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Effects of Individual Priorities on Ethical Decisions in Traffic: Use of Artificial Intelligence

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Abstract

Artificial intelligence, a software or computer program with a learning mechanism is used in many fields. In the present study, the aim was to determine the effect of individual priorities on ethical decisions in terms of the use of artificial intelligence in traffic, through scenarios created by using the Moral Machine, an online experimental platform designed to identify ethical dilemmas. A questionnaire consisting of three parts was used to collect the data. In the first part, socio-demographic characteristics were questioned. The second part included the Importance of Health Scale. In the last part, the participants were given 12 scenario examples of an unmanned vehicle moving in traffic with the illustrations, and they were asked what their decisions and justifications of their decisions were. The study population comprises 75 health care academicians in Çankırı University. It was observed that most of the participants preferred to protect a larger number of people rather than a small number of people, a woman rather than a man, a child rather than an adult, a physician rather than an adult who is not a physician. The scenarios created in the study contain more and more variables that should be considered. There-fore, as the scenarios continued, the participants had difficulty in making decisions. Artificial intelligence has become one of the problem clusters of bioethics due to the increase in its use in many areas directly related to human life, such as health, apart from traffic.

Keywords: Artificial intelligence; Bioethics, Individual priority; Moral machine; Traffic ethics

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1. Introduction

Artificial intelligence, a software or computer program with a learning mechanism is used in many fields [1]. The concept of artificial intelligence was first introduced by Prof. John McCarthy at the Dartmouth Conference held in 1956 [2]. Today, artificial intelligence is a very popular topic used in many areas of life. Artificial intelligence, sometimes unconsciously, is used in many areas such as cars, online shopping and appointment systems, phones, social media, online search engines, navigation, etc [3, 4]. The increasingly widespread use of artificial intelligence has brought about legal and ethical problems. For example, who will be responsible if unmanned aerial vehicles collide in mid-air and cause damage? Another example is the problems caused by the actions of robot workers and the compensation of the damage resulting from these actions. These examples indicate that recently, the issue of determining who would be responsible for the results of the actions of unmanned vehicles working with artificial intelligence is an ethically debated issue [5].

What an unmanned vehicle would do in case of a situation developing suddenly while driving in traffic will be the previously programmed decision of the artificial intelligence. Is it possible for this decision to be always ethically correct? Will the personal views of the person(s) doing the programming not be effective in these decisions? Can we expect that artificial intelligence can be programmed to make ethical decisions in every situation [6]? Although ethical codes for vehicles with automatic control were determined in June 2017 in Germany, it is anticipated that ethical dilemmas and discussions on the issue will continue and that these ethical codes will need to be updated again in the coming years [7].

Today, a lot of research is carried out on machine ethics. In addition to current research articles specific to the subject, there is also a web page (moralmachine.mit.edu) open to everyone. This website, prepared in several languages, includes scenarios created for people to respond. It is possible to create new scenarios besides the existing scenarios. Considering that unmanned vehicles will be used more widely in the coming years, research conducted in this way is important because it enables us to find out what the

weighted consensus of the society is. The research is carried out worldwide, and it is possible to participate in the research on the mentioned web page. According to the results of the research so far, the death of a small number of people is accepted instead of many, it is preferred to save not older people but young people's lives, and there is a tendency to protect people who follow traffic rules. However, due to the large number of variables in this research, it is possible to create millions of scenarios. People in cars or walking across the crosswalk may have different characteristics. The 18 people included in the scenarios are as follows: pregnant woman, baby, little boy, little girl, older woman, older man, homeless man, thief man, businesswoman, businessman, female physician, male physician, fat woman, fat man, athletic woman, athletic man, and man or woman without any specific characteristic. Apart from these, the following three options are presented: living creatures die or get injured due to an accident, or it is not clear what will happen to them. In the scenario, it can be fictionalized that the car can be unmanned or that people, if any, in the car can possibly be hurt by adding a barrier to the scenario. It is also possible to create different scenarios: besides humans, pets such as cats and dogs can be included, besides pedestrians walking across the crosswalk, there may be living beings in the car, the traffic light at the crosswalk might be green or red, the car might continue on its way, or the steering wheel might suddenly be turned. Thus, millions of scenarios can be created [8, 9].

