(WCTR) Children & Congestion:

Determinants of travel choice for the journey to school and ways of reducing urban school traffic congestion

by
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In the last three years one of the most controversial local transportation issues has been the congestion caused by children being driven to school by car. Many environmental groups have campaigned for the thorny 'school run' issue to be addressed, and various government administrations have made gestures towards reducing car use and encouraging sustainable travel but have stumbled at confronting the problem head on. So why have they develop cold feet?

Tackling the 'school run' will involve tackling the majority of car users about their car use. The Department of Transport claims that the 'school run' composes ~20% of peak period traffic flow, but parents often complain that the remaining 80% should be targeted instead. However, the 'school run' does not exist in isolation from overall urban congestion and the rest of the general public's car use. According to the research carried out by the Transport & Road Assessment Centre (TRAC) at the University of Ulster, 89% of drivers would still use the car in the morning, even if they didn't have to drive children to school.

Unlike most 'regular' commuting, school travel is (i) Consistent, (ii) Compulsory and can be (iii) Counted. Children have to travel to school every day for the same time, and many of them travel to their nearest school. Thus, school travel behaviour is easier to quantify than regular commuting and therefore should be more easily tackled. Given that the majority of children travel relatively short distances to school, under 5 miles, there is the potential to develop initiatives to reduce the 'school run' and encourage sustainable travel.

The travelling public has come to rely on the car and people are no longer prepared to walk but instead drive, even over relatively short distances. Research by Transport 2000 has shown that the car has replaced walking journeys and that we are not necessarily travelling more often, but that the car is being used more at the expense of what were previously bus and pedestrian journeys. There is obviously not the same willingness to either walk long distances or tolerate physical discomfort from travelling in inclement weather. (1)

The downside to this auto addiction is that society and individuals are suffering. According to the CBI traffic congestion costs the UK economy £20 billion per year. (4) During the rush hour in GB over 60% of cars are single occupancy vehicles. Levels of car use, for commuting to work, is highest in NI, at approximately 80%, and is increasing year on year. While car journeys increase, journeys by public transport have decreased by 10% in the last 5 years, and in a ten year period from 1988 to 1998 road traffic levels rose by 22 per cent. (2)

With levels of car ownership and car usage at an all-time high in Northern Ireland, the population is regularly becoming a victim of the success that is the motor-car, and left unchecked traffic congestion will curtail all 'freedom' to movement.

All this has been happening at a time when the real cost of motoring has been decreasing and the cost of using public transport increasing. Over the past 20 years the overall cost of motoring has decreased in real terms by 5 per cent while bus and rail fares have risen by 30 to 40 per cent. (3)

The general public's perception of public transport is coloured by the adverse media portrayal of unreliable, undesirable and unsafe buses and trains. They much prefer the privacy and comfort of the own private car, and the travelling public has come to rely, to a greater extent, on the car and people have become dependant on the car.

When examining the modes of travel to school the most obvious issue that comes to mind is the distance that pupils walk to school. School Transport Legislation in Northern Ireland has effectively remained unchanged from the 1944 Education Act when distances were set for Transportation Assistance to school. However, levels of car ownership have increased ten-fold over the last 50 years and many parents of school children are not prepared to permit children to walk up to 2 miles to primary school or up to 3 miles to secondary school. (1)

When parents are questioned about why their children are driven to school, the two main reasons they will quote for protecting their children are Road Safety risk and Stranger Danger. According to research by the University of Westminster, 66% of parents are concerned about traffic danger and 52% are concerned about Stranger Danger. (4)

However, in Northern Ireland the main factor that exacerbates the 'school run' is the freedom of choice of school. Parents are able to choose the primary and secondary school that they wish their child to attend, and a previous paper from TRAC has shown that socio-economic factors play a greater part in the choice or school travel mode than safety or security fears. (5)

In the NI School Travel Study two adjacent towns in Co. Antrim were examined but only the data collected in Larne (pop ~20,000) is due to be discussed in this paper.

Figure 1: Map of Northern Ireland



Larne is situated on the eastern seaboard of Northern Ireland, and is an important Ro-Ro seaport, with links to Scotland and north-west England.

The southern limits of the Antrim Hills lie to the west of the town and extend to the north, forming the Glens of Antrim. It lies within easy commuting distance of Belfast, 20 miles to the south, and is linked to Belfast and the other costal settlements to the south of the county by a railway line.

METHODOLOGY

The overall method of conducting the research was a questionnaire targeted at school pupils aged from 4-18 years of age. The pupils at primary school, 4-11, were given a 'School Travel' questionnaire to take home for their parent's to complete and return to school, while the pupils at secondary school, 11-18, were given a self-completion questionnaire during one of their daily registration classes. The data collected was analysed using the SPSS software package, and key questions were cross-tabulated to examine the relationships between these issues. Only the data from the primary schools study will be discussed in this paper.

