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The Romanian version of the multidimensional driving style inventory: Psychometric properties and cultural specificities



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ABSTRACT

The multidimensional driving style inventory (MDSI), assessing four broad dimensions of driving styles, was originally built in Israel. In line with other previous adaptations of this instrument in different cultural contexts (such as Argentina), our research aimed to develop a valid and reliable Romanian version of the MDSI and to evaluate its external and construct validity. We conducted two studies aimed at this objective. Study 1 ($n = 1237$) first tested the factorial adequacy of the previous MDSI versions in our Romanian sample. Then, the culture-specific version of the MDSI that emerged from the factor analysis was examined in terms of its structure, internal consistency, item proprieties, and associations to socio-demographic variables and self-reported traffic crashes and offenses. Study 2 ($n = 835$) examined the associations between the driving styles assessed by this newly developed measure and several relevant personality traits: sensation seeking (both general and in traffic), desire for control, driving anger, normlessness, dutifulness and frustration discomfort. The results of the two studies support the validity and reliability of this culture-specific version of the MDSI. In comparison to the previous versions, the Romanian MDSI version addresses a supplementary driving style, concerning the violation of rules perceived as irrational in the respective situation. The reasons for the emergence of this distinct driving style in the Romanian driving context, as well as its relationships to the high traffic crashes rate in this country are discussed.

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1. Introduction

In its 2013 global status report on road safety, the World Health Organization presented information on road safety from 182 countries, accounting for almost 99% of the world's population. The report indicated that worldwide the total number of road traffic deaths remains unacceptably high at 1.24 million per year (World Health Organization, 2013). In 2010 there were more than 2377 people killed on Romanian roads. This corresponds to a rate of 11.1 deaths per 100,000 people, which is lower than Montenegro (15/100,000 people), Ukraine (13.5/100,000 people), Greece (12.2/100,000 people) but considerably higher than the European leaders, such as Sweden (3/100,000 people) or UK (3.7/100,000 people). As a result, Romania currently ranks as fourth among the 28 EU countries in terms of the number of deaths per 100,000 people, in spite of the strictness of Romania's road legislative enforcement, which is evaluated as very high (the eighth level on a 0–10 scale).

Eighty-five percent of the traffic crashes can be attributed to human error (Rothengatter & Huguenin, 2004). When analyzing human behavior in traffic, two independent aspects must be considered: drivers' abilities and their behavioral risk,

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thus distinguishing between driving skill and driving style. While driving skill refers to drivers' performing in relevant tasks, e.g., maneuvering and detection of hazards, driving style concerns the way they habitually choose to drive, specifically to their attentiveness and assertiveness in traffic, speed, headway, etc. (Elander, West, & French, 1993).

1.1. Driving styles

The importance of drivers' habitual behaviors in traffic is recognized by most authors. Yet, there are many diverging perspectives concerning their definition and measurement. Taubman-Ben-Ari, Mikulincer, and Gillath (2004) conducted a systematization of the heterogeneity of theoretical viewpoints on driving style and the diversity of self-report instruments subsequently developed. The result of this approach was a multidimensional conceptualization of driving styles, broadening the scope of analysis from the behaviors proximally related to traffic crashes to a more comprehensive level, including behaviors and habits related to driving in general. Taubman-Ben-Ari et al. (2004) identified four broad facets of driving styles: (a) *reckless and careless* driving style, referring to behaviors of seeking sensation and thrill while driving, (b) *anxious* driving style, characterized by alertness, tension and ineffective engagement in relaxing activities during driving, (c) *angry and hostile* driving style, including feelings of irritability and hostility while driving and aggressive behaviors in traffic, (d) *patient and careful* driving style, referring to the well-adjusted driving styles characterized by attention, patience, politeness, and calmness while driving.

Based on these conceptualizations, Taubman-Ben-Ari et al. (2004) built a self-report scale assessing these domains (Multidimensional Driving Style Inventory – MDSI). Factor analysis revealed eight factors which explained 56% of the variance of the 44 items: the *risky* and *high-velocity* driving styles reflect the first of the four facets listed above (*reckless and careless*), the *anxious*, *dissociative* and *distress-reduction* styles are part of the second facet (*anxious*), the *angry* driving style reflect the third facet, while the *patient* and *careful* driving styles cover the last dimension.

1.2. Driving violations and perceived rationality of traffic rules

Since traffic rules have the purpose to foster traffic safety, deliberate infringements of these rules increase the risk of road accidents. The issue of driving violations is explicitly addressed by the Manchester Driver Behaviour Questionnaire (DBQ, Reason, Manstead, Stradling, Baxter, & Campbell, 1990), one of the most widely used instruments in traffic psychology, which measures three types of aberrant driving behaviors (errors, lapses and violations). Previous studies using the DBQ revealed significant associations between the self-reported tendency to commit driving violations and accident liability (Parker, Reason, Manstead, & Stradling, 1995). Since keeping or transgressing traffic rules is one of the most frequent decision drivers have to take, associations between driving styles and violations are also to be expected. Although Poó, Taubman-Ben-Ari, Ledesma, and Díaz-Lázaro (2013) found no significant associations between the MDSI and traffic offences in the Argentinian population, Taubman-Ben-Ari et al. (2004) reported positive correlations between two of the MDSI styles (*risky* and *high-velocity*) and traffic offences. Furthermore, studies that focused on specific dimensions addressed by the MDSI (such as driving anxiety or anger) and evaluated them through other instruments than the MDSI have revealed significant associations to violations. Specifically, driving anger was found to be associated to the tendency to commit driving violations (Ulleberg, 2002), as well as anxiety, although in this respect contradictory empirical results were reported. On one hand, Shahar (2009) found a positive relation between anxiety and driving violations; similarly, the “careful drivers” cluster in the Lucidi et al. (2010) study had both the lowest scores on the DBQ violations scale and the lowest anxiety. On the other hand, lower trait anxiety was found to be associated to driving violations in the Stephens and Groeger (2009) study.

In the MDSI (Taubman-Ben-Ari et al., 2004), two of its four broad styles include in their definition the tendency to violate rules (in the case of the *reckless and careless* driving style) and to obey them (in the case of the *patient and careful* driving style). Yet, only three of the 44 items of the instrument explicitly address this topic, specifically “drive through traffic lights that have just turned red”, “get a thrill out of breaking the law”, “drive over the speed limit in the city”. Presumably, drivers' responses to these items reveal their tendency to disrespect traffic rules, allowing for between-subjects comparisons on this issue. Nevertheless, previous research indicates that there are also significant within-subjects variations of violation behavior, as traffic rules have various degrees of social acceptance (Åberg, 1998). Drivers often act according to their own judgments regarding the appropriate behavior in the respective situation. Consequently, when this subjectively appropriate behavior conflicts with the official norm, drivers might violate the traffic rule (Gardner & Rockwell, 1983).

Most of the theoretically developments and research in this area have focused on drivers' transgressions of speed limits. The violation of this specific set of traffic rules appear to be quite often; for instance, the 30 km/h speed limit on urban residential streets was found to be exceeded by the majority of drivers (Dinh & Kubota, 2013; OECD/ECMT, 2006). An important reason for this lack of compliance with the traffic law is the perceived lack of credibility of the rule in the immediate situation (Goldenbeld & Van Schagen, 2007). In other words, drivers do not automatically comply with all traffic rules. They evaluate the extent to which the rules that they should obey in the respective situation are “realistic” (Fildes & Lee, 1993), “adequate” (Kanellaidis, Golias, & Zarifopoulos, 1995), “acceptable” (Risser & Lehner, 1998) or “rational” (Havârneanu & Havârneanu, 2012).

