



## **The Winding Road to Autonomy: 8-15 Year-Olds' Use of Private and Public Transportation to School and Spare-Time Activities<sup>1</sup>**

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### **Introduction**

Means of transportation are linked to autonomy development:

- To learn to handle them – coping with traffic situations, handling a bicycle, understanding a bus schedule, etc. – is part of autonomy development.
- Especially self-directed means of transportation provide knowledge of the area and the ability to orient oneself (Risotto & Tonucci, 2002).
- Transportation is needed for getting to settings away from home where further autonomy development can occur, e.g., with friends.

### **What roles do walking, riding a bicycle, using the bus, and being driven by car play for children's autonomy development from 8 through 15 years?**

In order to answer this question, it is necessary to disentangle the ability to use the respective means of transportation from the autonomy it provides to choose if and where to travel.

- School: Destination is fixed; thus, focus on ability to use the respective means of transportation.
- Spare-time activities: Combination of ability to travel and choice if and where to travel. Can be disentangled by statistically controlling for travels to school.

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## Assumptions on the Four Means of Transportation

	Demands put on user	Independence from others	Possible Distance
High	Bicycle	Walking	Car
↕	Bus	Bicycle	Bus
↕	Walking	Bus	Bicycle
Low	Car	Car	Walking
	<b>Children hypothesized to progress upwards (in this table) when travelling both to school and to spare-time activities.</b>		<b>Children hypothesized to progress upwards when travelling to spare-time activities only, because distance to school does not change.</b>

## Methods

- 715 students (54.4% girls) attending grades 4, 6, and 9 ⇒ comparison between ages 10, 12, and 15 from child reports.
- 497 parents of children (51.5% girls) attending grades 2, 4, and 6 ⇒ comparison between ages 8, 10, and 12 from parent reports.
- Data collected in 16 schools in 4 Swedish and 2 Danish municipalities in the Oresund region.
- Questionnaires, asking number of days per week of travel to school and spare-time activities, resp., on foot, by bicycle, bus, and car.
- Statistical analyses:
  - Multilevel (generalized mixed) analyses with children nested in schools, nested in municipalities. 2 (targets: school/spare-time activities) by 4 (means of transportation) by 2 (child/parent report) separate analyses.
  - Dependent variable: number of days of using the respective means of transportation to the respective target. Walking, cycling and bus rides to school dichotomized because of strongly bimodal distributions. The others square root transformed or inverted to approach normality.
  - Independent variables: Distance from school (4 steps), even used as a proxy for distance to spare-time activities; gender; age (each age group compared to the preceding one); country; 2-way interactions of distance, gender, and grade.
  - Several models tested without and with country and the 2-way interactions, respectively. Best fitting model chosen (AIC, BIC).

## Findings

### Confirmation of Assumptions: Effects of Distance to School

- Less walking to school at larger distance (child report, parent report)
- Less bicycle rides to spare-time activities at larger distance (parent report)
- More bus rides to school at larger distance (child report, parent report)
- More bus rides to spare-time activities at larger distance (child report)
- More car rides to school at larger distance (child report, parent report)

**Age-Related Effects**

		
	<p>Age increase in walking to school:</p> <ul style="list-style-type: none"> <li>• Age 15 &gt; age 12 (child report)</li> </ul>	<p>Complex interactions:</p> <ul style="list-style-type: none"> <li>• More girls than boys walk at age 8, but 10-year old boys walk most (parent-report)</li> <li>• Walking more restricted to short distance at age 12 than at age 10 (parent report). Does this mean that older kids use other means of transportation instead?</li> </ul>
	<p>No age difference</p>	<p>Age increase in cycling to spare-time activities:</p> <ul style="list-style-type: none"> <li>• Age 10 &gt; age 8 (parent report)</li> </ul>
	<p>No age difference</p>	<p>Age increase in riding the bus to spare-time activities:</p> <ul style="list-style-type: none"> <li>• Age 12 &gt; age 10 (parent report)</li> <li>• Age 15 &gt; age 12 (child report)</li> </ul>
	<p>Age decrease in being driven to school by car</p> <ul style="list-style-type: none"> <li>• Age 10 &lt; age 8 (parent report)</li> <li>• Age 12 &lt; age 10 (child report)</li> <li>• Longer distance from school less linked to being driven at age 12 than at age 10 (parent report)</li> </ul>	<p>Complex interaction in child report:</p> <ul style="list-style-type: none"> <li>• Generally, less car rides at age 15 than before</li> <li>• Generally, car rides especially at larger distances</li> <li>• Except at age 12: <i>less</i> car rides at larger distances. Does this mean that kids who live farther away start to use other means of transportation first, followed by the others?</li> </ul> <p>Two opposite trends in parent reports add up to zero age effect:</p> <ul style="list-style-type: none"> <li>• Age decrease in need of being driven (see results on rides to school on the left) and</li> <li>• Age increase of having more destinations to reach at age 10 than age 8. These 2 trends disentangled by statistically controlling for car rides to school.</li> </ul>

### Gender Differences: Girls Less Physically Capable in Their Own and Their Parents' Eyes

- Only girls cycle less to school if it is more distant (child report)
- Girls cycle less to spare-time activities (parent report)
- Girls take more often the bus to spare-time activities (child report)
- Girls are driven to school by car more often (child report)

### Cultural Differences Even Between Adjacent Scandinavian Countries

- Walking to spare-time activities: Denmark > Sweden
- Bicycle rides to school: Denmark > Sweden
- Bus rides to school: Sweden > Denmark

(All child report)

⇒ Denmark more “individualistic,” Sweden more “collectivistic.” Public transportation is even called “kollektivtrafik” in Sweden.

### What Do the Findings Tell Us?

- When the destination is given (school), children are less dependent of car rides with age and walk more.
- No development found for bicycle and bus rides to school.
- In contrast, all four means of transportation to spare-time activities depend on age, partly in complex ways. None of these dependencies can be explained statistically by changes in how to get to school. That is, children appear to choose their means of transportation flexibly according to their changing needs.
- **Children get more autonomous by**
  - **using independent means of transportation instead of car rides;**
  - **reaching more, and more distant destinations, as implied by use of long-distance means (bus & car rides).**
  - Both trends compensate for each other when it comes to car rides to spare-time activities, but they can be distinguished statistically.
- Findings with implications for environment, gender, and culture:
  - Children seem not to regard the bicycle as a means to bridge distances, not even when they get older.
  - Girls less physically active.
  - Swedish children prefer public transportation, Danish children individual (walking, bicycle).