RESULTS & DISCUSSION

All primary school age children in Larne who were attending school on the day in question were surveyed.

How do children travel to school?

Table 1 shows both how children travel to school during the summer and winter and how children travel home from school during the summer and winter.

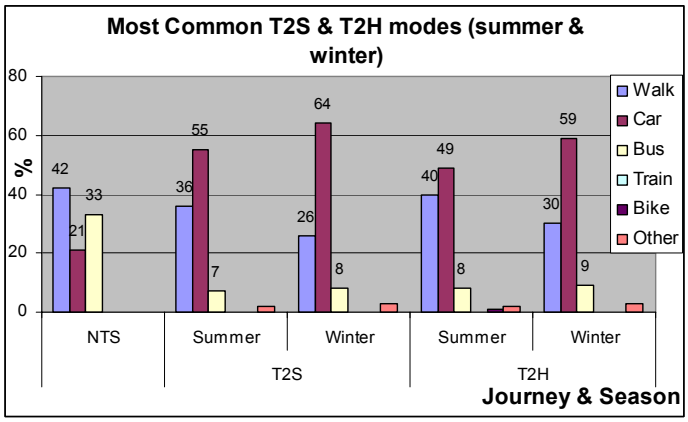
Table 1: Travel to School & Travel to Home modes (Summer & Winter)

T2S %	*Walk*	*Car*	*Bus*	*Train*	*Bike*	*Other*
NTS	42	21	33	0	0	0
Summer	36	55	7	0	0	2
Winter	26	64	8	0	0	3
T2H %	*Walk*	*Car*	*Bus*	*Train*	*Bike*	*Other*
NTS	42	21	33	0	0	0
Summer	40	49	8	0	1	2
Winter	30	59	9	0	0	3

Figure 3 shows the difference between Travel to School (T2S) modes during the summer and winter. What is instantly apparent is that levels of walking are much lower and levels of car use much higher, than national statistics would indicate. In Larne there is a seasonal modal shift, approximately 10% of pupils change from walking to being driven by car during the winter.

This data would immediately indicate that despite lower population densities in Northern Ireland, the 'school run' may have a proportionately greater impact in NI than the DfT general statistics for the UK would appear to indicate as the percentages for car use are so high

Figure 2: T2S (S) modes - need new chart with NTS data



If ‘Travel to School’ modes are compared to ‘Travel to Home modes’ it can be seen that more children walk to school in the summer when compared to the winter and that more children in the afternoon than walk to school in the morning. 40% of the pupils appear able to walk during the winter but only 26% of them actively walk to school.

Does the age of children affect their modal choice?
It would appear from the info displayed below in **Table 2** that there is only a slight increase in walking with increasing age but the overall level of walking at each age band also decreases during the winter months.

Table 2: Age & ‘Travel to School’ modes during both the summer and the winter?

	Walking		By Car		By Bus		By Bicycle		By Taxi	
	(sum)	(win)	(sum)	(win)	(sum)	(win)	(sum)	(win)	(sum)	(win)
Larne mean	*36*	*26*	*54*	*64*	*7*	*8*	*1*	*0*	*2*	*2*
4	25	18	61	68	4	4	0	0	11	11
5	37	25	55	66	7	7	1	0	1	1
6	35	26	53	60	8	9	0	0	5	5
7	28	18	64	72	7	8	0	0	1	1
8	40	25	52	62	6	8	1	3	2	3
9	34	25	56	65	8	8	0	0	2	2
10	37	27	54	62	8	10	0	0	1	1
11	43	35	45	57	6	6	4	0	2	2

Why do pupils, or their parents choose their particular modes?
The top 3 reasons for choosing a pupil’s mode are (1) ‘Only option’, (2) ‘More convenient/time constraints’ and (3) ‘More comfortable/weather factors’. However, the reasons for the choice of mode hardly vary with season.

If an examination is made to determine a link between the age of the child and why their travel mode is chosen we see that no real trends appear other than to say that as age increases the perception is that fewer pupils have ‘no other option’.

