

# Impact of drivers with special needs on road safety

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**Abstract.** This article aims to present the impact of drivers with special needs on road safety. This is a very important aspect for road traffic participants, as practically everyone takes part in it. Some as drivers, others as pedestrians and others as cyclists. We should be aware of that people with special needs, that is, the elderly and the disabled, despite their dysfunctions, participate in road traffic to the same extent as others. It is often claimed that, as a result of their dysfunctions, elderly people and people with disabilities cause more accidents and are more of a danger on the road than people without disabilities. The examples of statistics and literature that have been presented show that accidents are rare in the case of people over 65, but this is certainly due to the fact that they do not travel many kilometres. It is also important to realise that the danger does not necessarily come from the driver, but may also be on the pedestrian side, which warns against excluding this group of people from driving altogether. In the case of people with disabilities, on the other hand, there are no specific accident statistics, but there are studies showing that appropriate adjustments to their vehicle make it fully possible for them to drive safely, just like any other road user. It is important to support the mobility of such people, especially on the road. In this work, the author has mentioned the aspect of the possibility of introducing an active safety element into vehicles used by people with special needs.

## 1. Introduction

Safety is one of the most important aspects of human life. This concept consists, among other things, of taking care of oneself and one's loved ones, having a roof over one's head, the stability of one's income and other factors relating to the performance of particular activities. It is man's responsibility to be safe, to respect it and to establish forms of respect for it. This term is intended to state that individual people are responsible for this aspect in particular areas. At work, it is the employer who is responsible for ensuring proper working conditions and thus for maintaining order and working procedures. At school, the head teacher and teachers are responsible for ensuring that learning takes place safely. At the swimming pool a lifeguard takes care of the safety aspect, and in the case of traffic, the driver is responsible, i.e. the person who drives a vehicle on national and international roads and foreign roads. The task is to drive the vehicle in such a way as to comply with all standards and regulations in order to ensure their own safety and that of other road users. The issue of being safe on the road is problematic in that it does not depend on one person, but on a dozen or more, including cyclists and pedestrians. Sometimes, one irresponsible action by either a driver or a pedestrian can lead to tragic events, in which even a large group of people can suffer damage to their health. Nevertheless, in such a situation the question arises as to what is the determinant of bad, irresponsible, inconsiderate or too slow behaviour in relation to the situation on the road? We could say that predispositions, skills, knowledge, experience, but certainly also age or fitness in the broad sense of the word. In a way, these two concepts are linked. Age is linked to various health issues, such as the ability to move, the speed of reaction to stimuli, the ability to assess a situation visually or aurally. These are the very things that gradually with the ageing process. These are the characteristics of the human body we are dealing with in the case of people with

special needs. By people with special needs means people with certain disabilities and dysfunctions, but also elderly people, in this case people who are already 65 years old. Certain body dysfunctions, such as not being able to walk or not having a limb, can occur at any age and make a person disabled. However, it should also be noted that certain dysfunctions are acquired with ageing, especially over the age of 65. These include problems with sight and hearing, impaired motor skills and, as a result, slower reaction times than for young people. The Road Traffic Law does not discriminate against such people either in Poland, in the European Union or even in the world. In particular, disabled people have the opportunity to hold a driving licence and to drive cars, subject to appropriate requirements to ensure that the vehicle is suitable for their dysfunctions so as to ensure safe driving for themselves and in relation to others. This raises the question of how these groups of people fare on the roads, and whether age or disability, whether acquired or as a result of ageing, are determinants leading to road accidents? This thesis will discuss the impact of people with special needs on road safety and where possible this will be supported by relevant statistical data.

