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Key Events and Their Effect on Mobility Biographies: The Case of Childbirth

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Key Events and Their Effect on Mobility Biographies: The Case of Childbirth

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ABSTRACT

Over the last few years, travel-behavior researchers have generally acknowledged the importance of habits and key events in understanding travel-behavior changes. The purpose of this study is to contribute to the evolving research field of mobility biographies. With a retrospective, qualitative survey, 20 parents of small children are questioned about key events affecting their travel behavior and in particular the role of childbirth in this respect. The findings reveal that the commonly expected car-dependency after childbirth is only one pattern among others such as the stability or even increase of green mode use.

Key Words: behavioral change, car use, childbirth, habits, key events, mobility biography, travel behavior.

1. INTRODUCTION

Transportation is one of the major challenges for the development of a more sustainable society. Despite numerous claims, speeches, and announcements made by governments and individual politicians about reducing the negative environmental and social impacts of travel, as yet limits placed on growth in the transport sector remain imperceptible. One important reason for the policy failure is that what are probably the most effective policies (e.g., pricing) are the least popular and politicians shy away from implementing them. The question therefore arises whether there are any more popular policies that would attain the same objectives. An improved understanding of individual travel behavior would facilitate improvement of the effectiveness of commonly accepted policies for a more sustainable

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transport system. For instance, research into the effects of residential relocations on travel behavior suggests that communication and marketing efforts for travel-mode changes are more successful if they are targeted to new residents rather than to the general population. Similarly, an improved understanding of a parent's travel behavior after childbirth might reveal opportunities for specific and effective policy measures.

It is not the aim of this study to suggest particular policies for changing travel behavior, but rather to contribute to our understanding of travel-behavior changes that correlate with specific key events in the life course. In the last few decades, the activity-based framework has been an essential element in most explanations and modelling of travel behavior. Recently, several researchers have stressed the importance of habits for daily travel behavior and consequently have included these in travel-behavior modelling (e.g., Gärling and Axhausen 2003; Verplanken et al. 1997; Harms 2003). Subsequently, factors changing travel habits, like the formation of new households or residential relocations, came within the scope of transportation research. With the concept of mobility biographies came a theoretical framework for the longitudinal and integrative analysis of individuals' travel behavior in the context of choices in other life domains. The term *mobility biography* refers to those life-course trajectories that link directly to an individual's travel behavior such as the availability of a private car, a public-transport season ticket, a driving license or actual travel patterns. In a life-course trajectory, a period of relative stability continues until a key event changes it.

To our knowledge, to date the number of attempts to analyze mobility biographies has been limited. The aim of this paper is to develop further the life-course approach for travel behavior presented in an earlier paper (Lanzendorf 2003) by its application to one specific key event: childbirth. With the birth of a child, the allocation of maintenance tasks in a household usually has to be rearranged. In the traditional nuclear family, women tend to take on the lion's share of childcare while their menfolk continue their professional careers. In that case, women usually take a break in their professional careers shortly before and for some time after childbirth. In that period, they evidently adapt their activity and travel patterns to the needs of the newborn child. However, given the short-term nature of the changes of travel behavior around this time period, it is unclear whether the needs of the child, still accompanied by maintenance needs, still have an impact on women when they resume their professional careers and also on their husbands.

For the purpose of this study, we first ask what key events affect the travel behavior of young parents and assess systematically how these changes are related to the key events. For our analysis, we decided to question young parents since they had usually just passed through a period of change in their educational, professional, family or housing trajectories and we expected the probability of change in travel behavior to be high. Second, the main aim of this paper is to identify typical patterns of change or adoption of travel behavior around the specific key event of childbirth and ascertain how these affect the mobility biography in a long-term perspective. In particular, we ask whether the mode use of mothers changes from the time before the birth of a child to the time afterwards. Methodologically, we have used qualitative retrospective interviews with 16 mothers and 4 fathers of

small children under the age of six in a small survey in Leipzig, Germany. In the qualitative interviews, the key objective was to detect different types and patterns of travel-behavior changes and to ascertain how these changes relate to childbirth. It must be stressed, however that the limited sample size did not permit conclusions to be derived regarding the quantitative importance of the results; rather, they shed light on the variability and the diversity of parents' reasoning for their travel behavior after childbirth.

The paper is organized as follows. In section 2, we outline the theoretical framework of this and earlier related research. In section 3 we describe the methodology employed and argue for retrospective qualitative interviews as an appropriate tool for this type of research. Section 4 contains some descriptive results and in particular the key events mentioned that affect parents' mobility biographies. In section 5, the effect of childbirth on a mother's travel behavior is revealed by analyzing the qualitative interviews; these results are summarized and discussed in section 6. The paper ends with some conclusions in section 7.

2. EARLIER RESEARCH AND THEORETICAL FRAMEWORK

An emerging perspective for analyzing travel behavior is the mobility-biographies approach (Lanzendorf 2003; Ohnmacht and Axhausen 2005 a,b; Scheiner 2005). This perspective stresses the continuity of travel behavior over the life course owing to its routine character. The perspective highlights the importance of key events in affecting and changing travel behavior (Klöckner 2004, 2005; Waerden et al. 2003). Key events are selected events in other domains of life that affect travel behavior. The main objective of the mobility-biographies approach is to emphasize the importance of certain stages and events in the life course for individual and household travel behavior. We expect this in-depth understanding to generate a better impact assessment of policies and other interventions on travel behavior. Ultimately, the approach aims to produce better-informed policy advice for policymakers and planners, allowing them to shape society in a more sustainable way.