Figure 3: Age & Why use T2H mode

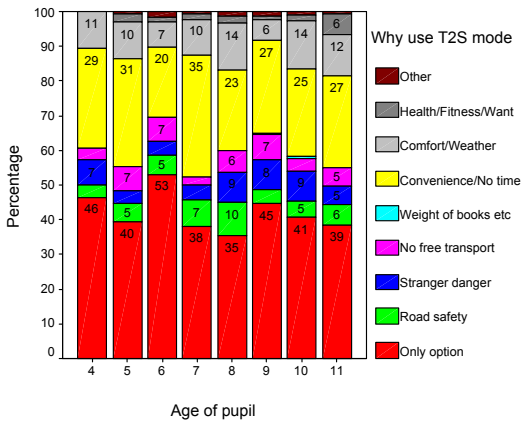
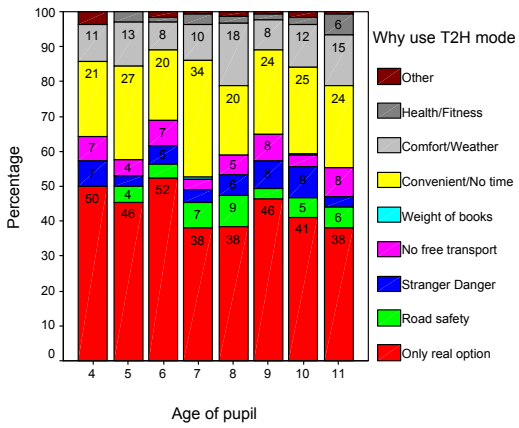


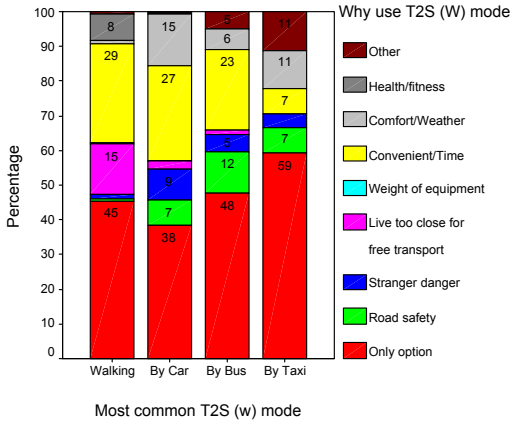
Figure 4: Age & Why use T2H mode

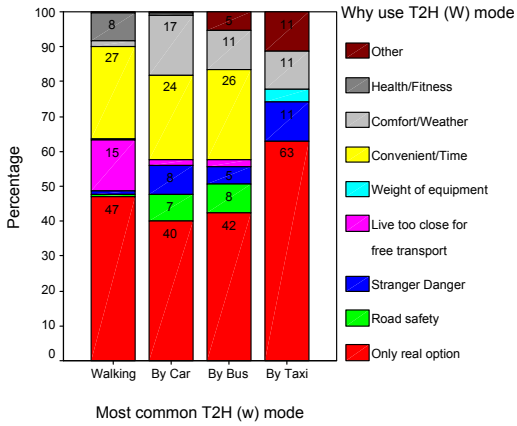


If the ‘Travel to School’ modes and the ‘Travel to Home’ modes are examined to determine why they are used, it can be seen that there is little difference between why the modes are chosen. It would appear that parents choose their children’s modes of travel on the basis that they have no other available option.

Figure 5: T2S (W) modes & Why use modes

Figure 6: T2H (W) modes & Why use modes





Car passengers are driven for mainly the same reasons as pedestrians. Namely, that they have no other option or it is more convenient for then

Table 3: Why use your T2S (w) mode, Why pupils walk and Why pupils are driven to school in both towns

Why use your mode?	All modes	Pupils Walking	Pupils driven
Only option	41	45	38
Road safety	6	1	7
Stranger danger	7	1	9
No free transport	5	15	2
Weight of books etc	0	0	0
Convenience/No time	27	29	27
Comfortable/Weather	10	1	15
Health/Fitness/Want to	2	8	0
Other	1	1	0

How could car passengers travel, what is their first choice alternative mode?
The results, from Table 2 show that approximately 70% of the car passengers could travel to school by both walking and using a bus. However, 35% of parents, whose children are driven to school, claim that they have no other option but to use a car for the school journey.

Table 4: Pupils who are driven to school and their alternative modes of travel

	Walking	By Car	By Bus	By Train	By Bicycle	By Taxi	None	Other
Larne PS	42	1	12	0	4	6	34	0

If all the pupils are examined to ascertain current and future levels of walking, it can be seen that there is the potential to increase levels of walking, especially if levels of 'on-street' supervision are increased.

Table 5: (1) The percentage of pupils who currently walk, (2) The percentage who could walk and (3) The willingness of parents to let their children walk to school

(1) Current situation		(2) Could you walk to school			(3) Willingness to walk if more supervision?		
T2S walking (sum) %	T2S walking (win) %	Yes %	No %	Maybe %	Yes %	No %	Maybe %
36	26	64	36	0	40	38	22

Currently, 40% of children walk to school in the summer and 29% in the winter. However, when the parents were asked specifically could their children walk to school approximately $^{2}/_{3}$ said they could, but when asked would they be more willing to let their children walk, if there was

greater on street supervision, this percentage decreases as only 40% of parents would be prepared and 22% may be persuaded.

If an examination is made of car passengers, 55% of parents believe they their children could walk but only 31% would actually be willing to permit them to do so, and again only if there was greater on-street supervision for provide more personal security.

