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BEHAVIOR AND AWARENESS OF ROAD TRAFFIC HAZARDS AMONG PEDESTRIANS IN POLAND UNDER 18 AND OVER 65 YEARS OF AGE

ZACHOWANIE I ŚWIADOMOŚĆ ZAGROŻEŃ W RUCHU DROGOWYM WŚRÓD PIESZYCH W POLSCE DO 18-TEGO I POWYŻEJ 65-EGO ROKU ŻYCIA

Abstract

Objectives: Next to car drivers, pedestrians are the most common perpetrators of traffic accidents. One of the factors influencing the occurrence of dangerous situations on the road is the age of pedestrians. The aim of the study was to identify similarities and differences in road behavior and knowledge of selected aspects of road safety in two different age groups of pedestrians, namely those under 18 and over 65.

Research problem: In two groups significantly different in age, do the propensity to engage in dangerous behavior and knowledge of risk from passenger car drivers differ ?

Material and methods: The analysis is based on a study conducted using a survey questionnaire in the period December 20, 2022 – June 1, 2023. 625 people took part in the study, 268 people under 18 and 357 people over 65.

Results: Research shows that both groups tend to engage in dangerous behaviors. Young people are more likely to cross the road in unauthorized places and to cross pedestrian crossings without traffic lights, using mobile phones and headphones. Older people are less likely to wear reflective elements. Awareness of selected threats in both age groups is low.

Conclusions: The research shows that both young and older people do not always behave safely on the road. People under 18 are more often responsible for dangerous behavior at pedestrian crossings. Another important problem is the lack of proper knowledge about the threats to which pedestrians are exposed and the lack of awareness of dangerous situations. In this study, most respondents were not aware of the dangers, partly due to their inappropriate behavior. Most questions regarding possible threats were answered incorrectly almost every time by over half of respondents in both age groups.

None of the surveyed groups has an advantage regarding road traffic hazards. People under 18 more often correctly answered questions about priority at a pedestrian crossing and the driver's reaction time to the appearance of a live obstacle. People over 65 more often indicated the correct answer regarding the braking distance and the distance covered by a driver traveling at a speed of 50 km/h.

Keywords: *Road traffic safety, pedestrian, need, behavior, awareness*

Słowa kluczowe: *Bezpieczeństwo ruchu drogowego, pieszy, potrzeba, zachowanie, świadomość*

Intruduction

Road traffic safety is a set of activities aimed at reducing the negative effects associated with traveling on roads (Claude et al., 2006). The negative effects of actions in road traffic lead to high costs incurred as a result of death or injuries suffered by road users and all the types of material losses (e.g. damage to the vehicle, road windage, protective barriers, etc.). They are associated with negative socioeconomic effects in terms of medical expenses and lost production. They are estimated at 0.4-4.1% of GDP in European countries (IRTAD, 2019; Wijnen et al., 2019; Amin, 2022).

The above costs are influenced by the behavior of various groups of road users. Road traffic fatalities are mainly people using passenger cars, but the second largest group among road users in the world are pedestrians hit by motor vehicles (Naci et al., 2009, s. 55-59; Stigson et al., 2023, s. 1-13). Globally, for every 4 deaths, 1 occurs among pedestrians and cyclists (WHO, 2023). In the EU, approximately 21% of all road traffic fatalities are pedestrians. Most often, these are people aged 65 or older (EC, 2023a). As many as 52% of accidents with fatalities occur on rural roads, 40% in urban areas and 8% on highways. Among road fatalities, 43% are car users (drivers and passengers), 20% pedestrians, 18% two-wheeled vehicle users (motorcycles and mopeds), and cyclists 10% (EC, 2023b).

