

# School trips in Germany: gendered escorting practices

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**Abstract:** Children's trips have become a growing issue of interest in recent transport studies. This paper studies parental escort on children's school trips in Germany. It uses binary logit regression models to look at social and spatial context factors simultaneously, as well as considering the gendering of parental escort, i.e. the allocation of escort trips to fathers and mothers. The results generally support other studies in terms of parental and children's sociodemographics, and trip attributes. The results for parental employment complement previous, somewhat inconsistent results. Descriptive analysis sheds some light on the interplay between escort and travel mode, as well as on age and gender structures and their intersections with spatial context. The effects of spatial context in regression are mixed. Urban locations seem to be more suitable for the independent mobility of adolescents, but less suitable for smaller children. Within municipalities escort is less common in inner city areas with mixed land-use and a well-established public transport system. Shorter distances to school in areas with mixed land-use further encourage independence. As in other countries, women carry a disproportionate burden of escorting. In large cities fathers are more involved in child escort, suggesting more gender equity.

**Keywords:** child travel behaviour, escorting practices, independent travel, school trips, gender, family

## 1 Introduction

Children's trips have become a growing issue of interest in recent transport studies. This is motivated by a number of concerns (see Carver et al., 2013; Fyhri et al., 2011; Lopes et al., 2014; Mitra, 2013; Shaw et al., 2013, for more discussion).

1. Increasing concern about child health and, more specifically, obesity and deficits in motor skills and cognitive development, which research suggests are related to a lack of independent mobility and active travel (walking and cycling);
2. Children's decreased independence and knowledge about their environment (see Fusco et al., 2012 for a nuanced discussion), both of which have been linked to children being increasingly driven in their parents' (and other people's) cars;
3. Increasing concern about the environmental, social and financial effects of free school choice and the associated increased trip distances and modal shifts towards the car, including local

congestion and traffic safety problems at school sites (Marique et al., 2013, for energy consumption; McDonald et al., 2015, on the public and private financial effects of increased walking);

4. Increasing political interest in family issues including their time budgets and mobility. For instance, in Germany the latest federal governmental family report is dedicated to families' time budgets (BMFSFJ, 2012), the government's demography strategy places emphasis on strengthening families (BMI, 2013) and, most recently, the Federal Ministry of Transport has commissioned a project on travel behaviour in families (Manz et al., 2015), on which this paper builds;

5. A general increase in interest among transport researchers to better understand the social fabric of travel and mobility as opposed to earlier decades when transport studies focused more on questions of engineering, modelling and forecasting. This research, if mainly hosted by planners and geographers, is now broadly embedded in feminist and gender studies, studies on time use and activity patterns, and the sociology of the family.

The latter two points do not just refer to a child-centred perspective on school trips, but also to the gendering of parental escorting practices<sup>1</sup>, i.e. to a parent-centred perspective (e.g. Schwanen, 2007). The first three points need to be seen in light of the general observation that children's use of active travel modes has steadily decreased over time, while car use has increased (see McDonald, 2007, for the US; Fyhri et al., 2011, for Denmark, Finland, Norway and the UK; Boussauw et al., 2014, for Belgium; Funk, 2008, for Germany). Children's independence in school travel has also decreased over time (Kyttä et al., 2015, for Finland), although the emerging patterns in travel mode use may have developed differently according to school location (Shaw et al. 2013 for Germany). At the same time school trip distances have increased (ibid.; Andersson et al., 2012, for Sweden; Boussauw et al., 2014, for Belgium; Schlossberg et al., 2006, and McDonald, 2007, for the US), which is a composite effect of concentrating schools in larger units, shifting from public schools to private schools, and demographic aging and the associated decline in the number of students and, hence, schools in developed countries.

While a large number of studies from the US have investigated children's travel, there is somewhat less research from Australia, Asia and Europe, and, specifically, considerably less from Germany, despite the seminal comparative study (UK and Germany) conducted by Hillman et al. (1990) and its follow-up study (Shaw et al., 2013). Other studies on school travel in Germany either focus on mode choice and the associated cost effects of school closures (Müller et al., 2008), or on long-term trends (Funk, 2008), which show inconclusive results due to data limitations.

This paper studies children's and adolescents' trips to school in Germany. It builds upon findings from a study commissioned by the Federal Ministry of Transport on travel behaviour in families (Manz et al., 2015). The focus here is on escorting. Escort purposes account for 16% of parents' trips in Germany, and this share is even higher among single parents (18%) and the parents of children aged 10 or younger (22%) (for comparison: 4% for couples without children) (Manz et al., 2015, 97). Specifically, the paper seeks to explore the conditions under which children make

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<sup>1</sup> The term 'escorting' has been used in recent literature (He and Giuliano, 2015; Motte-Baumvol et al., 2015; Vovsha and Petersen, 2005; Yarlagaadda and Srinivasan, 2008). It may sound less natural than other, more common terms such as 'serve passenger trips' or 'chauffeurage'. However, the latter two terms both refer to car use (or at least evoke associations of car use), which does not necessarily apply when children are being escorted.

school trips without parental escort. Other companions as well as interrelations between escorted/joint trips and mode are considered in the descriptive analysis. A gender perspective is employed by studying gendered escorting practices, i.e. by considering the conditions under which the father rather than the mother accompanies a child to/from school. The study utilises the most recent national travel survey Mobility in Germany (MiD) 2008.

The next section introduces the state of the research on escorting practices on school trips. This is followed by a description of the data, the methods and the variables used. Subsequently the results are presented, starting with a descriptive analysis of escorting, followed by three logit regression models of parental escorting practices. The paper closes with some conclusions for policy and further research.

## **2 Escorting children to/from school – state of the research**

### **2.1 Theoretical considerations**

Research on children's (including adolescents') school travel can be subdivided into studies of mode use, independent vs. escorted travel, and school trip distances. These strands of research are not independent of one another, but are nonetheless distinguishable. For instance, independent travel tends to be equated with active modes in research (Fyhri and Hjorthol, 2009), as children transported in a car are clearly not travelling independently, while those who walk often make the trip alone (McDonald and Aalborg, 2009). Specifically, in car-oriented settings such as the US it is very unlikely that a walking or cycling child would be escorted (Hsu and Saphores, 2014, 550), while in Germany 22% of escort trips are made using active modes (Manz et al., 2015, 96). Even though children walking or cycling may be accompanied, at least they have the chance of learning to travel independently.

The theoretical grounds on which school travel research is based are, firstly, the generalised travel cost paradigm, which captures distance, time and financial barriers and the relative utility of different modes in overcoming these barriers. Secondly, the household activity-travel framework, which lends credit to this research by proposing that children's travel can be understood within the context of household capacities, resources, constraints and interpersonal interactions (Mitra, 2013). When considering these strands together, time geography may serve as a worthwhile theoretical starting point, especially as children's travel is more severely constrained than adults' travel. Hägerstrand (1970) introduced the triad of authority, coupling and capability constraints, all of which clearly contribute to understanding children's travel. Children's travel is to a large extent an outcome of choices made by parents, rather than by the child herself (He and Giuliano, 2015). Parental attitudes and decisions in this sense function as authority constraints. Choices will become more autonomous as the child grows older, and the child's self-efficacy belief, attitudes and wishes will play an increasing role (Mitra, 2013). For instance, a boy may opt to walk to school with or without his sister, and he may opt to wait next door for the neighbour's boy to join him. Hence, active travel seems to be associated with children's (and parents') preferences for independence (Curtis et al., 2015).

Furthermore, a child is subject to capability constraints over and above his/her own physical capabilities – in terms of being dependent on modes available to (and made available to the child by) the parents. Parental time schedules affect the temporal dimensions of a child's school trips, in terms of departure time in the morning and arrival time in the afternoon, as well as trip duration and mode, which may both depend on whether or not parental time schedules allow a child to be taken to school by car. The latter is an example of a coupling constraint, as is the operation of schools themselves, in that several people have to meet at a particular time and place.

## **2.2 Factors affecting escorting v. independent travel**

The factors that affect the independent school travel of children may be grouped into characteristics of (1) the child, (2) the parents and household, (3) the built environment and transport system, (4) the school, and (5) the trip.

*Trip characteristics.* Among the most consistent findings is that longer distances to school are associated with less independent travel (Fyhri and Hjorthol, 2009, for Norway; Carver et al., 2013 and Curtis et al., 2015, for Australia; Waygood and Susilo, 2015, for Scotland; Manz et al., 2015, 104 for Germany), which is closely related to the fact that longer trips are typically made with motorised, rather than active, modes (e.g. Schlossberg et al., 2006; McDonald and Aalborg, 2009; DeKa, 2013; Hsu and Saphores, 2014; all for the US, Mitra and Buliung, 2012a, 2012b for Toronto, Canada). Yet there may be cultural norms and expectations that influence children to accept longer walking distances (see Waygood and Kitamura, 2009, for Japan), which may contribute to between-country differences in distance thresholds for walking (Waygood and Susilo, 2011).