What modes do pupils use in relation to their distance from school?

If the distance from school of the children's homes are compared to their chosen modes it can be seen that the vast majority of pupils who walk live within 1 miles of school but that 41-44% of pupils who are driven live within 1 miles of school and that approximately 70% of car passengers live within the 2 mile zone and would therefore not be entitled to transportation assistance. Primary school age children who live more than two miles from their nearest school qualify for Transportation Assistance and so have free transport provided courtesy of the local Education & Library Board.

Parents outside of such provision are themselves expected to provide for their children's transportation, and as such provision can be an expensive arrangement they may arrange to combine several trips in one journey

If the cross-tabulation is reversed and an examination is made of modes and the distance that people travel, using these modes, it is revealed that walking is only popular within 1 mile, but very few children walk more than 1 mile to school.

Figure 7: T2S (W) modes & Distance

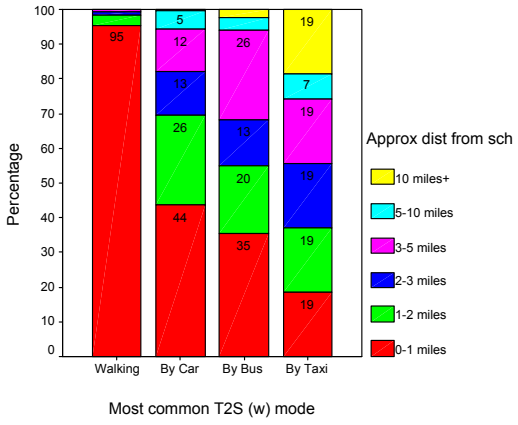
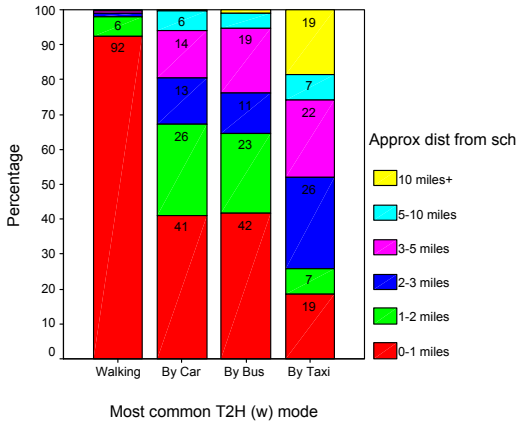


Figure 8: T2H (W) modes & Distance



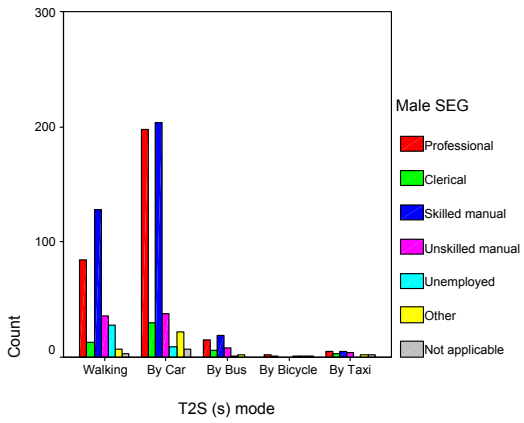
Approximately 75% of children live within 2 miles of their school and approximately 83% of children driven to school are from within this boundary. What this appears to show is that the 'school run' is mainly caused by families who live within 2-3 miles of school.

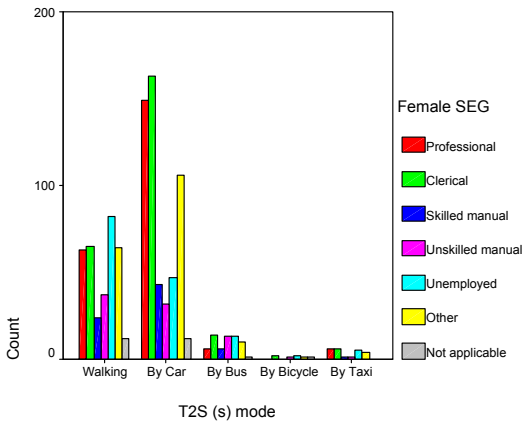
Why are pupils who live so close to school driven?

One of the first factors we must consider is the socio-economic background of the children's familys. We can note from the next two figures that children who are driven to school have the highest percentage of 'Professional' fathers and mothers, and the lowest percentage of 'Unemployed' fathers and mothers. Children from households with 'Professional' parents are 2 times more likely to have 2 or more cars than Children from households with 'Unemployed parents and twice as likely to be driven to school.

