

U.S. School Travel, 2009

An Assessment of Trends

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Background: The White House Task Force on Childhood Obesity has set a goal of increasing walking and biking to school by 50% within 5 years. Meeting the goal requires a detailed understanding of the current patterns of school travel.

Purpose: To document nationally representative estimates of the amount of school travel and the modes used to access school in 2009 and compare these levels with 1969, 1995, and 2001.

Methods: The National Household Travel Survey collected data on the travel patterns of 150,147 households in 2008 and 2009. Analyses, conducted in 2010, documented the time, vehicle miles traveled, and modes used by American students to reach school. A binary logit model assessed the influence of trip, child, and household characteristics on the decision to walk to school.

Results: In 2009, 12.7% of K–8 students usually walked or biked to school compared with 47.7% in 1969. Rates of walking and biking to school were higher on the trip home from school in each survey year. During the morning peak period, school travel accounted for 5%–7% of vehicle miles traveled in 2009 and 10%–14% of all private vehicles on the road.

Conclusions: There have been sharp increases in driving children to school since 1969 and corresponding decreases in walking to school. This increase is particularly evident in the number of vehicle trips generated by parents dropping children at school and teens driving themselves. The NHTS survey provides a unique opportunity to monitor these trends in the future.

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Introduction

Nearly 55 million American elementary and secondary students travel to and from school each day.¹ Transporting these students required an expenditure of \$20 billion on busing by the public sector during the 2006–2007 school year and untallied costs by families.² This essential trip has received increased attention in recent years. The 2010 White House Task Force on Childhood Obesity³ recommended that “‘active transport’ should be encouraged between homes, school, and community destinations” and set a success benchmark of “increas[ing] by 50% the percentage of children ages 5–18 taking safe walking and biking trips to and from school.”

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The 2005 federal transportation bill, SAFETEA-LU, created a national Safe Routes to School program to make walking safer and encourage students to walk and bike. The original legislation and extensions have allocated more than \$800 million to the program.

Other recent trends such as education budget shortfalls and rising fuel prices also have focused attention on school travel.^{4,5} Understanding the scale and patterns of school travel is critical to developing policy on these issues and measuring progress toward goals. This article provides a snapshot of school travel in 2009, investigates trends in how children traveled to and from school between 1969 and 2009, and identifies correlates of active transport.

Methods

The U.S. Department of Transportation conducts the National Household Travel Survey (NHTS) to document America’s travel patterns. Conducted at 5- to 10-year intervals since 1969, the most recent NHTS, from 2009, provides important detail on children’s school travel. The survey collected information on all trips undertaken on a randomly assigned survey day. In 1969 and 2009, there were also special sections of the survey devoted to school travel.

This analysis used data from 1969, 1995, 2001, and 2009. The 1969 survey was based on a clustered sample design and results were collected through in-person interviews. The 1995 to 2009 surveys used a nonclustered, list-assisted random-digit-dial sample stratified by geographic area. The response rate for the 1969 survey was not recorded. Weighted person-level response rates were 34.3% in 1995, 34.1% in 2001, and 25.1% in 2009.^{6,7}

Measures of School Travel

The NHTS reported two measures of school trip mode choice: usual school travel mode (1969, 2009) and survey-day school travel mode (1995, 2001, 2009). The 1969 and 2009 surveys had special sections that asked *On most school days, how did [. . .] usually get to school?* These data were available for elementary and middle school students in 2009. The second measure of school travel was survey-day travel mode, which is equivalent to asking the question *How did you get to school today?* These travel-day data are available for students aged 5–18 years. Trips were counted as school trips if (1) the trip purpose was *Go to school as a student* (2009, 2001) or *School* (1995); (2) the trip began on a weekday morning between 5:00AM and 10:59AM during the school year (September–May); (3) the student spent at least 150 minutes at the destination; and (4) the student did not begin the travel day away from home. The definition of trips from school was analogous to that developed for trips to school with the exception that they were required to occur between 1:00PM and 6:00PM.

The 2009 special section on school travel collected data on usual mode of travel for students aged between 5 and 15 years. This analysis used records from the 19,671 students aged between 5 and 14 years (our definition of elementary and middle school students) with valid responses to usual school travel mode, distance to school, and child's gender. The 1969 school travel report stated that the survey was based on in-person interviews with 6000 households.⁸ For the survey-day school travel analysis, the number of students aged between 5 and 18 years who made trips to school and also recorded valid responses for distance to school and gender was 7416 in 1995, increased to 11,998 in 2001, and to 18,657 in 2009.