Poland is struggling with similar problems. Drivers dominate among the perpetrators of road accidents in Poland, but the second group of road accident perpetrators are pedestrians. In 2022, 4,762 accidents involving pedestrians were recorded (22.3% of all accidents), in which 460 pedestrians died (24.3% of all fatalities), and 4,367 pedestrians suffered bodily injuries (17.6% of all injured) (KGP, 2023). A similar trend occurred in previous years (KGP 2021; KGP 2022). Young people constitute a significant number of the perpetrators of pedestrian accidents. Accidents involving them occur not only when they drive a car, but also when they behave dangerously on the road as pedestrians (crossing a crossing without traffic lights with headphones, talking on the phone, writing text messages, or crossing in an unauthorized place). In turn, the most common victims of road accidents are older people, over 60. They are most often the victims of road accidents and are the most injured

(the highest number of fatalities and injuries) (KGP, 2023). This problem becomes particularly important in the aspect of the aging of Polish society, which is dominated by older people. At the end of 2018, there were approximately 6.7 million people of post-working age living in Poland – that's 17.5% of all Poles. By 2050, there will be approximately 11 million people of post-working age, i.e. 32.7% of the population. Life expectancy continues to increase, all over the world. In Poland, men live on average 74 years, women 82 years. In 2050, the projected average life expectancy will be 82.1 years for men and 87.5 years for women (Lejzerowicz, 2020). Such perceived demographic change trends justify the assumption that the number of road accident victims among people aged 65+ will increase.

The aim of this article is to contribute to the road safety literature on the behavior and awareness of pedestrian road users. Its main goal is to identify similarities and differences in the road behavior of two groups of road users, i.e. people under 18 and over 65, and to examine the level of their awareness of selected road traffic hazards. The justification for this goal results from the socio-economic effects of road accidents and the causes of their occurrence, as well as the lack of research on the behavior and awareness of pedestrian road users in Poland.

The article consists of few subsequent parts. Section one presents a review of the literature on the subject and the research hypotheses. Another, two sections cover the research methodology and study`s participants. The sections that follows present the results of the obtained research. The last, two sections present discussion and conclusions, as well as recommendations and limitations.

Literature review

Age of pedestrians

Road accidents and their socio-economic consequences prompt many studies related to the behavior of pedestrians as road users (Tulu et al., 2015; Sheykhfard et al., 2021; Olowosegun et al., 2022; Macedo et al., 2022). These studies consider various aspects of pedestrian behavior in road traffic. Some researchers address issues related to pedestrian behavior at crossings (Morency,

2015; Lord et al., 2018; Chebanyuk et al., 2020), pointing out that regardless of age, the speed of crossing the road is higher than the speed of walking on the street. At the same time, two groups of pedestrians can be identified whose behavior differs significantly due to age. These are young and older people.

The behavior of older pedestrians is largely influenced by factors related to age, not the location of pedestrian crossings. Older pedestrians are more observant of the rules and approach crossing the road with greater caution because they perceive this maneuver as dangerous (Simončič, 2001; Chen et al. 2019; Vilma & Donatas, 2020; Distefano, 2021). From research conducted by Zito et al. (2015) shows that less safe street crossing behavior in older pedestrians can be explained by their reduced cognitive and visual abilities, which in turn causes difficulties in making decisions, especially under time pressure. Older pedestrians look more at their feet, probably because they need more time to plan a precise step movement and, therefore, pay less attention to movement. In turn, accidents involving young school-age people occur when students are left unsupervised near schools, parks and shopping centers (Oxley, 1997; Ivan et al., 2019). Young people are also more likely to engage in dangerous behavior, such as crossing in prohibited places or crossing with an orange light (Xiao et al., 2021).

In the context of pedestrians' age, the following hypothesis (H1) was formulated: Older pedestrians are more likely to choose crossings with traffic lights because they feel safe, while young people are more prone to risky behavior on the road.

Mobile phones and headphones

Currently, the use of mobile phones and headphones is an increasing threat in road traffic, which largely concerns pedestrians. Many studies indicate that talking on a mobile phone is associated with cognitive distractions that may pose a threat to pedestrian safety (Bunguma et al., 2005; Hatfield & Murphy, 2007). Behaviors resulting from the use of a telephone or headphones, which may affect the risk of road traffic, are more common among young people (Xiao et al., 2021). Using a mobile phone while crossing the street causes the pedestrian to be preoccupied with the device and ignore the surrounding conditions at that time. Holding a phone causes pedestrians to move awkwardly

because they are carrying an item, which may impede their walking speed, thus increasing the risk of collision with a vehicle (Hatfield & Murphy, 2007).

