Theory of Planned Behavior: Application for risk taking in traffic

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Abstract: This present research is aimed to determine the predictive value of an extended model of the Theory of Planned Behavior for the intent to commit a series of traffic violations, on Romanian subjects. At the same time, the causal relationship between model elements and behavior was analyzed, as well as gender and age differences in performing risky behavior.

Overall, the results presented habit as the most powerful predictor for behavioral intent. Other predictors identified were: - attitude toward behavior, subjective perception of norms or moral norm explaining. Also consistent with the results obtained in previous studies, we determined the existence of gender and age differences in the behavior of non-compliance.

In the last part of the paper we discussed the limits of this present research, directions for future research and intervention models that could be implemented in order to reduce the tendency of drivers performing risky behavior in traffic.

Keywords: Theory of Planned Behavior, traffic, risk, habit

Introduction

The Theory of Planned Behavior was developed in 1985 by Ajzen, based on the Reasoned Action Theory, postulated by Fishbein and Ajzen in 1975.

The theory of Reasoned Action, in turn, is an adaptation of Dulany's Theory of Propositional Control, developed in 1968. This theory states that an individual's verbal responses occurs according to two assumptions, namely what the individual believes the group's feedback will be and the individual's hypothesis regarding the congruence of his/her response with the group norms.

Using this theory as a starting point, Fishnein and Ajzen enunciated the Reasoned Action Theory, stating that an individual's intention to perform a specific act in a certain situation is given by his/her beliefs about the consequences of the behavior (in a given situation), mainly whether the behavior will have any consequences, the evaluative aspect of these consequences – the individual evaluation of these consequences, by a normative belief – the individual's belief as to what he is supposed to do in that situation and by his/her motivation to comply with this norm, if he/she wants to do or that which he/she thinks they should do, according to the norm (Fishbein, 1967, according to Ryan, Bonefield, 1975).

This theory was developed, however, to discuss the motivation controlled behaviors, and does not explain habitual behaviors or those behaviors that do not involve a conscious decision-making process.

In part to extend the theory to cover involuntary habitual behavior, Ajzen added in 1985 a new factor to the Theory of Reasoned Action, called perceived behavioral control. The revised theory was named the Theory of Planned Behavior. The

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concept of perceived behavioral control determines the behavior, both directly and indirectly, through behavioral intention.

The immediate determinant of human behavior remains behavioral intention, if two conditions are met: measurement in the same conditions of time, subject, action and context, as well as a measurement of behavioral intention and actual behavior at a minimum distance in time.

The intention, in turn, is determined cumulatively by the attitude toward behavior, subjective norm and perceived behavioral control.

Due to the complexity of the decision-making process, the number of factors involved and their complexity, the model of the Theory of Planned Behavior was considered even by its creator, Ajzen, to be perfectible.

Many researchers have tried to find new elements that could be integrated in the model of the Theory of Planned Behavior to explain a greater variation of the behavioral intention, some of these attempts obtaining results that have allowed researchers to broaden the theoretical model.

The first change was brought about by Aberg *et al.*, 1997, who added to the three basic elements of the models studied thus far, namely the driver, vehicle traffic and the physical environment, a fourth element, the social environment of traffic. The study results showed that most drivers overestimated the speed of other drivers, at the same time saying that other drivers' speed in traffic is important in the choice of driving speed.

A number of researchers have tried to bring amendments to the Aberg model, introducing elements, such as behavioral habits (Verplanken & Aarts, 1999), defined as semi-automatic actions in performing well learned behavior (Charng *et al*., 1988), personal moral norms regarding the discussed behavior, which are defined as perceptions of moral fairness of the behavior (Ajzen, 1991; Manstead, 1999, cit. in Conner *et al.*, 2003), or anticipated regret - defined as contemplating the possibility of having made the wrong choice (Eagly & Chaiken, 1993, cit. in Manstead & Parker, 1995).

Risky driving behaviors have been the subject of many studies in the psychology of transport. The model of the theory of planned behavior has been often used in predicting the occurrence of these behaviors. The relationships between predictors of the model and a wide range of driving behaviors, from speeding to dangerous overtaking or not wearing seat belts, were analyzed, with encouraging results, the model elements explaining a significant proportion of the variance of the intention to produce the behavior.

Other research studies have supported the finding that attitudes, subjective norms and perceived behavioral control can independently explain the variance in driving behavior. These three factors have explained a significant proportion of the variance for the intention to comply with the speed limits (Elliott *et al.,* 2003) and intention to exceed the speed limit (Letirand & Delhomme, 2005) as well as for the variance of the observed speed choice in a speed simulator (Warner & Aberg, 2006; Elliott *et al.,* 2007). Strong correlations were found between self-reported

and observed behavior, suggesting that self-reports are a reasonable surrogate for observed behavior (Elliott *et al.,* 2007), and support previous evidence for the existence of a strong relationship between the observed speed and self-reported speed (Haglund & Aberg, 2000).