The rationality of the traffic rules appears to be subjectively assessed in reference to the immediate context. For instance, in the case of drivers' perception of speed limits, previous studies have revealed a set of specific environmental factors that influence their evaluation: sight distance, clarity of the situation, the presence or absence of a curve (Goldenbeld & Van

Schagen, 2007), road surface and width, the presence or absence of road markings, buildings and vegetation alongside the road (Elliott, McColl, & Kennedy, 2003), or the amount of traffic flow (NHTSA, 2002). Similar environmental factors can be hypothesized as decisive in the evaluation of the credibility of other traffic norms, such as the interdiction to overtake other vehicles by crossing the continuous line: when the car in front drives at a very low speed, there is good visibility (e.g. no curve ahead) and no oncoming traffic, this rule might appear irrational.

Some scholars go beyond the concept of irrational rules by suggesting that some of the traffic norms, especially certain speed limits, are *perverse*, in the sense that their main function appears to be not that of motivating their respect but, on the contrary, their infringement (Fernández-Dols & Oceja, 1994; Lucas & Pérez, 2003). Particular rules which are broken by the vast majority of drivers fail to regulate behavior, instead they only create opportunities for sanction. As a result, the most salient reason for keeping them is authority pressure, and compliance with this type of rules largely depends on police immediacy. These ideas were tested in a study on a Romanian sample (Havârneanu & Havârneanu, 2012) that asked participants to report their potential engagement in counter-normative behavior in scenarios in which the rules could easily be perceived as inadequate to the situation, as the forbidden behavior involved no perceived risk. The perceived irrationality of the rules emerged as a significant predictor of their violation. Furthermore, the only deterrent of drivers' tendency to break the law appeared to be authority pressure; specifically, results showed that perceived norm adequacy loses some of its effect of determining counter-normative behavior when the latter involves severe punishments.

1.3. Country-specific driving style

Driving-related attitudes and behaviors have been shown to vary across countries (Nordfjærn & Rundmo, 2009; Şimşekoglu et al., 2013), including drivers' tendency to obey or break traffic rules (Ozkan, Lajunen, Chliaoutakis, Parker, & Summala, 2006). Thus, it is necessary to test the external validity and the psychometric proprieties of instruments assessing driving-relevant psychological factors by taking into account culture-specific conditions.

So far, most of the studies that have employed the MDSI have been conducted in Israel. It is important to note that even in this context in which the MDSI was originally developed, several studies (e.g. Taubman-Ben-Ari, 2011; Taubman-Ben-Ari & Yehiel, 2012) have adopted a different and less refined factorial structure than its initial one, introduced by Taubman-Ben-Ari et al. (2004). Specifically, most of the initially proposed styles were merged, which led to a four-factor solution corresponding to the four broad and theoretically driven facets of driving styles. The factorial structure that emerged in two studies (Poó et al., 2013; Silva, 2004) that tested the factorial structure of the MDSI in other countries was even more different from the initial one. For example, Poó et al. (2013), expanded the content of the MDSI items in order to increase their representativeness for the Argentinean context and obtained six factors, with two of the original eight dimensions (*high velocity* and *patient*) submerged into others.

Previous research on Romanian samples suggests that the Romanian socio-cultural context could be prone to the emergence of a distinct driving style, besides those addressed in the original MDSI, entailing the violation of the traffic norms perceived as irrational in the immediate driving context. Specifically, previous studies on Romanian drivers (Havârneanu & Goliță, 2010) show that the most important reason for obeying traffic rules is fear of punishment. Nevertheless, although the severity of sanctions administered for traffic offenses in Romania has progressively increased in the last decade, the deviance rate and traffic casualties have not significantly decreased. Since rule-breaking behavior depends not only on drivers' fear of punishment, but also on the perceived irrationality of the respective rules (Havârneanu & Havârneanu, 2012), this failure of authority pressure in creating obedience to traffic norms suggests a high frequency of situations in which the rules appear inadequate to Romanian drivers. Hence, we consider that the content validity of the Romanian MDSI could be enhanced by including items aimed at drivers' behavior in traffic situations ruled by laws perceived as irrational.

1.4. Aims of the present research

The main objective of our study is to develop a valid and reliable Romanian version of the multidimensional driving style inventory (MDSI-RO) that would provide valid information on Romanian driving styles and become a valuable tool in the extension of the currently underdeveloped research field of traffic psychology in our cultural context. Similar to the approach of Poó et al. (2013), who adapted the MDSI-S in Argentina, we aim to develop an instrument optimally suited for the investigation of the driving styles of Romanians by taking into account their socio-cultural driving context. However, while the instrument developed in Argentina through the addition of more culturally appropriate items only narrows the factorial structure of the original MDSI, we believe that the existing set of driving styles identified by this measure could prove to be incomplete in the Romanian driving context. Our objective is to enhance the content validity of the Romanian version of the MDSI by including items targeting a specific set of behaviors with high cultural relevance, namely those that entail the violation of traffic norms perceived as irrational. Our hypothesis is that this type of behaviors constitutes a distinct driving style in Romania, besides those addressed in the original MDSI.

We conducted two studies aimed at this main objective. The first study consisted of the development of a Romanian-language version of the MDSI and the examination of its factorial structure, reliability and associations with several relevant variables: self-reported traffic crashes and offenses, gender and age. The second study evaluated the construct validity of the scale through its associations with a set of personality traits which have already been found to be related to the MDSI styles in other cultural contexts, namely sensation seeking and desire for control (e.g. Taubman-Ben-Ari et al., 2004). The other

personality dimensions included in our investigation were selected mainly due to their relevance for traffic rule violations. Two of them were already found to be significantly related to counter-normative behavior in traffic, namely driving anger (Stephens & Groeger, 2009) and normlessness (Lucidi et al., 2010). The others, namely dutifulness (Costa & McCrae, 1995) and discomfort intolerance (Harrington, 2005), were included in our analysis because of their relevance for people's willingness and/or ability to keep the rules, and to tolerate the discomforts that such normative behavior might entail.

2. Study 1

The aims of Study 1 were to build an adapted version of the MDSI for use in the Romanian population (MDSI-RO), to investigate its factorial structure and psychometric proprieties, respectively to assess its associations with drivers' gender, age, self-reported traffic crashes and offenses. We expected that the factorial structure that would emerge would be similar to the one identified in the previous studies conducted in Israel (Taubman-Ben-Ari et al., 2004) and Argentina (Poó et al., 2013), but with a culture-specific addition in terms of the scope of the behaviors that the MDSI-RO addresses. In line with the arguments stated above concerning the high frequency of situations in which the rules appear inadequate in the Romanian driving context, we hypothesized that obeying or breaking this type of rules would emerge as a distinct and supplementary factor of the MDSI-RO. Furthermore, we expected women to score lower than men on the risky and angry driving styles, and higher on the dissociative and distress-reduction styles. Lastly, we expected drivers with a rich history of traffic crashes and offenses to score significantly different on the MDSI-RO scales than those with no such history.

2.1. Method

2.1.1. Participants and sampling

A convenience sample of one thousand two hundred thirty-seven Romanian drivers participated in this study. Their age ranged from 18 to 83 ($M = 37.33$; $SD = 14.20$). As our goal was to develop a version of the MDSI that would reflect in the highest degree possible the behaviors of the regular Romanian drivers, we didn't use as selection criterion only having a driving license; instead, we only included in our sample people who regularly drive a car. Also, we intended to access a sample as representative as possible for the population of Romanian drivers (Romanian Drivers Licenses, 2015). To this purpose, we first segmented the sample according to age in three groups (young, adult, old). The proportions of the representatives of three age groups that we decided to include in the sample would reflect the corresponding proportions in the actual population of drivers (40% drivers younger than 30 years old; 50% drivers between 31 and 60 years old; 10% drivers over 61 years old). Second, we decided to access equal numbers of men and women, and people with various total mileages.