Another danger is wearing headphones. According to the study conducted by Lee et al. (2020), pedestrians are actually unable to detect the warning sound of a vehicle behind them, even from a distance of 1 m, if they are listening to music from headphones at the time. Based on the above issue, another hypothesis (H2) was built: A significant hazard in road traffic is the use of mobile phones and headphones while crossing a pedestrian crossing without traffic lights. This problem more often affects young people.

Visibility on the road

Most people travel on the road at night without realizing how much visibility a driver has at night. If road conditions require to drive with low beam headlights on, the headlights can illuminate the road in front of the vehicle at a distance of just 40 m. On the other hand, a pedestrian is visible from an even closer distance. For this to happen, the light beam must illuminate the pedestrian at approximately 25–30 cm, measured from the road surface, which guarantees that the beam will be visible to the driver. In fact, this means that the distance to notice a pedestrian is much shorter for the driver (about 20–25 m) (Kępa, 2020). Owens et al. (1994) conducted a laboratory experiment in which volunteers watched a video of runners recorded from a car traveling at 40 km/h. The runners were dressed in different types of clothing: only dark clothing, a reflective running vest, five reflective strips anywhere, and 11 reflective strips distributed on the lower limbs. The authors concluded that the observation distance (i.e., from the first fixation on the pedestrian) was greater when wearing reflective materials than when wearing dark clothing. In addition, reflective strips arranged to correspond to biological movement made runners visible from a greater distance than those who wore reflectors everywhere. Other studies have shown that reflective elements attached to the wrists and ankles or other major joints provide 60 – 80% greater visibility than markings on the torso (Babic et al., 2021). In light of the above, the following hypothesis (H3) was adopted: Even though pedestrians are aware that they are not visible to drivers after dark, they do not wear reflective elements. This mainly applies to young people.

Knowledge about road hazards

Knowledge of road safety rules determines safe driving on public roads. Knowledge of legal acts positively affects the safety and efficiency of road traffic (Muślewski et al., 2018). In turn, knowledge about the possible behavior of other road users may influence rational decision-making by vulnerable road users. Sometimes road users have sufficient knowledge to ensure themselves and others how to behave properly in road traffic, but they do not always apply it and sometimes even behave in an undesirable way (Reang & Tripura, 2014). According to the research of Xiao et al. (2021), road safety awareness among young pedestrians is poor, some young people are ignorant of road traffic regulations and are easily influenced by other pedestrians. Issues regarding knowledge among pedestrians, especially adults, are rarely discussed in scientific publications. According to one of the studies (Olakulehin et al., 2019), conducted in the age group of 18 – 63, the level of knowledge regarding road traffic regulations among pedestrian residents of a university community in southwestern Nigeria was low. In turn, other research (Jothula & Sreeharshika, 2020) shows that few study participants knew which side of the road a pedestrian should walk on, just over half of them were able to correctly identify road signs. A similar trend was also observed by other researchers (Dunbar 1999; Reang & Tripura, 2014; Nesoff et al., 2018; Setorwofia et al., 2020; Tabuñar 2020). H4 is another assumption made for the purposes of this article: Older people are more aware of road traffic hazards resulting from their knowledge and experience compared to young people.

Materials and methodology

A diagnostic survey method was used to verify the research hypotheses set. is based on establishing the purpose of the study, developing research tools (e.g., questionnaires), selecting an appropriate sample of respondents, and collecting and analyzing data. In turn, the research tool was a survey questionnaire. The survey was prepared for the needs of this study and consisted of three parts. It contained 18 questions in total. The first part of the survey included demographic variables (age, gender, place of residence,

professional status). The second part examined the type and frequency of use of pedestrian crossings. The third group of questions concerned dangerous behavior of pedestrians (crossing in unauthorized places, crossing a pedestrian crossing while using a mobile phone or headphones, using reflective elements). This group of questions ended with a question regarding the pedestrian's assessment of his or her own visibility. This question uses a Likert scale, where: 1 – very poor visibility and 5 – very good visibility. The fourth group of questions concerned the awareness of threats posed by other road users, such as drivers. The last question from this group of questions concerned the assessment of one's own knowledge about safe road driving. A Likert scale was also used to assess the knowledge of the respondents, where: 1 – very poor knowledge and 5 – very good knowledge.

