

## Traffic education of children 4-12 years old

### Summary

What must children learn to ultimately become safe road users? And how can this best be taught? To answer these questions the effects of various traffic education programmes were studied. Both formal education programmes at schools and especially the education parents give their children were assessed. A number of assessed programmes showed small improvement in behaviour whereas not one programme had a negative effect. It is remarkable that two programmes apparently using the same approach had a very different effectiveness.

This fact sheet is largely based on a recent literature study covering the 1995-2005 period (Dragutinovic & Twisk, 2006) and the recent EVEO study in which eleven education programmes were assessed, four of which focussed on primary school pupils (Twisk et al., 2006). This fact sheet does not deal with the question of which requirements traffic education programmes should meet. This is discussed in the SWOV fact sheet entitled [Content and assessment of traffic education programmes](#). Child road safety is indirectly dealt with. For more details on this subject readers are referred to our fact sheet entitled [Road safety of children in the Netherlands](#).

### How do children develop mentally?

Children are essentially different from adults because a number of competences has not yet developed. On the one hand, this means that a child's biological development is not yet sufficient to carry out certain tasks correctly. On the other hand, children learn most from everything they experience. Therefore, the surroundings strongly influence a child's development which, in turn, ultimately results in physiological changes in the brain. In her book entitled "Het maakbare brein" (2006, translated as 'The makeable brain'), Margriet Sitskoorn makes a distinction between three different types of brain development after birth: (1) developments that occur autonomously without any influence from the surroundings, (2) developments for which exposure to the surroundings is essential at particular ages e.g. if you do not hear anybody talk between the ages one and six, you will no longer be able to learn your native language properly at a later age, and (3) developments through specific training. A lot can be achieved by training, but it is not true that training can be used to teach everything at all ages.

For traffic education this means that it is important to allow a child to have all sorts of experiences. However, traffic is not a playground and children must be protected and not exposed to dangerous situations. If we just look at a simple task like crossing the road (see *Table 1*), we realise that a child must have a number of essential skills to do this correctly and safely.

### Which social and cultural factors play a role?

The limited mental development of children is not the only thing that makes them vulnerable in traffic. International crash studies (Thomson et al., 2001) show that there are differences in crash involvement between children from different ethnic and social-economic groups. What causes these differences is not clear, but they could be related to differences in living conditions (e.g. old residential areas with poor facilities for children versus newer and more affluent areas with good facilities), or the parents not being familiar with the traffic system. This kind of research has not been done in the Netherlands, and therefore it's not possible to say if and to what extent this problem exists in the Netherlands. However, international research offers sufficient indications to conclude that traffic education should take these differences into account. To be effective, this can mean that traffic education should target the parents of these children. If it is a matter of unsafe playing areas and frequent exposure to unsafe traffic situations, the first priority should be to consider improving the traffic infrastructure (see also OECD, 2004; Wegman & Aarts, 2006).

Activity	Psychological Process	Age limit
Noticing the presence of other traffic in time	Visually scanning the surroundings, understanding where other traffic is going, distinguishing important from unimportant stimuli	50% of the 4-14 year olds have insufficient command of this activity
Recognizing safe and unsafe road crossings	Knowing the causes of dangerous traffic situations and suppressing distraction	Insufficient up to 9 years old
Dividing attention and concentration	Time-to-collision estimates, estimating distance and speed of other road users, observing and estimating accelerations and decelerations	Improves as the child gets older
Judging information in its context	Dividing attention between various causes of danger, analyzing the connection between information from different visual areas, processing the information, impulse control	Very poor under the age of 7 . Boys are more impulsive
Coordinating observation and action	Judging whether the available crossing time is sufficient in relation to the time needed, taking into account one's own maximum walking speed	No information about age limit available
Sense of responsibility	Realizing the consequences of errors	Up to 14 years old: 50% only judges behaviour to be 'bad' if it causes damage

Table 1. *Necessary activities, psychological processes, and age groups for successful carrying out of the traffic task 'crossing the road'.*

### **What does this mean for traffic education programmes?**

The mental development must determine the contents of education programmes. Here the programmes are limited to 4-12 year olds, specifically focussing on young children as pedestrians. To establish that content requires the following questions to be answered:

#### *Which training is the most effective?*

The Thomas (1996) study shows that learning during the formative years usually begins through self experience. Only then does an overview and understanding of traffic's general features develop. For traffic education this means that young children mainly need to master practical skills. When a skill has frequently been practiced in familiar and unfamiliar situations, children can progress towards situations that require an overview and understanding, such as interactions between different categories of road user. In addition to teaching children the correct behaviour, education should also deal with awareness and impulse control. The area of the brain that regulates these processes is the frontal lobe which grows rapidly between the ages of 12 to 25 years old (Giedd et al., 2004). This means that the effects of training will partly be limited by the physiology of the brain.

#### *How do children learn?*

Learning is domain specific. This means that a young child can often only put into practice that what was learned at the location where it was learned, for example at a particular zebra crossing along the route to school. Extending what has been learned to new situations, such as crossing over somewhere else, is difficult and likely to be done incorrectly. This means that a child must be accompanied by an adult in order to master this new situation as well. Similar problems occur, for example, when learning is done from a book or using computer games. What is correctly learned or done in the learning environment, does not automatically result in the correct behaviour in practice.

#### *Who do children learn the most from?*

Children learn the most from those who mean a lot to them. These can be their parents or teachers, but also 'heroes' such as the characters in a comic strip or 'role models' such as sport stars. In social psychology these are known as the 'important other'. This does not only relate to explicit messages such as 'put your belt on, that is safe' but especially to implicit messages. These are conveyed in a manner in which the 'important other' behaves and expresses himself. A parent who does not wear a seatbelt but expects a child to wear one, is sending the implicit message that it is not really very important.

### *How much traffic education is needed?*

Teaching and learning safe behaviour in traffic is time consuming since children must learn to allow for suddenly and rapidly changing traffic situations and for complex rules. They must also be able to estimate their own capabilities of carrying out the required task within the time available, e.g. crossing the road when there is traffic. In fact, even relatively simple tasks such as cycling require practice nearly every day. Education at school can provide part of the training, but seeing the practical exercise needed, this forms only a fraction of the total training required. That is why it is essential to, more than is the case now, motivate parents and childminders to teach the children in their company more actively about traffic during their daily trips. This also means not only taking the children to school by car, but also walking or cycling with them, along the safest route (see also Wegman & Aarts, 2006, chapter 7).

### *Which age limits are there?*

The age limits in *Table 1* are only indicative. Recent psychological research (see Dragutinovic & Twisk, 2006) have shown that children can already learn important traffic skills from the age of 5, and that traffic education can speed up the learning process. For example, there are indications for the pedestrian task that, with correct training, children of about 12 years old can perform almost as well as adults.

One of the most practical questions on this issue is which is the correct age for being an independent road user. There is no general answer to this question because it depends on the dangers on a child's route and on the child. Parents could be supported here by a practical checklist to help them judge both the complexity of the route and the development level of their child.

Traffic education programmes must beware of creating the illusion that a child can do more than it actually can.

### **How effective is traffic education for children?**

Although traffic education takes place in practically all countries, there have been few evaluation studies. Moreover, few of the assessments that were carried out were of a sufficient quality. This conclusion is based on two sources: an overview of international studies (Dragutinovic & Twisk, 2006) and the recent EVEO study in the Netherlands (Twisk et al., 2006).

### *Research in other countries*

Using their titles and summaries, Duperrex et al. (2002) made a systematic overview of randomized assessments with a control group. They found 674 potential assessment studies, of which only 15 ultimately met the methodological requirements. 14 of these referred to the education of children up to the age of 12.

The assessed programmes can be roughly divided into two groups:

- *Traffic clubs*. These are programmes, often after school hours, in which parents play an active role practicing together with their children. The target group is 3 to 6 years old.
- Other programmes, including crossing over programmes.

### *Traffic clubs*

Three evaluation studies of *traffic clubs* were found. West et al. (1993) assessed the GAERTC programme in East England on the points of knowledge, self-reported behaviour, and acceptance of the programme by the target group. Self-reported behaviour improved, and the parents more often tried to teach their children road safety.