The natural setting of an area is also likely to influence mode choice and independent travel, including topography (slope) along the route (Lin and Chang, 2010). While the impact of weather at the time of undertaking school travel has rarely been studied, it is roughly reflected in seasonal or weekly variations (Fyhri and Hjorthol, 2009, for Norway; Mitra and Faulkner, 2012, for Canada; Müller et al., 2008, for Germany, all focusing on mode choice).

Trips to and from school have been found to be distinctly different. The return trip is typically more often conducted independently of parents than the morning trip (Lin and Chang 2010, for Taiwan; Schlossberg et al., 2006; and McDonald and Aalborg, 2009, for the US). This is probably a reflection of parental work schedules and, perhaps, safety considerations which preclude parents from letting their children walk in the rush hour or on dark winter mornings.

*Built environment.* The built environment and transport system in the residential and school areas have been found to be associated with independent mobility. High traffic density, high speed levels, wide streets, and the need to cross intersections (particularly when they are four-way or wider) increase parents' safety concerns and may prevent them from allowing their children to walk or cycle independently (Kerr et al., 2006, for Seattle, US; Mitra and Buliung, 2012a, for Toronto; Seraj et al., 2012, for California; Waygood and Susilo, 2015, for Scotland). Conversely, factors such as pavements and good road connectivity have been reported to positively affect active and independent travel (Lin and Chang, 2010, for Taiwan; Schlossberg et al., 2006, for Oregon, US; Stone et al., 2014, for the Toronto/Hamilton area, Canada).

More general measures of urbanity, such as population density, land-use diversity, city population size and a generally urban (as opposed to suburban or rural) location encourage active and independent travel (McDonald, 2008 and Hsu and Saphores, 2014, for the US; Waygood and Kitamura, 2009, for Japan; Carver et al., 2013, and Curtis et al., 2015, for Australia). On the other hand, urbanity is typically associated with parental traffic safety and security concerns and, hence, results on the role of the built environment are not fully consistent (see Mitra, 2013, 30-31 for discussion). For instance, Lopes et al. (2014) find that urbanity decreases children's independent mobility in Portugal because of parental fear of strangers and traffic. Yoon et al. (2011) report for California that the propensity to travel independently to school is reduced in (mixed-use) neighbourhoods with many retail facilities. Kyttä et al. (2015) find the highest proportion of independent school travel in a medium-sized town in Finland, but lower shares in the countryside as well as in the inner city of Helsinki.

Schlossberg et al. (2006) argue that general measures of urban form should not significantly affect mode to school, as long as more specific characteristics of the road network, the route chosen and distance to school are controlled for. On the other hand, one may object that distance to school – one of the strongest and most consistent factors in travel choices – is itself closely linked to urban form. As multiple measures of the built environment are typically closely related to one another, their effects may perhaps best be understood as the composite impact of many variables taken together (Yoon et al., 2011).

Another inconsistency is related to the interpretation of measures. E.g., intersection density in an area may be interpreted as the need to cross many intersections, which may increase parental safety concerns (e.g., Stone et al., 2014). On the other hand, intersection density serves as a measure of road connectivity, which is likely to increase active and, hence, independent travel (e.g., Schlossberg et al., 2006).

Moving beyond the built attributes of the environment, Mitra and Buliung (2012b) find that children are more likely to walk to school in neighbourhoods where other people walk. This may capture uncontrolled built environment effects, but may also reflect social environmental factors in terms of a sense of pedestrian safety or a collectively shared walking culture. In a similar vein, Carver et al. (2013) find that neighbourhood social trust motivates parents to not drive their children home from school (or to/from other destinations) within walking distance. This highlights the importance of neighbourhood social capital or sense of community (see also Lopes et al., 2014, for Portugal). The chance to meet friends may also play a role here. Waygood and Friman (2015) have shown for Osaka, Japan, that the likelihood of seeing (known) people on the school trip is highest in urban settings and on walking trips. Walking or cycling to school has also been found to be more likely for children living in a socially disadvantaged neighbourhood (Pabayo et al., 2012, for Quebec, Canada). Hence, socio-spatial differences are not just driven by preference, but by socioeconomic constraints.

*School characteristics.* Significant differences in mode use have been found between school types. Trips to public schools are typically associated with lower levels of driving (Deka, 2013) and more walking (Carlin et al., 1997, for Australia) than trips to private or 'magnet' schools, which may in turn be linked to more independent travel. This may reflect social status effects or trip distances associated with the larger catchment areas of private or magnet schools. What is more, school policies such as encouraging volunteer organisations for ensuring traffic safety may increase independent travel, as noted by Lin and Chang (2010, 875).

*Characteristics of the child.* As children grow up, their travel becomes more independent, and activity spaces grow. Hence, age has been found to be one of the most important factors to explain independent school travel (Carver et al., 2013, for Australia; Fyhri and Hjorthol, 2009, for Norway; Yoon et al., 2011, and He, 2013, for California). The effects of age interact with the environment. Lopes et al. (2014) find that children in highly urbanised environments in Portugal are allowed to be independently mobile only at a greater age than those living in more rural environments. This is supported for Germany by Holz-Rau et al. (2010, 40).

Girls have been found to travel less independently than boys (Fyhri and Hjorthol, 2009, for Norway; Lopes et al., 2014, for Portugal; Carlin et al., 1997, and Carver et al., 2013, for Australia), which is likely due to parental concerns about harassment and the vulnerability of girls (Valentine, 1997). On the other hand, no significant effects of gender have been found on the propensity to walk alone (Yarlagadda and Srinivasan, 2008) or travel independently (He, 2013) in California, or in Portugal (Cordovil et al., 2013).

*Characteristics of parents and the household.* Household socioeconomic status, as reflected in income, parental education, or home ownership, affects children's travel. Nationality (or migrant/

minority/ ethnic status) may also be interpreted in this way in that minorities are often more likely to have a lower socioeconomic status. On the other hand, these variables may also reflect differences in cultural habits (Seraj et al., 2012).

Children living in high-status and/or non-minority households have been found to travel less independently (Yoon et al., 2011, Hsu and Saphores, 2014, He, 2013, all for the US; Pabayo et al., 2012, for Canada; Manz et al., 2015, 104, for Germany). Several considerations may explain this. Depending on the local and national context, high-status households may live in more remote areas, which increases distance and thus the need to drive. Parents in privileged households are more likely to choose the 'best' school for their children (rather than the nearest), if the school system allows this (e.g., Andersson et al., 2012, for Sweden). Privileged households may be more protective or more concerned about crime and safety (Yoon et al., 2011; Seraj et al., 2012 find the opposite to be true in California, but suspect that this is due to the safer residential environments of the more privileged).

High-status households are also more likely to include more than one employed parent and have more than one car, which facilitates dropping a child off at school on the commute. Having a mother who travels to work in the morning has been found to reduce the propensity for a child to walk or cycle to school in the US (McDonald, 2008). On the other hand, time constraints are more severe when both parents are full-time employed. Carver et al. (2013) find that in Australia the likelihood for a child to be driven home from school increases when at least one parent is not employed full-time. Note that this refers to the homebound trip when picking up a child is easier for part-time employees.

Household car ownership is such a strong resource for travel that it may operate over and above its link to social status. It has consistently been found to decrease independent travel (Carver et al., 2013, and Carlin et al., 1997, for Australia; Yoon et al., 2011, for the US).

Household composition may affect children's school trips. Children in single parent households may be escorted less often due to the time constraints imposed on the parent they live with (mostly the mother) (He, 2013, for California; Lin and Chang, 2010, for Taipei; Manz et al., 2015, 100 for Germany), although that parent may still be strongly burdened with escort trips because there is no intra-household worksharing (Manz et al., 2015, 97 for Germany; Hsu and Saphores, 2014, for the US). Yoon et al. (2011) find that the number of siblings is positively associated with independent travel to school in the US. He (2013) finds a negative association, but does not consider joint trips with siblings as being independent. Pabayo et al. (2012) report that having an older sibling increases the likelihood of active travel, as joint travel with older siblings may reduce parental fear.