In the present study, it was aimed to determine the effects of individual priorities on ethical decisions related to the use of artificial intelligence in traffic, through scenarios created by using Moral Machine, an online experimental platform designed to identify ethical dilemmas.

2. Materials and Methods

Type of the Study: It is a cross-sectional descriptive study.

Study Population: The study population included 75 instructors working in the Faculty of Health Sciences (n=38) and Health Services Vocational School (n=37) of Çankırı University. In the study, no sampling method was implemented. We tried to reach all the instructors in the population. However, the study was performed with 51 instructors. The participation rate was 68%. Before the study was conducted, ethical approval was obtained from the Ethics Committee of Çankırı University (decision date: March 2, 2020, decision number: 191). Permissions to conduct the study were obtained from the Dean of the Faculty of Health Sciences, and Health Directorate of Eldivan Health Services School where the study was to be conducted with the official letters dated March 16, 2020, and March 11 2020 respectively.

Data Collection Tool: A questionnaire consisting of three parts, prepared by the researchers in accordance with the literature was used to collect the data. The first part included the Personal Information Form containing 10 items questioning the socio-demographic characteristics of the participating instructors; the second part included the Importance of Health Scale used to determine the participants' individual priorities. In the third part, the participants were given 12 scenario examples of an unmanned vehicle moving in traffic with the illustrations, and they were asked what their decisions and justifications of their decisions were.

Importance of Health Scale: The scale was developed by Wallston et al. in 1976 as a 10-item scale by adding the health item to the 9 items they took from the 18-item Rokeach's Value Scale developed by Rokeach in 1973. It was adapted into Turkish by Esin and Erdoğan in 1997. The validity and reliability of the scale were evaluated with test-retest correlation. Its r value was 0.89. The significance level was $p<0.01$. The scale is used to determine an individual's perception of his/her health from such aspects as happiness, freedom, a comfortable life and a sense of achievement, and the order of his or her life goals in terms of their importance. The person is asked to rank 10 items on the scale from 1 to 10 according to their importance. The score obtained from the scale is determined by subtracting the number written at the beginning of the health item indicating its order from 11. The highest and lowest possible scores to be obtained from the scale are 10 and 1 respectively. A high score obtained from the scale indicates that the person values health highly [10].

Scenarios: To create the scenarios, Moral Machine [9], an online experimental platform designed to identify ethical dilemmas in which autonomous vehicles are used, was utilized. This web page, prepared in several languages, contains scenarios designed for people to respond. It is also possible to create new scenarios in addition to the existing ones. Scenarios are about decisions to be made in programming unmanned vehicles with artificial intelligence. In the present study, the participants were given scenarios together with their illustrations and explanations. Explanations were given in writing. At the beginning of a scenario, a general explanation was given about the scenario and the participants were asked, "How would you program the vehicle for such a situation? Please tick and write down the justification of your decision". In all the scenarios, one possibility is that what will happen to the person after he or she is hit by the vehicle is not known. Other possibilities are that the person dies or is injured. There is a question mark on the pedestrians to show this in the illustrations.

All the scenarios are listed below.