Therefore, we believe that there is both theoretical and statistical data to support the existence of a relationship between the model of the Theory of Planned Behavior and the intention to cause violations of the norms while driving. One of the objectives we can set is verifying the existence of this relationship in a Romanian context.

A number of studies have focused on the relationship between the model of the theory of planned behavior and risk identification or risk-taking.

Most definitions of risk include a probability estimate for the appearance of a negative effect (Brown, 1994, cit. in Rundmo & Inversen, 2004).

It may be considered impossible to perceive risk, since it is not something tangible. Sjöberg (1979), said that risk is only about thoughts, beliefs and constructs, thus a person's estimate of the risk of a situation can be very different from objective estimates.

We can differentiate between the perception of personal risk and general risk perception. People tend to estimate the overall risks as higher than the personal ones. Most people evaluate themselves as better drivers than other drivers (Rundmo & Inversen, 2004)

Identifying risks is essential to driving. Drivers who can quickly detect threats are less involved in traffic accidents than those who detect these hazards slower (e.g. Hull & Christie, 1992, McKenna & Crick, 1991, cit. in Borowsky *et al.,* 2009).

Method

Participants
This research was conducted on 328 drivers, of which 172 were male subjects and 156 female, 116 subjects were aged between 18 and 24 years, 116 subjects were aged between 25 and 50 years, and 96 subjects were aged over 50 years. In terms of driving experience, 99 subjects had driven for less than 10,000 km, 38 subjects between 10,000 km and 25,000 km, and 190 subjects more than 25,000 km.

Instruments
        For this present research we developed a questionnaire which measured several dimensions of the Theory of Planned Behavior as well as behavioral intention and behavior choice, through six scenarios labeled from A through F, each describing a traffic related situation where the subjects needed to choose between violation and compliance with a certain traffic norm (A - speeding in a locality, B - driving without their seatbelt, C - driving after consuming alcohol, D - taking a phone call while driving without a hands-free device, E - speeding on an European road, and F - not slowing down and stopping at a pedestrian crossing).

As an example, scenario A stated: „You are driving through a locality with a speed of 50 Km/h (i.e. the maximum speed limit inside localities in Romania). Visibility is good, and there is little traffic. You could accelerate to 70Km/h, especially since you know there are no traffic radar devices in the area." The scenario then offered two choices: either stay within the legal speed limit or accelerate.

Each scenario was followed by 15 items, grouped into two subscales.

The first items assessed the risk the subject perceived, both for themselves (e.g., for scenario A, Item 1: *Assess how risky it would be for you to accelerate to 70km/h under these circumstances*) as well as for other drivers (e.g., for scenario A, I3: *If another driver chose to accelerate to 70km/h under these circumstances, how much risk do you think he/she is taking*?). The subjects were asked to respond to these items on a Likert- type scale from 1 to 8, where 1 signified „very little risk" and 8 signified „very much risk".

The second subscale contained items measuring attitude toward the behavior (e.g. I1: *What is your opinion regarding breaking the speed limit in a locality?*), subjective norms (e.g. I2: *What would my family think if they found out I broke the speed limit in a locality?*), perceived control (e.g. I3: *I break the speed limit in a locality only in the situations I want to*), perceived behavior of others (e.g. I4: *When I break the speed limit in a locality, I believe a great number of drivers do the same thing.*), moral norms (e.g. I11: *It would be wrong for me to break the speed limit in a locality.*), anticipated affective reaction (e.g. I14: *I would regret it if I broke the speed limit in a locality*), which the subjects had to answer on the same Likert-type scale, from 1 to 8, where 1 meant „total disagreement" and 8 meant „total agreement". The subscale also contained one item measuring intention (I10: *How probable is it that you will break the speed limit in a locality in the next month?*) and habit (I13: *How often have you broken the speed limit in a locality in the past month?*). The response to these two items was also given on a scale from 1 to 8, where 1 signified „very improbable" for the item measuring intention and „never" for the item measuring habit, while 8 translated through „very probable" for intention and „very often" for habit.

Procedure

The questionnaire was applied by undergraduate students at the Faculty of Psychology and Educational Science in exchange for credits. Their task consisted of applying the questionnaire to 12 subjects matching the age and gender criteria given to them.

In order to familiarize themselves with the task, a meeting with the students took place, during which they were told about the structure of the questionnaire, and they were given the application instructions.

The students were given a dead-line for the task, and contact was maintained with them through e-mail and telephone in order to resolve any problems that could have arisen.

Results

To validate the questionnaire, the Cronbach alpha coefficient of internal consistency was calculated for each of the predictors considered in the questionnaire as well as each scenario.

For habit, after analyzing the internal consistency, we eliminated an item, which lead to an increase in the coefficient alpha with an average of 0.18, the final values being located between 0,714 and 0,943.

Next, in order to examine the predictive power of the proposed theoretical model of the Theory of Planned Behavior, we conducted a series of regression equations for each of the scenarios presented in the questionnaire, with the intention of violating the rule, respectively behavior choice being the criterion variables.