Figure 9: T2S & Parental SEG (Male)

Figure 10: T2S & Parental SEG (Female)





If the mode a child uses is influenced by the parental socio-economic grouping, then this will obviously have implications for congestion outside individual schools in the town, depending on the socio-economic profile of the parents. We can see from Figs 11 & 12 that some primary schools have 4-5 times the percentage of professional parents that other schools have.

Figure 11: School & Parental SEG (Male)

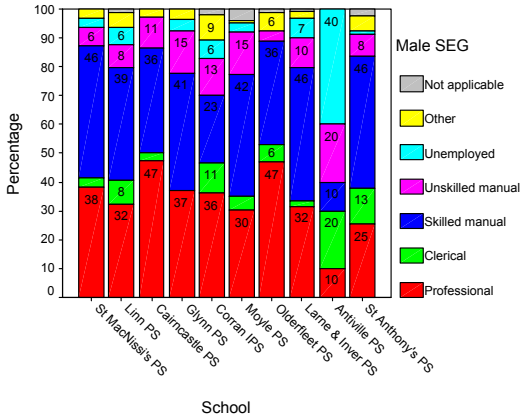
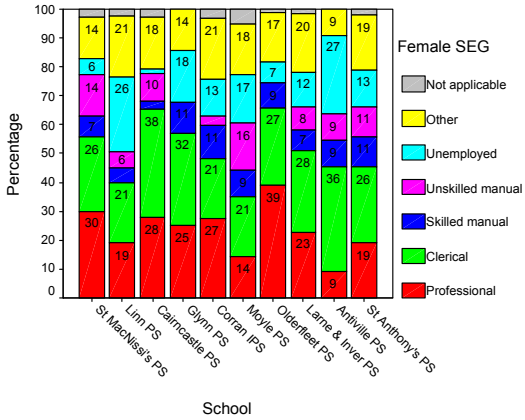


Figure 12: School & Parental SEG (Female)



It would appear that the children of 'Professional' parents are more likely to be driven and that some schools have more 'Professional' parents. What effects does this have on the modal split at the schools?

We can immediately see that some schools have very high levels of walking. Combined with the knowledge that some schools have very high levels of car ownership and levels of car usage it it not surprising that these same schools have such high levels of car ownership.

Table 6: What is your child's most common mode of travel to school during both the summer and the winter?

	Walking		By Car		By Bus		By Bicycle		By Taxi	
	(sum)	(win)	(sum)	(win)	(sum)	(win)	(sum)	(win)	(sum)	(win)
Larne mean	*36*	*26*	*54*	*64*	*7*	*8*	*1*	*0*	*2*	*3*
Olderfleet	32	26	68	74	0	0	0	0	0	0
Larne & Inver	29	32	65	71	4	4	1	0	2	2
St Anthony's	18	13	65	69	14	16	0	0	3	3
Linn	44	30	52	66	2	3	1	0	1	1
Cairncastle	16	12	54	60	28	28	2	0	0	0
Moyle	52	35	44	60	2	4	1	0	1	1
St MacNissi's	49	38	45	53	5	5	0	0	1	4
Glynn	53	37	33	50	13	13	0	0	0	0
Corran	8	2	55	48	20	23	0	0	17	17
Antiville	55	45	9	18	0	0	0	0	36	36

Even for the journey home there are high levels of car use and low levels of walking at the same schools.

Table 7: What is your child's most common mode of travel to home during both the summer and the winter?

	Walking		By Car		By Bus		By Bicycle		By Taxi	
	(sum)	(win)	(sum)	(win)	(sum)	(win)	(sum)	(win)	(sum)	(win)
Larne mean	*40*	*29*	*49*	*49*	*8*	*9*	*1*	*0*	*2*	*3*
Cairncastle	16	11	64	71	18	18	2	0	0	0
Olderfleet	33	29	65	69	0	0	0	0	2	2
Larne & Inver	30	25	61	67	7	7	1	0	1	1
Linn	53	38	44	60	2	2	2	0	0	0
St Anthony's	25	17	50	53	23	27	0	0	2	2
Glynn	53	40	40	53	7	7	0	0	0	0
Moyle	59	41	37	53	3	5	1	0	1	1
St MacNissi's	50	39	41	49	8	8	0	0	1	4
Corran	11	2	44	48	28	33	0	0	17	17
Antiville	55	45	9	18	0	0	0	0	36	36

Perhaps the distance of a pupil's home from school has an influence on how children travel. We can see from Table 8 that over ½ of the pupils live within 1 mile of school and that 74% live within the 2-mile range from school.