Scenario 1. Two women and two men are walking across the crosswalk on one side, and a woman and a man on the other side.
Scenario 2. A woman is walking across the crosswalk on one side, and a man on the other side.
Scenario 3. A little girl is walking across the crosswalk on one side, and a woman on the other side.
Scenario 4. An older man is walking across the crosswalk on one side, and a young adult man on the other side.
Scenario 5. A non-pregnant woman is walking across the crosswalk on one side, and a pregnant woman on the other side.
Scenario 6. A female physician is walking across the crosswalk on one side, and a woman who is not a physician on the other side.
Scenario 7. A male thief is walking across the crosswalk on one side, and a man who is not a thief on the other side.
Scenario 8. A male thief is walking across the crosswalk on one side, and a man who is not a thief on the other side. However, in this scenario, there are traffic lights, and the thief is crossing at the

green light and the other man is crossing at the red light.
Scenario 9. A homeless man is walking across the crosswalk on one side, and an older man on the other side.
Scenario 10. A homeless man is walking across the crosswalk on one side, and an older man on the other side. However, in this scenario, there are traffic lights, and the homeless man is crossing at the red light and the older man is crossing at the green light.
Scenario 11. An athletic man is walking across the crosswalk on one side, and a businessman on the other side.
Scenario 12. An athletic man is walking across the crosswalk on one side, and a female physician on the other side

The first scenario was given as an example in Figure 1. (moral-machine.mit.edu)

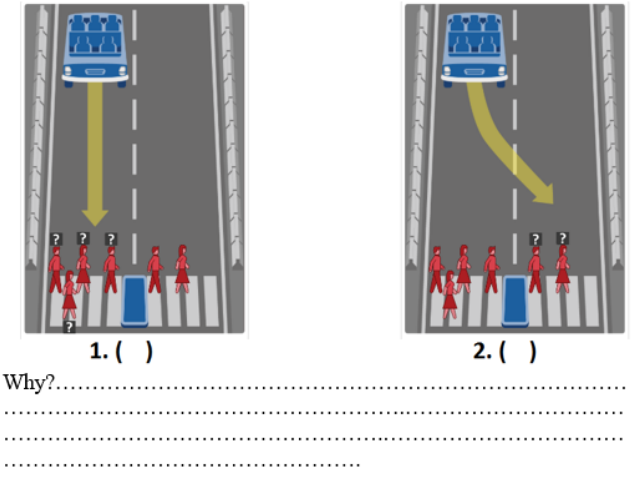

Fig. 1. Two women and two men are walking across the crosswalk on one side, and a woman and a man on the other side. How would you program the vehicle for such a situation? Please tick which illustration you would choose and write down the justification of your decision.

Data Collection: The instructors in the study population were informed about the study. After those who agreed to participate in the study gave their written informed consent, they were included in the study. The data were collected by the paper-and-pencil method at the faculty and school where the teaching staff included in the study sample worked. Although the scenarios were explained in written in the data collection forms, the participants were also informed about the scenarios verbally. Due to the COVID-19 pandemic, it took longer than expected to collect the study data. The data were collected between March 10, 2020, and October 13, 2020.

Analysis of the Data: The data obtained in the study were analyzed in the SPSS program. In the analysis, numbers and percentages were used. P-values less than 0.05 were considered statistically significant. The data obtained in the study were also analyzed in accordance with the qualitative study. Content analysis of the data obtained from open-ended questions was made by coding. Coding was achieved based on the concepts extracted from the data; in other words, an inductive analysis was performed [11]. The answers given to open-ended questions were read by the researchers and important points within the scope of the purpose were determined. In this way, the topics were generated directly from the data.

3. Results

Socio-demographic characteristics of the participants are given in Table 1. As is seen in the table, the majority of the participants was women (78.4%), was married (68.6%), was between the ages of 24 and 44 years (82.4%), had a doctorate degree (62.7%), perceived their socio-economic status as good (64.7%), and used vehicles actively (82.4%).

Table 1. Descriptive characteristics of the participants (n=51)

Descriptive characteristics	n	%
Sex		
Women	40	78.4
Men	11	21.6
Age		
24-44	42	82.4
45-54	7	13.7
55-64	2	3.9
Marital Status		
Married	35	68.6
Single	16	31.4
Number of children		
No	19	37.3
1	20	39.2
2	12	23.5
Education		
Bachelor's degree	1	2.0
Post Graduate	18	35.3
Doctorate	32	62.7
Socio-economic Status		
Good	33	64.7
Mid	16	31.4
Poor	2	3.9
Active Driving Status		
Yes	42	82.4
No	9	17.6
Perception of Importance of Health	**Mean±SS**	
	9.01±1.93	

The analysis of the life goals of the participants in terms of importance demonstrated that "Health" (64.7%) ranked first, "Freedom" (11.8%) second, and "A comfortable and successful life" (7.8%) third. The mean score they obtained from the Importance of Health Scale was 9.01±1.93 (mini: 1, max: 10).