First, we analyzed the relationship between the predictors and the intention to manifest behavior. Using the Forward method, we added both traditional elements of the analysis model of the Theory of Planned Behavior as well as additional elements. The predictors of the model were attitude towards behavior, perceived control, subjective perception of norms, perceiving behavior of other drivers, moral norms regarding the traffic violation covered by the scenario and anticipated regret.

The results showed that the main predictor for the intention of breaking the norm was habit, which explained between 22.8% and 80.5% of the variance in the scores for the criterion variable, across all scenarios. Other predictors were, depending on the scenario, moral norm (explaining 0.4 to 2.2% of the variance for intention), attitude toward behavior (explaining 0.8 1.2% of the variance for intention) and the subjective perception of norms (explaining 1% - 2% of the variance for intention).

Table 1. *Prediction models for intention to break the norms, for every scenario*
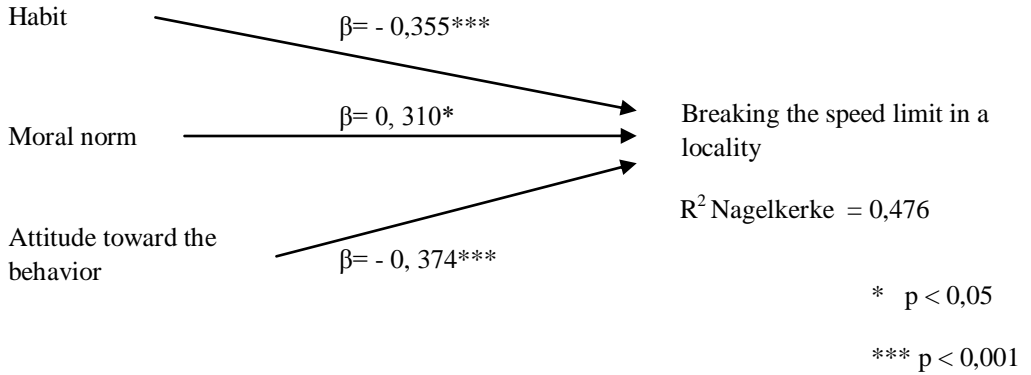
Scenario	Predictors	β	$R^2_{adjusted}$
A	Habit	0,681***	0,650
	Moral Norm	-0,188***	
B	Habit	0,823***	0,762
	Moral Norm	-0,087**	
C	Habit	0,425***	0, 240
	Attitude toward behavior	0, 134**	
D	Habit	0,801***	0, 812
	Attitude toward behavior	0, 131***	
E	Habit	0,789***	0, 760
	Subjective perception of norms	0, 133***	
F	Habit	0,442***	0, 295
	Subjective perception of norms	0, 171**	

N=328, **$p< 0.01$, *** $p< 0.001$

These findings support the existing data regarding the predictive power of habit for behavioral intention, suggesting that this construct is suitable to be added to the prediction model of the Theory of Planned Behavior. Our results thus match those obtained by Forward (2009), who determined that habit is the strongest predictor for breaking the speed limit in a locality. It should be noted, however, that the predictive power of habit in this present research goes far beyond the power of prediction identified by the author in his study.
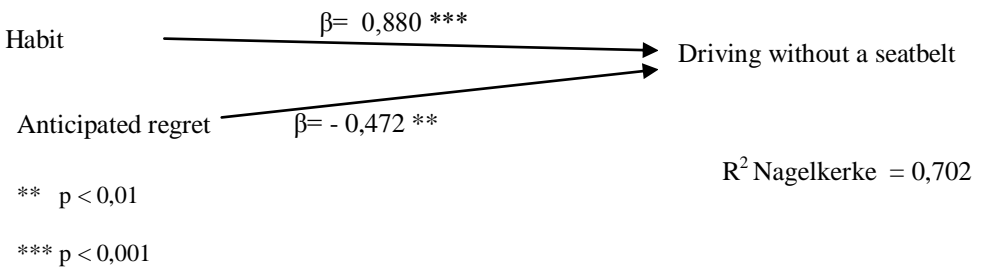
In order to determine the predictive models for behavior choice in the situations described by the six scenarios, we used binary regression.

Fig. 1 – Prediction model for the behavior of breaking the speed limit in a locality (scenario A)