The sample for the study of the effects of the Swedish *traffic club* was large enough to judge the effects on the crash rate (Gregersen & Nolen, 1994). Although the study had positive results, such as less exposure, more education by parents, and more frequent use of safety devices; there was, however, an undesired effect, namely that the crash rate of the *traffic club* group increased. There is no really logical explanation for this effect other than the possibility that the children having become overconfident because of the course and thinking more highly of their skills than they actually were. The study of Bryan-Brown & Harland (1999) showed mainly positive results. Parents taught their children about road safety more often, and more often chose safe pedestrian crossings.

### *Other programmes*

During the 1995-2006 period one Dutch traffic education programme was assessed in the Netherlands (Van Schagen & Rothengatter, 1997). This study compared the effects of education at school with the effects of education in traffic. Two aspects were assessed: knowledge and crossing behaviour. This

study showed that, for both aspects, the control group did worse than the children who had been taught with one of three teaching methods used. The methods did not differ in effectiveness. Describing the other five assessments in detail would detract from the main subject of this fact sheet (for more details see Dragutinovic & Twisk, 2006). Only two of the studies assessed the effects on behaviour. They also found a positive effect (Tolmie et al., 2003; Thomson, 1997). The other studies limited themselves to knowledge and/or attitudes (Platt et al., 2003; Clayton et al., 1995; Zeedyk et al., 2002).

The previously mentioned overview of Duperrex et al. (2002) concluded that the crossing behaviour of pedestrians can be improved by traffic education. However, whether this ultimately results in a decrease in the pedestrian crash rate remains to be seen since this had not been studied at all. Admittedly, this conclusion is not entirely fair because most of the programmes were too small-scaled and short in duration to be able to draw meaningful conclusions showing differences in the numbers of crashes, particularly seeing that crashes with young pedestrians are relatively rare (see also the SWOV fact sheet entitled [Content and assessment of traffic education programmes](#)).

#### *The results of the Dutch assessment study EVEO*

The EVEO project was part of the SWOV 2003-2006 research programme. The effects of traffic education programmes were assessed together with the organizations that offer these programmes (Twisk et al., 2006). Four of the eleven projects assessed in EVEO were aimed at primary school pupils (see *Table 2*).

Name of project	Brief description of project	Percentage of participants showing safer behaviour*
Brabant Safety Label (Province of Noord-Brabant)	A quality brand for primary and secondary schools that have traffic education as a structural part of their curriculum. Target group: pupils and their parents.	10%
Instruction lesson Heavy Goods Vehicles (Province of Friesland)	A programme organized by lorry drivers in the province of Friesland in which a lorry and trailer, furnished as a classroom, visits schools. Its purpose is to improve the safety of children who live in areas with HGV traffic (see also 'Safe on the Way'). Target group: primary school pupils aged 10-12 years old and the initial years of secondary school.	No measurable effect
Walking and cycling to school (National)	Action day to persuade parents of primary school pupils to take them to school on foot or by bicycle and to make school routes safer. The activities are supplemented with a helpdesk, radio- and tv spots and a school competition. Target group: parents of primary school pupils.	Short lasting effect
Safe on the Way (National)	Education programme about children and goods traffic, with the emphasis on the blind area problem. Transport and Logistics Netherlands organized the lessons that consist of a theoretical and a practical part. Target group: primary school pupils from 8 years old.	41%
* Without further explanation, the measured effect was statistically significant ( $p > 0.05$ tested two-sided)		

*Table 2. Projects involving primary school pupils: description and assessment of the results.*

All programmes were assessed by examining self-reported behaviour during a one month period following the completion of the education programme, and not by counting the number of crashes. This choice was made because crashes with pedestrians are relatively rare events in the Netherlands. Specifically aspects related to possible dangerous behaviour, for example red light running on a bicycle, were examined. The results on the posttest were compared with a pretest before the programme, and compared to that of a control group.

A month after the education project a few of the assessed programmes show a slight but significant improvement in behaviour. The blind area programme 'Safe on the Way' had the largest effect: 41% of the pupils reported improved behaviour as a result of the programme. The similar programme entitled 'Heavy Goods Vehicles Instruction Lesson' had no measurable effect. Such a difference between programmes using practically the same approach is at the same time a good illustration of how important assessments are: they can help improve the weaker programmes.