Table 8: Distance from school

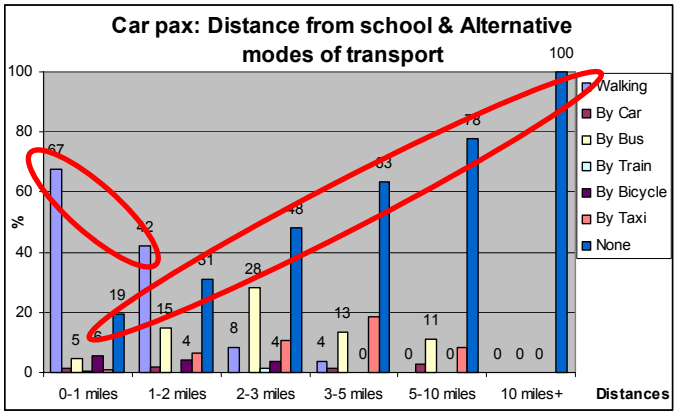
%	0-1 miles	1-2 miles	2-3 miles	3-5 miles	5-10 miles	10 miles
All schools	55	19	10	11	5	0

What alternative modes are there for car passenger pupils relative to their distance from school?

If a cross-tabulation is made of pupils' distance from school and their alternative modes of travel to and from school it can be seen that there are 2 distinct groups. Within the 2-mile limit of each town, the travel mode with the greatest potential is walking and beyond the 2-mile limit of each school, the travel mode with the greatest potential is bus transportation

This first main group is the most important as 75% of pupils live within 2 miles of school and 70% of car passengers live within 2 miles of school.

Figure 13: Car passengers: Their distance from school and the Alternative way for travelling to school



However, distance from school is not so important in the 'school run' as how children travel, relative to their school's distance from home.

How could the pupils, and in particular car passengers, travel to and from school?
Two things are revealed by Table 9, that nearly $^1/_3$ of pupils could walk to school but that over $^1/_3$ of pupils have no other way to travel.

Table 9: Other 'Travel to School' modes & Other 'Travel to Home' modes

	Walking	Car	Bus	Train	Bike	Taxi	None	Other
Other T2S	32	10	9	0	8	5	36	0
Other T2H	31	12	8	0	8	4	37	0

If present travel modes and the alternative travel modes are compared, 40% of pedestrians and 35% of car users allegedly have no other option but to use their current mode. However, the majority of car passengers, 42%, could both walk to and from school, but 35% of parents claim that their children have no other option.

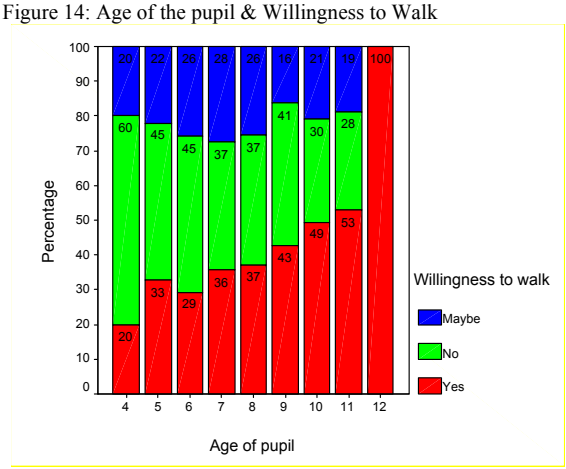
How many pupils could walk to school?
As was shown earlier, over ½ of children driven to school could possibly walk to school but less than $^1/_3$ of children would actually be allowed to walk if there was greater on street supervision for their safety and security.

If an examination is made of the willingness of parents to let their children walk and their distance from school, we see that the children most likely to be allowed to walk live quite close.

Distance from school plays an important part in modal choice. The vast majority of parents, 83%, who would be willing to permit their children to walk to school live within 1 mile of school, however, only 63% of parents who live within 1 mile of school would be willing to permit their children to walk.

When a comparison is made of the age of the children and their parent's willingness there is a definite relationship. Only 20% of parents of 4 year old children would permit them to walk to school but 53% of parents of 11 year olds would be willing to let them walk.

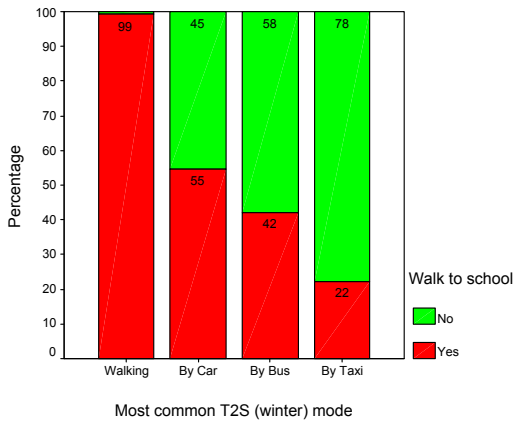
Figure 14: Age of the pupil & Willingness to Walk