Habit

β= - 0,355***

Moral norm

β= 0, 310*

Breaking the speed limit in a locality

R^2 Nagelkerke = 0,476

Attitude toward the behavior

β= - 0, 374***

*   p < 0,05

*** p < 0,001

After calculating the binary regression for scenario A, the best model contained three predictors: habit, attitude toward behavior and personal standards. This model explained 47.6% of variance in behavior scores change for breaking the speed limit in a locality. Habit in breaking the norm, as well as a positive attitude towards breaking the speed limit lowers the chances that the subject chooses to maintain the legal speed limits. In the case of moral norms, more individuals consider that this behavior is wrong, the higher the probability that they do not exceed the maximum legal speed.
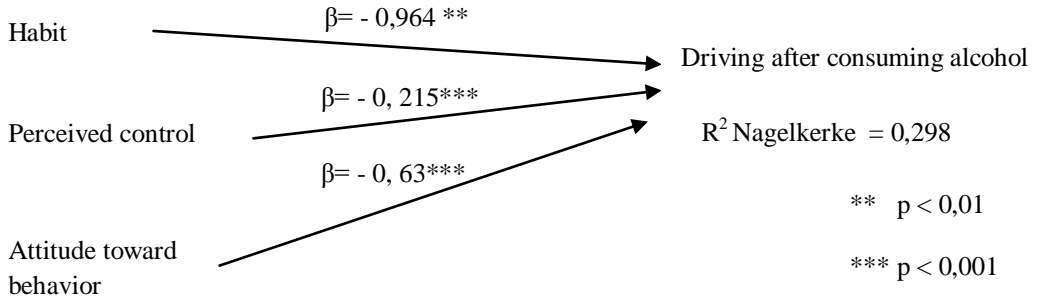
Fig. 2 – Prediction model for the behavior of driving without having a seatbelt (scenario B)

Habit

β= 0,880 ***

Driving without a seatbelt

Anticipated regret

β= - 0,472 **

R^2 Nagelkerke = 0,702

**   p < 0,01

*** p < 0,001

For scenario B, the predictive model includes two predictors, namely habit and anticipated regret. Together they explained 70.2% of the variance in behavior choice, driving without a seat belt. Habit increases the chances for subjects to drive

without a seatbelt. Anticipating regret decreases the likelihood for subjects to drive without a seatbelt.

Fig. 3 – Prediction model for the behavior of driving after consuming alcohol (scenario C)

Habit
$\beta= -0,964$ **
Driving after consuming alcohol

$\beta= -0,215$***
R^2 Nagelkerke $= 0,298$

Perceived control

$\beta= -0,63$***

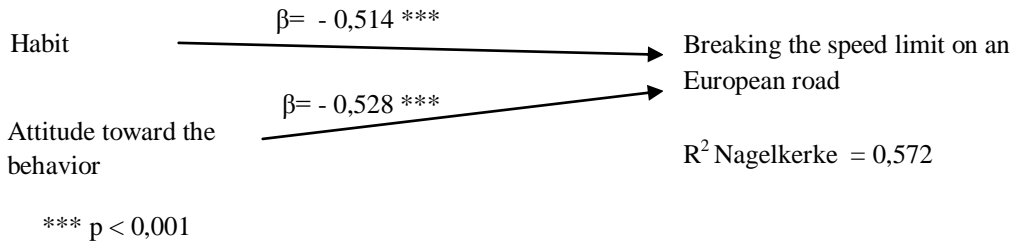** $p < 0,01$

Attitude toward behavior

*** $p < 0,001$

For the behavior analyzed in scenario C, driving after consuming alcohol, the predictive model resulted contains three predictors: attitude towards the behavior, perceived control over behavior and habit. Together, the three predictors explained 29.8% of the variance behavior. A positive attitude towards rule violation decreases the chances that subjects refuse to drive after drinking. The increase in their perceived control and habit also has the same effect.

Fig. 4 – Prediction model for the behavior of answering the phone while driving, without connecting to a hands free type device (scenario D)

Habit
$\beta= -0,842$ ***
Answering the phone while driving, without connecting a hands free device type

Anticipated regret
$\beta= 0,426$ ***

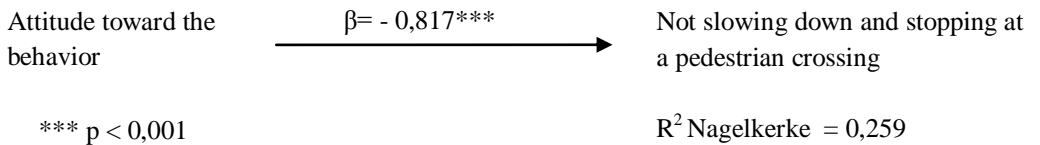*** $p < 0,001$
R^2 Nagelkerke $= 0,685$

In scenario D, through the analysis of the behavior „answering the phone while driving, without connecting to a hands free type device" resulted a predictive model without a constant, with two predictors: habit and anticipated regret. Habit to answer calls without having to connect to a hands-free device decreased the chances that the subjects chose to reject the call, while negative anticipated regret increased the chances that they would choose to reject the call.

Fig. 5 – Prediction model for the behavior of breaking the speed limit on a European road (scenario E)

Habit
$\beta = -0,514$ ***
→ Breaking the speed limit on an European road

Attitude toward the behavior
$\beta = -0,528$ ***
→

R^2 Nagelkerke $= 0,572$

*** $p < 0,001$

Regression performed for the prediction of behavior exemplified in Scenario E, namely breaking the maximum speed limit on a European road, resulted in a model with two predictors, habit and attitude toward the behavior, which explain 57.2% of the variance of behavior choice. Both habit and positive attitude regarding the discussed behavior decreased the likelihood that subjects chose to maintain their speed within legal limits.
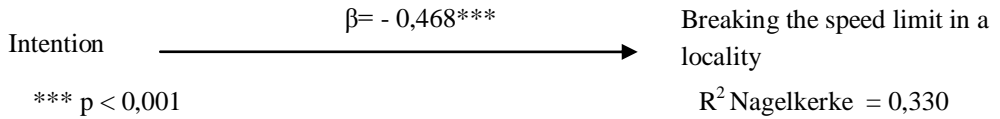
Fig. 6 – Prediction model for the behavior of not slowing down and stopping at a pedestrian crossing (scenario F)