With its view on other life domains like family and household structures or residential relocations, the mobility-biographies approach broadens the explanation of a household's decision-making processes to topics beyond the scope of traditional transportation researchers and politicians. For instance, although broadly covered by the literature on the impact of urban form on travel (for an overview see for example Handy 2005), the effect of housing on travel is analyzed within the mobility-biographies framework from a more dynamic perspective. Thus, housing is the result of residential relocations and the travel impact of housing is not only caused by the physical environment and the accessibility of locations. Moreover, the travel and activity patterns of an individual or a household in a previous residential location can affect the travel decisions in a new location, too. Thus, consideration of the housing career delivers new insights for travel-behavior research. More generally, the approach emphasizes the dynamics of travel behavior over time and the importance of impact factors on a long-term time scale versus those operating on a short-term scale. Thus, the need arises for considering non-transport-related policies in their effect on travel behavior.

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The empirical research on key events affecting travel behavior is limited. Although there are some quantitative surveys on relevant key events (Waerden et al. 2003; Klöckner 2004; Ohnmacht & Axhausen 2005a, 2005b), a systematic approach to the interaction of life-course events with travel behavior and the related causalities is still lacking. Residential relocations are probably the most important and best researched key events for travel behavior (Krizek 2003; Stanbridge et al. 2003; Bamberg 2003; Scheiner 2005; Kasper and Scheiner 2006; Prillwitz et al. 2006). Other important key events are related to the professional career, either the interaction of job and housing decisions (Kalter 1994), income changes (Dargay 2001; Dargay and Hanly 2004) or retirement (e.g., Holz-Rau and Scheiner 2004; Scheiner 2004). Furthermore, social conditioning during childhood (Flade and Limbourg 1999) and the birth of children (Heine and Mautz 2001) are important.

One general hypothesis about mobility biographies should be mentioned here. Franke (2004) suggests a *funnel theory*, by which she means that, over a lifetime, younger adults tend to be more open-minded regarding new travel options and choices than are the elderly. In particular, she argues that, for most people, travel habits are already relatively firmly established at about the age of 35, possibly an interaction with less markedly key events in other domains of life occurring after that age. Therefore, in the mobility biographies, many key events should occur below the age of 35 while with increasing age the number of key events should decrease.

3. METHODOLOGY AND DATA: A QUALITATIVE PERSPECTIVE

Retrospective Qualitative Interviews

Although retrospective interviews do not deliver datasets as reliable as those from observations or from panel studies, we argue that the retrospective methodology has other advantages such as the greater efficiency and effectiveness of data gathering. As has been argued elsewhere, the importance of travel behavior for an individual's daily activity scheduling and choices improves an individual's capacity to remember past travel behavior and thereby increases the reliability of responses to retrospective questionnaires (Lanzendorf 2003). That respondents have a good recollection of earlier events is important in retrospective interviews in social science research. At least two conditions should be met: first, the time span between the event under investigation and the interview should not be too long; second, the event should be important for the respondent to remember it well. Since this paper deals with the travel behavior of young parents before and after the birth of a child, these conditions should be met.

Furthermore, since our knowledge and understanding of the interactions between key events and travel behavior is still limited, we decided on a qualitative retrospective interview technique allowing for in-depth analysis of relevant factors affecting the decision-making process. With the qualitative approach we were able to track down relevant key events, interactions between key events, their impact on travel behavior, and the respondents' underlying reasoning concerning the observed changes. Furthermore, in contrast with quantitative retrospective surveys,

the qualitative methodology allows respondents to improve their recollection by thinking and arguing about their decision-making some five or ten years ago. Since the respondents have to report about their decision-making process and, in particular, about their reasoning for changing travel behavior along with a particular key event, they sometimes remember additional events, impact factors or outcomes of their decision-making that would probably not have been detected in a quantitative survey. This outcome is enhanced by the in-depth interviews about earlier life events. Although, theoretically, quantitative results might deliver the same results, we believe that fewer events and behavior changes would be mentioned. Notwithstanding these advantages of a qualitative approach for detecting key events and interactions between events in a mobility biography, respondents might still fail in some cases to remember all or at least the most important issues for their decision-making. Furthermore, the various aspects of travel behavior are not covered with the same quality in retrospective interviews. While the modes of transport and, with some limitations and mainly in a qualitative way, the distances covered were gathered, the trip purposes, activity scheduling, timing or duration of trips were not, since these travel characteristics are much more difficult to obtain.

Parents of Small Children

In the remainder of this paper, we focus on the parents of small children for an explorative analysis of their mobility biographies. Assuming the fulfilment of the theoretical assumptions in the previous section, we expected the parents of small children to be in a life period when they had just passed or were still encountering major changes in various trajectories of their life path. The obvious change in their household composition with a new child is frequently anticipated by residential moving (“building the nest”) and sometimes by other changes like marriage or living together with a partner in a joint household. Other major changes may include the start of a professional career and earning money or the completion of an education career. Besides moving to a larger dwelling, the residential move may also include a change of residential area, for example the classic move from the inner city to a suburban area. Moreover, the tenure and type of housing may change from renting an apartment to owning a single-family home. Other changes most relevant for the subject of mobility biographies may include the purchase of a family car, perhaps the first car owned in the mobility trajectory. Since the interviews were conducted in Leipzig, we had further expectations that during the previous fifteen years (that is, between 1989 and 2004), the transformation of the eastern political and economic system would be of relevance for individual mobility biographies, thereby increasing the probability for behavioral changes.

