. Results from Britain. In Traffic Injury Prevention 15, 8, 794-800. doi: 10.1080/15389588.2014.880838

Lois, D.; López-Sáez, M. (2009): The relationship between instrumental, symbolic and affective factors as predictors of car use: A structural equation modeling approach. In: Transportation Research Part A: Policy and Practice 43, 9-10, 790-799. doi: 10.1016/j.tra.2009.07.008

Metropolitan Washington Council of Governments (2010): Survey Shows Significant Shift in Daily Travel Patterns. Edited by Metropolitan Washington Council of Governments.

Oakil, A.T.M.; Manting, D.; Nijland, H. (2016): Determinants of car ownership among young households in the Netherlands: The role of urbanisation and demographic and economic characteristics. In Journal of Transport Geography 51, 229-235. doi: 10.1016/j.jtrangeo.2016.01.010

Paulssen, M.; Temme, D.; Vij, A.; Walker, J.L. (2014): Values, attitudes and travel behavior: a hierarchical latent variable mixed logit model of travel mode choice. In Transportation 41, 4, 873-888. doi: 10.1007/s11116-013-9504-3

Santos, A.; McGuckin, N.; Nakamoto, H.Y.; Gray, D.; Liss, S. (2011): Summary of Travel Trends: 2009 National Household Travel Survey. Washington, D.C.

Schönduwe, R.; Bock, B.; Deibel, I. (2012): Alles wie immer, nur irgendwie anders? Trends und Thesen zu veränderten Mobilitätsmustern junger Menschen. Berlin. = InnoZ-Baustein 10.

Schwartz, S.H. (1977): Normative Influences on Altruism. In: Advances in Experimental Social Psychology 10, 221-279. doi: 10.1016/S0065-2601(08)60358-5

Shell Deutschland (2009): Shell Pkw-Szenarien bis 2030. Fakten, Trends und Handlungsoptionen für nachhaltige Auto-Mobilität. Hamburg.

Sivak, M.; Schoettle, B. (2012): Update: Percentage of young persons with a driver's license continues to drop. In: Traffic Injury Prevention 13, 4, 341. doi: 10.1080/15389588.2012.696755

Statistisches Bundesamt (2003): Wirtschaftsrechnungen. Einkommens- und Verbrauchsstichprobe. Ausstattung privater Haushalte mit langlebigen Gebrauchsgütern. Wiesbaden.

Statistisches Bundesamt (2008): Wirtschaftrechnungen. Einkommens- und Verbrauchsstichprobe. Ausstattung privater Haushalte mit ausgewählten Gebrauchsgütern. Wiesbaden.

Statistisches Bundesamt (2013): Wirtschaftsrechnungen. Einkommens- und Verbrauchsstichprobe. Ausstattung privater Haushalte mit ausgewählten Gebrauchsgütern. Wiesbaden.

Statistisches Bundesamt (2016): Bildung und Kultur. Nichtmonetäre hochschulstatistische Kennzahlen. Fachserie 11 Reihe 4.3.1. 1980-2015. Wiesbaden.

Steg, L. (2005): Car use: lust and must. Instrumental, symbolic and affective motives for car use. In Transportation Research Part A: Policy and Practice 39, 2-3, 147-162. doi: 10.1016/j.tra.2004.07.001

Triandis, H.C. (1977): Interpersonal Behavior. Monterrey.

Tully, C.J. (2011): Mobilisierung des Mobilen. Trends in der Jugendmobilität. Anmerkungen zur Veränderung im Mobilitätsverhalten. In: Der Nahverkehr 29, 7-8, 12-15.

van Wee, B.; Holwerda, H.; van Baren, R. (2002): Preferences for modes, residential location and travel behaviour: The relevance for land-use impacts on mobility. In European Journal of Transport and Infrastructure Research 2, 3/4, 305-319.