Attitude toward the behavior
$\beta = -0,817$ ***
→ Not slowing down and stopping at a pedestrian crossing

*** $p < 0,001$

R^2 Nagelkerke $= 0,259$

Regression for the behavior described in the last scenario, scenario F, slowing down and stopping at a pedestrian crossing, resulted in a predictive model with one predictor, which is the attitude toward behavior. This model explains 25.9% of the variance in the changes for the score to the criterion variable. The subjects who had a more positive attitude towards the violation of the rule, resulted in decreased likelihood that they would choose to slow down and stop at a pedestrian crossing.
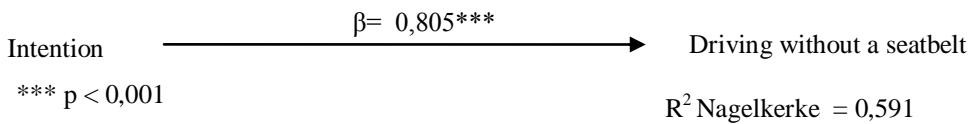
We also checked the predictive power of behavioral intention for choosing to carry out the behavior. Overall, intention proved to be a good predictor of the subjects' behavior choice, as you can see in the figures below:

Fig. 7 – Prediction model for the behavior of breaking the speed limit in a locality (scenario A)

Intention ——————→ β= - 0,468*** Breaking the speed limit in a locality
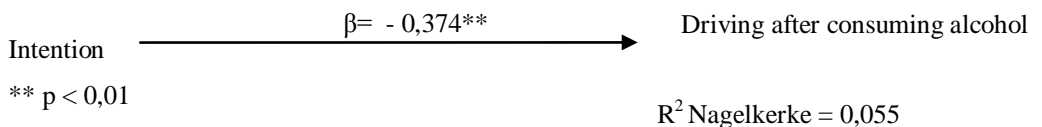
*** $p < 0,001$ R^2 Nagelkerke $= 0,330$

In Scenario A, behavioral intention predicted 33% of the variance criterion changes. If the subject intended to violate the norm, the likelihood that he/she would maintain accepted speeds decreased.

Fig. 8 – Prediction model for the behavior of driving without having a seatbelt (scenario B)

Intention ——————→ β= 0,805*** Driving without a seatbelt

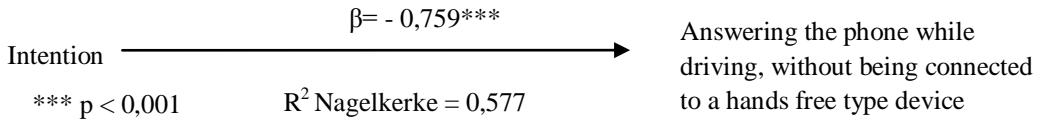*** $p < 0,001$ R^2 Nagelkerke $= 0,591$

For Scenario B, 59.1% of the variance of intention predicted criterion variance. If the subject does not intend to attach the seat belt, it's increasingly likely that he/she travels without a seatbelt attached.

Fig. 9 – Prediction model for the behavior of driving after consuming alcohol (scenario C)

Intention ——————→ β= - 0,374** Driving after consuming alcohol
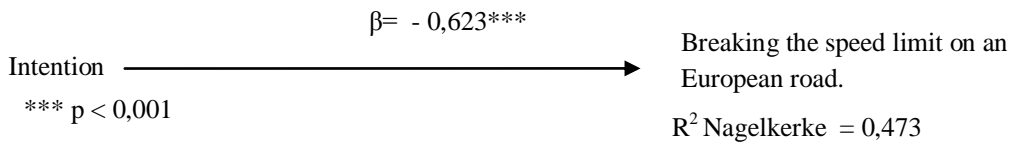
** $p < 0,01$ R^2 Nagelkerke $= 0,055$

In the case of the third situation, the intention predicted 5.5% of variance in behavior scores. Increased intention to violate the norms decreased the likelihood that the individual refused to drive after drinking.

Fig. 10 – Prediction model for the behavior of answering the phone while driving, without being connected to a hands free type device (scenario D)

$\beta = -0,759^{***}$

Intention ————————————————→ Answering the phone while driving, without being connected to a hands free type device

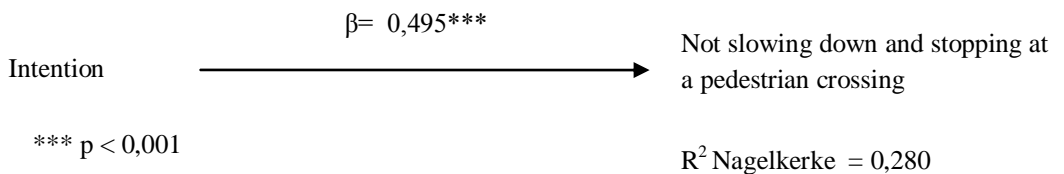$^{***} p < 0,001$ R^2 Nagelkerke = 0,577

In this case, intention predicted 57.7% of the variance of the scores for the criterion variable. Intention to answer lowered the probability that the individual rejected the incoming call while driving.