Methodology

We decided to interview 20 parents of pre-school children. All the children attended one of two kindergartens located in Leipzig, Germany. The kindergartens are both located in socially mixed neighborhoods, neither predominantly poor nor rich, to avoid social bias. We selected the parents randomly and visited them at home for the interviews. On average, the interviews took about 60 minutes; they took place between autumn 2003 and spring 2004. Most of the

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Table 1. Sociodemographic characteristics of respondents.

| Characteristics | | Cases |
|------------------------------------|--|-------|
| Gender | male | 4 |
| | female | 16 |
| Age (years) | 25–30 | 5 |
| | 31–35 | 9 |
| | 36–45 | 6 |
| Education | 10 years | 6 |
| | 12–13 years | 14 |
| Number of children in household | 1 | 6 |
| | 2 | 11 |
| | >2 | 4 |
| Job | full-time | 11 |
| | part-time | 2 |
| | seeking work | 3 |
| | maternal leave | 2 |
| | in education | 2 |
| Family status | married/same household with partner | 15 |
| | single | 5 |
| Total | Σ | 20 |

respondents were women between 30 and 39 years old. Most parents had a post-graduate degree, two or more children in their household, and worked full- or part-time (Table 1).

Content of the Interviews

The interviews included sections on the respondent's attitudes towards transport modes and relevant events affecting their travel behavior over the past fifteen years. The retrospective part was conducted by asking the respondents open questions about their travel-behavior changes in previous years. The interviews were tape-recorded. After recalling these changes in type and effect (travel mode or distance), questions were asked about the underlying causes for these changes; the responses were evaluated. This first step gave insights into the interviewee's perception and memory of relevant key events. Additionally, the interviewer asked about further key events that had occurred during the past 15 years and thereby collected complete information on residential mobility, household composition (including partner and children), professional career, and major leisure activities over that time span. For all the events mentioned, they were asked whether these had affected travel behavior and if these events were interrelated with events in other life domains. Finally, to conclude the retrospective part, we asked about perceived attitudinal changes towards travel modes during that fifteen-year period.

Furthermore, the interviews gathered three types of more quantitative information: first, a short questionnaire for sociodemographics; second, a 2-week trip

diary that respondents were asked to complete in the two weeks following the interview; third, a map of the respondent's perceived activity space. For this last purpose, we asked for a list of activities associated with frequent locations (work, education, shopping, social, recreation, day trips) and for the travel modes for each purpose. In this paper we have not used the trip diaries or the perceived activity spaces.

Data Analysis

The data analysis proceeded in five steps: first, we transliterated the tape-recorded interviews and compiled a table with the sociodemographic characteristics of each respondent; second, we recoded all the qualitative interviews with the help of Atlas TI (specialized software for analyzing qualitative data), and printed first-table summaries of code frequencies; third, we drew up a chart of important events for each respondent in both the travel-related and other life-domain trajectories. We highlighted the key events and their impact on travel behavior in this chart; fourth, we compiled a list of all key events with their travel impacts; finally, we conducted a more in-depth analysis of the relationships under investigation.

4. KEY EVENTS FOR PARENTS WITH SMALL CHILDREN

For identifying the key events in an individual's mobility biography, we first condensed the interviews to the most relevant parts and schematized them with a figure relating to the theoretical framework: the horizontal lines correspond to the different trajectories of various life domains over time starting at about 1989 on the left and ending in 2003 or 2004 on the right (see Figure 1). At the bottom of the diagram, the mobility domain with car availability and season

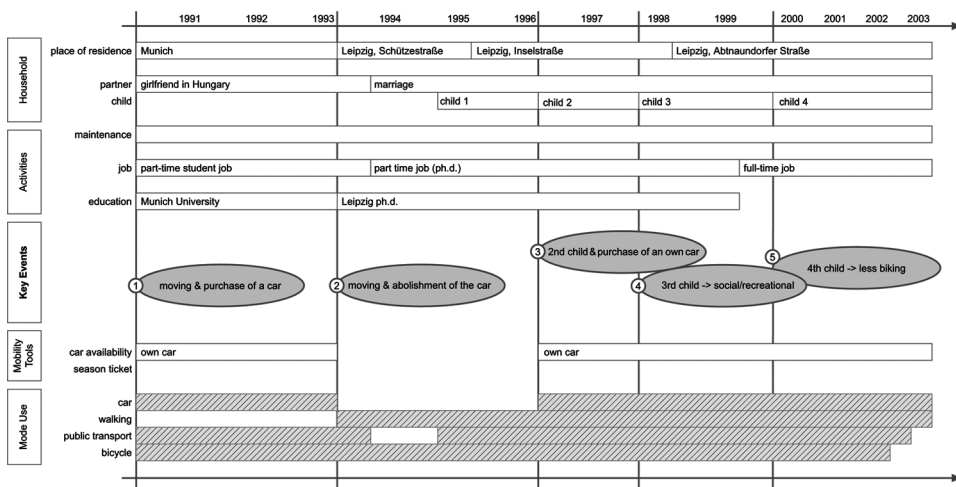


Figure 1. Example of a mobility biography chart.

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ticket are both indicative preconditions on a medium- to long-term time range, and the use of travel modes for activities for short-term decisions. Filled boxes indicate that a certain mode was used frequently during that time. Changes in this part of the diagram indicate changes in the mobility biography; we may ask what the reasons for that change were and whether there were related changes in the other trajectories. If there were, the relevant key events were marked and explained in the horizontal section above the mobility domain; a vertical line indicates the relevant moment in time when this event took place. The event was marked in its respective domain in grey color.