According to the analysis of the responses given by the participants, the majority of them (86.3%) preferred to protect a larger number of people rather than a small number of people. As for the sex, they wanted to protect the woman rather than the man. The majority of them also wanted to protect the child rather than the adult (86.3%), the physician rather than the adult who was not a physician (72.5%), an adult who was not a thief rather than a thief (92.2%), and the pregnant woman rather than the non-pregnant woman (92.2%).

Table 2. Distribution of participants' responses to the scenarios

SCENARIOS	n*	%
Scenario 1		
Small number of people	44	86.3
Larger number of people	5	9.8
To anyone	2	3.9
Scenario 2		
Women	8	15.7
Men	40	78.4
To anyone	2	3.9
Indecisive	1	2.0
Scenario 3		
Child	7	13.7
Adult	44	86.3
Scenario 4		
Elderly	20	39.2
Adult	29	56.9
To anyone	2	3.9
Scenario 5		
Pregnant woman	2	3.9
Non-Pregnant Woman	47	92.2
To anyone	2	3.9
Scenario 6		
Physician	11	21.6
Non-physician adult	37	72.5
To anyone	2	3.9
Indecisive	1	2.0
Scenario 7		
Thief	47	92.2
Non-thief adult	1	2.0
To anyone	2	3.9
Indecisive	1	2.0
Scenario 8		
Thief advancing at green traffic light	21	41.2
Non-thief adult driving at red traffic light	25	49.0
To anyone	5	9.8
Scenario 9		
Homeless	33	64.7
Elderly	12	23.5
To anyone	3	5.9
Indecisive	3	5.9
Scenario 10		
Homeless driving at red traffic light	44	86.3
Elderly driving at a green traffic light	4	7.8
To anyone	2	3.9
No answer	1	2.0
Scenario 11		
Athletic	40	78.4
Businessperson	7	13.7
To anyone	2	3.9
Indecisive	2	3.9
Scenario 12		
Athletic	45	88.2
Physician	3	5.9
To anyone	2	3.9
Indecisive	1	2.0

***** The side that the vehicle prefers to move forward and therefore to hit

It was also observed that some of the participants who did not choose any of the two options wrote down that they were undecided, or they did not want to hit anyone. For example, the answers given to scenario 4 demonstrated that more than half of the participants (56.9%) preferred to protect the elderly person, while 3.9% did not choose any option and wrote down that they preferred not to hit anyone (Table 2).

In scenario 9, while only 23.5% of the participants preferred to hit the elderly person, the majority preferred to protect the elderly person. As for the responses given in Scenario 11 and Scenario 12, the majority of the participants wanted to protect not the athletic person but the businessperson or physician (Table 2).

In the scenarios, there were changes in the preferences of the participants when traffic rules were concerned. While the thief was not protected by 92.2% of the participants in scenario 7, the percentage of people who preferred to hit the thief decreased to 41.2% in scenario 8, because in scenario 8, the thief crossed at the green light, and the other person did not obey the traffic rules and crossed at the red light. The same situation was observed in the 9th and 10th scenarios. In scenario 9, while 64.7% of the participants did not want to protect the homeless person, this percentage increased to 86.3% in scenario 10, because in scenario 10, the homeless person crossed at the red light. Some of the participants who did not choose any of the two options wrote down that they did not want to change the lane or that they preferred to hit the barrier.