We developed a sampling scheme on the basis of these criteria, and each of the 100 field operators was instructed to identify among his/her personal acquaintances (in order to increase the validity of the responses) at least 13 drivers that would each correspond to a combination of these criteria. The potential participants were contacted at their homes; the field operators informed and clarified them about the scope and objective of the study, then asked for their consent to participate in the research. Then, those who consented filled in the questionnaire; the average time to answer it was 25 min. At the end of the questionnaire, they were asked to mention their age, gender and total mileage. The questionnaire administration took place in June 2014.

Although we intended to include at least 1300 drivers in our research, 82 people declined their participation after being informed about the objective of the study and being presented the questionnaire. As most of these refusals came from drivers over 61 years old (especially women), the final distribution of the sample on the age and gender criteria didn't match perfectly the one we intended. Specifically, there are 7% people over 61 years old in our sample, and according to gender, the sample includes 661 (53%) men and 576 (47%) women. According to education level, 30% had university education, 62% had secondary education, and 8% had only elementary education. The most frequent occupations in our sample were teachers (8%), students (7%), engineers (7%), and commercial workers (6%).

2.1.2. Measures

The MDSI-RO was developed upon two previous measures of driving styles, namely the original MDSI (Taubman-Ben-Ari et al., 2004) and the Argentinian version (Poó et al., 2013). In order to maintain as much correspondence as possible between the Romanian version of the MDSI and these previous versions, the MDSI-RO includes the Romanian translation of the 44 items in the original instrument, as well as that of the 17 items added in the Argentinian adaptation of the instrument.

The process of translation of the items of the MDSI and those specific to the MDSI-S was done in several steps. First, both English documents were independently forward translated into Romanian by two qualified translators, native in Romanian and fluent in English. The two authors compared the translations and resolved the differences, producing an initial Romanian version. Subsequently, another qualified translator, not aware of the original scale, produced a back translation on this version into English. The authors then compared the initial Romanian version, its back-translation and the original English documents, and corrected the discrepancies by trying to ensure the highest level of relevant equivalences between the original items and their final Romanian translations.

Moreover, we added six items referring to the violation of specific rules in contexts where they might be perceived as irrational (e.g. "Exceed the 50 km/h speed limit in villages on perfectly straight roads with no obstacles limiting my

visibility”). Five of these items were built upon the scenarios used by Havârneanu and Havârneanu (2012): overtaking, obeying the 50 km/h speed limit, wearing seatbelts, legal stopping/parking and waiting at red traffic lights. A sixth item concerning obeying the 90 km/h inter-city speed limit was added. Participants were asked to rate the extent to which each of the 63 items reflected their feelings, thoughts and behaviors during driving on a 6-point scale, ranging from “not at all” (1) to “very much” (6).

Participants also reported their socio-demographic characteristics (age, gender, education level) and driving variables: years of driving, license type, number of km driven (lifetime and in the last year), lifetime number of traffic crashes caused, lifetime number of traffic crashes caused by someone else, and number of offenses in the last year.

2.1.3. Data analysis

In order to test the adequacy of the previously developed MDSI versions in our sample, we performed a first-order confirmatory factor analysis and an exploratory factor analysis. For each of the two MDSI versions, the first analysis examined the statistical fit in our sample of the model defining the allocation of items (the observed variables) to their respective latent dimensions or first-order factors. The method used for the treatment of missing data was maximum likelihood estimation, which computes the most probable value for each missing parameter on the bases of the available data for each case. The exploratory factor analysis performed employed the Primary Axis method of factor extraction, in order to reveal the underlying structure of the items. This structure was further revealed by rotating the axes identified in the initial extraction; the rotation method employed was Oblimin, which allows for the factors in the final solution to be correlated (as the driving styles in both previous versions of the MDSI are). In this analysis, we used mean substitution as the method for dealing with missing data. The same type of exploratory factor analysis was performed on the extended set of MDSI items. In order to decide on the number of factors retained for interpretation, we used Parallel Analysis (PA); the factors with eigenvalues higher than their corresponding 95th percentile eigenvalue derived from random data (i.e. the PA criterion, Glorfeld, 1995) were retained. Subsequently, we computed the mean scores on the factors retained, and we examined differences in these factor scores by socio-demographic and driving-history variables by means of Multivariate analyses of covariance (MANCOVA). The univariate effects of the variables that emerged as significantly associated to factor scores were then further examined through Univariate ANOVAs and Pearson correlations.

2.2. Results

2.2.1. Factor analysis and reliability analyses

First, the adequacy of the factorial structure of the 44 items in the initial MDSI (Taubman-Ben-Ari et al., 2004) was tested through a first-order confirmatory factor analysis via AMOS 18.0. The results indicated a poor fit of the hypothesized models to our data: $\chi^2(874) = 2956.00$, $p < .01$; CFI = .764, GFI = .851, AGFI = .831, RMSEA = .053. Similar results emerged from the confirmatory analysis of the factorial structure of the 40 items in the Argentinean MDSI-S (Poó et al., 2013): $\chi^2(687) = 2525.18$, $p < .01$; CFI = .762, GFI = .855, AGFI = .836, RMSEA = .057. Both sets of items were then submitted to an Exploratory Factor Analysis via SPSS 15.0, in order to check whether an alternative acceptable factor solution emerged from our data. In both cases, the factorial solutions were rather problematic, with many items loading on other factors than those presumed. Moreover, the factorial structure of the initial 44 MDSI items consisted of 9 factors (instead of 8), while one of the factor includes only one item. In the case of the 40 items of the MDSI-S, several items had high factor loadings on more than one dimension, only two factors have reasonable internal consistency (with Cronbach's alpha higher than .7), while some of the items did not load on any factor.

Second, we submitted our extended set of 57 MDSI items to an exploratory factor analysis (Extraction: primary axis; Rotation: Oblimin). Parallel analysis, performed using ViSta statistics, informed us that seven factors surpassed the PA criterion, which explained 47.8% of the total variance. Items with a factor loading lower than .30 were discarded. In the selection of items for their factorial assignment, we analyzed both the structure matrix and the pattern matrix coefficients, which yielded the same results in terms of the higher factor coefficient for each of items selected. The loadings of the items on each of these factors are presented in Table 1.

The first factor explains 19% of the total variance and consists of six items. Five of these items referred to the hypothesized driving style of breaking the rules that are perceived as irrational. The sixth item (“Drive over the speed limit in the city”) was previously included in the *Risky* style in the MDSI-S, but it also taps drivers' tendency to exceed speed limits in certain contexts, as other two items in this set (concerning the 50 km/h and the 90 km/h speed limits). Therefore, we labeled this first factor as *Violation of Rules Contextually Perceived as Irrational* style.

The second factor includes four items and explains 9.47% of the variance. We labeled this factor as *Anxious* driving style, since all its items are included in the *Anxious* style in the original MDSI, denoting a person's tendency to experience nervousness and distress while driving.

The third factor explains 5.06% of the variance and consists of seven items describing careful and patient driving behaviors and attitudes. Three items are included in the *Patient* style and other three items in the *Careful* style of the original MDSI, while one item was added in the *Careful* style of the MDSI-S. On this basis, we labeled this factor as *Careful and patient* driving style.

Table 1
Exploratory factor analysis of the MDSI-RO items.