We look, for example, in figure 1 at the mobility biography of a 37-year-old male, employed full-time, with four children. During the fifteen years between 1989 and 2003, we identified four key events affecting the mobility biography in a major manner: the first was in 1991 when he moved for his university courses from Leipzig to Munich and frequently visited his girlfriend in Hungary. He bought a car for weekend trips to Hungary and some recreational trips in the Munich region. However, he still used public transport and a bicycle for most of his daily trips in Munich; secondly, in 1993 both partners moved to Leipzig from Munich and Hungary respectively, to Leipzig, because he obtained a job there; they moved in together, and married. Owing to the increased housing costs for a young couple, the low income, and the disappearance of the most important reason for car ownership, he disposed of his car on moving to Leipzig. In the next period of time, he mainly used a bicycle and sometimes public transport; thirdly, in 1996 the second child was born and with this event they accepted a car as a gift from the grandparents. Although the little family was able to manage their daily lives without a car while there were only three of them, with a second child they felt that coping with daily tasks would be much easier with a car. He then used the car mainly for child-service tasks. When transporting the children anywhere, he frequently trip-chained the childcare task with his journey to or from work. Therefore, his preferred commuting mode, the bicycle, has sometimes been replaced by the car. With car ownership, the use of public transport has practically vanished for the respondent; the fourth key event mentioned in the interview, the birth of a third child, led to more frequent car use, mainly for social and recreational purposes. Moreover, the children's daily needs, for example attending a specialized school which is not close to their residential neighborhood, have forced him to use the car more often on his way to work instead of the bicycle, which he still prefers. Additionally, the increasing income with a full-time academic position allows him to allocate more money for travel purposes.

In the 20 interviews, 164 key events affecting the mobility biographies are mentioned (Table 2). We distinguish two types of key events: first, those with an impact on the mobility resources (car ownership, availability of a season ticket for public transport or bicycle ownership) and only an indirect impact on actual travel patterns; second, key events that affect the travel patterns directly. Since the mobility resources play an intermediate role between other domains of life and the mobility domain, we acknowledge this specific role in both the theoretical considerations and the empirical analysis. Changing mobility resources probably has a long-lasting effect on travel patterns in the future. The careful consideration of these changes and their interaction with travel behavior patterns is an important issue for further

Table 2. Key events affecting travel behavior in the qualitative study (N = 20 respondents).

| Key event | No. | (%) | With effect on mobility resources no. | Without effect on mobility resources no. |
|----------------------------|-----|------|--|---|
| Driving license | 15 | 9,1 | 15 | — |
| Partner | 15 | 9,1 | 15 | — |
| Disposal/purchase of a car | 5 | 3,0 | 5 | — |
| Children | 34 | 20,8 | 13 | 21 |
| Moving | 60 | 36,7 | 27 | 33 |
| Job/education | 25 | 15,2 | 15 | 10 |
| Incident | 10 | 6,0 | 7 | 3 |
| Total | 164 | 100 | 97 | 67 |

research. For the purpose of this analysis, we tried to discover the underlying reasons for changing mobility resources through key events in other domains of life. This was particularly the case for car-ownership changes. As mentioned in Table 2, only in five cases is the disposal or purchase of a car mentioned as a key event affecting the mobility biography. However, in the interviews car ownership was frequently mentioned as a trigger for changing travel patterns. But in most of these cases key events for the car-ownership changes were mentioned; a new job with the need of a car for business-related trips for instance or the gift of a car from parents. Only in the five cases mentioned were we unable to detect from the interviews the underlying causes for the car-ownership changes.

We detected seven different key events in the interviews. Three of these affected the mobility biographies by changing the mobility resources: first, in most households with the acquisition of a driving license a car also became available. This was frequently a parent's or partner's car; second, an example of a partner-related reason is one person's need to use the family car during working hours or for the work trip so that the car is no longer available for the partner. Similarly, another partner-related reason is if a couple is divorcing and one partner moves out along with the family car. Third, the disposal or purchase of a car as mentioned above as some rather specific key event already directly connected to the mobility biography. Economic or other reasons may trigger this key event. Only where we were unable to detect the underlying reasons in a more systematic way were cases classified under this key event.

For the second group, the effect on mobility resources depends on the specific key event: it either affects the mobility resources or it does not. We distinguish four types of key events: first, child-related reasons such as travel needs during pregnancy or with an infant make the use of public transport, car or bicycle difficult. Moreover, parents' activity scheduling and patterns have to adjust to the timetables of schools, childcare facilities or children's leisure activities. This scheduling may involve the need for different transport opportunities and modes. About one-fifth of the key events are related to the birth of children. We discuss this issue in

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section 5 in more detail. Second, in one third of cases, moving house is the most important key event. Moving usually affects the accessibility of activity places like work, shopping or leisure as well as the travel distances for visiting families or friends. If the whole household moves, mobility resources are frequently not affected, in contrast with only one person moving out of the household and setting up elsewhere. For example, leaving the parental home frequently reduces the availability of a car. Third, every seventh key event mentioned was job or education-related. Job-related travel needs, for a salesman or a craftsman for example, were mentioned with the beginning of a new job. Income changes associated with the professional career bring different economic opportunities. However, previous research suggests that the effects of increasing and decreasing income may be non-symmetric (Dargay 2001). Finally, incidents may affect the mobility biographies (Waerden et al. 2003). The respondents in our survey mentioned fatalities from a close friend's traffic accident or the breakdown of an old car that reduced car use for some time. However, the distinctive nature of the incidents mentioned and the limited number of cases involved only afford limited explanation power.