The above considerations of parents' employment status suggest that parents' activity and travel behaviour also affects children's travel. Parents being 'unavailable' early in the morning due to their own work schedules may motivate their child to walk alone (as shown by Mitra and Buliung, 2012a, in Toronto), while commuting by car makes it easy for many parents to drop their child off at school, as long as the work schedule is flexible or fits school start time. Conversely, Fyhri and Hjorthol (2009) find a negative association between the frequency of parents' car use and children's independent mobility in Norway. This relationship may also reflect children's mobility socialisation in a wider sense by shaping a child's travel expectations, norms and routines, thus contributing to her longer-term mobility biography (Döring et al., 2015). In any case, these findings suggest a close link to research on intra-household interactions (McDonald, 2008; Deka, 2013; Hsu and Saphores, 2014), including intra-family interactions beyond the household.

Safety and security concerns may lead to more escort rather than allowing the child to travel independently (Fyhri and Hjorthol, 2009; Carver et al., 2013; Shaw et al., 2013; Hsu and

Saphores, 2014; Waygood and Susilo, 2015; see also the above considerations on neighbourhood social trust). Parental fears are, however, only one dimension of attitudes that discourage parents from letting their children go to school independently. Another is simply that driving is perceived to be convenient and fast, even though a household may spend more time travelling in total when a child is driven than when (s)he walks. This convenience reasoning has been found to be more prevalent than safety concerns (McDonald and Aalborg, 2009, for the US; see also Fyhri and Hjorthol, 2009; see Stone et al., 2014, on the role of parents' mode attitudes).

### **2.3 The gendering of escort**

So far this paper has focused on factors affecting children's independent versus escorted travel. Conditional on a child being escorted, the gendering of escorting tasks is the subject of another, if closely related, strand of research. This research is not as broad, but it is embedded in a myriad of studies on gendered time use and activity patterns which cannot be reviewed here (see Gershuny and Kan, 2012 for a review), and the cultural construction of parenting (Valentine, 1997). The general observation around the world is that mothers are more likely to escort their children to school (or elsewhere) than fathers, even when both partners are employed (Schwanen, 2007, for the Netherlands; Scheiner, 2013, for Germany, Motte-Baumvol et al., 2015, for France; Vovsha and Petersen, 2005, for the US).

An international comparison of figures suggests that the proportion of escort trips made by fathers rather than mothers roughly varies between 30-40% of trips escorted by parents (Motte-Baumvol et al., 2015, 3; Yoon et al., 2011 report 25% for California). In Germany, Scheiner (2013) reports that men contribute 30% of the time couples with children aged less than 14 years devote to escort purposes. In other couples (with elder or no children) men devote more time to escort purposes than women (58%). The paper does not consider who is escorted. Manz et al. (2015, 73-74) also report fathers' undertaking 30% of all escort trips, but only 26% in families with children aged 10 or younger. For children's school trips, specifically, the fathers' share of trips escorted by a parent is lower (27% in the morning, 18% in the afternoon) (Manz et al., 2015, 102).

Fathers, if at all, tend to take their children to school in the morning, but not back home in the afternoon (Schwanen, 2007, for The Netherlands; Lin and Chang, 2010, for Taiwan; Motte-Baumvol et al. 2015, for France; Manz et al., 2015, for Germany). This is probably due to mothers' more frequent part-time employment. Generally, escorting practices of couples are characterised by complex interactions between partners as well as between parents and children, and they are embedded in the wider activity schedules of all household members, including domestic, care and employed work (see Vovsha and Petersen, 2005; McDonald, 2008; Schwanen, 2007; Schwanen et al., 2007; Yoon et al., 2011; Manz et al., 2015). For instance, dual-earner households with very tight time schedules are likely to split care and household tasks rather than leaving all tasks to just one partner (Manz et al., 2015, 74) or undertaking them jointly. In almost 30% of his sample of Dutch dual-earner families Schwanen (2007, 453) finds that fathers do half the escorting trips, suggesting a household strategy of split-shift chauffeuring. Similarly, Scheiner (2013, 91) reports for Germany that one-third of households in which both partners spend equal amounts of time on employment (= 22% of couple households), also split out-of-home household tasks (shopping, errands, escorting) equally. Motte-Baumvol et al. (2015, 9) support the idea of split-shifts for dual-earner couples in the Paris region by finding that "if one parent escorts in the mornings, it is much more likely that the other parent will escort the children in the afternoons". Manz et al. (2015, 104) find that the likelihood that the father rather than the mother escorts a child is slightly higher when the child is a boy. Thus, parental and child gender seem to intersect in escorting practices.

Barker (2008) explores fathers' experiences with escorting their children to various places in the UK and finds masculine styles of care which are distinctive from mothers' (see also Valentine, 1997, and Schwanen, 2007, for nuanced discussions of mothering and fathering practices). For instance, mothers' safety concerns have been found to be stronger than fathers' (Hsu and Saphores, 2014). The study also shows that the disproportionate escort burden carried by mothers is maintained even when concerns about safety are held constant.

Women's employment schedules seem to affect the allocation of escort differently from men's. He (2013) reports that mothers', but not fathers' work hours are positively associated with a child's independent travel to school (similarly: He and Giuliano, 2015). Yarlagadda and Srinivasan (2008) discuss US data that shows that the mother going to work on a random day increases the likelihood of a child being driven by her mother, while conversely the father going to work decreases the likelihood that he drives the child to school. Yoon et al. (2011) report for the US that the father working at home increases the propensity that he escorts a child rather than the mother.

On the other hand, Schwanen (2007) finds that the gendering of escorting children depends on the father's weekly work hours to about the same degree as on the mother's. This can be seen from Yoon et al. (2011, 21) as well, although the effect of the mother's work hours is only marginally significant. Schwanen (2007) also shows that the commute time and mode of both parents serves to negotiate escort tasks. Motte-Baumvol et al. (2015) add that the requirement to make a detour on the work trip reduces the likelihood of a child being escorted to school, and this is true for both parents alike.

Modern arrangements with above-average involvement of fathers may be more likely in urban than rural settings. Schwanen et al. (2007) support this idea for the Netherlands, however not with respect to escort trips.

## **2.4 Conclusions from the literature**

Overall, rich research on school trips has emerged in the past few years. The majority of this research focuses on mode choice, while less is known about escorting practices, and even less about its gendered character. Though some research uses large samples (e.g. McDonald, 2008; Waygood and Susilo, 2011), studies are dominated by regional or local case studies using targeted original data. These studies allow the survey instruments to be designed so that they perfectly match the purpose of the study, and also allow the built environment to be measured in great detail. On the other hand they are of limited representativeness and sometimes lack the differentiation permitted by large samples. Last but not least, while there are many studies from North America as well as from Australia, Asia and Europe, strikingly little is known about school travel and its links to gender issues in Germany. The most notable exception is Shaw et al. (2013), a follow-up study to Hillman et al. (1990) that focuses on long-term trends and highlights the decline in independent mobility, especially among primary school children, but does not simultaneously investigate factors affecting independent mobility nor the gendering of escort. Rare international comparative studies suggest that Germany may be more similar to Japan than to North America or Australia, as both countries are characterised by dense urban layouts, proximity between homes and schools, and similar mode use (Waygood and Susilo, 2011).

## **3 Methods**

### **3.1 Data**

The empirical work in this paper is based on the national household travel survey Mobility in Germany (MiD) 2008. MiD includes a sample of 25,922 households with 60,713 individuals



randomly drawn from the German-speaking residential population. One-day trip diaries were collected from all household members regardless of age. The response rate was 21% (Follmer et al., 2010). The analysis in this paper is limited to school trips (including primary school) made by children and adolescents (< 18 years), excluding trips to or from job training or apprenticeships. This sample includes 10,238 trips made by 4,793 individuals. As we also use a multitude of explanatory variables in regression, including variables referring to both parents, the sample used in regression modelling excludes single-parent families and responding households with missing values. The regression sample includes 4,653 trips, and it is further reduced to a minimum of 1,937 trips in a model that is limited to trips escorted by either the mother or father (see below). We use weighted data for descriptive analysis, but not for regression modelling or any test of significance.

### 3.2 Variable definitions

#### 3.2.1 Target variables and analysis approach

This paper studies escorting on school trips on the trip level and its association with personal, household, spatial context and trip variables. School trips are defined as ending (outward trip) or starting (return trip) at school. The full range of escorting persons and other trip companions, as reported in the data, is considered in the descriptive analysis, as is the relationship between escort and mode use.

In the regression analysis, two variables are studied in more detail. Firstly, we look at whether a child is escorted to/from school by her parents or makes the trip alone (parental escort model). Trips escorted by other persons, but not by the child's parent(s) are excluded. A second and third model study the conditions under which the father escorts the child, conditional on the child being escorted by either mother or father, but not by both or by someone else (father escort model). As we look at binary variables, the binary logit model is used for regression.