### **What traffic education is there in the Netherlands?**

Traffic education has been part of the primary school curriculum in the Netherlands for many years already. For example, the Dutch Traffic Safety Association's bicycle exam celebrated its 75<sup>th</sup> anniversary in 2007. There has recently been a comparative study between countries in which the Dutch situation was also described (Rose 25). For the 4-14 years old age group, for which the Ministry of Education is responsible for traffic education as part of the primary school curriculum, the following training objectives were reported:

- children know the traffic rules and the meaning of road signs; they can apply this knowledge in the traffic situation in their immediate environment.
- children are capable of safely participating in traffic as pedestrians, cyclists, and as independent users of public transport.

However, it has not been evaluated whether the intended goals are being achieved in practice. In 2006 the Ministry of Education carried out a questionnaire study among teachers about the traffic education offered in primary schools (Van der Schoot, 2006). 85% of the teachers who responded gives traffic education lessons once a week to 10 year olds, with lessons lasting slightly over half an hour on average. 90% of the lessons consists of theory since practical lessons are perceived by teachers to require too much organization and time. No study has been made of the effectiveness of traffic education.

For the analyses the schools were divided into three groups. These groups represent three socio-economic levels: high, medium, and low. The criteria used were the highest education of the parents and the proportion of children from ethnic minorities.

There were hardly any differences between the three groups. One aspect, however, is striking; participation in the traffic practical exam (a test of practical traffic and cycling skills in real traffic). Only 27% of the schools in the 'low' group takes part as opposed to 83% of the 'high' group. Considering the suspected higher crash rate of children in the ethnic minorities, this is a worrying state of affairs.

### **Which recent traffic education developments are there?**

Two products of the Knowledge Platform for Traffic and Transport (KpVV), are worth noting because they aim to further professionalize traffic education:

- a document containing the objectives of permanent traffic education;
- the toolkit.

#### *Objectives of permanent traffic education*

Permanent traffic education is education which takes place at any time when the existing capabilities/competencies are no longer expected or observed to be adequate for safe behaviour. The permanent character, on the one hand, means that the education anticipates the inadequate behaviour level and, on the other hand, that the education continuously builds on previous traffic education and lays the foundation for later traffic education. The moments when the 'old' competency levels of children do not meet the behavioural demands are situations in which:

- the traffic environment changes, e.g. when moving house;
- the traffic task changes: the child cycles to school for the first time;
- a change in traffic rules caused by the new adapted infrastructure;
- the child has reached a new psychological development phase; e.g. from primary school to secondary school.

KpVV has drafted a document which gives a clear description of what the behavioural preconditions or learning goals for each age group and transport mode are (Vissers et al., 2004).

#### *The toolkit*

The toolkit contains concrete results of testing whether current traffic education products have achieved the learning goals as defined for the various age groups within permanent traffic education (KpVV, 2006). Some 70 products were examined and described. Besides a description of the contents, the toolkit contains general information such as the availability and costs (<http://pvetoolkit.kpvv.nl>; in Dutch).

## Conclusions

Traffic education is essential for equipping children sufficiently to become safe road users. Not only formal education at school is important, but even more so is the education provided by parents. The mental development of children limits their capabilities in traffic, but by stimulating them this development can be speeded up slightly.

The effects of traffic education are seldom known and evaluation is urgently needed to further professionalize the field. This professionalization is also stimulated by the KpVV document with training objectives which describes the necessary 'know, can, and want to' for each age group. There is also the toolkit in which the Dutch traffic education programmes are tested on meeting the training objectives for the target group.

Traffic education is of utmost importance because 'what is learnt in the cradle lasts till in the tomb'. However, because a child's brain has not yet completely developed (a process that can, to a certain extent, be speeded up by training) the road safety of 4-12 year olds has to be primarily improved by making the traffic system safer for this age group. Where the traffic system is too complex and crashes are potentially severe, parents must accompany their children.

Education programmes must not give parents and children the impression that children 'can now do it alone' (see also Wegman & Aarts, 2006).

## Publications and sources

**(SWOV reports in Dutch have a summary in English)**

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