In the study, no significant difference was found in the statistical analyses performed separately to investigate the relationship between the scores given to the scenarios by the participants and the independent variables (sex, education, marital status, having a child, economic status, etc.) and between the scores they gave to the scenarios and the scores they obtained from the Importance of Health Scale ($p \geq 0.05$).

4. Discussion

According to the analysis of the responses given by the participants, the majority (86.3%) preferred that not many, but few people be harmed. This result is an expected result regardless of the variables (pedestrians, road, other conditions, etc.).

The results of the research conducted by Awad, Dsouza, Shariff, Rahwan, and Bonnefon (2020) with a scenario which included a train running on the railroad, and individuals on the railroad and bridge are similar to the results of our study. The research which included 70.000 participants was conducted in 10 different languages in 42 countries. Although the results of the research differed from one country to another, most of the participants preferred to switch the railroad so that few people would die or to push the person on the bridge to the front of the train to save more people [12].

According to the analysis of the participants' decisions regarding to the sex of the pedestrians, most of them preferred to protect the woman. One of the reasons put forward for this was that the possibility of the woman's being a mother. In the study, the participants had the opinion that if something happened to the mother,

her child might also be affected adversely. The following are statements made by the participants reflecting their opinions.

"Women have responsibilities at home, especially regarding childcare. Children cannot live without a mother, but they can continue their life without a father." (Participant (P) 20, 37 years old, woman, scenario 2)

"If the woman lives, she can take care of her children (if she has any)." (P21, 35 years old, woman, scenario 2)

Another justification for protecting women was that men are stronger than women. The following are the statements made by the participants regarding this:

"Because women are physically more vulnerable"(P10, 40 years old, woman, scenario 10)

"Because the man is stronger, he is less damaged after collision" (P12, 51 years old, woman, scenario 10)

"Because I think that men can be physiologically stronger than women" (P41, 30 years old, man, scenario 10)

Given the other characteristics of the pedestrians in the illustrations, most of the participants preferred to protect not adults but children (86.3%), not the adult who is not a physician but the physician (72.5%), and not the thief but the adult who is not a thief (92.2%).

Their justification for protecting the child was that the child is less likely to be saved after an accident, the child may not think that she could escape from the vehicle, and the child is thought to have more years to live than the adult has. Examples of this are the following statements:

"The adult is more likely to live after the collision, an adult has lived longer compared to the child, and the child has years to live as an adult has lived" (P5, 28 years old, man, scenario 3)

"Adults are physically stronger." (P12, 51 years old, woman, scenario 3)

"The adult is more conscious, the child cannot realize the seriousness of the situation." (P8, 25 years old, woman, scenario 3)

Among the factors affecting the participants' decisions in the scenarios are the individual characteristics of the pedestrians, and the location of the vehicles and pedestrians on the street.

Among the individual characteristics of pedestrians affecting the participants' decisions were the pedestrian's being strong/weak, being affected by trauma more/less, productivity in the society, being young and thus having more years to live. Some of the participants who stated that a businessperson could provide job opportunities to many people, and that a physician could save many people's lives. The quite common view was that athletic people would be affected by the trauma less or that they could escape from the car agilely, or that the elderly person could not move quickly. In the case of an elderly person, the majority of the participants had the same opinion they had in the child-adult scenario. Most of the participants thought that the older adult could not escape from the vehicle quickly and he would be affected more seriously than would the younger adult after the accident. However, some of the participants did not want to save the elderly person. One of them justified her opinion as follows:

"The younger adult may be a father, have responsibilities at home, or have dreams of going to university. Then he will contribute to the country." (P27, 34 years old, woman, scenario 4)

The results of our study demonstrated that according to the participants' opinions regarding the characteristics of the pregnant woman, she would not manage to escape from the vehicle, and she carried another living creature in her body. The decision coincides with the view of preferring that not many, but few people be harmed, as in the first scenario. The following are the statements made by the participants regarding this:

"A pregnant woman's movements are slow. The other woman can act faster." (P30, 40 years old, man, scenario 5)

"A non-pregnant woman can escape from the vehicle by maneuvering. If the pregnant woman is hit, two lives, that is, more individuals are harmed." (P24, 40 years old, woman, scenario 5)

As for their decision regarding the businessperson and the physician, the participants justified their decision by considering how beneficial the person to the society. A businessperson can provide job opportunities for others, and a physician can save other lives. Therefore, the death of the physician means the death of other people. Some of the participants said that the physician could help people if they were injured at the accident, which indicates that not only the role of the physician in the society but also her role during the accident affected their decision.

