



Pupil Transportation:

Factors Affecting Mode Choice and the Amount of Parent-driven Trips to School

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Introduction

Trends in School Transport

- Walking and biking trips have decreased (McMillan)
- Parent-driven trips have increased and are the predominant mode for school transport (Dellinger and Staunton 2002; Nationwide Personal Transportation Survey 1997)

Why are parents increasingly driving their children to and from school?

- Convenience (Rhoulac 2005, Black et al. 2005)
- Safety (Kann et al. 1997, Rhoulac 2005)
- Distance (McMillan 2005, McDonald 2008, Timperio et al. 2006)
- Work and Activities (Strathman and Ducker 1995, DiGiuseppi et al. 1998, McDonald 2005, Black et al. 2001, Vovsha and Petersen 2005, Chandra and Bhat 2007)



Why are students walking and biking less to school?

- Safety (Kann et al. 1997, TRB, Rhoulac 2005)
- Distance (McMillan 2005, McDonald 2008, Timperio et al. 2006)
- Urban form (McMillan 2005, Yarlagadda and Srinivasan 2008, Ewing et al. 2004)



Research Methods

Survey

- Mail-in-mail-back & Internet household travel survey conducted in three Vermont school districts



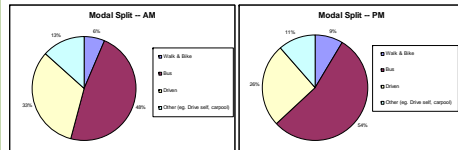
- n=859

Model Development

Double-hurdle model:

- The first hurdle: binary logit model (Y=1 if driven by parents and Y=0 otherwise)
- The second hurdle: multiple regression model (number of times being driven by parents)
- The two models have the same set of independent variables
- Two double-hurdle models: AM model and PM model

Results



Significant Variables

- | | |
|---------------------|------------------------|
| AM Logit Regression | AM Multiple Regression |
| Education | Distance |
| AutobetterSame | AdultLicense |
| NumberSame | AutobetterSame |
| AutoSafe | NumberAuto |
| BusstopFar | AutoSafe |
| BusstopFar | BusstopFar |
| WorkCommute | Bussearly |
| | BusBehavior |
| | WorkCommute |
| | AMActivity |
| PM Logit Regression | PM Multiple Regression |
| Age | Age |
| Gender | AdultLicense |
| Distance | AutobetterSame |
| Education | NumberAuto |
| AutoSafe | AutoSafe |
| BusstopFar | BusLong |
| WorkCommute | BusstopFar |
| PMActivity | WorkCommute |

*Correlations: No variables were included in the models with correlations above 0.5

n=859	AM Logit: First Hurdle	AM Regression: Second Hurdle	PM Logit: First Hurdle	PM Regression: Second Hurdle
Independent Variables	Coefficient	Coefficient	Coefficient	Coefficient
(Constant)	-.075	-.111	0.44	0.10
Age	-.006	.007	-.022***	-.049***
Gender	.002	-.018	-.008***	.007
Distance (Distance/1000 from school)	-.005	-.003***	.010*	.019
AdultLicense (Adult license per household)	0.11	.439***	-.001	-.288*
Education	.041***	.089	.003*	.066
Income	.000	.007	.015	.015
AutobetterSame (Auto better or same for environment than bus)	.136***	.648***	.027	.392***
NumberAuto (Automobiles per household)	-.028*	-.146**	-.017	-.127**
AutoSafe (Automobile is safe)	.216***	.697**	.239***	.709**
BusLong (Agree bus took too long)	.055	.254	.071	.513***
Inconsistent (Agree bus arrival drop-off time is inconsistent)	.043	-.021	-.025	-.013
BusstopFar (Agree bus stop too far from home)	.318***	1.295***	.178***	.690***
BusEarly/BusLate (Agree bus comes too early in the morning/late in the afternoon)	1.931***	.378**	.020	.124
BusNotSafe (Agree bus is not safe)	-.009	-.101	.030	.187
BusBehavior (Agree bus behavior not good)	.027	.325**	.016	.129
WalkNotSafe (Agree walking is not safe)	-.000	-.099	-.054	-.169
WorkCommute (Drop off pick up kids on work commute)	.400***	1.725***	.294***	1.488***
AMActivity/PMActivity (Student after school activities)	.055	.436***	.163***	.214

* Significant at 90% **Significant at 95% ***Significant at 99%



Objectives

Research Question

What are the factors that contribute to the increase in parent chauffeuring for school transport?



Research Objectives

- Collect primary data on student travel modes
- To identify factors that determine mode choice
- Provide school districts with information to improve school transportation

Research Limitations

- Surveyed primarily in rural areas
- Modeled only one mode (parent-driven trips)

Conclusions & Key Findings

- Parents chauffeur children to school more often if they believe that cars are better than or the same as school buses for the environment
- The more educated the parents the more likely parent chauffeuring will occur at all but it is not significant for the number of days driven
- Parents who are likely to drive their children to school most often rate the family vehicle as the safest way to get to school
- Parents are more likely to drive children to and from school if dropping off on the work commute
- Parents are more likely to drive children to and from school if they feel that the school bus stop is too far from home
- Parents who drive children to school are more likely to believe that the bus comes too early in the morning (value additional morning time)
- Age is only a significant factor in the afternoon; the younger the child the more likely to be picked up by parents
- Gender was only significant in the PM Binomial model; girls were more likely to be picked up at least one day per week by parents

Unusual/Inconsistent findings:

- Distance: In the mornings; the farther distance from school, the less likely to be frequently driven by parents. In the afternoon, the farther distance from school, the more likely to be picked up by parents
- The more cars per family; the less likely to drive kids to school
- Children who have morning activities are less likely to be driven to school; Children who have afternoon activities are more likely to be driven from school

Non significant variables in models:

- Income
- Parental perception that the school bus is not safe
- Perception that walking/biking are not safe
- Perception that the bus drop off/pick up time is inconsistent

Future Directions

- Estimate how mode choice for school transportation affects the environment (carbon footprint) and local traffic
- Estimate models for other modes (walk/bike and school bus)
- School transport finance and management studies