MDSI-S items	Factor loading							M	SD	Item test
	1	2	3	4	5	6	7			
<i>Violation of rules contextually perceived as irrational style</i>										
1. Exceed the 50 km/h speed limit in villages on perfectly straight roads with no obstacles limiting my visibility	.757							3.12	1.51	.64
2. Exceed 90 km/h speed limit outside towns on perfectly straight roads with no obstacles limiting my visibility	.749							3.45	1.64	.58
3. Leave the car parked for short periods of 10–15 min in unauthorized places where I think it wouldn't create any traffic danger	.728							2.66	1.43	.58
4. Drive over the speed limit in the city	.701							2.44	1.39	.62
5. Don't fasten my seatbelt during short trips of less than 10–15 min in the city	.638							2.55	1.76	.48
6. I overtake slower vehicles by crossing the continuous white line when the visibility is very good and there are no other obstacles	.508							2.45	1.54	.50
<i>Anxious style</i>										
7. Feel distressed while driving ^c			-.724					2.07	1.26	.62
8. Driving makes me feel frustrated ^c			-.675					1.55	1.04	.48
9. Feel nervous while driving ^c			-.648					2.15	1.22	.53
10. Feel comfortable while driving ^a			-.550					1.77	1.11	.41
<i>Patient-careful style</i>										
11. Tend to drive cautiously ^c			.675					5.43	1.06	.48
12. Drive cautiously ^a			.606					5.38	1.06	.47
13. Always ready to react to unexpected maneuvers by other drivers ^c			.582					5.19	1.03	.45
14. At an intersection where I have to give right-of-way to oncoming traffic, I wait patiently for cross-traffic to pass ^c			.526					5.19	1.30	.41
15. I base my behavior on the motto "better safe than sorry" ^c			.435	-.351				4.45	1.51	.36
16. Wait patiently when you cannot advance the traffic ^b			.398		.326			4.79	1.44	.40
17. When a traffic light turns green and the car in front of me doesn't get going, I just wait for a while until it moves ^a			.367					2.54	1.44	.36
<i>Risky style</i>										
18. Like to take risks while driving ^c				.686				1.96	1.38	.50
19. Enjoy the sensation of driving on the limit ^c				.665				1.73	1.22	.49
20. Enjoy the power of the engine ^b				.624				2.99	1.61	.50
21. Enjoy the excitement of dangerous driving ^c				.620				1.87	1.33	.55
22. Feel the car asking for more speed ^b				.510				3.30	1.57	.35
23. Enjoy shifting gears quickly ^b				.446				3.18	1.53	.29
<i>Angry- high-velocity style</i>										
24. When a traffic light turns green and the car in front of me doesn't get going immediately, I try to urge the driver to move on ^c						-.726		2.76	1.53	.54
25. Blow my horn or "flash" the car in front as a way of expressing frustrations ^c						-.568		2.57	1.44	.48
26. When in a traffic jam and the lane next to me starts to move, I try to move into that lane as soon as possible ^a						-.529		3.19	1.54	.43
27. In a traffic jam, I think about ways to get through the traffic faster ^a						-.500		3.80	1.54	.44
28. Arguing with other drivers or pedestrians ^c						-.466		1.86	1.16	.48
29. Get impatient during rush hours ^a			-.347			-.447		2.97	1.44	.45
30. Honk my horn at others ^a						-.415	-.303	2.47	1.26	.48
31. Get angry with people driving slow in the fast lane ^b						-.324		2.93	1.57	.47
<i>Distress-reduction style</i>										
32. While driving, I try to relax myself ^c							-.794	4.11	1.64	.46
33. Use muscle relaxation techniques while driving ^a							-.634	3.95	1.65	.30
34. Do relaxing activities while driving ^c							-.579	2.90	1.74	.36
35. Listen to music to relax while driving ^b							-.557	4.64	1.40	.38
<i>Dissociative driving style</i>										
36. Plan my route badly, so that I hit traffic that I could have avoided ^c							-.739	2.22	1.17	.57
37. Attempt to drive away from traffic lights in third gear (or on the neutral mode in automatic cars) ^c							-.557	1.50	1.02	.55
38. Intend to switch on the windscreen wipers, but switch on the lights instead ^c							-.472	1.59	1.05	.49
39. Driving somewhere else to other than the intended destination ^b							-.449	2.00	1.22	.38
40. Forget that my lights are on full beam until flashed by another motorist ^c							-.423	2.19	1.18	.43
41. Nearly hit something due to misjudging my gap in a parking lot ^c			-.314				-.377	1.93	1.31	.46

^a Items that belong to the original version of the MDSI.

^b Item that belong to the Spanish-language version of the MDSI.

^c Items that belong to the both versions.

The fourth factor explains 4.19% of the variance and consists of six items, all referring to a person's seeking for stimulation and engagement in risky driving and included in the *Risky* style of the other MDSI versions (half being part of the original MDSI and half being added in the MDSI-S).

The fifth factor explains 3.85% of the variance and includes eight items. Four correspond to the *Angry* driving style in the other versions of the MDSI (half being included in this dimension in the MDSI and the other half in the MDSI-S). The other four items are part of the *High-velocity* driving style in the original MDSI, but they describe behaviors that might be considered as aggressive or at least distressing by the other drivers in that situation (e.g. "When a traffic light turns green and the car in front of me doesn't get going immediately, I try to urge the driver to move on"), similar to the items referring to the *Angry* driving style. Overall, the items that load on this factor denote drivers' tendency to become frustrated in specific traffic situations and to express their anger through direct or indirect aggressive behaviors toward other drivers. On this basis, we labeled this factor as *Angry* driving style.

The sixth factor explains 3.84% of the variance and consists of four items tapping drivers' engagement in relaxing activities during driving, corresponding to the *Distress-reduction* style.

The seventh factor explains 2.81% of the variance and groups six items that are part of the *Dissociative* driving style of the other MDSI versions (five in the original MDSI and one added in the MDSI-S). These items describe a person's tendency to be distracted and to commit driving errors because of this distraction.

The total number of items in the MDSI-RO is 41, five of which being Romanian additions and tapping the Romanian – specific *Violation of Rules Contextually Perceived as Irrational* style. The other 36 items correspond to existing items in the two previously developed MDSI versions that emerged as culturally equivalent in the Romanian context. Scores for each factor were computed by averaging the items with the highest load on the respective factor. Summary statistics for each factor are presented in Table 2. All but one of the seven factors (*Distress reduction* style) have acceptable ($>.70$) Cronbach's alpha coefficients, a situation which parallels the psychometric properties of the Argentinean MDSI-S (Poó et al., 2013). Moreover, the mean inter-item correlation of the *Distress reduction* factor (.27) indicates a reasonable level of reliability. The associations between the factors (see Table 3) were consistent and in line with the results of the previous studies and with the theoretical definitions of these factors.

2.2.2. MDSI-RO factors and socio-demographic variables

Next, we examined differences in the MDSI-RO factor scores by gender, age, educational level and driving experience (in years). The MANCOVA indicated significant variations for gender, $F(7, 1225) = 18.03, p < .001$, age, $F(7, 1225) = 18.03, p < .001$, and driving experience, $F(7, 1225) = 18.03, p < .001$. The Univariate ANOVAs revealed significant gender differences in four of the seven driving styles; group means (see Table 4) show that women scored higher in *anxious*, *distress-reduction* and *dissociative* driving styles, while men scored higher than women on the *risky* driving style. Pearson correlations between age and driving styles revealed that age was positively correlated with the *careful and patient* style ($r = .27, p < .001$) and negatively with *risky* ($r = -.21, p < .001$), *angry* ($r = -.22, p < .001$), *distress-reduction* ($r = -.26, p < .001$), *dissociative* ($r = -.13, p < .001$) and *Violation of rules contextually perceived as irrational* ($r = -.26, p < .001$) styles. Finally, driving experience was positively

Table 2
Summary statistics for the MDSI-RO factors in Study 1 ($N = 1237$).

MDSI-S factors	Number of items	Cronbach's	Min	Max	Mean	SD	Skewness	Kurtosis
Violation of rules contextually perceived as irrational style	6	.806	1	6	2.78	1.10	.31	-.61
Anxious style	4	.720	1	6	1.89	.85	1.09	.82
Patient and careful style	7	.699	2	6	5.05	.76	-1.00	1.04
Risky style	6	.707	1	6	2.50	.92	.72	.26
Angry style	8	.769	1	6	2.82	.89	.34	-.24
Distress-reduction style	4	.590	1	6	3.91	1.08	-.28	-.47
Dissociative driving style	6	.731	1	5	1.91	1.91	1.26	1.72

Table 3
Correlation matrix for the MDSI-RO factors.