In the scenario including a homeless person, there were two extreme views: While some of them thought that the homeless person's life was difficult, he could be hospitalized after being hit by the vehicle, and therefore he could have a place to stay for a while, the others thought that he was not productive, had no benefit for the society and therefore not his but the other person's life should be saved. According to scenario 9, 64.7% of the participants did not want to save the homeless person's life, whereas in scenario 10, this percentage increased to 86.3% because in this scenario, the homeless person crossed at the red light.

In the scenarios including the thief, the participants gave striking responses. According to scenario 7, while the majority of the participants (92.2%) preferred the thief's being hit, this rate decreased to 41.2% in scenario 8 because in this scenario, the thief crossed at the green light and the other pedestrian crossed at the red light. In scenarios 8 and 10, one of the factors affecting the participants' decisions was the person's complying with the traffic rules.

Especially in scenarios 7 and 8 including the thief, the variable affecting the participants' decision was the person's complying with the traffic rules. Under normal conditions, the thief is not an individual accepted by the society even if he obeys the traffic rules. However, since the scenarios in question took place in traffic, complying with these rules was an important factor affecting the participants' decisions. Another factor affecting the participants' decisions was the location of the pedestrians and vehicles.

While some of the participants preferred the vehicle to go straight without changing lanes, some other participants thought that if the vehicle changed lanes, it would take longer for the vehicle to reach the pedestrian than if the vehicle moved straight, so

that the pedestrians would have an opportunity to escape.

On the other hand, some participants took the positions where the vehicle and the pedestrians were into account and thought that the pedestrian would cross the crosswalk until the vehicle came where he was. Some participants paid attention to whether the vehicle was within sight of the pedestrian or if one pedestrian was more visible to the vehicle than was the other. These participants made the following explanation to justify their decisions:

"Because the distance between the vehicle and the woman is long enough, she will have crossed until the vehicle arrives." (P7, 30 years old, woman, scenario 2)

"The man will have crossed until the vehicle arrives." (P25, 45 years old, woman, scenario 2)

"The car is not within sight of the woman, but within sight of the man" (P24, 50 years old, woman, scenario 2)

"Since the vehicle is in the direction of the road the elderly person is on, the elderly person can see the vehicle coming, but the younger adult cannot see it" (P32, 28 years old, man, scenario 4)

Because the illustrations have only two options, some of the participants who did not choose any of these two options wrote down that they would not hit anyone or would hit the barrier. This result suggests that the participants experienced serious ethical dilemmas in some scenarios. Another factor affecting the participants' decision hitting the barrier was probably the fact that there was no one in the car. They may have thought that no one would be harmed by hitting the barrier. Some of the participants' statements indicated that they put themselves in the place of the driver. The following are the statements made by the participants regarding this:

"The pedestrian is on my way" (P36, 35 years old, woman, scenario 11 -12)

"I would drive in the same lane, so as not to confuse pedestrians" (P9, 25 years old, man, he answered most of the scenarios this way)

In the scenarios, the participants were told that it was not known what would happen to pedestrians crossing the crosswalk after they were hit by the vehicle. In other words, pedestrians could be killed or injured, or would not suffer any injury or damage. In our scenarios, it is not known what will happen to pedestrians. It is thought that this was one of the variables affecting the participants' decisions. Their thoughts that athletic individuals would suffer less damage and that children and women might suffer more after an accident may have been affected by this variable.