In order to verify the correctness of the questions, pilot studies were carried out on a group of 16 people, both among road users of both surveyed age groups and specialists professionally dealing with road safety problems.

The study was conducted between December 20, 2022 and June 1, 2023. Two methods were used in the data collection process (Gobo & Mauceri, 2014):

- PAPI (Paper-and-Pencil Interviewing) – among some people over 65 who do not use social media and among some rural residents who did not have the opportunity to complete the survey online;
- CAWI (Computer-Assisted Web Interview) – among the remaining respondents.

The online questionnaire was prepared using Microsoft Forms and distributed to groups of potential respondents or randomly selected individuals via email and social media channels such as Facebook and LinkedIn. In total, responses were obtained from 630 respondents.

In order to answer the research questions and test the hypotheses, statistical analyzes were performed using an Excel spreadsheet and the Statistica 13.3 program. It was used to calculate Pearson's $\chi 2$ correlation coefficients. The level of significance in the article was assumed to be alpha = 0.05.

Study participants

After verification of the correctness of the answers, 625 surveys were used for further analysis. Among the respondents, 268 people were under 18 (in practice – those over 14 were surveyed), and 357 people were aged 65+. The demographic data of the respondents are presented in Table 1.

Table 1. Characteristics of respondents (N=625)

Variable	Under 18		Over 65	
	Frequency	Percentage [%]	Frequency	Percentage [%]
Gender				
Women	137	51,1	228	63,9
Men	131	48,9	129	36,1
Domicile				
City	158	59,0	221	61,9
Village	110	41,0	136	38,1
Professional status				
Student/Pupil	268	100	-	-
Working	-	-	30	8,4
Retired/Pensioner	-	-	327	91,6
Involvement in a road accident at a pedestrian crossing				
Yes	66	24,6	36	10,0
N o	202	75,4	321	90,0
Witness to a road accident at a pedestrian crossing				
Yes	77	28,7	94	26,3
No	191	71,3	263	73,7

Source: own study

In the group of respondents under 18, 51.1% were women, all respondents were pupils or students, 59% of them lived in cities. 75.4% of respondents in this group were not involved in an accident and similarly 71.3% did not witness any accidents. In the case of respondents over 65, 63.9% were women, 61.9%

of respondents were urban residents. The vast majority of respondents from this group are retirees and pensioners – 91.6%. Only 10% of respondents from this group participated in a road accident and 26.3% witnessed a road accident.

Types and frequency of pedestrians crossings used by respondents

One of the places where pedestrian accidents most often occur are pedestrian crossings. As shown in the data in Table 2, both people under 18 and people 65+ most often use crossings without traffic lights and this constituted 60% and 60.8% of respondents, respectively.

Table 2. *Types and frequency of pedestrian crossings used by respondents (N=625)*

Age	Under 18	Over 65
A type of pedestrian crossing		
Pedestrian crossing without traffic lights	161 (60,0%)	217 (60,8%)
Pedestrian crossing with traffic lights	99 (37,0%)	139 (38,9%)
Underpass or footbridge	8 (3,0%)	1 (0,3%)
Frequency of using pedestrian crossings without traffic lights		
Never	7 (2,6%)	19 (5,3%)
Several times a month	17 (6,3%)	63 (17,6%)
A few times a week	53 (19,8%)	114 (32%)
Every day	191 (71,3%)	161 (45,1%)

Source: own study

Every day, pedestrian crossings without traffic lights are used more often by people under 18 (71.3%). In the case of people 65+, 45.1% of them uses crossings without traffic lights every day.

Dangerous behavior among pedestrians

The main cause of most road accidents is human. According to the Highway Safety Manual (HSM) of the American Association of State Highway Traffic Officials, 3% of crashes are caused by road-related factors alone, but 34% of crashes are a combination of road-related and other factors. 3% of accidents are caused solely by vehicle factors, while 13% of accidents are a combination of road and other factors. 57% of accidents are caused solely by human factors, but 97% of accidents are caused by a combination of road and other factors (Ahmen, 2013). Selected dangerous behaviors of pedestrian road users are summarized in Table 3.