A more detailed and systematic analysis of the decision-making process yielded four factors influencing travel behavior in the 164 key events analyzed (Figure 2): mobility resources, urban form, quality of the transport modes, and a group of

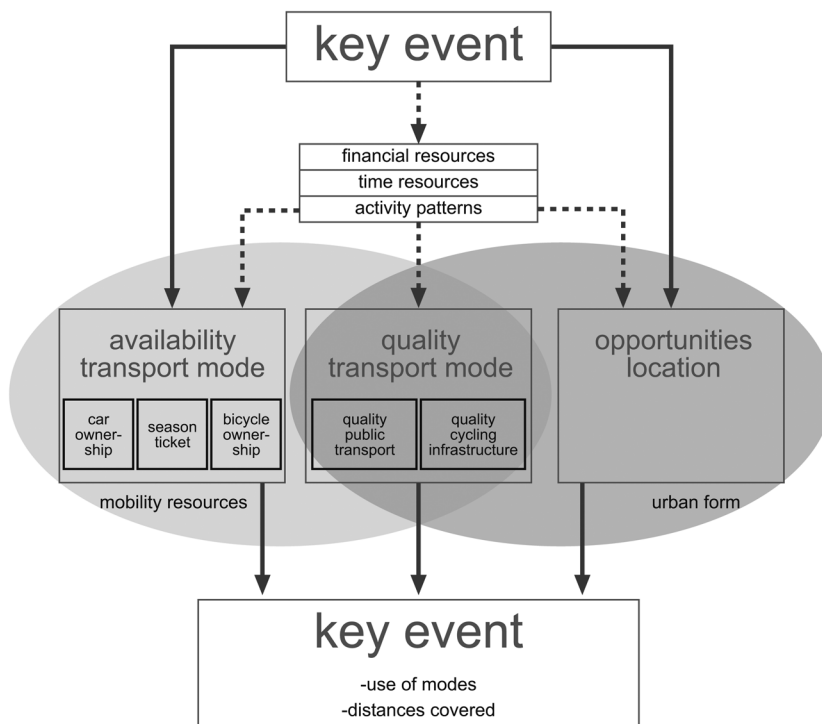


Figure 2. The causal relationship between key events and travel patterns.

intermediate variables affecting the other three factors mentioned. First, *mobility resources* with their intermediate role between the different domains of life and travel behavior were mentioned above. Second, the *urban form* with the location of opportunities for activities is another major factor affecting travel behavior. With the location of opportunities and the available modes, the accessibility of places that affects travel behavior is determined in a fundamental way. However, a third factor, the *quality of transport modes* also influences travel patterns. This factor includes the *quality of the built environment* (e.g., the transport infrastructure) as well as the individual's preferences; routines and decisions play a crucial role in the perception of transport quality. For example, one mother argues that the only mode capable of meeting an infant's needs is a private car, because so many things have to be carried along. Another mother, however, considers that driving a car with an infant on board is dangerous, since one has to watch the baby and attention is diverted from the traffic. She concludes therefore that the only available modes for her are tram or bus. However, in a third example, another mother argues that infants need fresh air, so she walks relatively long distances, even for grocery shopping, since that is the best choice for the baby. There were many similar decisions: parents with similar travel needs and opportunities each asserting that there was only one suitable travel mode for them, although their choices were different and the result of individual perceptions. Finally, the interviews revealed that the impact of key events is triggered through intermediate variables to the three factors mentioned above: financial and time resources and the working hours were frequently affected by the birth of children. Additionally, the activity patterns were important as mentioned above.

5. THE IMPACT OF CHILDBIRTH ON TRAVEL BEHAVIOR – A QUALITATIVE ASSESSMENT

Q: "And in the last few years, have there been any remarkable changes in your life affecting your travel behavior?"

Mother L: "Yes, my children."

In this section the impact of the key event of childbirth for travel behavior is analyzed in more detail. Although men increasingly share maintenance tasks with their wives and the traditional household roles have changed, women still take on the main burden of childcare. The composition of the sample, 16 women and 4 men, is in itself an indicator of this unequal distribution of tasks. Although we intended initially to question fathers and mothers equally in the sample, the mothers usually felt more competent to answer our initial questions and participate in the interviews. Moreover, most parents accompanying their children to and from the kindergarten were women. We therefore, decided to take this unequal distribution of tasks into account by an unequal gender distribution in the sample. Also, it soon appeared that the impact of childbirth on the mobility biographies was less obvious for men who usually continued with their jobs and only made stepwise adaptations to the new household composition while the mothers had already adjusted their travel behavior during pregnancy.

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Since the fathers were much less affected in their daily activity and travel patterns than the mothers, we restrict our analysis in this section mainly to the 16 mothers in our sample. Six of these mothers have only one child, eight have two children, and only two mothers have three children. No mother has more than three children. For the purpose of this paper, we limit the travel-related aspects to the mode use and focus on the respondent's changes of car use owing to the overwhelming importance of the car for future urban and environmental development. Subsequently, we present and discuss a timeline for the key event of childbirth. We then consider the travel-behavior changes of mothers after the birth of the first child. Finally, we discuss how three types of mode user before the birth of the child (car, green modes, intermodal) change their travel behavior after childbirth. Although there are some interesting differences between the effects of the first and of subsequent children, we limit our analysis to the birth of the first child.

A Timeline for the Key Event of Childbirth

The qualitative interviews showed that childbirth is actually not a key event occurring at one particular moment, but extends over a period of time with continuously changing travel and activity needs and patterns (Figure 3). In the months preceding childbirth, in particular in the last few months of pregnancy, women choose travel modes that best suit their physical needs. In Germany, maternity-protection laws oblige women to take leave from paid work for six weeks before and eight weeks after the birth. Moreover, one of the parents can continue with parental leave until the child is three years old. However, in many German families only the women stay at home for these three years. Sometimes they take up part-time work when the child grows older. Although nowadays some husbands take up the parental-leave option, they are still only a small minority.