In addition to all these results, some of the participants gave their responses from different perspectives. For example, some participants thought that the decision should be made according to the right of way of the vehicle. The following are the statements made by the participants regarding this (in Scenario 8, while the adult who is not a thief is crossing at the red light and the thief is crossing at the green light, the vehicle is moving in the lane where the thief is):

"The person crossing at the red light wanted to cross because there was no vehicle there. Since the vehicle does not have the right of way, I would first program it to progress on its own side… Priority should be given to people's own intelligence not to artificial intelligence. I don't discriminate physicians against thieves or vice versa" (P3, 42 years old, man, scenario 8)

"Even if the pedestrian was a thief, I would definitely reflexively drive to the side where I have the right of way." (P18, 37 years old, woman, scenario 8)

According to the response below, the participants made their decisions by taking the benefit of the majority of the society into account in line with the utilitarianism.

"According to the utilitarian philosophy of ethics, the physician should live in order to be beneficial to people and to save lives." (P21, 35 years old, woman, scenario 6)

The scenarios created in the study contain more and more variables that should be considered. Therefore, as the scenarios continued, the participants had difficulty in making decisions. It is possible to understand their difficulty from the statements of some of the participants:

"Ethical dilemma / I am undecided, other factors should be considered" (P26, 47 years old, woman, scenario 12)

Although some participants were undecided or had dilemmas, the other participants made a choice out of two options by providing justifications:

"A professionally detectable program entails ethical debates. A non-physician may be a senior bureaucrat. However, if it is an ordinary individual, the physician can have priority over other people." (P30, 40 years old, man, scenario 6)

At the end of the study, it was observed that as the scenarios became more complex, the ethical dilemmas experienced by the participants increased. This result is consistent with the results of other studies conducted on this subject [13]. Here, the decision maker is the people themselves because they program the decisions beforehand; however, it is thought that in the coming years, the decision will be directly made by the artificial intelligence because artificial intelligence will be a learning intelligence. Therefore, it is thought that in the use of unmanned vehicles, the decision in an unusual situation in traffic will be left to artificial intelligence, so people will tend not to prefer these vehicles [14].

5. Conclusions

The results of the study demonstrated that among the factors affecting the participants' decisions in the scenarios were the individual characteristics of the pedestrians, their compliance with the traffic rules, the positions of the vehicles and pedestrians on the street, the uncertainty of what will happen as a result of the vehicle hitting the pedestrians (that is, the possibility of not dying), and the absence of an individual in the vehicle.

The results of the study demonstrated that in the given scenarios, the majority of the participants preferred to protect

- a larger number of people rather than a small number of people,
- a woman rather than a man,
- a child rather than an adult,
- a physician rather than an adult who is not a physician,
- an adult who is not a thief rather than a thief,

- a pregnant woman rather than a non-pregnant woman,
- an individual who obeys the traffic rules, even if it is a thief, rather than an individual who does not obey the traffic rules.

The participants' socio-demographic characteristics and individual priorities did not affect the responses they gave to the scenarios in the study, which was probably due to the homogeneous distribution of the participants in the study in terms of their socio-demographic characteristics, therefore, we recommend that similar studies should be conducted with different sample groups.

It is emphasized that ethical principles should be established for smart machines with artificial intelligence and that these principles should be updated in line with the changing conditions over the years [15]. However, despite the ethical principles in question, in ethical problem clusters (such as euthanasia, abortion, genetic studies), decisions may be made on an individual basis. Therefore, artificial intelligence has become one of the problem clusters of bioethics due to the increase in its use in many areas directly related to human life, such as health, apart from traffic.

Conflict of Interest Statement

The authors declare that there is no conflict of interest in the study.

CRediT Author Statement

Güzin Yasemin Tunçay: Conceptualization, Methodology, Project administration, Data collection, Writing - original draft, Writing-review & editing
İlknur Göl: Data collection, Formal analysis, Writing-review & editing
Nesrin Çobanoğlu: Supervision, Validation, Writing-review & editing

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