	Anxious	Patient and careful	Risky	Angry	Distress-reduction	Dissociative
Violation of rules contextually perceived as irrational style	.08**	-.34**	.44**	.55**	.24**	.24**
Anxious		-.33**	.10**	.22**	-.04	.57**
Patient and careful			-.34**	-.34**	-.03	-.43**
Risky				.45**	.24**	.26**
Angry					.27**	.37**
Distress-reduction						.06*

** $p < .01$.

* $p < .05$.

Table 4
Means of the MDSI-RO scales by gender.

MDSI-RO factors	Gender	N	Mean	SD	F(1, 1235)	Cohen's d
Violation of rules contextually perceived as irrational style	Women	576	2.75	1.02	.66	-.06
	Men	661	2.80	1.17		
Anxious	Women	576	2.05	.90	42.02***	.37
	Men	661	1.74	.79		
Patient and careful	Women	576	5.01	.77	2.97	-.10
	Men	661	5.09	.75		
Risky	Women	576	2.40	.85	14.54***	-.22
	Men	661	2.60	.96		
Angry	Women	576	2.84	.89	.83	.05
	Men	661	2.80	.89		
Distress-reduction	Women	576	4.05	1.02	20.42***	.26
	Men	661	3.78	1.12		
Dissociative driving	Women	576	2.06	.79	39.45***	.36
	Men	661	1.79	.71		

*** $p < .001$.

correlated with the *careful and patient* style ($r = .08$, $p < .01$) and negatively with *anxious* ($r = -.12$, $p < .001$) and *dissociative* ($r = -.08$, $p < .01$) driving styles.

2.2.3. MDSI-RO factors, involvement in traffic crashes and offenses

We examined differences in the MDSI-RO factor scores by three driving-history variables: (a) traffic crashes caused by the participant: No (76%), Yes (24%); (b) traffic crashes caused by someone else: No (63%), Yes (37%); traffic offenses: No (45%), Yes (55%). The MANCOVA revealed significant differences for traffic crashes caused, $F(7, 1207) = 2.27$, $p < .05$, and traffic offenses, $F(7, 1207) = 2.20$, $p < .05$, controlling for gender, age, educational level and years of driving experience. The Univariate ANOVAs and group means (see Table 5) showed that participants who had caused traffic crashes scored higher than those with no such driving history on the *Violation of rules contextually perceived as irrational*, *risky* and *angry* styles, while participants with traffic offenses scored higher than those without traffic offenses on the *Violation of rules contextually perceived as irrational* and *angry* styles and lower on the *anxious*, *distress-reduction* and *dissociative* styles.

2.3. Discussion

First, our results revealed that the two previously developed versions of the MDSI (the original scale and the MDSI-S) have a low psychometric adequacy to the Romanian data. Then, our analysis on a larger item base, including all the items in these previous versions as well as a set of items addressing a culture-specific issue (the traffic rules perceived as irrational in the respective context), a Romanian version (MDSI-RO) emerged, with better psychometric proprieties.

In large, the factorial structure of the MDSI-RO is comparable to the previous versions. In fact, six out of the seven MDSI-RO factors are identical to the factorial composition of the MDSI-S. Similar to the Argentinean results, two of the factors in the original MDSI (the *careful* and the *high-velocity* styles) became submerged into others. Specifically, the *patient* and *careful* driving styles form a single dimension in the MDSI-RO, an aggregation also adopted in Taubman-Ben-Ari and Yehiel (2012). Second, the items tapping the high-velocity style loaded on other two factors: those with an aggressive connotation merged into the *angry* driving style, while one item loaded on the *Violation of rules contextually perceived as irrational* factor. Thus, the

Table 5
Mean, standard deviations and Cohen's d for driving styles according to driving history variables.

Driving styles	Accidents caused					Offenses				
	No (75.53%)		Yes (24.47%)		Cohen's d	No (44.6%)		Yes (55.4%)		Cohen's d
	M	SD	M	SD		M	SD	M	SD	
Violation of rules contextually perceived as irrational style	2.70	1.06	3.02	1.18	-.29***	2.64	2.64	2.88	1.14	-.22***
Anxious style	1.91	.87	1.78	.76	.16**	1.97	.87	1.80	.81	.20***
Patient and careful style	5.07	.75	5.04	.74	.04	5.05	.74	5.07	.76	-.03
Risky style	2.43	.87	2.70	.99	-.29***	2.45	.87	2.54	.94	-.09
Angry style	2.77	.87	2.94	.93	-.18**	2.76	.88	2.86	.90	-.11*
Distress-reduction style	3.92	1.05	3.89	1.15	.02	3.98	1.02	3.85	1.12	.10*
Dissociative style	1.90	.75	1.88	.71	.03	1.96	.75	1.86	.73	.13*

*** $p < .001$.

** $p < .01$.

* $p < .05$.

changes in the original factorial structure of the MDSI in the Romanian context closely correspond to those in the Argentinean one.

Furthermore, our results indicate that the behaviors of the Romanian drivers can be characterized by an additional dimension, namely the violation of traffic rules that might be perceived as irrational in the respective context. The tendency to break or obey traffic rules was already included in the psychological profile of two facets identified by Taubman-Ben-Ari et al. (2004). In the Romanian context, the *Violation of rules contextually perceived as irrational* emerged as a distinct and supplementary style, albeit covering a narrower psychological area, in the sense that it addresses drivers' behaviors only in situations in which traffic norms might be perceived as irrational. This culture-specific factor is further supported by the adequate internal consistency of its item set. Moreover, its associations with the other driving styles in the MDSI-RO are theoretically consistent with its psychological background of rule violation tendencies; most relevant, it is negatively related to the *careful and patient* style and strongly and positively related to the *risky* and *angry* styles.

It is important to stress that the rules violated by the behaviors that compose this driving style are not objectively irrational. On the contrary, all traffic rules are based on the objectively estimated risk on the bases of the relevant parameters of the situation (road conditions, human density, visibility, etc.). Consequently, all items describe potentially dangerous behaviors: exceeding the speed limits, not fastening the seatbelt, crossing the continuous white line, parking in unauthorized places. All of them create traffic risks not only in general, but also in the specific and narrow situations described in the items, and the rules forbidding these behaviors are necessary. Thus, the drivers who disregard them because they subjectively estimate a low accident risk as a consequence of their rule-breaking behavior, and thus perceive the rule forbidding this behavior as irrational, actually put themselves and others at serious risk. The emergence of this style in Romania might be due to the specificities of the driving context, which makes a significant part of the drivers question the rationality of the traffic rules and act according to the level of risk that they subjectively estimate instead of the one implied by the rule in the respective situation.

The pattern of correlations between the other six factors is also in accordance with the previous studies, with positive associations between the maladaptive styles and negative associations between them and the *prudent and careful* style. Most of the results concerning gender differences were also consistent with previous literature, with women scoring higher than men on the *anxious* and *dissociative* driving styles and lower on the *risky* driving style. In line with the results of Taubman-Ben-Ari et al. (2004) results and the research conducted elsewhere, we found no gender differences on the *angry* factor as well as higher mean scores for women on the *distress-reduction* style. The associations between age and the seven driving styles were also in accordance with previous studies: age was positively related to the adaptive driving behaviors (namely, the *careful and patient* style) and negatively related to the *risky*, *angry* and *dissociative* styles, as in Taubman-Ben-Ari et al. (2004), but also to the *distress-reduction* style, as in Poó et al. (2013), as well as to the *Violation of rules contextually perceived as irrational* style.