The effect of childbirth on women's travel behavior is remarkable although there are differences between the various stages of the childbirth timeline. As expected, most of the mothers interviewed did not continue with their professional career after the birth of the first child, but stayed at home or worked part-time. Their travel behavior was therefore affected in various ways: by additional leisure and maintenance activities related to the child; more and different shopping needs; different transport needs owing to the accompanying infant on the regular trips; interruption of the educational or professional career and

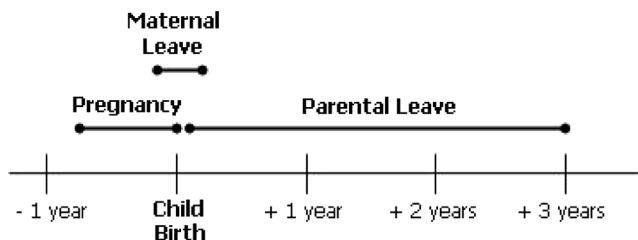


Figure 3. Time line for childbirth and travel-related impacts.

Table 3. Overview of mode-use type before and after the first child's birth in our sample (all mothers, N = 16).

| | Before birth of 1st child | After birth of 1st child |
|------------|------------------------------|-----------------------------|
| Car | 4 | 4 |
| Intermodal | 2 | 5 |
| No car | 10 | 7 |
| Total | 16 | 16 |

the related activity-pattern changes when switching from professional worker to housewife. Although a holistic analysis of this key event was the purpose of this study, we restrict further discussion to the longer-lasting travel behavior changes triggered by childbirth. We do not discuss in detail how parents and in particular women adjust their travel patterns in the weeks before and after childbirth or in the first months of the newborn infant's life. Our focus is on the long-term travel behavior changes resulting from this key event, even though this approach may give some insights into short-term changes and adoptions like that reported by K:

“Before the child was born, I used to cycle much more often than I did afterwards. You can't ride a bicycle very easily with an infant. But that changed again later when our daughter was old enough to sit in a child-seat on the bicycle.” (K).

After the Birth of the First Child

Before the birth of their first child, ten of the 16 mothers already owned a car. However, surprisingly few of them used it frequently (Table 3): only four respondents covered the main share of their daily trips by car and another two chose intermodal transport modes. The remaining 10 respondents used green modes, four of them cycling, another four cycling and using public transport, and only two using public transport alone. For the purpose of the analysis we assigned all respondents to one of three mode-use types: *car* (mothers who used a car regularly for most of their activities without considering other modes); *intermodal* (mothers who used both car and public transport frequently); green modes (mothers who did not use the car for daily travel and who combined other modes).

After the birth of the first child, the amount of car and intermodal use increases slightly compared with green-mode use (table 3). However, the underlying reasons for these changes differ from case to case. We discuss below the reasoning for changes in mode-use type: first the car before childbirth; second, intermodal; third, green-mode users.

Car Users before the First Child's Birth

Four mothers in our sample (C, E, F, R) were classified as car users before the birth of their first child. Of these, two (C, F) changed after the birth of the child and became non-car users; the other two (E, R) remained car users. E and R

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adapted their travel patterns after the child's birth to activities related to child-care, but did not change their travel-mode choices substantially. Since they were on parental leave, E and R did not have any work-related trips for a while and carried out their daily activities more frequently at home or in their residential neighborhood. Their trip distances were therefore shorter than before the birth. However, for visiting friends or family or for the weekly grocery shopping, they still travelled by car and, overall, estimated that their travel patterns had changed very little. Additionally, E bought a bicycle and used it while her daughter was still quite small.

In contrast with the two previous cases, C and F changed their travel patterns in a rather traditional way. Like most other mothers in the sample, they took parental leave while their male partners continued to work. In both cases the male partners needed the family car for their daily commute and so the women had no access to it during the day. They used non-car travel modes instead. C reports that:

“Before the birth of the child, I was completely dependent on the car since the hospital [her workplace at that time, M. L.] was outside Erlangen [her place of residence at that time, M. L.]. And so I was commuting daily by car. And after our son was born [...], his father used the car every day. Then I often travelled by bus and bicycle.”

After C and her family moved to another city, they kept these travel patterns, since the husband needed the car for accessing his new workplace and his wife dealt with that situation by walking frequently. She continued travelling by train and still likes it, but only uses the urban public transport system reluctantly since she dislikes

“waiting at the bus stop. And then [...] earlier with the pushchair – boarding, de-boarding, finding a seat... For some time I had to use it. But I wouldn't call it fun.”

For F, the case is a little different. She used to share a car with her partner. But with the birth of their child the couple broke up and she became a single mother. She had to give up her job and was on welfare. Thus, for economic reasons, she was not able to purchase or maintain her own car and so she changed to public transport and non-motorized modes although she would have liked to own a private car again.

Intermodal Users before the First Child's Birth

Before the birth of their children, two mothers (G, J) were intermodal users. While J continued with this after the birth of her first daughter, G changed to the car and stopped using public transport. J used to live with her husband in Berlin when her first daughter was born. Although she owned a private car, she only used it infrequently, mainly for visiting friends and family, for day trips and holiday travel. In Berlin, before moving to Leipzig, she favored public transport and walking for her daily trips. With the child's birth her mode use changed only slightly:

“Transport modes, didn't really change, since I continued working at the same place and was already used to walking a lot before our children were born.”

Unlike J, with the birth of her child G changed her workplace and other activities. Thus, the frequency and distance of her daily trips changed:

“Uhm, that’s all tailored to the particular needs of the child now: my workplace, day trips, visiting our friends, and so on. And before the birth our activities were much more varied. I mean, there were places we liked to go out to; we didn’t have a TV set and so we went to the movies once a week.”