Table 3. *Dangerous behavior of pedestrian road users (N=625)*

Factor		Under 18	Over 65	Under 18 versus over 65
				Test results
Crossing the road in an unauthorized place	Yes	185(69%)	204(57,1%)	χ^2 = 9,2038, df=1, **p=0,0024**
	No	83 (31%)	153(42,9%)	
Using your phone while crossing a pedestrian crossing without traffic lights	Never	106 (39,5%)	286 (80,1%)	χ^2 = 122,759, df = 3, **p = 0,000**
	Rarely	109 (40,7%)	66 (18,5%)	
	Often	53 (19,8%)	5 (1,4)	
Using headphones while crossing a pedestrian crossing without traffic lights	Never	86 (32,1%)	343 (96,1%)	χ^2 = 291,882, df = 3, **p= 0,0000***
	Rarely	77 (28,7%)	9 (2,5%)	
	Often	105 (39,2%)	5 (1,4%)	
Using reflective elements after dark	Yes	35 (13,1%)	67 (18,8%)	χ^2 = 10,2508, df=2, **p=0,006**
	No	122 (45,5%)	184 (51,5%)	
	Sometimes	111 (41,4%)	106 (29,7%)	

Bold values indicate statistical significance at p<0.05

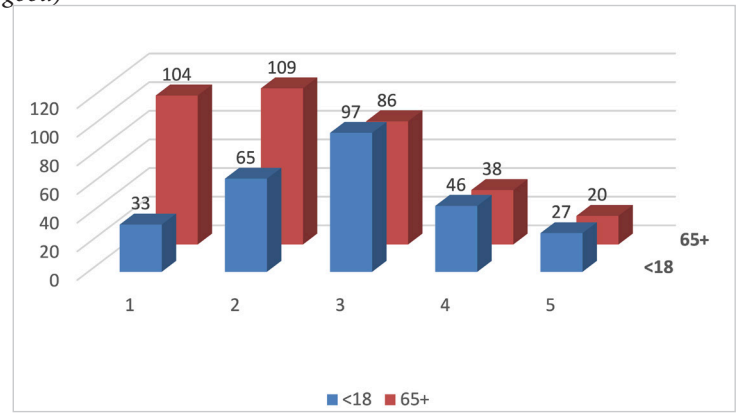
Source: own study

The answers presented in Table 3 show that in both age groups the number of people crossing the road in prohibited places is large and amounts to 69% for people under 18 and 57.1% for people over 65. People under 18 are significantly more likely (p = 0.0024) to enter unauthorized places. As many as 80% of surveyed people in the 65+ group do not cross the road using a mobile phone, while in the case of young people, 40% of them use a mobile phone while crossing the road. There is a statistically significant relationship between the studied age groups and the use of a mobile phone, p = 0.0000.

A similar tendency occurs when using headphones while crossing the road. There is a statistical relationship between the age examined and the use of headphones, p = 0.0000. 1.4% of people 65+ use headphones when crossing the road and as many as 39.2% of people under 18. For people under 18 it is 32.1%. Another dangerous behavior among pedestrians is not using reflective elements after dark. In the case of this problem, there is a statistically significant relationship p = 0.006. A significant proportion of respondents from both age groups do not wear reflective elements after dark: under 18 (45.5%) and over 65 (51.5%). Young people were more likely to indicate that they sometimes wear reflective elements (41.4%), which was over 10% more indications than in the case of the surveyed older people.

Respondents were asked to assess their own visibility after dark (Figure 1).

Figure 1. *Respondents' assessment of their own visibility after dark (1 – very poor, 5 – very good)*



Source: own study

The data presented above indicate that people over 65 assess their visibility after dark as worse (items 1 and 2 were marked by 59.5% of respondents). In turn, people under 18 (items 1 and 2 were marked by 36.9% of respondents). Both groups of respondents rate their visibility after dark quite low.

Awareness of threats from other road users

The concept of limited trust is defined in Polish road traffic regulations: *A road participant and another person on the road have the right to count that other road participants comply with road traffic rules, unless the circumstances indicate the possibility of their behavior differently* (Act of…, Article 4). Different behavior may occur due to lack of knowledge about the threats that pedestrians themselves may pose. The research results addressing this issue are summarized in Table 4.