Statistical Analysis

All analyses were conducted in 2010 using Stata, version 11.1, and version 2 of the NHTS data sets.⁹

Amount of School Travel in Vehicle Miles Traveled and Trips

Vehicle miles traveled (VMT) and vehicle trips associated with school travel were estimated using 2009 travel diary records with information on trip distance, duration, and household members accompanying the student. Trips were counted as private vehicle school trips if they were to drop off or pick up a child at school or for teens to drive themselves to or from school. The trips were adjusted so that if a parent drove multiple children to school at the same time only one vehicle trip was recorded.

Mode Shares

School trip modal shares were estimated using NHTS-supplied weighting factors based on the 2008 American Community Survey to project from the sample to nationally representative estimates. The reported mode splits were standardized to the weighted 2009 NHTS distribution by school type (elementary [aged 5–11 years]);

middle [aged 12–14 years]; high [aged 15–18 years]); gender; and race (non-Hispanic white, non-Hispanic black, Hispanic, other/missing).

Correlates of Walking and Biking to School

A model of the probability of usually walking or biking to school versus driving or taking the school bus for trips of less than 1 mile assessed the relative influences of trip, individual, and household factors. The model included students in grades K–8 because previous analyses documented sharp differences in travel behavior when students enter high school.¹⁰ Because the sample was exogenously stratified, binary logit models were estimated without the application of survey weights.¹¹

Model results are summarized by presenting ORs and the marginal effect of each factor on the probability of walking to school. Because most explanatory factors are dichotomous, reported here is the change in the probability of walking to school for a discrete change in the explanatory variable. Reported effects are averaged over the sample and have sample weights applied. The final sample size for the model was 4508, which included respondents aged between 5 and 14 years living within 1 mile of school who reported their usual school travel mode.

Results

Table 1 shows the unweighted sample statistics. No summary statistics were provided for the 1969 data.

Amount of School Travel

American youth made 15.3 billion person-trips and traveled 4.7 billion person-hours and 68.9 billion person-miles to get to and from school in 2009. For youth aged 5–18 years, school trips accounted for 22% of annual person-trips, 22% of annual person-hours spent traveling, and 12% of annual person-miles. The average distance to school in 2009 was 4.4 miles, with elementary students having shorter average trip lengths (3.6 miles) than high school students (5.5 miles). Students spent an average of 17.3 minutes traveling to school.

Americans drove 30.0 billion miles and made 6.6 billion vehicle trips taking students to school and picking them up from school in 2009. This accounted for 1% of annual VMT in the country. During the morning peak period (7:00AM–9:00AM) from September through May, parents driving kids to school and teens driving themselves accounted for 10% of vehicle trips and 5% of VMT. This figure includes only private vehicle travel; there is no reliable source of data on aggregate school bus miles traveled. It also does not include the impacts of what parents do after dropping children at school. For example, approximately 40% of parents returned home immediately after dropping their child at school. If parents' trip home after dropping children at school is included, then 10%–14% of morning peak period vehicle trips and 5%–7% of VMT are associated with school travel.

Travel Mode

In 2009, 12.7% of elementary and middle school students usually walked or biked to school; 45.3% usually were driven (Table 2). These proportions are nearly the reverse of 1969 when 12.2% of elementary and middle school students were driven and 47.7% walked or biked. School bus usage stayed constant between 1969 and 2009, with approximately 40% using school buses. Walking is more common on the trip home from school than the trip to school.^{12,13} In the afternoon, 16.0% of K–8 students usually walked or biked home, 39.0% were driven, and 41.9% took the school bus.

Elementary and middle school students living within 0.25 miles of their schools are 14 times more likely to walk to school than students living 1–2 miles from school (Table 3). Those living between 0.5 and 1 mile from school had walk rates nearly four times those living 1–2 miles from school. The prevalence of biking is highest, 3.4%, for trips between 0.5 and 1 mile. The share of elementary and middle school students living within 1 mile of school was 30.6% in 2009 and those living 1–2 miles from school was 19.6%.

For all K–12 students, the travel-day data showed a static picture between 1995 and 2009, with no significant changes in the prevalence of walking, driving, or riding the school bus during the time period (Table 4). However, the overall picture masked

Table 1. National Household Travel Survey summary statistics for school travel, unweighted

	Usual travel mode 2009 (n=19,671)	Survey-day travel mode		
		1995 (n=7416)	2001 (n=11,998)	2009 (n=18,657)
Mean age of child (years [SE])	9.7 (0.02)	11.2 (0.04)	11.3 (0.03)	11.5 (0.03)
School level (age in years)				
Elementary (5–11)	65.8	52.9	51.0	48.4
Middle (12–14)	34.2	23.2	23.9	24.6
High (15–18)	0.0	23.9	25.1	26.9
Gender				
Female	49.2	48.2	48.2	48.2
Male	50.8	51.8	51.8	51.8
Race/ethnicity				
Non-Hispanic white	75.2	80.5	80.5	76.2
Non-Hispanic black	6.4	7.9	5.8	6.2
Hispanic/Latino	12.9	6.0	7.8	12.2
Other/missing	5.5	5.6	5.9	5.3
Family type				
Two adults/parents	91.0	86.0	88.8	91.1
Single adult/parent	9.0	13.1	11.1	8.7