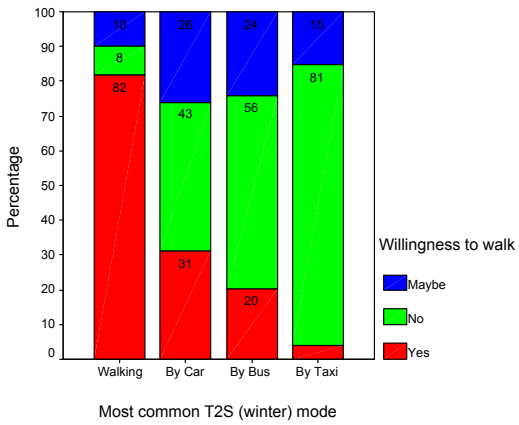


If an examination is made of Travel to School (winter) modes and the pupils ability to walk to school it can be seen that 55% of children driven to school during the winter could walk to school. However, if their willingness is then examined alongside their current Travel to School winter) mode we can see that even if children are able to walk only 31% of parents would not be willing to permit them to walk.

Figure 15: T2S (winter) modes & Could you walk to school?

Figure 16: T2S (winter) modes & Willingness to walk if there was greater 'on street' supervision……..?





If a cross-tabulation is made between the ability to walk and the willingness to walk it is seen that 61% of pupils who could walk to school would be willing to do so. However, ¼ of the pupil's parents would be unwilling to let them walk even if their journey was more safe and secure. The parents willingness to permit their children to walk, we find that 61% of the pupils who could walk to school would be willing to do so. 25% of parents would not be willing to permit their children to walk even if they could.

If the different schools in the town are compared 3 different levels of walking are revealed. The schools with higher levels of walking are the schools where parents are willing to let their children walk and also the schools with lower levels of 2 car ownership.

Figure 17: Walking & School

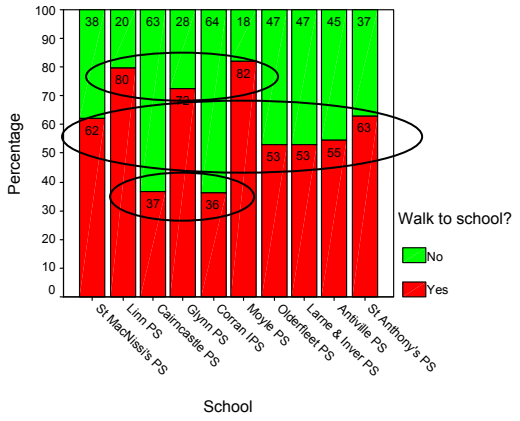
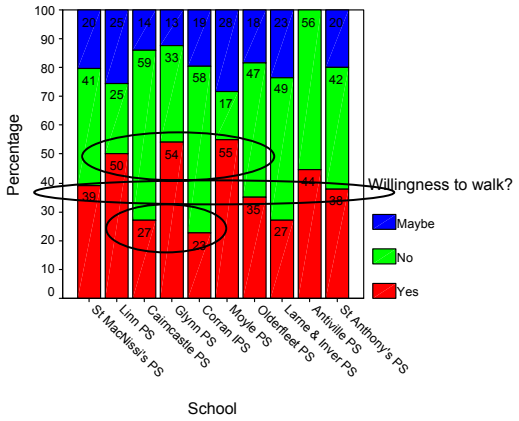


Figure 18: Walk if supervised & School



It has been established that the majority of pupils could walk to school but their parents may not be willing to let them walk. In that case the focus will now target car users we shall focus on car use. After the 'school run' the majority of parent's drive on to work. However, 44% of 'school run' drivers return home, showing that there is the potential to involve parents, the majority of whom (68%) are female, in sustainable school travel schemes such as walking and cycling. The 'driver after' destinations vary with each school but the destinations do not appear to be influenced by the gender of the driver. Approximately 50% of drivers go on to work but male drivers are less likely to go back home, 39% compared to 49% of female drivers.

After the 'school run' 49% of drivers travel on to work and 44% return home. There also appears to be no difference between the gender of the driver and their destination afterwards.

As mention earlier, the two main reasons that parents will quote for protecting their children are Road Safety and Stranger Danger risks. So what are the perceived dangers or deterrents that prevent children from being permitted to walk and cycle.

Are these fears manifested by experience?

The data from the survey population shows that 98% of children have not experienced an accident on the way to/from school, but 1% have been involved as pedestrians and 1% as car passengers. The groups that have experienced fewest accidents are pedestrians, however, it is impossible to say if pedestrians have experienced fewest accidents because fewer children are now walking and therefore exposed to danger.
There is no correlation between the age of a child and their accident experience nor the gender of the child.

CONCLUSIONS

1. The 'school run' is an URBAN problem – caused in urban areas by mainly urban dwellers.

2. Levels of car use in NI are higher than GB, even during the summer

3. The 'school run' has a greater impact during the winter because of the 10% of pupils who switch from walking to being driven.