Table 4. *Knowledge and awareness of threats among pedestrian road users*

Factor		Under 18	Over 65	Under 18 versus over 65
				Test results
Priority at a pedestrian crossing: emergency vehicle versus pedestrian (pedestrian*/emergency vehicle/ no opinion)	Well	70 (26,1%)	59 (16,5%)	χ^2 = 24,043, df=2, **p =0,000**
	Wrong	165 (61,6%)	281 (78,7%)	
	No opinion	33 (12,3%)	17 (4,8%)	
The distance from which a pedestrian walking at dusk without reflective elements is visible (answers: approx. 5 – 19 m/ approx. 20 – 39 m*/ approx. 40 – 59/above 60 m/I have no opinion)	Well	58 (21,6%)	80 (22,4%)	χ^2 = 4,9501, df= 2, p = 0,0842
	Wrong	146 (54,5%)	217 (60,8%)	
	No opinion	64 (23,9%)	60 (16,8%)	
The driver's reaction time to the sudden appearance of an obstacle or living creature on the road (answers: 0.7-1* s/1-15s/16-20s/I have no opinion)	Well	80 (29,9%)	75 (21%)	χ^2 = 6,4459, df = 2, **p=0,0399**
	Wrong	136 (50,7%)	206 (57,7%)	
	No opinion	52 (19,4%)	76 (21,3%)	

Braking distance of the driver from the moment of noticing the obstacle at 50 km/h(answer: approx. 5m/approx. 13m/ approx.28 m*/ approx.42 m/I have no option	Well	32 (12,7%)	103 (28,9%)	
	Wrong	155 (57,8%)	182 (51%)	χ^2 = 25,0743, df = 2, **p=0,0000**
	No opinion	79 (29,5%)	72 (20,1%)	
Distance covered by a driver traveling at a speed of 50 km/h (answers: 5m/14m*/20m/I have no opinion)	Well	76 (28,4%)	158 (44,3%)	
	Wrong	110 (41 %)	113 (31,7%)	χ^2 = 16,5323, df=2, **p= 0,0003**
	No opinion	82 (30,6%)	86 (24,1%)	

* **correct answer**
Bold values indicate statistical significance at p<0.05

Source: own study

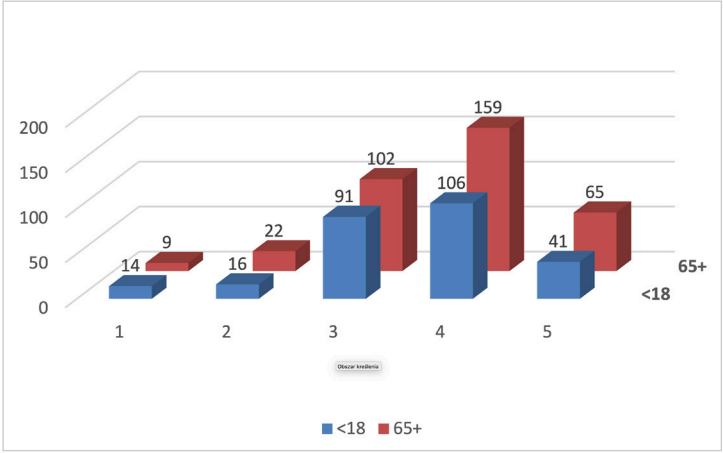
There is a significant statistical relationship between knowledge about priority at a crossing without traffic lights and age (p= 0.0000). 26.1% of people under 18 knew that pedestrians have priority when crossing in front of an emergency vehicle, and 16.5% of people 65+ also knew this. The vast majority in both groups did not know the correct answer (61.6% of people under 18 and 78.7% of people 65+). In both groups, the answers regarding the distance from which a pedestrian walking without reflective elements is visible at dusk were similar. The majority of respondents in both groups gave an incorrect answer (54.5% of people under 18 and 60.8% of people 65+). There is a statistically significant relationship between age and the answer to the question regarding the driver's reaction time to the sudden appearance of an obstacle or living creature on the road (p=0.0399). In the group of people under 18, 29.9% of respondents knew the correct answer, and in the group 65+, 21% of respondents knew that.