Fig. 11 – Prediction model for the behavior of breaking the speed limit on a European road (scenario E)

$\beta = -0,623^{***}$

Intention ————————————————→ Breaking the speed limit on an European road.

$^{***} p < 0,001$ R^2 Nagelkerke = 0,473

For scenario E, 47.3% of the intention variance explained variance in criterion scores. Intention to violate the norm lowered the probability that the individual chose to maintain the legal speed limits on a European road.

Fig. 12 – Prediction model for the behavior for not slowing down and stopping at the pedestrian crossing (scenario F)

$\beta = 0,495^{***}$

Intention ————————————————→ Not slowing down and stopping at a pedestrian crossing

$^{***} p < 0,001$ R^2 Nagelkerke = 0,280

The intention also explained 28% of the variance in the scores for the criterion variable in this scenario. The presence of the intention to slow down and stop at the pedestrian crossing increased the likelihood that subjects did so.

Next, average scores obtained for risk perception were compared, both for self risk and risk for other drivers. Average scores obtained in risk perception were calculated and then, using One Sample T-Tests, the average scores were compared to find significant differences.

Self risk perception averages obtained for each scenario differed significantly from each other. The lowest perceived risk was breaking the speed limit in a locality (M = 4.24), followed by a speed limit violation on a European road (M = 4, 43). The riskiest behavior perceived by subjects was driving without a seatbelt attached (M = 5.40).

For the perception of risk to others, the averages obtained for each scenario are significantly different, except for the scenario A (M = 4.47) and scenario E (M = 4.65) - speed limit violations in a locality and violations of the speed limit on a European road. Although the speed limit violation on a European road was seen as more risky, the difference was not significant (p = 0.706).

We then proceeded to compare the subjects' average perceived risk for themselves and the average perceived risk to other drivers. The results indicated that the subjects perceived some behaviors as being more risky for others than for themselves - breaking the speed limit in a locality (p = 0.005), and breaking the speed limit on a European road (p = 0.008).
One explanation for this may be overestimating their own abilities compared to others. As stated by Rundmo (2004), most people tend to consider themselves better drivers than others.

To test the hypotheses regarding the variables of age and sex, statistical methods were used to determine the influence of age on choice behavior, its influence on the variable type, and then to determine if there exists a combined effect of both variables.

To determine the effect of age on choice behavior, we used the Chi Square test.
For scenario A, we found significant differences between the number of people who decided to break the norm and those who complied in the category 18-24 years and over 50 years. In the first age category, a significantly higher number of subjects violated the norm ($\chi2 = 12.44$, $p <0.001$), while in the age category over 50 years, significantly more subjects complied with the rule on speed ($\chi^2 = 16.66$, $p <0.001$).

For scenario B, significant differences were found between the number of people who violate the norm and those who abide by it, in all age groups significantly more people declaring that they would attach their seat belt when driving ($\chi2_{18-24} = 42.20$ $p <0.001$, $\chi2_{25-50} = 19.86$ $p <0.001$, $\chi^2 > 50 = 48.16$ $p <0.001$).

In scenario C significant differences were found between those who comply and those who violate the norm in all age groups, a significantly greater number of people stating that they would not drive after consuming alcoholic beverages ($\chi2_{18 -24} = 49.97$ $p <0.001$, $\chi2_{25-50} = 23.31$ $p <0.001$, $\chi^2 > 50 = 48.16$ $p <0.001$).

In scenario D, significant differences were found for the age groups 18-24 and 25-50. In these groups, significantly more subjects said they would answer the

phone without a hands-free device connected, while in the age group over 50 years, fewer subjects declared they would reject the call compared to those who said they would take the call but without the existence of any significant difference ($\chi 218$-24 = 16.69 p <0.001, $\chi 225$-50 = 11, 17 p <0.001)

In scenario E, we find significant differences only for the age group 18-24 years, where the number of people who said they would break the speed limit was significantly higher than that of the people who said they would maintain the legal speed limit ($\chi 218$ -24 = 16.69 p <0.001). In the age group 25-50 years, the number of subjects who said that they would break the legal limit was still higher than that of those who declared that they would maintain the legal speed limit – this being only a tendency, however. For the last age group, the tendency is to maintain legal speed limits, but the difference is not significant.

For scenario F, there are significant differences in all age groups, significantly more people saying that they would slow down and stop at a pedestrian crossing. (X218-24 = 55.17 p <0.001, $\chi 225$-50 = 49.79 p <0.001, $\chi 2$> 50 = 54 p <0.001)

We note that, overall, there is a greater tendency for violating the norms for subjects in the age group 18-24 years, while in the age group ">50 years", the trend is to comply with the norms, even though sometimes the differences are not significant.