Most of G’s trips in the first years of parenthood were in the vicinity of the residential neighborhood and non-motorized. For daily trips, G believes that, with a pushchair, buses and trams are inconvenient. Furthermore, there were no direct public transport services near her new place of residence or most of her daily activity locations and she disliked transfers to other tram or bus lines. Although G used public transport frequently before the birth of the child, she hardly used it at all after the birth. The only exceptions were longer-distance train rides, which her daughter used to love. However, for most motorized trips G used their private car, and so changed from the intermodal- to the car-use type.

Green Mode Users before the First Child’s Birth

Ten women in our sample used green modes before the birth of their children. Five of these continued with green modes after the childbirth, one changed to car use, and four to intermodal modes. We discuss these three types of change in turn.

In the five cases of green-mode stability, two mothers (I, P) did not have a driving license and were obliged to use green modes after the child’s birth. The other three mothers (D, M, X) were enthusiastic cyclists who did not want to change mode even after the child’s birth. Although they did not have driving licences themselves, I and P liked travelling by car as passengers. I, for example, emphasizes that a car is her favorite mode of transport

“since you get anywhere faster and it is more convenient. With two small children [3 and 6 years old, M. L.] it’s always an effort to get to places by public transport. [...] In most cases we have to take some baggage along. So we enjoy going by car.”

But she does not only like car driving for the technical advantages:

“Well, actually I don’t drive on my own. My husband drives. [...] But I enjoy travelling by car.”

Similarly P argues that the child’s birth did not change her travel behavior:

“Question: Did the childbirth change your travel behavior?”

P: Change? No. We continued travelling by tram just the same. [...] With those old tramcars it was difficult [boarding and de-boarding with the pushchair, M. L.] but actually we didn’t change anything and we continued to go shopping by tram.”

Although for P the birth of her child was not the main reason for changing her transport mode, it should be noted that she acquired her driving license two years

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later, bought a car, and then changed her travel patterns. In spite of the fact that her daughter was only one of the reasons mentioned for that change two years later, it is worth noting this possible long-term effect. The changing travel and maintenance needs of children as they get older may trigger an increase in car use in a way similar to that of the birth of a child. However, P mentioned other, non-child-related reasons for the car purchase, like holiday travel, grocery shopping, and the case of a visually impaired husband who was not able to drive a car.

The other three cases with green-mode stability, D, M, and X, are the bicycle enthusiasts. They prefer cycling over all other modes of transport, because of its technical advantages like low cost, flexibility or relatively high travel speeds in urban areas, and because of the emotional ties they have developed with cycling over their lifetime. The bicycle is an important part of their daily life practices and is not only a technical tool, but also a symbolic element of their lifestyle. For example, M explained how she managed to ride a bicycle with one and later even with three children.

Question: "But when your first child was born did you stop cycling for a while?"

M: "Well, actually I was still cycling four hours before the birth. Yes, and also after the birth, [...] some people called me irresponsible, but I used my bicycle again as soon as possible. And we still have a front and a back seat on the bicycle for the children, and [...] we have a trailer. [...]. So, I can ride my bicycle even with three children."

D and X did not use their bicycles for some months after the birth of their children and explained how they managed this relatively short time period by public transport:

"When my child was too small for bicycle riding, we used the tram. At that time I was still at home, I had a student's season ticket and that was very convenient. And regarding travel time, the extra minutes did not really matter. And I got along very well."

However, both emphasize how they went back to their bicycles as soon as possible. For example, D:

"After the birth I travelled by tram most of the time. But as soon as our daughter was nine months old she was able to sit in the children's seat, and I used my bicycle again."

Only one mother in the survey (Y) reported that she changed after the childbirth from green modes to car use without using public transport anymore. Y explains that when she was pregnant she and her husband decided to buy a family car, larger than the one they had at that time. At the same time, they decided to keep the old car for Y's use:

"From that moment on I used the car for commuting in the last few weeks before the maternal leave and then, later, for my trips during parental leave. [...] During parental leave I was exclusively, or rather almost exclusively, driving the car." Public transport was not a travel mode option for Y, "because I didn't want to be stressed anymore

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by boarding and de-boarding the tramcar with a pushchair and, so, I said, OK, I have a car and with it I can get everywhere I want with a small child."

This case is rather exceptional for a former green-mode user, since all other mothers in the interviews reported that they continued to use public transport at least to some extent even when they started driving a car again after the childbirth.

More frequently, a childbirth-related change from green modes to more car travel is a shift to intermodal use. Unlike case Y above, the intermodal users K, L, N, and Q continued using public transport and used the car only for some trip types. Surprisingly, receiving the private car as a gift from the children's grandparents played an important part in changing travel patterns here. Although in some cases the car is received with some hesitation, ultimately it affects travel patterns seriously. With the new needs and challenges related to the household's maintenance and leisure activities and with its new travel-mode requirements, the household's activity and travel planning becomes more complex. Although the households adapt to the new needs and reorganize their activities and travel, the car gift triggers the modal shift immediately. K explains the grandparents' underlying reasoning:

"Actually we only received the car [from the grandparents, M. L.] when we had the child. Otherwise we wouldn't have had it. But my parents believe that they have made our daily lives easier with it. They bought a new car and passed their old one on to us."

However, K believes that the gift was only the trigger for the modal shift to car use and not the only reason:

"I believe we would have had a car today anyway. Even if we hadn't received the gift at that time, we would certainly have got a car in the meantime, since my husband has to travel around a lot."