In both groups of respondents, incorrect answers prevailed. Also in the case of the answer to the question about the driver's braking distance from the moment of noticing the obstacle, there is a statistically significant relationship (p=0.0000). Among people aged 65+, 28.9% gave a positive answer to the question, as well as 12.7% of respondents under 18. The last question concerned the distance covered by a driver driving at a speed of 50 km/h. There is a statistically significant relationship between the answer to the question

and the age of the participants (p=0.0000). More positive answers were given by people from the 65+ group (44.3%), in the case of people under 18 it was 28.4% of correct answers.

An important aspect of the research was the question of how respondents assessed their knowledge of road safety. The respondents' answers are shown in Figure 2.

Figure 2. *Respondents' opinion on their knowledge of road safety (1 – very poor, 5 – very good)*



Source: own study

Based on the answers obtained, it can be indicated that both groups of respondents rate their knowledge of road safety highly (59.4% of respondents gave answers 4 and 5 for both groups). Among people under 18, indications 4 and 5 were selected by 54.9%, and in the group 65+ (62.7%).

Discussion and conclusions

The research shows that both young and older people do not always behave safely on the road. People under 18 are more often responsible for dangerous behavior at pedestrian crossings. First of all, this concerns aspects such as crossing the road in an unauthorized place (p=0.0024) or using mobile phones (p=0.0024) and headphones (p=0.0000) (Byington, 2013; Hatfield & Murphy 2007; Lee et al., 2020; Distefano, 2021). Another important problem is the lack of proper knowledge about the threats to which pedestrians are exposed from other road users and the lack of awareness of dangerous situations. In this study, most respondents were not aware of the dangers posed by other road users, partly due to their inappropriate behavior (not using reflective elements). Most questions regarding possible threats were answered incorrectly almost every time by over 50% of respondents in both age groups. Similar observations have been made by researchers in other countries (Nesoff et al., 2019; Nikolau et al., 2023). There is a statistically significant relationship between the answers provided by respondents and their age. None of the surveyed groups has an advantage regarding road traffic hazards. People under 18 more often correctly answered questions about priority at a pedestrian crossing (p = 0.0000) and the driver's reaction time to the appearance of a live obstacle (p = 0.0399). People over 65 more often indicated the correct answer regarding the braking distance (p = 0.0000) and the distance covered by a driver traveling at a speed of 50 km/h (p = 0.0003).

Referring to the research hypotheses set at the beginning:

H1. Partially proven. Both older and young people most often use pedestrian crossings without traffic lights. However, people under 18 (71.3% – every day) and older people (45.1% every day) use this type of crossings much more often. Both older (57.1%) and young people (69%) often cross the road in prohibited places.

H2. Confirmed. People under 18 use mobile phones and headphones much more often when crossing a pedestrian crossing without traffic lights than people over 65.

H3. Not proven, although 29.1% of older people are aware that they are not visible on the road, as many as 51.5% of them do not wear reflective

elements. For people under 18, 45.5% do not wear reflective clothing at night.

H4. Partially proven. Both people under 18 and over 65 have low awareness of road traffic hazards. Elderly people were more aware of the threats related to the driver's braking distance from the moment of noticing the obstacle (28.9%) than people under 18 (12.7%). When asked about the distance covered by a driver driving a car at a speed of 50 km/h in 1 second, the correct answer was given by 44.3% of people over 65 and 28.4% of people under 18.

Limitations and recommendations

Our findings have limitations. The research was conducted in a group of young people who had finished primary school, younger pupils were not included. Another limitation may be the use of two methods for testing: online and in-person.

The presented research constitutes a contribution to further analysis. The research should be extended to include knowledge of issues related to road traffic regulations among all road users. The aspect of dangerous road behavior and knowledge about road safety should also be extended to other groups of road users (cyclists, motorbike and truck drivers). Research should be carried out in different countries, e.g. with more and less restrictive road traffic regulations.

Both the behaviors and awareness of threats of the study participants indicate an urgent need to undertake educational activities. It is advisable to develop educational paths dedicated separately to people under 18 and for people from the 65+ group. In addition, technical (engineering) actions should be taken that would help improve safety at pedestrian crossings without traffic lights.

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