This model is based on a transformation of the binary dependent variable. It does not estimate the probability of an event (e.g. escort vs. no escort), but the logarithmic ratio between this probability and the probability that the event does not happen ('Log-Odds') (Long, 1997). This can be expressed as follows:

$$L(p_i) = \ln\left(\frac{p_i}{1-p_i}\right) = \alpha + \sum_{j=1}^k \beta_j x_{ij}$$

L(p<sub>i</sub>): Logit

Log-Odds: ln (P<sub>i</sub> / (1-P<sub>i</sub>))

Logit coefficients: α, β<sub>j</sub>

exogeneous variables: x<sub>j</sub>

probability of the event: p<sub>i</sub>

The logit coefficients β<sub>j</sub> can be antilogged into effect coefficients e<sup>β<sub>j</sub></sup> (Exp(B) in Table 7 and 8). Effect coefficients facilitate interpretation by giving odds ratios changes for a one unit change in the explanatory variable.

#### 3.2.2 Explanatory variables used in regression

*Urban form.* Tables 1 and 2 present an overview of the full set of variables used along with their descriptive statistics. The most important shortcoming of the data for the purpose of this paper is

that due to German data protection laws there are no geocodes available. The study of urban form measures is therefore limited to variables that are provided in the data available for scientific analysis. These are limited to rough categories of spatial context and self-reported measures of urban form. We use municipality size categories (number of inhabitants) that have been proven to be good proxies for urban form (e.g. Scheiner, 2009), as city size in Germany can to a large extent be equated with administrative municipality size.

We also include two proxy variables for a highly accessible neighbourhood. Both are based on subjective ratings. They are recorded in a fashion similar to German school grades, i.e. as ordinal scales ranging from one to six, with smaller values being better. We reverse all scales to ensure that high values represent good access and, hence, we expect negative effects on being escorted. The first variable is composed of separate ratings of walking and cycling access to groceries, which strongly correlates with the general level of urbanity, as has been shown in data for Cologne (Scheiner, 2009). We use the mean access ratings given by all household members aged 14 or older (Cronbach's  $\alpha = 0.78$ ). The second variable is based on ratings of public transport access to two different facilities: groceries and the respondent's own place of work or education (as applicable). Again we use the mean ratings of all household members aged 14 or older (Cronbach's  $\alpha = 0.55$ )<sup>2</sup>.

*Sociodemographics.* A range of sociodemographic variables is used that have been found to affect escorting behaviour in previous studies. This includes the child's age and gender, plus interaction terms between the two, as (primary school) girls can be expected to be accompanied more often than boys (Manz et al., 2015, 103). The youngest category (1-5 years) mainly includes trips made by children aged 3-5 (84%) while a few are 1-2 years old. All pre-school children are put in the same category as the large majority are escorted regardless of age.

For parental employment arrangements, two different forms are tested. Firstly, employment status is used separately for both parents. Secondly, combined categories for both parents' employment are tested, as these may not work independently of each other. These combined categories performed clearly worse than separate categories in the parental escort model. Hence, the model with separate categories is presented. Both variants are presented for the father escort model, as they are interesting to compare. To the best of our knowledge, such combined variables representing gendered arrangements of employment in couples have not been used in previous, related studies with the exception of Yoon et al. (2011) who use a similar, but simpler categorisation. Additionally, we enter three categories of work-time arrangement for both parents (fixed or shift work, flextime, completely flexible or not employed). Household monthly equivalent income (as defined by OECD, n.d.) is also entered in the models. Finally, car availability is used in five categories that consider both parents' car access.

We tested interaction terms for child age category and municipality size, as suggested by our descriptive results, but found no significant effects. We excluded these variables for the sake of parsimony. The same is true for household education level (measured by the highest school grade achieved by either father or mother), which we initially suspected could be positively associated with escort due to the possibility of higher levels of parental fear among those with higher levels of education (Yoon et al., 2011).

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<sup>2</sup> While these variables represent a general evaluation of accessibility at the residence, other variables have been collected that reflect mode-specific access to the particular school a child respondent attends. However, these have also been recorded only for those aged 14 or older.

In order to construct parent variables, parents need to be defined. This is not a major problem for households with one or two adults plus one or more children (or adolescents). In cases with three or more adults (18 years or older) the two eldest different-sex persons are defined as parents if the age difference between the second- and third-oldest person is 18 years or more. The third-oldest person is considered an adult descendant in this case. In cases with a smaller age difference the household is defined as a multiple-adult household, but not as a family.

*Trip.* Three trip variables are entered in the models, i.e. trip distance (self-reported), season and whether the trip is an outward or homebound trip. Trips longer than 50 km (6 trips) are eliminated. Consideration of seasonal variation (measured in four season categories) did not exhibit any significant effects except for the autumn season (September-November) in the father escort models. We retained this variable in these latter models only.

	Parental escort model				Father escort models			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Household equivalent income (1,000 Euro)	1.49	0.62	0.17	4.17	1.55	0.64	0.17	4.17
Trip distance (km)	4.37	5.92	0	47.5	3.73	5.53	0.1	43.7
Access to PT	3.47	1.33	1	6	3.35	1.30	1	6
Walking access to groceries	4.67	1.23	1	6	4.56	1.30	1	6
n	4,646				2,278 /1,933			

**Table 1: Continuous variables used in regression: descriptive statistics**

	Parental escort model	Father escort models
	Per cent 'yes'	
Escorted by parents (v. alone)	50.1%	
Escorted by father (v. mother)		24.0%
Gender female	46.1%	47.7%
Age 0-5 years (ref.)	24.3%	47.6%
Age 6-7 years	11.8%	17.5%
Age 8-9 years	11.9%	11.7%
Age 10-13 years	22.4%	12.2%
Age 14-17 years	29.6%	11.1%
Age 6-7 years * female	6.2%	10.0%
Age 8-9 years * female	5.8%	6.1%
Age 10-13 years * female	9.4%	5.6%
Age 14-17 years * female	14.1%	5.3%
Father not employed (ref.)	5.8%	4.9%
Father full-time employed	90.6%	91.1%
Father part-time employed	3.7%	4.0%
Mother not employed (ref.)	32.2%	35.0%
Mother full-time employed	15.5%	14.1%
Mother part-time employed	52.3%	50.9%
Parents' employment combination (ref.: mother part-time, father full-time)		49.5%
Mother full-time, father full-time		12.8%
Mother full-time, father part-time or not employed		1.2%
Mother not employed, father full-time		30.8%

Mother not employed, father part-time		1.8%
Mother part-time, father not employed		1.6%
Mother not employed, father not employed		2.4%
<hr/>		
Parents' work schedules		
Father flexible or not employed (ref.)	62.4%	61.4%
Father flexitime	16.2%	17.7%
Father fixed working hours or shift work	21.4%	20.9%
Mother flexible or not employed (ref.)	63.2%	63.6%
Mother flexitime	13.0%	12.8%
Mother fixed working hours or shift work	23.8%	23.7%
<hr/>		
Municipality size < 5,000 inh (ref.)	19.2%	20.2%
Municipality size 5-20,000 inh	28.2%	28.3%
Municipality size 20-100,000 inh	27.9%	26.9%
Municipality size 100-500,000 inh	11.9%	11.4%
Municipality size > 500,000 inh	12.8%	13.3%
<hr/>		
Car availability (ref.: both parents licensed, 2+ cars in HH)	35.7%	31.7%
Car competition (both parents licensed, 1 car in HH)	30.2%	26.4%
Father has car, mother not licensed	2.7%	2.4%
Mother has car, father not licensed	0.7%	0.6%
Both parents not licensed or no car in HH	2.2%	2.3%
<hr/>		
Return trip	48.6%	45.1%
Autumn (Sept - Nov)		28.4%
<hr/>		
n	4,646	2,278/1,933

**Table 2: Dummy variables used in regression: descriptive statistics**

All variables are coded as yes=1, no=0.

## 4 Results

### 4.1 Escorting in the morning and the afternoon

*Age.* The proportion of trips made alone strongly increases with age (Table 3), while parental escort sharply decreases. Joint travel with siblings, but not parents, is more evenly distributed over age categories, except for pre-school children of whom 90-95% are escorted by parents or, in some cases, by non-household members, such as grandparents or neighbours. Trips made with siblings reach a maximum for morning trips in the age bracket 10-13 years. Non-household members are far more common companions than siblings, and this also reaches a maximum in the age bracket 10-13 years, but more so for afternoon than morning trips. Typically, from the age of 7-8 years these companions would be the child's friends.