## 2. The role of elderly people in road safety

Elderly people, as already mentioned, are those who are over 65 years old. It should be noted that Polish law does not set an age limit for driving. Until 2013, driving licences were issued for an unlimited period of time, but later they started to be issued for 15 years. After this period, the driver is obliged to undergo appropriate tests in order to renew the licence for another period. In the case of elderly people, the only limitation is that the tests are more frequent and do not exclude elements such as a too slow reaction to a given event. As can be seen in the existing literature, a similar analysis can be found in [11], where the authors show how visually impaired people affect road safety. On the other hand, from the study [30] one can get a clear statistical picture showing elderly drivers against all drivers. For example, in 2015, deaths in accidents among older people accounted for 26% of all fatalities in twenty-four European Union countries. In contrast, studies [3], [12], [16], [20], [26], [30] and [32] show that seniors statistically cause fewer accidents than other drivers, but at the same time drive significantly fewer miles [5] and suffer more injuries [4], [7] and [9].

It can be said that older people are at increased risk of accidents [2], [10], [17], [18] and [29], as the proportion of this age group in the total population will gradually increase over time. At this moment one in five inhabitants of the European Union is over the age of 65 [31], while in Poland, until recently, this group of people constituted 17.2 % of the total population of the country [33]. It is also worth mentioning that with the aging process, the level of resistance to perform or receive aggressive reactions in humans decreases [25]. Certainly, this is one of the reasons for the occurrence of accidents involving this age group. Table 1 shows the statistics of road accidents for the years 2010 - 2020 including fatalities, injured persons and including seriously injured persons in Poland, while Table 2 presents exactly the same data, for the same period and with the same considerations, but for persons over 65 years of age.

Table 1. Accident statistics 2010 - 2020  
[Instytut Transportu Samochodowego POBR, may 2021].

Year	Number of accidents	Fatalities	Injured	Including severely injured
2010	38832	3908	48953	11491
2011	40069	4189	49506	12585
2012	37046	3571	45792	12049
2013	35847	3357	44059	11672
2014	34970	3202	42545	11696
2015	32967	2938	39778	11200
2016	33664	3026	40776	12078
2017	32760	2831	39466	11103
2018	31674	2862	37359	10963
2019	30288	2909	35477	10633
2020	23540	2491	26463	8805

Table 2. Accident statistics for elderly people 2010 - 2020  
[Instytut Transportu Samochodowego POBR, may 2021].

Year	Number of accidents	% of total	Fatalities	% of total	Slightly injured	% of total	Severely injured	% of total
2010	5027	13	674	17,3	3321	8,9	1343	11,7
2011	5416	13,5	703	16,8	3413	9,2	1609	12,8
2012	5031	13,6	653	18,3	3125	9,3	1557	13
2013	4956	13,9	647	19,3	3028	9,3	1614	13,9
2014	5227	15	692	21,6	3114	10,1	1765	15,1
2015	5082	14,5	619	19,3	3050	10,7	1712	15,3
2016	5341	16,9	656	21,7	3100	10,1	1934	16
2017	5340	16,3	673	23,8	3219	11,4	1807	16,3
2018	5433	17,1	699	24,4	3313	12,5	1792	16,4
2019	5239	17,3	664	22,9	3113	12,5	1803	17
2020	4000	17,3	545	22,9	2226	12,5	1429	17

The statistics presented clearly show that people over 65 years of age are less than 20% involved in road accidents. However, a few aspects should be noted here. Firstly, according to data [21] from 2019, older people in Poland numbered 6619000, which among the total population, i.e. 38413000, constituted 17.2%. Putting the data in Table 2 against this background, it can be seen that in 2019 the elderly participated in 17.3% of all accidents, which is almost the same fraction as they are in the total Polish population. Secondly, the fact that people 65+ participate in relatively few accidents according to the statistics presented in this way does not at all mean that they drive a lot of kilometres. In a study [30], the author drew attention to this fact by conducting a survey, in which she asked drivers about the number of accidents they had participated in a given calendar year and the number of kilometres driven in the same year. After the survey, it turned out that the age group 60 and over came second in this classification of accident rates. In their case, an accident occurred once every 2.6 million kilometres. This study may not be a fully conclusive example of an experiment, as it defined a wider age group than the one in question, was conducted 24 years ago and in it respondents self-declared the data, but it shows that ranking drivers solely by the number of accidents they participate does not reflect the real danger they may pose on the roads.