L and her family also acquired a car after the birth of the first child:

"Travelling by tram was too inconvenient for me. In the first six months of the newborn's life, we only had the pushchair and we couldn't put him in a child-seat on the bicycle. And then my best friend was in Mockau and I was annoyed by these tram rides with the high-level doors. And then day trips at weekends were cumbersome with the tram... That was annoying, all the transport for goods and shopping. There was no grocery shop in my neighbourhood and I had to travel all that long way and even ride the tram with a pushchair... That was completely annoying. And for this convenience and also for the day trips and then even, I forgot that earlier, the holidays, we always go camping, we do that by car today." (L)

Q and her partner received a car as a gift from his parents after the birth of the child:

"[Riding busses and trams] I really used to like, but with children it's awkward. [...] And then it's stressful, even with low-floor vehicles the child almost drops out of the

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pushchair. [...] 'Mummy, mummy', this is actually just stress. Everybody looks, then you have to find a seat with the pushchair and if you don't find a place to sit everybody pushes you about. [...] Well, and it's expensive! I can't afford it. It isn't possible to afford it out of social security. Although a bike is expensive, cycling is really cheaper."

N, too, received a car from her mother after the birth of her child. Before that gift, she was just a car passenger with her mother or friends. Afterwards, she drove on her own. However, she still used public transport for certain activities and routes, for example for shopping trips to the inner city by light rail or by tram.

6. DISCUSSION

The birth of a child requires households to reorganize their maintenance and leisure activities in a fundamental way. Small children not only need somebody to take care of their needs, but they bring about more shopping and other child-related maintenance activities (visiting doctors, playgroups, and so forth) so parents have to rearrange their daily activity scheduling. In most families, the child-maintenance tasks are unequally distributed between mothers and fathers in a rather traditional way. While fathers usually continue with their professional careers, mothers bear the lion's share of maintenance activities, take parental leave and, frequently, only work part-time afterwards. Moreover, leisure activities change for most families in a fundamental way and are more child-oriented than before.

As the qualitative interviews show, these patterns of parents' changing activities and tasks do not necessarily affect travel patterns in a one-directional way. Even the importance of the changing tasks and activities is not perceived with the same intensity by all parents. While some mothers report that the arrival of small children changed their travel behavior, for others it did not change much. Almost all the mothers reported that they had to adjust their travel patterns in the last weeks of pregnancy and during the first months of the newborn to meet their own health needs or the baby's needs. However, after the first life-phase of small children, the mothers react differently to the new tasks and activities.

Some mothers believe that the private car is the best solution for their changing activities and travel needs. We find this argument in particular for former users of green modes who changed with the child's arrival to intermodal or car use. Similarly, mothers who were already car or intermodal users before the birth tend to keep the car for the more complex maintenance needs after the birth. For them, not only the mode use, but also the frequency of car and public-transport use or the travel distance is affected.

Despite the importance and convenience of the private car for many mothers with a small child, the interviews reveal that other patterns of change are also related to the key event of childbirth. These patterns can be in the direction of reducing car use and changing to other modes of transport as well as stability of green-mode usage. For this pattern, our interviewees revealed four types of reasoning: first, economic reasons requiring mothers to give up their car with the birth of the child, for instance through separation and becoming a single mother or for other reasons related to loss of income; second, biographical reasons, for mothers who do not have a driving license or after divorce and the partner takes the car;

third, the traditional division of household roles requires the mothers to take parental leave, work part-time, and cover daily trips by green modes since the fathers use the family car for commuting and mothers only use the car for the weekly shopping trip or weekend family travel; finally, some interviewees report strong emotional ties to their modes of transport, in particular for cycling, which makes them use tools like a child-seat or a bicycle trailer instead of changing their mode of transport.

Sometimes these four types of argument overlap, for example the biographical with the economic reasoning. And for the emotional ties, to the bicycle for example, it remains unclear whether there are other underlying reasons such as economic or normative ones not mentioned in the interviews. However, it is important to accept that not only mere economic, technical or accessibility reasons are decisive factors for mode choices, but emotional and symbolic meanings play an important part as well.

7. CONCLUSIONS

To our knowledge, only a few studies analyzing mobility biographies have as yet been undertaken. The objective of this paper was to ascertain the impact of one specific key event, the birth of a child, on the parents' travel behavior. Twenty qualitative retrospective interviews with the parents of small children were conducted. The first aim of this paper was to identify relevant key events in the biography of young parents for travel-behavior changes. Our analysis reveals two significant groups of key events. The first, mainly affecting mobility resources, accounts for about one-fifth of the 168 key events mentioned in the 20 retrospective interviews. The key events listed are possession of a driving license, a partner, and the disposal or acquisition of a car. The second group of key events does not affect mobility resources, but includes the key events of children, residential relocation, job- or education-related reasons, and incidents. A systematic analysis of the key events' impact on travel behavior showed that there are four types of factors influencing an individual's behavioral changes: mobility resources, the urban form, the quality of transport modes; and mediating factors like financial and time resources.

For the main aim of this paper, an improved understanding and explanation of travel-behavior changes around the key event of childbirth, the empirical analysis centered on the interviews with 16 mothers. First, we identified some typical patterns of change, although these were not in one direction of increased or decreased car use. In contrast with the common belief that children in a household increase car orientation, we found some mothers reduced their car use with the birth of a child and others who used a car infrequently both before and after the birth of their children. The interviews revealed four types of reasoning from mothers who did not increase their car use after childbirth: economic, biographical, gender-role related, and emotionally tied to some travel modes, in particular to the bicycle. The quantitative effects of these patterns cannot be determined from the qualitative data, but it does reveal a complexity of reasons for travel behavior stability or changes and so justifies further in-depth analysis of travel behavior changes.

The analysis and results presented here are a first step in applying the mobility-biographies approach to the key event of childbirth. The qualitative

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analysis is only one possible step; it may be followed by more quantitative analyses. However, although the qualitative data do not permit quantitative generalizations of the results, they have the specific advantage of improving our understanding of what is actually going on in the everyday life of people; the results show that at least in some respects parents' travel behavior changes after childbirth are not as simple as general opinion might suggest.

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