*Who escorts.* Escort trips are very unevenly distributed between parents. Mothers escort their children on 25% of their school trips, but fathers on only 7% (see Table 4 for outward and homebound trips considered together). This means that mothers account for 78% of school trips that are accompanied by either the mother or father. The disproportionate burden for mothers is true in all child age categories, but is strongest for pre-schoolers (79%) and primary school children (81%). This is not to say that fathers do not accompany pre-schoolers. 17% of those trips are escorted by fathers, as compared to 7% of primary school trips. This does not, however, affect the relative burden for mothers as opposed to fathers because of the general decline of escort as children grow older.

Joint escorting that involves both mothers and fathers is very rare, and neither do siblings play a substantial role as companions. Note however that siblings may in some cases be part of parental escort trips. Non-household members play a large role however (30% of trips), as opposed to only 6% found in California (He, 2013). This is true for all age categories except pre-schoolers, most so in the age bracket 10-13 years. The data do not allow distinctions to be made here between adults and children, but it is very likely that the share of classmates strongly increases from about the age of seven to eight, while the share of classmates' parents would decrease.

	Outward trip (morning) – Age					Homebound trip (afternoon) – Age				
	0-5	6-9	10-13	14-17	All	0-5	6-9	10-13	14-17	All
<b>&lt; 20,000 inh</b>										
No escort	2.1	23.5	33.5	41.5	26.6	3.8	25.0	36.2	42.2	28.3
Father	19.1	6.6	4.6	2.9	7.5	13.2	2.9	2.8	2.7	4.7
Mother	67.4	28.2	8.6	8.7	25.4	62.4	25.0	8.6	6.6	23.0
Other escort	11.5	41.8	53.3	46.9	40.4	20.6	47.3	52.4	48.5	44.1
n (unweighted)	371	649	794	753	2,567	366	640	778	743	2,527
<b>20-100,000 inh</b>										
No escort	1.0	19.4	37.5	45.2	27.8	0.4	21.9	39.4	48.9	30.1
Father	16.7	10.7	5.5	5.4	9.1	12.2	6.4	2.1	2.6	5.4
Mother	70.0	28.7	10.2	5.0	25.6	61.5	29.2	9.1	5.0	23.4
Other escort	12.3	41.2	46.8	44.4	37.5	26.0	42.5	49.4	43.5	41.2
n (unweighted)	218	301	395	534	1,448	209	299	392	531	1,431
<b>100-500,000 inh</b>										
No escort	0.8	19.8	32.2	52.8	27.0	1.6	26.2	36.5	52.4	29.9
Father	27.1	10.7	6.1	4.2	11.9	9.7	5.4	1.7	1.4	4.5
Mother	59.7	26.7	8.7	5.6	25.0	64.5	19.2	7.0	4.2	23.2
Other escort	12.5	42.7	53.1	37.6	36.1	24.1	49.3	54.7	42.0	42.4
n (unweighted)	107	130	159	201	597	102	128	158	199	587
<b>&gt; 500,000 inh</b>										
No escort	0.8	16.9	35.0	52.6	26.4	0.0	16.7	37.3	57.1	27.8
Father	30.1	14.7	3.6	5.9	13.5	16.8	5.8	0.0	1.5	6.0
Mother	61.7	30.9	5.8	8.9	26.6	59.5	37.7	6.0	2.3	26.3
Other escort	7.5	37.5	55.5	32.6	33.4	23.7	39.8	56.7	39.1	40.0
n (unweighted)	108	139	171	208	626	106	139	168	206	619
<b>All municipalities</b>										
No escort	1.4	21.4	34.7	45.2	27.0	2.0	23.4	37.3	47.3	29.0
Father	20.9	9.0	4.9	4.2	9.1	12.9	4.4	2.2	2.4	5.0
Mother	66.4	28.4	8.7	7.1	25.6	62.0	26.9	8.3	5.3	23.5
Father and mother	0.7	0.7	0.7	0.4	0.6	1.6	0.9	0.3	0.0	0.7
Siblings, no adults	2.7	10.7	14.8	10.1	9.9	5.8	10.8	10.5	6.9	8.7
Other escort	7.8	29.9	36.1	33.0	27.7	15.6	33.6	41.4	38.1	33.1
n (unweighted)	804	1,219	1,519	1,696	5,238	783	1,206	1,496	1,679	5,164

**Table 3: Escort on school trips by age, municipality size and outward/homebound trip**

All differences between age groups significant ( $p=0.00$ ) for outbound trips as well as for homebound trips. The following differences in escorting between municipality size categories are significant. Outbound trips: age 14-17 years ( $p=0.00$ ), all age groups taken together ( $p=0.00$ ). Homebound trips: Age 6-9 years ( $p=0.01$ ), 14-17 years ( $p=0.01$ ), all age groups taken together ( $p=0.05$ ). - Parental escort may include other persons (e.g. siblings). Other escort excludes members of the child's household. The same applies for the other tables.

*Morning vs. afternoon.* Being escorted by non-household members is more frequent in the afternoon, and the same is true (to a lesser extent) for trips made alone. Mothers escort almost as much in the afternoon as in the morning, while fathers are considerably less involved in the afternoon, which reflects their full-time employment.

*Spatial context.* Making a distinction by urban context allows some interesting observations to be made. First, looking at pre-school children (0-5 years) shows that fathers are substantially more involved in the morning escort in large cities (> 100,000 inh) than in medium-sized and smaller towns and villages. Conversely, the escort burden for mothers is clearly lower. Fathers are also somewhat more involved in the return trip escort of pre-schoolers in cities (though just in those > 500,000 inh), but this only slightly relieves the mothers. The greater involvement of fathers in morning trips in large cities is also seen with primary school children. This, however, does not reduce the mothers' burden at all, as it is at the expense of children making the trip alone or with others – both forms are somewhat less typical in large cities among primary school children.

These observations suggest more equal gender relations among parents in cities than in suburban areas and the countryside, but the fly in the ointment of this statement is the disproportionately high share of mothers in the largest cities who take their primary school children home in the afternoon (38% versus 25% in the smallest municipalities). Note however the limited sample size of n=139 homebound trips here.

Does the high level of accessibility in cities ease the burden of escort for parents? For primary school children it is rather the other way round. Almost half of their trips (47%) are escorted by parents in the largest cities, but only one in three trips (32%) in the smallest municipalities (Table 4). However, things change as children grow up: fewer children aged 10-13 are escorted by parents in large cities (9%) than in small municipalities (13%), and the same is true for adolescents (9% v. 11%). This is more due to afternoon trips, while for morning trips geographical differences are less pronounced (Table 3). Taken overall, it still appears that the access advantages the city offers for older children and adolescents does not make up for the disadvantages it has for the independent mobility of smaller school children.

While these findings support many observations from other countries, they suggest that there are manifold forms of escorted/joint trips that go well beyond the binary distinction between independent and escorted (dependent) trips typically highlighted in related research.

## **4.2 Escorting boys and girls as they grow up**

Generally, girls make their school trip alone less often than boys, while they are more often accompanied by others. However, this hardly affects their parents' escort burden (Table 4).

Distinguishing by age group reveals some interesting nuances. At pre-school age, boys seem to be escorted by parents somewhat more often than girls, while girls are accompanied by others more often. This may reflect the somewhat more mature state of development of girls in this age group.

Primary school girls (6-9 years) are considerably more often escorted by their parents than their male counterparts, and this is true for all municipality size categories except the smallest. Even though the subsamples are small, the tendency is consistent for different geographical contexts. The finding that there is no gender difference in the smallest towns and villages suggests that parents strongly tend to protect girls aged 6-9 years in more urban contexts while they feel safer in smaller and more rural settings. This may also be reflected in the observation that trips made jointly with other persons are substantially more frequent in these smaller settings, while parents' escort is more prevalent in cities. Note that in the sum category (all municipalities) the gender

difference is not as pronounced because roughly half of the sample is from the smallest municipalities.

Things change substantially in secondary school (10-13 years). From this age, joint trips with other persons account for a larger share than parental escort. Girls still make their trips alone considerably less often than boys, but the gender difference is now due to friends or other persons rather than parents, which may be due to girls' stronger wish to talk or socialise (Kirby and Inchley, 2013). In the teenage years (14-17 years) the gender gap is narrower, but girls still make joint trips somewhat more often, and again this is with people other than parents. Unfortunately, we cannot determine the social role, age or gender of non-household companions.

The disproportionate burden of mothers has been highlighted above. From a gender perspective two more points are interesting to note. Both contribute in a relatively unique way to the emerging literature on socialisation effects in travel.