Note: Values are percentages unless otherwise indicated. Summary statistics are not available for 1969.

differing trends between K–8 and high school students. Among high school students, the proportion using personal vehicles to reach school dropped by 7 percentage points and school bus use rose by a proportionate amount. Among elementary and middle school students, the share of students arriving to school by personal vehicle rose by 6 per-

Table 2. Usual mode of transportation to school, 1969 and 2009, %

	Grades K–8 (aged 5–14 years)		Elementary (aged 5–11 years)		Middle (aged 12–14 years)	
	1969	2009	1969	2009	1969	2009
Auto	12.2	45.3	12.2	47.5	12.3	40.5
Walk/bike	47.7	12.7	49.3	13.1	41.6	11.8
Walk	N/A	11.7	N/A	12.1	N/A	10.7
Bike	N/A	1.0	N/A	1.0	N/A	1.1
School bus	38.3	39.4	37.3	37.9	42.3	42.8
Other	1.7	2.6	1.2	1.5	3.8	4.9
Total	100	100	100	100	100	100

N/A, not assessed

Table 3. Percentage of students who usually walk or bike to school, by distance, 2009

Miles	Grades K–8		Elementary		Middle	
	Walk	Bike	Walk	Bike	Walk	Bike
>0.25	55.3	0.9	53.1	0.9	65.5	1.0
0.25–0.5	30.4	2.2	25.5	2.0	49.9	3.1
0.5–1	15.1	3.4	13.9	3.1	18.5	4.1
1–2	4.0	1.6	2.6	1.4	7.2	1.9
≥2	1.6	0.1	1.3	0	2.0	0.2

Note: Respondents gave a free response to the question of distance to school. If they responded with a boundary value (e.g., 0.5 miles, they were asked to which grouping it was closer [e.g., 0.25–0.5 miles or 0.5–1 miles]).

centage points—compensated by smaller declines in walking and school bus use. No modal shifts are apparent among elementary and middle school students living within 1 mile of their school. But the proportion of elementary and middle school students living within 1 mile of the school declined from 1995 to 2009.

Analysis of the travel-day data also highlighted variation between the usual travel mode and how students traveled on the survey day. Estimates of walking to school were higher and estimates of driving to school lower for the usual travel mode. For example, 11.7% of elementary and middle school students reported usually walking to school, but on the travel day 9.8% walked to school. Comparison of respondents reporting both modes showed that 87% of usual walkers actually walked on the travel day, but 97% of those usually taken in the car were driven on the survey day.

Multivariate Model

Table 5 presents the effects of trip, individual, and household factors on the probability of walking or biking to school versus being driven or taking the school bus for trips less than 1 mile. Distance to school had the strongest

effect on levels of walking to school, with the probability of walking to school declining by 19 percentage points for students living between 0.25 and 0.5 miles from school compared with students living <0.25 miles from school. Living 0.5–1 mile from school is associated with a 37 percentage points decline in walking to school compared with living within 0.25 miles of school. Being male increased the probability of usually walking to school by 5 percentage points. The child's age has a nonlinear effect on walking to school. For those aged 5–9 years, there are no significant differences in prevalence of walking to school. But for those aged 10–14 years, the probability of walking to school increased by 11 percentage points compared with those aged 5–9 years.

Students from households with no vehicles had a probability of walking or biking to school that was 16 percentage points higher than students from households with at least one vehicle. Students from households where at least one adult reported being a homemaker had walking rates 4 percentage points higher than students where all adults were working, in school, or looking for work. Living in urban clusters, which are Census-defined units of higher density, was associated with a 6 percentage points increase in the probability of walking to school compared with students from more rural areas. The effect of serious parental concerns about traffic and speed was a decrease in the probability of walking to school for these short trips of 6 percentage points.

Discussion

The 2009 NHTS data confirmed the trends observed in previous analyses of school travel.^{14,15} There have been sharp increases in driving children to school since 1969 and corresponding decreases in walking to school. Distance to school continues to be a critical factor in levels of walking to school because the relative travel time advantage of motorized transport becomes large for trips more than 0.5 miles.^{16–21} For the first time, this study quantified the contribution of school travel to vehicular travel.