It should be noted that in the case of certain norms, pertaining to personal safety or the consequences of which are well publicized, the trend in all age groups is to comply with the law.

The analysis of the effect of gender was done with the help of the Chi square test.

For scenario A, significantly more men ($\chi 2$ = 5.23 p <0.05) decided to break the norm, while a significantly higher number of women ($\chi 2$ = 8.30 p <0.05) chose to remain within the legal speed limits.

In the case of scenario B, significantly more people of both genders ($\chi 2M$ = 33.58 p <0.001, $\chi 2F$ = 83.30 p <0.001) said that they would attach their seat belts when driving.

Similarly, for scenario C, significantly more people from both genders said they would refuse to get behind the wheel after consuming alcohol. ($\chi 2M$ = 47.09 p <0.001, $\chi 2F$ = 72.02 p <0.001)

Our fourth scenario, scenario D, showed that significantly more men ($\chi 2M$ = 25.32 p <0.001) would answer their phones without being connected to a hands-free device, the same tendency appearing in the case of females, but in their case without any significant differences (p = 0.631).

For scenario E, again, significantly more men ($\chi 2M$ = 19.55 p <0.001) would break the permitted speed limit, while for women the tendency is to maintain the legal speed limits, although the difference is not significant (p = 0.337).

In the case of the last scenario, F, significantly more people from both genders said they would slow down and stop at the pedestrian crossing ($\chi 2M$ = 86.53 p <0.001, $\chi 2F$ = 72.02 p <0.001).

We note that there is a tendency in the group of male subjects to violate norms, while for the female subjects, the tendency is to respect the norm, except for the behavior of answering a call without being connected to a mobile hands-free device, where the tendency, however slight, is to break the norm.

As for the age variable, when talking about the behavior of wearing a seat belt, driving after consuming alcohol and slowing and stopping at a pedestrian crossing, gender differences are no longer present, the general trend is that of respecting the norm.

Next we analyzed the combined effect of age and gender on behavioral choice, and for that we used the asymmetric lambda test.

For scenario A, the results show that in the age group 18-24 years, a significantly higher percentage of men chose to break the norm, compared to the percentage of women who did the same ($\chi2 = 10.301$, p <0.01). Significant results were obtained in the age group > 50 years. Here, a percentage significantly higher of men chose to break the norm, compared to the percentage of women who did so ($\chi2 = 7.31$, p <0.05).

Scenario B showed that in the age group 18-24 years, a significantly higher percentage of men chose to drive without a seatbelt compared to the percentage of women who chose to break this norm ($\chi2 = 7.509$, p <0.01).

The analysis of the third situation showed that, in the age group 25-50 years, a significantly higher percentage of men chose to drive after consuming alcoholic beverages, compared to the percentage of women who declared they would drive under the influence ($\chi2 = 5.13$, p <0.05).

For scenario D, the results showed that, in the age group 18-24 years, a significantly lower percentage of men chose to reject a call while driving, unless they have a hands-free device connected, compared to the percentage of women who responded in the same manner. ($\chi^2 = 7.21$, p <0.01).

In scenario E, the results showed that, regardless of the age group, a significantly higher percentage of men compared to the percentage of women chose to break the speed limit on a European road. (18-24 $\chi^2 = 9.52$, p <0.01, $\chi^2 = 4.04$ 25-50, p <0.05, "> 50" $\chi^2 = 4.52$, p <0.05).

Our last situation showed that in the age group 18-24 years, significantly more women than men chose to not slow down and stop to ensure the passage of pedestrians at a pedestrian crossing. ($\chi^2 = 3.89$, p <0.05).

We notice some trends in terms of behavioral choices, depending on age and gender variables.

Thus, the biggest behavioral differences between men and women appear in the age group 18-24 years, in most cases a significantly higher number of men in this age group choosing to break the norms, with the exception of driving after consuming alcohol, where no significant differences were found between male and female subjects as well as slowing down and stopping at a pedestrian crossing, where a significantly higher number of women declared they would drive on and not slow down to make sure there were no pedestrians crossing.

The most obvious gender based difference occurs in the case of a speed limit violation on a European road, where men declared they would violate the norm in a significantly higher number than women, regardless of age group.

Discussion

The objective of this study was to examine whether and to what extent, risky driving behaviors that are performed daily by drivers can be predicted using the theory of planned behavior as a reference.

We expected that attitude towards behavior, perceived subjective norms and perceived behavioral control and added elements to the traditional model, perception of other drivers' traffic behavior, habit, moral norms and anticipated regret, variables stipulated in the theory of planned behavior, permitted a level of prediction of risky, self-reported, driving behaviors, and that after applying statistical analysis, we would obtain a strong predictive model to measure the criterion variable, with the intention to engage in risky driving behaviors.

Also, according to existing theoretical support, we expected that behavioral intention, but also some of the elements of the extended prediction model of the theory of planned behavior to directly predict the choice of performing risky driving behavior.

The study had two hypotheses, one related to the predictive power of the model of the theory of planned behavior and the second on the effects of independent variables on the behavioral choices.