Firstly, boys are more often accompanied by their brother(s) (5.3%) than by their sister(s) (3.3%), while for girls it is the other way round. The odds ratios of these two events among boys and girls, respectively, are particularly pronounced in adolescence, but the relative unlikelihood of joining a different-sex sibling for the trip to school is apparent in all age groups. While this may not be unexpected, it reflects a dimension of mobility socialisation – i.e. adult-gender child-gender interaction – that shows the gendering of social relationships in childhood mobility.

Secondly, fathers tend to escort boys, while mothers tend to escort girls. This may sound somewhat overstated, given that the respective percentages do not differ that much. However, they are in the same vein as the observations for same-sex v. different-sex siblings made above and, hence, may reflect some sort of social reality, albeit weakly pronounced. What is more, this observation is somewhat more pronounced for pre-school children, which may again reflect some gendering in early mobility socialisation.

### **4.3 Independent travel and mode use**

Mode use and independent travel are clearly connected with each other. Being a passenger in a car requires a driver and, hence, some escort – typically a parent (Table 5). On the other hand, the few students who drive themselves tend to make their trips alone (61%). Also, the relative majority of cycling trips (44%) and public transport trips (41%) are made alone. Still about one third of public transport and cycling trips are made with persons from outside the household, and almost one in five cycling trips is accompanied by a parent. For walking trips, escorting arrangements are more evenly distributed. Only 30% of walking trips are made alone, while almost equally as many (26%) are escorted by parents and another 34% are undertaken with other persons.

Taken overall, these observations suggest that escort is closely related to travel mode, but at the same time there is hardly a compulsive relationship between the two. Children who walk to/from school may walk independently, or they may not, and the same is true for other modes except for being a passenger in a car.

There is considerable change in the association between mode and escort with the age of the child (Table 6). Most trips of pre-school children are escorted by parents regardless of mode, with the exception of the few PT trips where the companions are more often non-household members. This may reflect an attempt to efficiently organise these (presumably long) trips. This is even more pronounced at primary school age.

At primary school age walking alone or with non-household members becomes more common. This is also true for children who cycle or use PT, although cyclists are more often accompanied

	0-5 years			6-9 years			10-13 years			14-17 years			All		
	M	F	All	M	F	All	M	F	All	M	F	All	M	F	All
<b>&lt; 20,000 inh</b>															
No escort	3.0	2.9	3.0	27.1	22.5	24.7	39.8	28.8	34.8	44.1	39.4	41.8	30.1	25.0	27.6
Parent(s)	80.4	83.5	81.8	32.9	31.5	32.2	12.6	13.4	13.0	10.6	10.8	10.7	31.1	30.7	30.9
Other	16.6	13.6	15.2	40.1	46.0	43.1	47.5	57.9	52.1	45.2	49.8	47.5	38.8	44.3	41.5
n	396	333	729	612	625	1,237	828	722	1,550	766	719	1,485	2,602	2,399	5,001
<b>20-100,000 inh</b>															
No escort	0.3	1.1	0.7	26.3	16.4	20.8	41.6	35.7	38.7	50.4	43.9	47.0	32.0	26.3	29.1
Parent(s)	85.3	78.1	81.7	33.0	44.6	39.4	15.2	11.5	13.4	10.6	8.3	9.4	32.7	32.3	32.6
Other	14.2	20.8	17.4	40.7	39.2	39.9	43.4	52.8	48.0	38.9	47.9	43.6	35.1	41.5	38.5
n	206	212	418	259	331	590	394	382	776	534	527	1,061	1,393	1,452	2,845
<b>100-500,000 inh</b>															
No escort	0.7	1.0	0.8	29.3	15.0	22.9	39.5	29.1	34.4	55.6	49.3	52.4	30.6	25.7	28.3
Parent(s)	83.7	81.0	82.6	21.4	45.2	32.0	12.3	13.6	12.9	7.7	8.2	8.0	32.8	34.4	33.6
Other	15.7	18.1	16.7	49.3	39.8	45.1	48.3	57.3	52.6	36.6	42.5	39.5	36.7	39.9	38.1
n	128	80	208	128	123	251	157	151	308	197	201	398	610	555	1,165
<b>&gt; 500,000 inh</b>															
No escort	0.0	0.8	0.4	21.8	13.0	17.4	45.2	27.2	36.2	56.0	54.2	55.1	29.8	25.0	27.4
Parent(s)	88.9	84.1	86.8	40.6	52.7	46.6	9.7	8.1	8.9	7.2	10.5	8.9	37.9	37.1	37.4
Other	11.1	15.0	13.0	37.7	34.4	36.0	45.2	64.7	55.1	36.8	35.2	35.9	32.2	38.0	35.1
n	122	92	214	145	122	267	164	172	336	198	212	410	629	598	1,227
<b>All municipalities</b>															
No escort	1.5	1.8	1.7	26.6	19.0	22.7	40.8	30.6	36.0	48.7	43.8	46.2	30.6	25.5	28.1
Father	18.6	15.1	17.0	6.5	7.0	6.8	3.8	3.4	3.6	3.8	2.9	3.3	7.7	6.5	7.1
Mother	63.6	65.4	64.4	25.1	30.9	28.1	8.6	8.4	8.5	6.0	6.4	6.2	24.2	25.2	24.7
Father and mother	1.2	1.1	1.2	0.9	0.8	0.8	0.6	0.4	0.5	0.1	0.3	0.2	0.7	0.6	0.6
Brother(s), no adults	2.9	1.3	2.1	6.0	4.4	5.2	7.0	4.6	5.9	4.9	3.5	4.2	5.3	3.6	4.5



Sisters(s), no adults	1.4	1.7	1.6	3.7	6.2	4.9	5.8	5.9	5.8	2.0	5.3	3.7	3.3	5.0	4.1
Brother(s) and sister(s), no adults	0.4	0.6	0.5	0.7	0.3	0.5	1.1	0.5	0.8	0.6	0.7	0.6	0.7	0.5	0.6
Other escort	10.3	13.0	11.6	30.7	31.3	31.0	32.4	46.1	38.8	33.9	37.1	35.5	27.5	33.1	30.2
n	852	717	1,569	1,144	1,201	2,345	1,543	1,427	2,970	1,695	1,659	3,354	5,234	5,004	10,238

**Table 4: Escort on school trips by gender, age and municipality size (M=male, F=female)**

The following differences between genders are significant.

Municipalities < 20,000 inh.: 6-9 yrs (p=0.05), 10-13 yrs (p=0.01), 14-17 yrs (p=0.01), all age groups (p=0.000).

Municipalities 20-100,000 inh.: 6-9 yrs, 10-13 yrs, 14-17 yrs, all age groups (p=0.000, respectively).

Municipalities 100-500,000 inh.: 6-9 yrs (p=0.000), 10-13 yrs (p=0.05), all age groups (p=0.05).

Municipalities > 500,000 inh.: 14-17 yrs (p=0.05).

All municipalities taken together: 6-9 yrs, 10-13 yrs, 14-17 yrs, all age groups (p=0.000, respectively)

	On foot	Bicycle	Car passenger	Car driver*	Public transport	All
No escort	29.6	43.6	0.0	60.8	40.7	28.1
Parent(s)	25.6	18.8	82.9	11.8	5.8	32.5
Sibling(s), no adults	10.5	5.4	2.4	15.7	15.3	9.2
Other persons	34.2	32.2	14.6	11.8	38.1	30.2
All	100.0	100.0	100.0	100.0	100.0	100.0
n (unweighted)	2,633	1,652	2,249	69	3,634	10,237

**Table 5: Escort by travel mode on school trips**

Difference significant (p=0.000).

\* Including motorcycle.

	On foot	Bicycle	Car passenger	Car driver*	Public transport	All
0-5 No escort	3.9	0.0	0.1		11.0	1.7
0-5 Parent(s)	75.8	87.4	88.1		51.2	82.6
0-5 Siblings, no adults	7.9	4.2	1.7		9.8	4.2
0-5 Other persons	12.4	8.4	10.2		28.0	11.5
0-5 n (unweighted)	469	173	852		75	1,569
6-9 No escort	29.1	35.2	0.3		34.9	22.7
6-9 Parent(s)	18.4	33.7	83.5		8.3	35.7
6-9 Siblings, no adults	13.2	7.3	3.6		15.8	10.6
6-9 Other persons	39.3	23.8	12.6		41.0	31.0
6-9 n (unweighted)	1,027	192	657		469	2,345
10-13 No escort	44.7	45.4	0.0		38.2	36.0
10-13 Parent(s)	1.6	1.6	77.2		3.8	12.6
10-13 Siblings, no adults	10.5	7.3	2.8		18.9	12.6
10-13 Other persons	43.2	45.6	19.9		39.1	38.8
10-13 n (unweighted)	604	597	401		1,367	2,969
14-17 No escort	49.8	63.1	0.4	60.8	47.1	46.3
14-17 Parent(s)	2.2	1.2	67.6	11.8	3.5	9.7
14-17 Siblings, no adults	7.0	3.3	1.5	15.7	12.4	8.5
14-17 Other persons	41.0	32.5	30.5	11.8	36.9	35.5
14-17 n (unweighted)	533	690	339	69	1,723	3,354

**Table 6: Escort by travel mode on school trips, categorised by age group**

Differences significant in all age groups (p=0.000).