4. The age of a child is not a major determinant of modal choice or the main reasons for the choice of mode.

5. The main reasons for the choice of mode are 'Only option' or 'Convenience/No time'. Children walk because they either live close to school or they have no other option. Children are driven also because it is their 'only option' or it is their 'Only option' or it is more 'Convenient'.

6. The majority of children who are currently driven could walk to school.

7. Overall, the majority of children could walk to school but their parents are unwilling to permit them to do so.

8. The 'school run' is exacerbated by parents in higher SEG, with higher levels of car ownership, who are more likely to drive their children to school. Some schools therefore have higher percentages of Professional parents and therefore more likelihood of congestion.

9. ¾ of pupils live within walking distance (2 miles) of their current school.

10. Walking would be the most common alternative form of travel to school if the pupils current modes were not available.

11. There is great potential for encouraging parents to get involved in safe and sustainable travel schemes as 49% of parents return home after the 'school run'.

12. Very few children have been involved in an accident going to/from school and Road safety is only a prima modal determinant for 5% of parents.

RECOMMENDATIONS

Ultimately, to discourage pupils from being driven to school, it is necessary to develop safe, convenient, suitable and attractive travel options.

At the Transport & Road Assessment Centre (TRAC), researchers have categorised the possible counter measures into 3 groups – the 3 Ts: Township, Time and Travel.

Township
By improving the infrastructure around a school site it should be possible to improve traffic flow; ease congestion, and decrease accident risk by enhancing the crossing points.

These changes should make it easier and safer to use pedestrian and cycle routes and minimise the impact of vehicle drop-offs near the school site.

Schools need to be aware of how improvements can be made to the school site to accommodate off-street loading of buses in a seamless movement of pupils from home to school. One such example would be the dual use of asphalt playgrounds and recreational space for loading and unloading passengers.

Time
The majority of schools and business start at, or around, 0900 and the morning peak occurs just before 0900. By staggering the start times of schools and businesses it would be possible to reduce the peak period traffic flow and hence reduce congestion.

As was seen from the graphs earlier, significant differences in peak period traffic flow if school start times are staggered. The perception of the impact of congestion can be minimised simply by staggering start times.

Travel
Engineering measures are limited in how they can effectively affect modal shift.

The only realistic way to reduce the 'school run' is to change how we currently travel, to make the most of current transport or use current more sustainable modes or travel.

People prefer travelling on their own and during the rush hour in GB over 60% of cars are single occupancy vehicles. Car sharing is one means of travelling with tremendous potential. In the NI School Travel Study 70% of cars are going to only one school and over ¼ of these cars are carrying only one passenger. Ideally, car-sharing could be the solution to the 'school run' but people are reluctant to transport other people's children.

The most sustainable forms of travel are walking and cycling, and 80% of children who walk to school live within 1 mile of school. However within the 1-3 mile range, 69% of children are driven, 60% of those who are driven live within the 3-mile range. Walking is therefore only popular within 1 mile from school.

In order to tackle the 'school run' it is therefore important to address the needs of pupils who live more than 1 mile from school, and less than 3 miles and who are currently driven by private car. Public transport is suitably placed to cater for these needs but pupils and parents appear unwilling to pay for and use these existing services.

There is, therefore, the potential to develop a bus service for pupils that would be an attractive alternative to the private car, and such a service will have to be Cheap, Clean, and Comfortable.

However, most of all, it must perceived by the young people as a 'Cool' and convenient way to travel.

The author believe that there is the potential to develop a sCool bus: a service that is pupil focused, that follows a flexible route and exists solely for pupils in urban areas currently not entitled to Transportation Assistance. The scheme must not appear as a 'second class' alternative to the car but the mode of choice, superior to the confines and isolation of the private family car.

There could be some incentive for using the service such as loyalty points that can be accrued to exchange for a CD voucher. There should be no dis-incentive for the scheme such as safety or security fears or a misconception of the service

The service concept will be more than a simple bus service that collects children for school. The bus will stop and wait at pick up points designed to be as convenient as possible for the pupils. The pupils will not pay on a 'journey by journey' basis but the parents/guardians will be billed for use over a time period, encouraging children to use the service even if they did not have the change for a single journey. The pupils could be issued with a smart card that is compatible with the Bus Operating Company ticketing system, and parents could receive an itemised bill detailing date and times of journeys. If 'one pupil per seat' and 'no standing' rules are imposed and if bus escorts are used, these measures could address parental fears for the safety and security of their children.

If such a service were introduced in Northern Ireland there would be the potential to replace 100,000 private cars with 1,000 buses, if school start times were staggered.

The pupils' perception of the sCool Bus should be that it is cool, something which they want to ride on a regular basis and is their preferred way of travel, especially over the 'private' family car

Thus the opportunity exists for the school bus to be the new form or urban transportation that pupils and their parents feel safe about using.

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