The results obtained from the application of statistical methods available confirmed the study hypotheses.

Thus, after applying linear regression and binary regression, we obtained the most effective prediction models for the intention to manifest behavior and to perform a certain behavior.

The results show habit to be by far the best predictor for the intention of breaking the norm; it explains between 22.8% and 80.5% of the variance in intention scores, other predictors being the moral norm, perceived subjective norms and attitudes towards behavior, which explain between 0.4% and 2.4% of the variance in scores for intention to manifest behavior.

Although these results are consistent with the findings by Forward (2009), which for the behavior of breaking the speed limit, found habit as the strongest predictor, explaining 17% of the variance of scores, it is interesting to note, that in the present research there is a great difference between the variance explained by habit, and variance explained by other predictors.

One possible explanation for this could be the habitual, automated character of the behaviors described. It is possible that by the nature of the situations described, the habit of choosing a certain behavior is favored in the prediction of the described situation. However, some scenarios involve decision

making at a conscious level, the habit being the main predictor in prediction models for the intention in performing these behaviors as well.

Another possible explanation of the situation responses could be provided by the instrument applied and the conditions under which the application was made. It is possible that, for various reasons, such as disinterest, fatigue or boredom, respondents may not have been involved enough in solving the task, and this might have led to filling out the questionnaire „absently", in this case taking over certain processes more or less automated.

Another element that attracts attention is that, for all scenarios, predictive models based on elements of the theory of planned behavior, the obtained R^2 is higher than the R^2 obtained from regressions with behavioral intention as a predictor and choice of behavior as a criterion variable.

These results can be explained in terms of the statement from Triandis (1980), who says that behavioral intentions and their antecedents (attitudes, for example.) can predict future behavior, as long as the behavior is habitual. Intentions may lose their predictive power when strong habits are formed. Thus, a number of studies obtained results where habit appears to have a better predictive value than behavioral intentions.

The risk perception analysis showed that exceeding the speed limit on a local and a European road were seen as the least risky, both for themselves and other drivers by the subjects. The risky behaviors were considered driving without having a seatbelt attached and driving after consuming alcohol.

This may be due, on one hand, to exceeding the speed limit by a small margin, and for behaviors considered to be the most risky behaviors, media coverage of the consequences through road safety campaigns.

Here, it is worth noting that the subjects perceived a level of risk in all scenarios for themselves as lower than risk for the others. But this is a trend; significant differences appeared only for the two scenarios which analyzed exceeding the speed limit. The results support the contention of Rundmo (2004), who says that most people tend to consider themselves better drivers than others.

The second hypothesis was also confirmed: there were differences according to age and gender in terms of behavioral choices made by the subjects. Thus, the people in the age group 18-24 years showed a greater tendency to break the norms, while those in the age group ">50 years" tended, not always significantly, to keep by the standards.

In terms of gender, men tend to violate the norms, while women tend to comply with them.   It should be noted that these differences, however, do not occur in the case of the attachment of seat belts behavior, driving after consuming alcohol and not slowing down and stopping at a pedestrian crossing, possibly because of the degree of coverage of the consequences of these behaviors.

An alternative explanation for the behavior of not slowing down and stopping at a pedestrian crossing would be given by the mentioning in the scenario of another driver who slows down and stops at an unmarked crossing, although the subject

"sees no pedestrian". It would, therefore, be an adjustment of their behavior depending on the perceived behavior of other drivers, a concept promoted by Aberg (1997) in his research

There are some limitations to this study: first, the fact that the subjects' testing was done in different contexts, not in a standardized manner, so it is possible that certain parasite variables may have influenced our results. Although each scenario independently represents a module of the questionnaire, we mention here the importance of measuring behavioral intention and behavior in the same context and at an interval of time as small as possible.

A second limit to the study could be the chosen scenarios, generalizing results through hypothetical scenarios being questioned in a series of research (Hughes, 1998, cit. in Conner *et al.,* 2003). It is possible that the intentions expressed in such scenarios may not translate into action because of situational factors that can inhibit this transition (Conner *et al.,* 2003). Future research could examine the perceived plausibility of such scenarios as well as its effects on the results. Another solution, which, however, requires high financial costs, would be the use of driving simulators, which could provide a more effective way of evaluating these effects in a safe, controlled environment.

Conclusions

In conclusion, this present research has shown that the Theory of Planned Behavior can predict behavioral intention for breaking six norms related to traffic. The results showed that habit had the greatest contribution when it came to predicting intention and behavior itself. The studied variables were age and gender effects, and these were found to have an effect on behavior, male drivers aged between 18 and 24 being more likely to violate traffic norms. However, there is a possible effect of media campaigns on the consequences of breaking certain norms, and breaking these norms is seen by the subjects as more risky and so, most of them respect them. Future research can focus on studying the perceived effects of these campaigns, and in case of positive assessment by the subjects, other interventions can be modeled, for other violations of traffic rules with potentially serious consequences. Given the tendency of young drivers to violate traffic rules, a solution would be to implement these campaigns at driving schools in order to educate the future drivers.

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