Table 3 presents data that shows what the 2019 UK fatalities, injuries and severely injuries statistics look like by age group, taking into account the breakdown between drivers and passengers.

Table 3. UK accident statistics in 2019 [20].

Age		16-19	20-29	30-39	40-49	50-59	60-69	70-79	80+
Killed	Drivers	22	115	68	45	54	60	77	60
Severely injured		532	2032	1605	1098	1118	792	748	530
All levels of injury		3321	15348	13622	10378	8834	4662	3185	1864
Killed	Passengers	36	43	19	14	10	20	29	49
Severely injured		608	924	470	286	297	278	318	285
All levels of injury		3345	5857	3458	2195	2065	1467	1259	806

Data [28] shows that in 2019 the population of people in the UK aged 65+ accounted for 18.4% of the total population, while accidents participated by the 60+ age group accounted for 17.5%. Taking into account that this is a wider age group than that of the statistics for Poland, and the fact that in 2019 the population in the UK was 66840000 [27], some 74% more than in Poland, it can be estimated that elderly people participate fewer accidents there than in Poland. At this point it is also worth mentioning the works [15] and [23], where it is made clear that the elderly are both endangered and sometimes a danger to traffic as pedestrians. Despite the promotion of walking and contact with fresh air of the elderly as an

element of health, one should also be aware of that it carries risks not only for the elderly due to the injuries they may suffer during such a walk, but also for other road users. As also mentioned in [3]. An elderly person participating in road traffic as a pedestrian may also cause danger as a result of, for example, poor vision or hearing problems and thus fail to see a vehicle on the street. Therefore, the proportion of elderly people participating in the traffic world as pedestrians or drivers should be balanced. Firstly, not all of their dysfunctions allow them to drive a car, but secondly this cannot be generalised, because in turn other elderly people with mild dysfunctions would find the absence of a car significantly detrimental to their comfort of living and functioning in their social environment [20].

### **3. The role of disabled people in road safety**

People of all ages are considered to have a disability that prevents them from functioning normally at home, at work, or in traffic. These dysfunctions often include arm or leg paresis, hearing or sight problems. However, such people are not excluded from functioning in society. They can function in the same environment as non-disabled people, they can play sports, they are employed in similar positions as people without disabilities and they can drive cars. Of course, all these elements are available to this group of people after appropriate adjustments have been made to their sport, work or vehicle positions. Often there is a generalised opinion among non-disabled people that people who have some kind of dysfunction and drive cars are more likely to contribute to the cause of accidents than people without disabilities. Unfortunately there are no precise tabulated data collected every year to confirm or deny this. However, a few scientific papers can be found that dealt with this topic in a fragmented way. One of the older scientific papers [24], from 1966, shows a study in which 494 disabled people with lower limb disability were examined to see how this disability affected road traffic accidents. Of all the people studied in this experiment, only three were found to have an accident caused by their disability. The main cause was the paresis of the right leg, but these few people accounted for only 6% of all subjects. The author is fully aware of that the paper [24] is from an earlier period and that nowadays there are different traffic flows, different road infrastructure, different cars, speeds and accelerations. However, there are not many works concerning disabled people, therefore this one is presented here. In the early 2000s, on the other hand, a study was carried out [6], which showed that, with an appropriate adjustment of a vehicle to a given dysfunction, a disabled person is as capable as a fully able-bodied person of driving a vehicle and performing sudden unpredictable manoeuvres resulting from traffic situations.