\* Including motorcycle.

by parents than walkers, and PT users less often. From starting secondary school, walking, cycling and PT are typically modes used alone or jointly with non-household members. Among adolescents, non-household members gain importance in car use. This is probably due to socialising with older friends on the car trip.

#### 4.4 Correlates of parental escort – multiple regression analysis

*Child characteristics.* Negative age effects suggest that the probability of being escorted by parents strongly declines with age (Table 7). This is not a linear trend, but escort is considerably lower even in the age bracket 6-7 years than for pre-schoolers, and it quickly declines further.

Interaction effects between gender and age clearly indicate that primary school girls are escorted more often than boys, most notably those aged 6-7 years.

*Parental and household characteristics.* Household equivalent income is positively associated with parental escort, suggesting more escort in high-status households.

Both parents' employment is negatively associated with escort. This is true for full-time as well as part-time jobs. Although the effect of fathers' part-time employment is not significant, it is still strong in magnitude. This is in line with European studies (Motte-Baumvol et al., 2015; Schwanen, 2007), but somewhat different from the US where McDonald (2008) finds maternal job trips to decrease the likelihood that a child aged 5-14 years walks or cycles to school. Otherwise, only one variable in parental work schedules significantly affects escort. A mother working fixed hours or shift work increases the likelihood that her child will be escorted, as compared to a flexible working arrangement or unemployment. This may be due to the temporal matching between many fixed schedules (e.g. in the retail or service sector) and school times.

Car availability works in a non-symmetrical way in gender terms. Car competition between parents (two license holders share one car) decreases the likelihood of escorting a child. The same is true with an even stronger effect magnitude for households in which the father has a car available while the mother is not licensed, but not for households in which the mother has a car available while the father is not licensed. Note that this is not just a matter of lack of significance, which may be due to the small number of cases, but also of the effect magnitude which is close to one (no effect).

*Trip characteristics.* Trip distance is positively related, and the trip being homebound is negatively related to escort. Both findings are in line with expectations.

*Built environment characteristics.* The municipality size categories do not show a fully consistent picture. The only significant effect is that escort is more likely in municipalities with 20-100,000 inhabitants than in villages (< 5,000 inhabitants). This is in line with the direction of effect in the largest cities, but not in those with 100-500,000 inhabitants. Descriptive analysis suggests that this may be due to interactions with age, but interaction effects were insignificant, as noted in the methods section.

On a small-scale level, central locations seem to encourage parents to permit their children to go to school independently. Access to PT and to groceries is negatively related to escort. The effect of walking access to groceries is far more pronounced, suggesting that land-use mix matters more than public transport, which is in line with Kerr et al. (2006) for the US, and Waygood and Susilo (2015) for Scotland. Hence, within cities escort seems to be less common in areas with mixed land-use, which are typically located in the inner city. Additionally, the shorter distances to school in areas with mixed land-use (correlation between distance to school and walking access to groceries:  $r=-0.191$ ) further encourage independence.

#### **4.5 The gendering of parental escort**

Before discussing effects, it needs to be noted that the model fit is considerably lower in the father escort models than in the parental escort model (Table 8). This is due to the strong age effects in the parental escort model that 'determine' the fit, while the gendered practices in escorting are less obvious. Model 2 on the right hand side of the table has a somewhat better fit, suggesting that combined categories for both parents' employment are better suited to explain the gendering of escort than separate employment variables for the mother and father. Otherwise the differences between the models are limited, and they are discussed below.

	B	Exp(B)	Sig.
Child's gender female	-0.585	0.557	0.15
Child's age (ref.: < 6 years)			
Child's age 6-7	-3.385	0.034	0.00
Child's age 8-9	-4.298	0.014	0.00
Child's age 10-13	-5.411	0.004	0.00
Child's age 14-17	-5.927	0.003	0.00
Child's age 6-7 * female	1.318	3.737	0.00
Child's age 8-9 * female	0.786	2.195	0.07
Child's age 10-13 * female	0.851	2.341	0.05
Child's age 14-17 * female	0.665	1.945	0.12
Parents' employment (ref.: not employed, respectively)			
Father full-time employed	-0.367	0.693	0.03
Mother full-time employed	-0.249	0.780	0.06
Father part-time employed	-0.288	0.750	0.29
Mother part-time employed	-0.342	0.710	0.00
Parents' work schedules (ref.: flexible or not employed, respectively)			
Father flextime	0.155	1.168	0.18
Father fixed working hours or shift work	-0.001	0.999	0.99
Mother flextime	0.201	1.223	0.13
Mother fixed working hours or shift work	0.227	1.255	0.04
Household net equivalent income	0.341	1.407	0.00
Car availability (ref.: both parents licensed, 2+ cars in HH)			
Car competition (both parents licensed, 1 cars in HH)	-0.410	0.664	0.00
Father has car, mother not licensed	-0.691	0.501	0.01
Mother has car, father not licensed	0.009	1.009	0.99
Both parents not licensed or no car in HH	-0.438	0.645	0.18
Trip distance (km)	0.042	1.043	0.00
Homebound trip	-0.427	0.652	0.00
Municipality size (ref.: < 5,000 inh)			
5-20,000 inh	0.077	1.080	0.51
20-100,000 inh	0.297	1.345	0.02
100-500,000 inh	-0.055	0.947	0.73
> 500,000 inh	0.269	1.309	0.09
Access to PT	-0.063	0.939	0.05
Walking access to groceries	-0.173	0.841	0.00
Constant	5.247	189.943	0.00
-2 Log-Likelihood	3960.5		
Pseudo-R <sup>2</sup> (Cox & Snell)	0.414		
Pseudo-R <sup>2</sup> (Nagelkerke)	0.552		
n	4,646		

**Table 7: Regression model of parental escort on school trips**

Data: MiD 2008

	Father escort model 1			Father escort model 2		
	B	Exp(B)	Sig.	B	Exp(B)	Sig.
Child's gender female	-0.201	0.818	0.20	0.013	1.013	0.94
Child's age (ref.: < 6 years)						
Child's age 6-7	-0.219	0.803	0.33	-0.209	0.811	0.40
Child's age 8-9	-0.371	0.690	0.15	-0.296	0.744	0.29
Child's age 10-13	0.418	1.519	0.05	0.434	1.543	0.07
Child's age 14-17	0.821	2.272	0.00	1.017	2.765	0.00
Child's age 6-7 * female	0.363	1.437	0.23	0.305	1.356	0.36
Child's age 8-9 * female	0.224	1.251	0.54	-0.064	0.938	0.87
Child's age 10-13 * female	0.007	1.007	0.98	0.015	1.015	0.97
Child's age 14-17 * female	-0.323	0.724	0.31	-0.944	0.389	0.01
Parents' employment (ref.: not employed, respectively)						
Father full-time employed	-0.801	0.449	0.00			
Mother full-time employed	0.984	2.674	0.00			
Father part-time employed	-0.376	0.686	0.26			
Mother part-time employed	0.072	1.075	0.62			
Parents' employment combination (ref.: Mother part-time, father full-time)						
Both parents full-time				1.139	3.124	0.00
Mother full-time, father part-time or not employed				1.655	5.231	0.00
Father full-time, mother not employed				0.101	1.106	0.57
Father part-time, mother not employed				-0.532	0.588	0.40
Mother part-time, father not employed				1.398	4.048	0.00
Both parents not employed				0.676	1.965	0.08
Parents' work schedules (ref.: flexible or not employed, respectively)						
Father Flextime	-0.118	0.889	0.43	-0.053	0.949	0.74
Father fixed working hours or shift work	0.258	1.294	0.05	0.251	1.285	0.08
Mother Flextime	-0.010	0.990	0.95	0.123	1.131	0.53
Mother fixed working hours or shift work	0.144	1.155	0.31	0.237	1.267	0.14
Household net equivalent income	0.120	1.127	0.17	0.128	1.137	0.19
Car availability (ref.: both parents licensed, 2+ cars in HH)						
Car competition (both parents licensed, 1 car in HH)	-0.237	0.789	0.07	-0.189	0.827	0.16
Father has car, mother not licensed	0.397	1.487	0.22	0.504	1.655	0.13
Mother has car, father not licensed	0.036	1.037	0.95	0.142	1.153	0.83
Both parents not licensed or no car in HH	-0.309	0.735	0.43	-0.730	0.482	0.13
Trip distance (km)	0.005	1.005	0.58	0.003	1.003	0.77
Homebound trip	-0.474	0.622	0.00	-0.441	0.644	0.00
Autumn	0.295	1.343	0.01	0.235	1.266	0.06
Municipality size (ref.: < 5,000 inh)						
5-20,000 inh	0.046	1.047	0.77	0.076	1.079	0.65
20-100,000 inh	0.263	1.301	0.10	0.158	1.171	0.37
100-500,000 inh	0.597	1.816	0.00	0.410	1.507	0.06
> 500,000 inh	0.586	1.797	0.00	0.582	1.790	0.01
Access to PT	-0.060	0.942	0.17	-0.033	0.967	0.49