The external validity of the MDSI-RO is further indicated by the associations between the driving styles and the involvement in traffic crashes. Although the effect sizes are small, drivers who had caused traffic crashes scored higher on several maladaptive styles (*risky*, *angry* and *Violation of rules contextually perceived as irrational*).

Overall, MDSI-RO presents some variations from the previous versions of the instrument in the item content and in the factorial structure, as our study highlights the presence of a culture-specific driving style. Yet, similar differences in content also appeared in the MDSI version developed in Argentina. Moreover, the Romanian-specific factor is anchored in a behavioral tendency that is included in the psychological account of driving styles formulated by Taubman-Ben-Ari et al. (2004), namely in drivers' tendency to break or obey traffic rules. Also, given the close correspondence between the other six factors emerged in our study and the dimensions of the previous MDSI versions, we can conclude that the factorial solution of the MDSI-RO matches the meaning of the four broad facets of driving styles originally proposed by Taubman-Ben-Ari et al. (2004).

While the results of the first study support the factorial and external validity of the MDSI-RO, the examination of its construct validity was left for a second study, which would investigate the relationships between its scores and the relevant personality variables. Similar analyses were performed in the previous studies on the MDSI (Poó et al., 2013; Taubman-Ben-Ari et al., 2004). In our case, the aim of this second research stage is not only to check the previously reported associations between the MDSI styles and personality, but also to examine the empirical relationships between the newly-introduced style (*Violation of rules contextually perceived as irrational*) and the personality constructs that are theoretically related to it.

3. Study 2

The purpose of the second study was to explore the construct validity of the MDSI-RO that emerged from the previous study by examining its relationships with a set of relevant personality traits, namely: sensation seeking (both general and in traffic), desire for control, driving anger, normlessness, dutifulness and frustration discomfort. In line with the definitions of the seven driving styles assessed by the MDSI-RO and with the previous relevant studies, we expected that the *Violation of rules contextually perceived as irrational* driving style would be positively associated to normlessness, sensation seeking and discomfort intolerance, and negatively to dutifulness. Moreover, we expected significant associations between: (a) sensation seeking, driving anger and discomfort intolerance, on the one hand, and the angry and risky driving styles on the other; (b) desire for control and the patient and angry styles; and (c) driving anger and sensation seeking and distress-reduction driving style.

3.1. Method

3.1.1. Participants and sampling

Another sample of eight hundred thirty-five Romanian drivers (466 men and 369 women) participated in this study. Their age ranged from 18 to 80 ($M = 37.91$; $SD = 14.11$). All participants had a driving license and regularly drove a car. The sample selection criteria and the recruiting procedure were the same as in Study 1: each of the 75 field operators had to recruit 12 participants among his/her personal acquaintances that would correspond to the combination of the same three criteria in the sampling scheme. After expressing their consent, those who agreed to participate completed the self-report questionnaire. After being informed about the scope and objective of the study, 65 people refused to participate. The sample distributions according to age, education level and occupation are similar to those in Study 1. The questionnaire administration took place in July 2014.

3.1.2. Measures

All participants completed the 41-item version of the MDSI-RO described in Study 1. The socio-demographic data and driving variables were also identical to those in Study 1.

Sensation seeking was assessed by Zuckerman, Kuhlman, Joireman, Teta, and Kraft (1993) 19-item scale. Participants rated their agreement with each item on a 6-point scale, ranging from “totally disagree” (1) to “totally agree” (6). Higher average scores indicate higher impulsive sensation seeking, defined as the willingness to seek excitement through risky behaviors.

Driving thrill seeking, defined as the tendency to obtain enjoyment through risk-taking driving behaviors (such as driving at high speeds), was assessed by the 8-item thrill seeking scale of the Driver Stress Inventory (the DSI – Matthews, Desmond, Joyner, & Carcary, 1997). Participants responded on a 6-point scale, ranging from “not at all” (1) to “very much” (6). Higher average scores represent higher thrill seeking tendencies in traffic.

Desire for control, or the need for control in everyday activities, was assessed by Burger and Cooper’s (1979) 20-item scale. Participants rated their agreement with each item on a 6-point scale, ranging from “totally disagree” (1) to “totally agree” (6). Higher average scores indicate higher desire for control.

Driving anger was assessed with the 33-item Driving Anger Scale (Deffenbacher, Oetting, & Lynch, 1994). Participants responded on a 5-point scale, ranging from “not angry” (1) to “very angry” (5). Higher average scores represent higher levels of anger in traffic situations.

Normlessness, defined as the general tendency to disobey the rules in order to achieve one’s goals, was assessed using Kohn and Schooler’s (1983) 4-item scale. Participants rated their agreement with each item on a 6-point scale, ranging from “totally disagree” (1) to “totally agree” (6). Higher average scores indicate stronger tendency to disobey the rules in the pursuit of one’s goal.

Dutifulness, or the general tendency to follow the rules, was assessed by the 10-item scale in the IPIP-NEO (International Personality Item Pool – Neuroticism, Extraversion & Openness, Goldberg et al., 2006). Higher average scores represent stronger tendencies to follow the rules.

Discomfort intolerance, a central dimension of frustration intolerance, refers to one’s negative reactions to unpleasant tasks or duties. It was assessed by the 7-item subscale in the Harrington’s (2005) Frustration Discomfort Scale. Participants are required to respond on a 6-point scale, ranging from “never” (1) to “always” (6).

3.2. Results

Summary statistics for the MDSI-RO factors on this new sample are presented in Table 6, and those for the personality measures are displayed in Table 7. Pearson and partial correlations between the MDSI-RO scales and the personality factors (controlling for age, gender, educational level and years of driving) are displayed in Table 8. Overall, the pattern of associations is in line with our hypothesis: the *Violation of rules contextually perceived as irrational* style correlates negatively with dutifulness and positively with sensation seeking (both in general and in traffic situations), driving anger, normlessness and discomfort intolerance. Among other significant relationships, the *angry* and *risky* driving styles correlated negatively with dutifulness and positively with sensation seeking, driving anger, normlessness and discomfort intolerance. Finally, sensation seeking and driving anger were positively related to the *dissociative* and the *distress reduction* styles, and negatively related to

Table 6
Summary statistics for the MDSI-RO factors in Study 2 ($N = 835$).

MDSI-S factors	Number of items	Cronbach’s	Min	Max	Mean	SD	Skewness	Kurtosis
Violation of rules contextually perceived as irrational style	6	.825	1	6	2.78	1.15	.43	−.49
Anxious style	4	.705	1	5	1.74	.75	1.18	1.08
Patient and careful style	7	.702	2	6	5.11	.74	−.97	.64
Risky style	6	.740	1	6	2.45	.94	.82	.50
Angry style	8	.811	1	5	3.00	.79	.35	−.26
Distress-reduction style	4	.621	1	6	3.89	1.10	−.42	−.33
Dissociative driving style	6	.684	1	4	1.77	0.61	1.06	.92

Table 7

Summary statistics for personality factors.

Personality factors	Number of items	Cronbach's	Min	Max	Mean	SD	Skewness	Kurtosis
Dutifulness	10	.835	2	6	5.05	.63	-.91	1.13
Normlessness	4	.595	1	6	3.48	1.01	-.34	-.51
Discomfort intolerance	14	.872	1	6	4.10	.85	-.44	.01
Driving anger	33	.937	1	5	2.99	.68	-.18	-.60
Sensation-seeking	19	.897	1	6	3.28	.94	.09	-.39
Driving thrill seeking	8	.912	1	6	2.31	1.21	.97	.26
Desire for control	20	.698	2	6	4.39	.53	-.21	.21

Table 8

Pearson and partial correlations between MDSI-RO and personality factors scores.