It is important that as time goes by and technology advances, better and more functional solutions [1], [14] are proposed to assist drivers with certain dysfunctions. In fact, an inexperienced non-disabled driver can be more dangerous than a driver with some dysfunctions but with a lot of experience in the aspect of driving motor vehicles. Nowadays there are a lot of companies that provide services of adapting particular vehicles for disabled people, which does not take away the comfort of living of people with certain dysfunctions and thus improves their daily mobility.

### **4. Supporting the mobility of people with special needs in road traffic**

Elderly and disabled groups should be supported sufficiently to enable them to function normally in every aspect of society [22]. As regards their participation in road traffic, as already mentioned, their role cannot be excluded simply because of certain dysfunctions. The question that arises here is how to support the mobility of people with special needs in road traffic in order to best assist them to function confidently and stress-free on the road? There are certainly many solutions, but one of them could be, for example, access to more active safety features in the vehicles they drive. Active safety is understood to mean individual items of equipment or vehicle design that are intended to prevent accidents. One such element could be the introduction of a four-wheel steering system (4WS) to any vehicle driven by people with special needs (Figure 1).

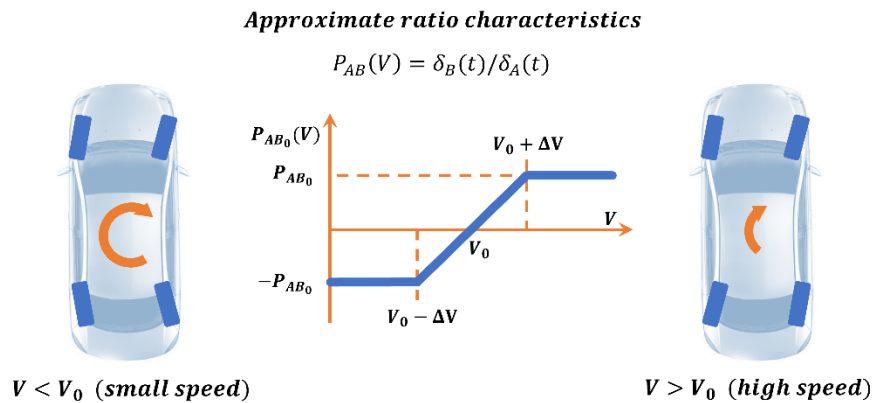


Figure 1. Overall idea of steering front and rear wheels in 4WS vehicles  
 Notation:  $P_{AB}$  – gear ratio between front and rear wheel twist angles ( $\delta_A$ ,  $\delta_B$ )  
 $V$  – vehicle speed,  $V_0$  – characteristic speed when  $\delta_B=0$ .

This system ensures, with the right transmission characteristics ( $P_{AB}$ ), manoeuvrability at low speeds and driving stability at high speeds. The manoeuvrability element is very often used when driving in a car park. This is when the rear wheels turn opposite to the front wheels, making it easier to park the vehicle in a narrow space. Whereas stabilisation is used at higher speeds, for example on a motorway. When driving at high speed, the rear wheels turn in line with the front wheels, which may in a way lengthen the driving path, but influences its higher safety level through stabilisation [8]. Introducing such an element into cars driven by people with special needs would certainly affect the comfort of the vehicles they drive and road safety.

## 5. Summary

Both elderly people and people with disabilities, so people with special needs, have an impact on road safety, but as current statistics, studies and publications show, their impact is not greater than that of other road users. Individual dysfunctions certainly make it more difficult to function in road traffic, but as has already been mentioned, each vehicle can be adapted so that every disabled person can move comfortably and safely among other road users. It is important to be aware of that, in fact, it is not disability that is the main cause of accidents on the roads, but inexperience and individual irresponsible behaviour from any group of drivers. This means that you cannot discriminate against someone on the road on the basis of whether they have a disability or a dysfunction, because if they can drive a vehicle, it means that it must be suitably adapted to traffic. What needs to be done is to support the mobility of such people in order to help them as much as possible and enable them to function in society on a day-to-day basis.

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