Walking access to groceries	-0.036	0.965	0.41	-0.048	0.954	0.31
Constant	-0.627	0.534	0.07	-1.604	0.201	0.00
-2 Log-Likelihood	2340.5			1944.0		
Pseudo-R <sup>2</sup> (Cox & Snell)	0.072			0.080		
Pseudo-R <sup>2</sup> (Nagelkerke)	0.108			0.120		
n	2,278			1,933		

**Table 8: Regression models of being escorted by the father on school trips (father escort models)**

Data: MiD 2008

*Child characteristics.* Positive effects for the age brackets 10-13 and 14-17 suggest that children at this age are more likely to be escorted by their father than smaller children (likewise: McDonald, 2006, for the US). Only the effect for adolescents is strongly significant. In Model 2 this is countered by a negative interaction with the child's gender, which shows that the father is less likely to escort his child at this age (14-17) when she is a girl.

*Parental and household characteristics.* Comparing both parents' full-time employment reveals a symmetrical relationship with gendered escort. The father's full-time employment decreases the likelihood that he escorts the child, and the opposite is true for the mother. Part-time employment effects are not significant, but their magnitudes seem to be less symmetrical. While the father's part-time employment affects the likelihood that he escorts the child in the same direction as his full-time employment, although to a lesser extent, the mother's part-time employment exhibits no notable effect at all. Again, these observations are not statistically significant. However, they are in line with the suspicion that a mother's part-time employment does not relieve her from doing the family work.

Model 2 contributes to the literature by using a novel, combined consideration of both parents' employment status. The model starts from the reference category in household employment which has become the norm in Germany, i.e. the mother working part-time, the father full-time. Compared to this reference, the likelihood that the father escorts a child increases when both parents work full-time, and – even more so – when the mother works full-time but not the father. The likelihood for paternal escort also strongly increases in families where the mother works part-time while the father is not employed and, less so and only marginally significantly, in families where neither parent is employed.

As in the parental escort model, one variable in parental work schedules significantly affects fathers' escorting. A father working fixed hours or shift work increases the likelihood that he will escort his child, as compared to a flexible arrangement or unemployment (only marginally significant in Model 2). Many fixed schedules are likely to temporally match school times.

Interestingly, neither household income nor the gendered categories of car availability have a significant effect. Hence, the gendering of escort does not seem to strongly depend on which of two parents has access to a car, or on social status.

*Trip characteristics.* Homebound trips are less likely to be escorted by the father, which is in line with expectations. Trip distance does not play a relevant role. Interestingly, fathers are more likely to escort their child in the autumn season (strongly significant in Model 1, marginally significant in Model 2). This may suggest their willingness to engage in escorting at the beginning of a school year, willingness that declines over time.

*Built environment characteristics.* Small-scale residential location is not associated with gendered practices in escorting. However, municipality size effects indicate that fathers are more involved

in child escort in cities with more than 100,000 inhabitants. This suggests greater gender equity in cities than in small or medium-sized towns and villages.

## 5 Conclusions

This paper studied parental escort on their children's school trips. This is the first contribution to school travel research from Germany that looks at social and spatial context factors simultaneously, as well as at the gendering of parental escort.

The results generally support other studies in terms of the effects of the sociodemographics pertaining to parents and the child, trip distance, and outward versus homebound trip. Escort decreases with age. At primary school and lower secondary school (6-13 years), age intersects with gender, as girls are escorted more often than boys at this age. Household income is positively associated with escort, which may suggest more parental fear of crime and/or traffic in higher income groups. Both parents' employment is negatively associated with escort which favours the idea of temporal constraints being at work, rather than the idea that the work trip represents an opportunity to drop off a child at school, as has been found in the US (McDonald, 2008). Fixed working hours tend to increase rather than decrease the likelihood that a child is escorted, perhaps because of good temporal matching between many fixed schedules (e.g. in the retail or service sector) and school times. Previous US results are inconsistent in this respect. While He (2013) finds that flextime arrangements tend to increase parental escort (compared to escort by other persons, but not compared to independent travel), Yarlagadda and Srinivasan (2008) find that mothers' inflexible work schedules increase the chance that she drives her child to school, and Hsu and Saphores (2014) find that fixed parental work times have no effect at all on escort.

The effects of spatial context are mixed. Descriptive results suggest that children tend to be escorted more often by their parents in cities than in smaller towns and villages when of primary school age, but somewhat less often when older. This favours the idea of urban locations being more suitable for adolescents' independent mobility, but less suitable for smaller children. On the other hand, interaction effects between municipality size and age were weak and insignificant. Within municipalities escort is less common in areas with mixed land-use and a well-established PT system, which typically characterise the inner city. Additionally, the shorter distances to school in areas with mixed land-use further encourage independence.

The association between escort and travel mode is less close than that found in US studies. Walking or cycling to school in Germany does not imply that a child makes the trip without his parents, and the same is true for public transport. At the same time, there seem to be manifold trip companions (siblings, friends or friends' parents) going well beyond the binary distinction between independent and escorted (dependent) trips typically highlighted in related research.

The gendering of escort practices suggests that women carry a disproportionate burden, escorting 78% of school trips that are accompanied by either mother or father. This figure appears to be somewhat higher than in other European countries or North America, which underlines that Germany tends to have a somewhat conservative gender regime. In cities larger than 100,000 inhabitants fathers are more involved in child escort, suggesting more gender equity. Within-city differences do not, however, support the idea of more modern, equal arrangements existing in central locations.

The effects of employment on escorting arrangements are more symmetrical than asymmetrical. Parental car access, on the other hand, has a strongly asymmetrical impact. Paternal car access increases the chance that the father takes a child to school, while maternal car access does not exhibit any effect.

This paper has several shortcomings that indicate the need for further studies. First, the lack of geocodes renders it impossible to look at details of the spatial or social environment at the place of residence, school, or in between, such as the traffic situation, urban form, or neighbourhood peers. Parental attitudes towards safety, security, independence, travel modes and gender are likely to operate as authority constraints on child mobility but could not be studied here. Children's attitudes may play an important role as well. It would also be worthwhile to better understand escorting practices by non-household members in order to find out about cooperative arrangements between parents. Such persons cannot be properly identified with the data given. Finally, most recent research on child travel focuses on school trips and, specifically, mode choice. A wider focus including leisure and other purposes, and including measures beyond mode choice (destination choice, route choice, activity spaces) would enhance understanding of children's travel.

The issue of children's independent travel will remain on the policy agenda for the reasons outlined in the introduction. According to the results presented here, independent trips are supported by parental employment. Hence, women's increasing participation in the labour market is likely to motivate parents to allow their children higher levels of independence. On the other hand, the ongoing, though moderate, increases in car ownership and distances to school (resulting from school closures and free school choice) make more escort likely in the future.

This favours a number of approaches, including continuing traffic safety policies, strengthening neighbourhood social security (e.g. by motivating people to walk or cycle), keeping decentralised school locations with relatively small catchment areas, ensuring sufficient supply in terms of school capacity, and maintaining a relatively uniform quality of schooling across locations to prevent parents from choosing distant schools for quality reasons, as suggested by Boussauw et al. (2014, 321). Travel demand management concepts implemented at the municipal level and at school may help motivate parents to organise walking busses, group cycling or, in case of longer distances, ride-sharing (in cars or PT).

At the same time, the issue of gendering remains on the equity agenda. Even though this paper found that the effects of fathers' and mothers' employed work on escort practices are more or less symmetrical, fathers are involved considerably less in escorting than mothers. Germany has clearly made some progress in gender equity in the past few years, but there is still a long way to go.

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