	Dutifulness	Normlessness	Discomfort intolerance	Driving anger	Sensation seeking	Driving thrill seeking	Desire for control
Violation of rules contextually perceived as irrational style ^a	-.47**	.36**	.29**	.33**	.38**	.52**	-.03
Anxious ^a	-.44**	.33**	.28**	-.31**	.33**	.47**	-.03
Careful and patient ^a	-.21**	-.01	.05	.23**	-.03	.02	-.19**
Risky ^a	-.23**	-.03	.04	.23**	-.02	.07	-.19**
Angry ^a	.44**	-.17**	-.19**	-.35**	-.28**	-.45**	.21**
Distress-reduction ^a	.41**	-.15**	-.17**	-.34**	-.23**	-.42**	.21**
Dissociative ^a	-.48**	.32**	.24**	.29**	.50**	.68**	-.06
	-.45**	.28**	.24**	.28**	.46**	.64**	-.06
	-.47**	.32**	.35**	.48**	.39**	.50**	-.03
	-.44**	.30**	.34**	.47**	.34**	.45**	-.03
	-.20**	.22**	.31**	.27**	.30**	.29**	.11**
	-.14**	.19**	.28**	.22**	.22**	.23**	.12**
	-.35**	.08**	.18**	.22**	.23**	.14**	-.18**
	-.36**	.10**	.17**	.21**	.14**	.19**	-.36**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

^a Pearson correlations in the first row and partial correlations (controlling for age, gender, educational level and years of driving) in the second row.

the *careful and patient* driving style, which also emerged as negatively associated to driving anger and positively related to dutifulness.

Moreover, we split the sample in two groups according to their score on the *Violation of rules contextually perceived as irrational* style and compared participants with scores above the sample mean with those scoring below it on two of the personality traits, namely discomfort intolerance and dutifulness. The results, displayed in Table 9, show that participants higher in the *Violation of rules contextually perceived as irrational* style score significantly lower on the dutifulness scale and higher on the discomfort intolerance scale than the others.

3.3. Discussion

Previous research pointed out significant relationships between sensation seeking and driving violations (Marengo, Settanni, & Vidotto, 2012; Rimmö & Åberg, 1999). Our results show that this association also applies when taking into account a subset of traffic rules, namely those that might be perceived as irrational. The tendency to break these traffic rules thus appears to be stronger in drivers who use traffic situations in order to satisfy their urges to experience intense sensations. In line with Lucidi et al. (2010) and Ulleberg (2002), we found that normlessness and driving anger reflect the general tendency to break the traffic rules. On the opposite side, dutifulness, or the strength of a person's sense of duty and obligation, motivates drivers' observance of the specific rules that govern road traffic, even in situations when they might be considered inadequate to the real safety needs. The positive association between discomfort intolerance and the irrational norms violation driving style can be explained by the fact that most traffic rules limit or censor drivers' behaviors in the respective situation, thus creating a certain level of frustration, a reaction that is amplified when these situational rules are perceived as irrational. Our results indicate that those who have more intense negative reactions to such momentary discomforts display a more frequent counter-normative behavior in these traffic situations.

The results concerning the *angry* and *risky* driving styles also parallel previous findings. First, the tendency to experience anger while driving increases the likelihood of risky behaviors (Iversen & Rundmo, 2002) and aggressive behaviors in traffic (Deffenbacher, Lynch, Oetting, & Yingling, 2001). Similarly, people who seek intense sensations in traffic perform angry (Berdoula, Vavassori, & Sastre, 2013) and risky (Marengo et al., 2012; Taubman-Ben-Ari et al., 2004) driving maneuvers more often than those low in this personality factor. The associations between the two driving styles and discomfort intolerance

Table 9

Means of the dutifulness and discomfort intolerance scales by violation of rules contextually perceived as irrational style.

MDSI-RO factors	Violation of rules contextually perceived as irrational style	N	Mean	SD	F(1,833)	Cohen's d
Dutifulness	Low score	418	5.28	.52	131.84***	0.79
	High score	417	4.81	.61		
Discomfort intolerance	Low score	418	3.92	.91	40.59***	0.44
	High score	417	4.29	.74		

*** $p < .001$.

are in line with the results of Beck, Daughters, and Ali (2013), which show that the ability to tolerate distress leads to less frequent occurrences of risky and aggressive driving behaviors. Concerning normlessness, Iversen and Rundmo (2002) also found that the tendency to disobey the rules is significantly associated to drivers' frequency of risky behaviors; our results indicate that this general personality factor might also explain in part drivers' tendencies to display angry behaviors in traffic. On the other hand, dutifulness appears to act as a psychological censor of these tendencies, as drivers with a strong sense of obligation display risky and aggressive behaviors less often.

The associations between the *careful and patient* driving style, on the one hand, and driving anger and dutifulness, on the other, suggest that the drivers' tendency to experience aggressive feelings lowers their likelihood of adopting safe and patient behaviors, while having a strong sense of obligation toward rules encourages positive driving behaviors.

Overall, the results of the second study support the construct validity of the MDSI-RO, indicating theoretically consistent associations between its driving styles and the set of relevant personality measures.

4. General discussion and conclusions

Since driving behaviors vary significantly between cultures, the adaptation of traffic-related psychological instruments developed elsewhere in new national contexts should keep track of their cultural specificities (Nordfjærn & Rundmo, 2009; Şimşekoğlu et al., 2013) and of the social norms that informally govern these behaviors (Zaidel, 1992). By revising and expanding the original content of the original MDSI, we developed a Romanian version (MDSI-RO) that, according to the results of our two studies, has satisfactory psychometric qualities. Its structure corresponds to the four broad driving domains of the original instrument, while also addressing a supplementary driving style, namely the *Violation of rules contextually perceived as irrational*, concerning the violation of traffic rules that are perceived as irrational in the respective situation.

Several factors might concur to the emergence of this distinct driving style in the Romanian context. First, several important rules from the Romanian Traffic Code are perceived by the drivers as inadequate for real safety needs (Havârneanu & Goliță, 2010). A possible cause of this public perception is the fact that during the last twelve years, the Romanian Traffic Code has become increasingly stricter (for instance, reducing the speed limit within rural areas from 60 to 50 km/h). In other words, in a relatively short period, behaviors that had been accepted before by the Traffic Code have been deemed too risky and forbidden. This progressive narrowing of the area of drivers' legal behaviors have led to the perception of traffic rules as somewhat arbitrary, detached from the real safety needs of the situations that they govern.

Another possible reason of the perception of Romanian traffic norms as irrational might be the high proportion of driving situations in which keeping the rules would be quite expensive from the standpoint of travel time. The Romanian traffic infrastructure is generally seen as severely underdeveloped and badly administered, unable to cover current traffic needs: highways represent a very low proportion of the Romanian national road network, while a large part of the roads between all Romanian cities crosses villages, constraining drivers who travel from one city to another to obey a speed limit of only 50 km/h during much of their trip and consequently greatly prolonging their travel time. Similarly, there is a chronic insufficiency of legal parking spaces in the urban areas. This objective limitation, usually attributed to the lack of authority concern for solving the problem, raises doubts about the adequacy of the norms that forbid parking in other places such as on the side of the sufficiently wide streets. Thus, the Romanian drivers often find themselves confronted with rules that ask them to pay a high personal and immediate price for what might be seen as consequences of the unwillingness of the authorities to improve traffic conditions. In line with these arguments, most of the items comprising this MDSI-RO factor refer to the decision to shorten travel time by breaking the law in specific conditions that makes it appear as inadequate to the real safety needs. Moreover, at least some of the respective rules tend to be perceived as purposively inadequate to the real safety needs of the context, in the sense of being designed, in fact, to create opportunities for punishing drivers caught violating them. The high prevalence of negative attitudes toward traffic authorities among Romanian drivers (Havârneanu & Goliță, 2010) lends support to this idea.

These factors presumably make Romanian drivers more sensitive to the situational adequacy of traffic rules. As a previous study on Romanian drivers showed, the perceived situational irrationality of a traffic rule further motivates its violation (Havârneanu & Havârneanu, 2012), hence the emergence of this specific set of driving behaviors in the Romanian context.