Table 4. Standardized mode of transportation shares for travel day school travel, 1995–2009, %

	Grades K–8			Grades 9–12			Grades K–12		
	1995	2001	2009	1995	2001	2009	1995	2001	2009
Auto	44.9	46.8	51.3	69.0	67.7	62.1	51.7	52.7	54.3
Walk	12.4	13.7	9.8	6.7	7.9	6.8	10.8	12.1	9.0
Bike	1.3	1.0	0.9	0.5	0.3	0.7	1.1	0.8	0.8
School bus	39.1	37.1	36.3	19.1	20.8	25.9	33.5	32.5	33.4
Other	2.3	1.4	1.8	4.6	3.3	4.5	2.9	1.9	2.5
Total	100	100	100	100	100	100	100	100	100

Table 5. OR and marginal effects on the probability of usually walking or biking to school for K–8 students for trips <1 mile

	OR	p-value	Marginal effect
Trip distance (miles)			
0–0.25	ref		
0.25–0.5	0.356	<0.001	–0.19
0.5–1.0	0.130		–0.37
Child characteristics			
Male	1.348	<0.001	0.05
Aged 10–14 years	1.861	<0.001	0.11
Family/household			
Non-Hispanic black	0.676	0.012	–0.07
Hispanic	0.772	0.025	–0.05
Other race (nonwhite)	0.976	0.874	–0.00
Zero vehicles	2.451	0.006	0.16
<1 vehicle per driver	0.881	0.750	–0.02
1 vehicle per driver	ref		
>1 vehicle per driver	0.716	0.386	–0.06
Household income (\$)			
0–30,000	ref		
30,000–60,000	1.139	0.284	0.02
60,000–100,000	1.187	0.198	0.03
>100,000	1.558	0.002	0.08
Renters	1.549	<0.001	0.08
Household adult is homemaker	1.230	0.008	0.04
Parent education			
High school	0.758	0.019	–0.05
Some college	0.859	0.105	–0.03
College graduate	ref		
Single-parent household	1.037	0.791	0.01
Foreign-born adult in household	1.317	0.005	0.05
Located in urban cluster	1.396	<0.001	0.06
Concerned about distance to school	0.964	0.192	–0.01
Concerned about crime	1.040	0.144	0.01
Concerned about weather	0.895	<0.001	–0.02
Concerned about traffic/speed	0.725	<0.001	–0.06

Table 5. (continued)

	OR	p-value	Marginal effect
N	4,508		
Log likelihood	–2349.23		
Pseudo R ²	0.163		

That contribution is relatively modest overall with private vehicle school travel accounting for 1% of annual VMT in 2009. But during the morning peak period from September to May, school trips accounted for 10%–14% of all private vehicles on the road and 5%–7% of VMT. This figure is comparable to data from the United Kingdom where the Department for Transport estimated that 10%–15% of auto trips during the morning rush hour were to drop children at school.²²

Analysis of modal shifts between 1995 and 2009 found varying patterns between high school and younger students. The proportion of high school students driving or being driven to school declined. Understanding the reasons for this shift is an important area for future research, but likely explanations are the introduction of Graduated Drivers Licensing programs in many states,²³ rising gas prices, and the economic downturn, which has likely affected teens’ and their families’ ability to access vehicles and pay for operations and maintenance.

Patterns among elementary and middle school students showed no changes in behavior among those living within easy walking or biking distance of school (~1 mile) but revealed a decrease in the proportion of students living close to school. The shift in the spatial distribution of students likely explains why overall auto use increased among all elementary and middle school students and walking declined slightly. These results also highlighted the importance of school location and school assignment policies on school trip mode choice.²⁴

The White House Task Force on Childhood Obesity set a goal of increasing levels of walking and biking to school by 50% by 2015. As the only nationally representative data on youth travel, the National Household Travel Survey provides a means of monitoring trends in school travel and progress toward the goals laid out in the Task Force report. A critical component of efforts to meet the Task Force goal is the federal Safe Routes to School program. As of September 2010, the Safe Routes to School program²⁵ has benefited more than 10,000 U.S. elementary and middle schools or approximately 10% of all elementary and middle schools. Many of these communities have begun collecting local data on school travel. The NHTS provides national- and state-level bench-

marks that schools and communities can use to better interpret local trends.

Conclusion

School trips accounted for approximately one quarter of the trips and time American children spent traveling. Most American students used motorized modes—private vehicles and school buses—to get to and from school in 2009. In fact, school travel accounted for nearly 1% of annual private vehicle VMT in the U.S. and 10%–14% of all autos on the road during the morning peak period. Travel by foot and bike was less common; 13% of elementary and middle school students usually walked or biked to school and 16% did so on the way home from school. These statistics reflect the speed advantage and convenience of driving for many trips greater than ½ mile as well as parental concerns about traffic and stranger danger. Policymakers have set a goal of increasing the proportion of students walking to school by 50% by 2015. The NHTS survey can be useful in monitoring progress toward this goal and providing a comparative benchmark for local communities.

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