Given the association between the *Violation of rules contextually perceived as irrational* style and drivers' involvement in traffic crashes, the specific conditions that render traffic rules inadequate in the drivers' perception could be considered

as contributing to the high accident rate on Romanian roads. Relevant in this respect, Wagenaar and Reason (1990) divide the causes of traffic crashes in two classes. The first, labeled token causes, includes the direct causes of the accident, occurring immediately before it. Among several varieties of token causes, Wagenaar and Reason (1990) place the conditions promoting violations, such as road repairs causing long delays, unnecessary traffic lights or insufficient parking space. The second class of accident causes, labeled type causes, refers to the factors that are present in the system for a long time.

In the Romanian case, although the conditions that make traffic rules appear as irrational are very similar to the type causes mentioned above, both in content and in their effect of promoting rule violations, the high frequency of these situations in the Romanian driving context and the emergence of drivers' behaviors in these situations as a distinct driving style suggest that in fact perceived traffic rule inadequacy might have become a type cause of traffic crashes in Romania. In other words, given the heightened sensitivity of Romanian drivers toward the issue of rule situational adequacy, the high frequency of traffic contexts in which traffic rules could be perceived as inadequate in the Romanian driving context, and the effects of this perception in what regards norm violation and, consequently, accident proneness in Romanian drivers, the perceived irrationality of traffic rules has become a chronic matter, seriously plaguing the national traffic system.

Several limitations of the research should be noted. Firstly, it relied on self-reports of driving behaviors and personality. Secondly, similar to most items in the previous versions of the MDSI, the items in the *Violation of rules contextually perceived as irrational* style do not explicitly state the motivation of the described behavior (i.e. the irrationality of the rules forbidding the respective behavior in that situation). The study limitation in this regard is that the degree in which the relevant traffic rules addressed by these items are perceived as irrational by our respondents was not assessed directly. This perception is only suggested by the fact that most of the items in this style were developed upon the scenarios used in Havârneanu and Havârneanu (2012); their results showed that the traffic rules in these situations are perceived by many Romanian drivers as inadequate to the real safety needs of the respective context.

Thirdly, both studies were done on convenience samples, not representative for the entire Romanian population, although we tried to include drivers varying as much as possible in age, driving experience, education level and occupation. Fourthly, the criterion for evaluating the external validity of the MDSI-RO was self-reported culpability for previous traffic accidents. As af Wählberg, Dorn, and Kline (2010) show, this could generate problems of common method variance that could artificially inflate the associations between the MDSI driving styles and self-reported traffic accidents. As the two types of instruments are related, people might have a tendency to respond consistently across them, by displaying an artificial correspondence between the frequency of accidents that they have been involved in and their behaviors that they identify as responsible for this frequency. Furthermore, the concept of culpability for traffic accidents is in itself controversial, since there is no universally accepted definition of responsibility for accidents within the traffic research scientists (af Wählberg, 2009). There are also methodological and practical deficiencies that contribute to the difficulty of determining culpability, such as the lack of a validated method for measuring and interpreting relevant parameters, and the current insufficiency of valid information that can be included in culpability analyses.

Fifthly, two out of the six items in the *Violation of rules contextually perceived as irrational* style (leaving the car parked in unauthorized places and not fastening the seatbelt during short trips) do not tap actual driving behaviors, which makes them susceptible of lacking face validity if we adopt a perspective on driving styles as restricted to the actions performed while driving the car and having direct consequences either on its movement through traffic (such as changing lanes as soon as possible) or on other people (such as blowing the horn). Yet, there are also several items in the previous MDSI versions that do not fit to this restrictive definition of driving styles; some refer to internal states (such as worry or relaxation) with no direct behavioral output, others to behaviors not related to car maneuvering (such as fixing one's hair/makeup, or listening to music). Therefore, the MDSI items can be conceived as evaluating driving styles through all their relevant indicators, either external or internal; in this respect, Ozkan and Lajunen (2005) also notice that Taubman-Ben-Ari et al.'s (2004) scale "measured behaviours, attitudes and emotions" (p. 357). These multifaceted indicators reveal a certain psychological approach to driving; the concept of driving style can, thus, be conceived as a personal characteristic of a psychological nature, although its practical importance stems from its behavioral consequences in traffic situations. In the case of the driving style that our results added to the previous structure of the MDSI, its distinctive psychological approach refers to the tendency to disregard traffic rules that are perceived as inappropriate to the respective situation. Similar to most of the other driving styles, it manifests not only through behaviors directly related to car maneuvering, but also through more distal actions or inactions. Further studies should extend the behavioral portrait of this style by revealing all its manifestations, especially those that increase the most the risk of traffic accidents.

Finally, the external validity of the MDSI-RO was analyzed through the associations with the same variables as those in the previous two studies on the development of this instrument in specific cultures (Poó et al., 2013; Taubman-Ben-Ari et al., 2004). A similar limit to the originality of the paper is posed by the fact that the relationships between the MDSI driving styles and personality have been the focus of research of several other previous papers (Poó & Ledesma, 2013; Taubman-Ben-Ari & Yehiel, 2012). Future studies could search for other types of determinants of driving behaviors besides personality variables, such as values, personal or social identity, and habits. This could prove especially fruitful when analyzing drivers' behaviors that transgress traffic rules, as many traffic violations have a more complex causal underpinning than personality alone (Havârneanu & Havârneanu, 2012). Our results also suggest the appropriateness of such a comprehensive approach, showing that in the Romanian driving context, breaking traffic laws when they are perceived as inadequate to the real safety needs in that situation emerges as a distinct driving style. On the one hand, they further show that there are certain personality traits that predispose drivers toward committing violations in these situations. On the other hand, this driving style

might be the result of an interaction between personality and a specific approach of Romanian drivers on traffic rules and authorities. As explained above, the specificities of the Romanian driving context (in terms of infrastructure and regulations) might make a significant part of drivers question more often the legitimacy of traffic rules in certain situations and might offer them rationalizations for their violations – although such rationalizations are only illusory, as the deviant behaviors are still objectively dangerous.

Moreover, the important psycho-social specificities of this driving context might help justify the theoretical deviation of this driving style from the underlying structure of the previous MDSI versions. While the definition of the driving styles in these versions did not include any reference to the motivation of the behaviors comprising them, the *Violation of rules contextually perceived as irrational* style not only refers to a type of behavioral regularity while driving (like the other styles do), but it is also conceptualized as being triggered by a specific factor, namely the subjective perception of the traffic rule as inappropriate in the context. Yet, as argued above, this perception does not generate in itself the kind of objectively risky behaviors that this driving style refers to; an essential and quasi-generalized underlying factor is the frequent Romanian drivers' perspective on traffic rules and authorities. In other words, these behaviors do not only stem from drivers' individual motivation, but also from this stable and general aspect of the Romanian driving culture, in interaction with drivers' personality. The other driving styles are also presumably anchored in stable and general factors, personality traits being so far the most frequently investigated in this area. Therefore, the *Violation of rules contextually perceived as irrational* style also shares important conceptual similarities with the others driving styles.

Relevant in this respect, the existence and the psychological mechanisms of this driving style should also be tested in other national driving contexts with better infrastructure, more stable regulations and more positive attitudes toward traffic authorities. Also, future research in the Romanian context should explore in more depth the topic of traffic rule perception, in order to assist in a systematic effort to increase the perceived adequacy of traffic norms and, consequently, to reduce the frequency of traffic violations.

In sum, our results indicate that the MDSI-RO is a reliable and valid instrument in the Romanian driving context, modeling the general psychological structure of the previously developed versions, as well as the local situational and cultural specificities. The MDSI-RO could prove a valuable tool in the further research on the factors that contribute to the high traffic crashes rate in Romania.

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