Perceived descriptive safety-related driving norms within and outside Arab towns and villages in Israel

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\textbf{ABSTRACT}

\textbf{Objective:} Involvement in car crashes is higher among Israeli Arabs compared to Jews. This study characterized perceived descriptive driving norms (PDDNs) within and outside Arab towns/villages and estimated their association with involvement in car crashes.

\textbf{Methods:} Arab drivers (594) living in 19 towns and villages were interviewed in face-to-face interviews. The questionnaire included questions about involvement in car crashes, PDDNs within and outside the towns/villages, attitudes toward traffic safety laws, traffic law violations, and socioeconomic and demographic variables. PDDNs represent individuals’ perceptions on how safe other people typically drive. The low scores indicate a low percentage of drivers performing unsafe behaviors (safer driving-related norms). A structural equation modeling analysis was applied to identify factors associated with PDDNs and involvement in car crashes.

\textbf{Results:} A large difference was found in PDDNs within and outside the towns/villages. Mostly, the respondents reported higher rates of unsafe PDDNs within the towns/villages (mean = 3.76, SD = 0.63) and lower rates of PDDNs outside the towns/villages (mean = 2.12, SD = 0.60). PDDNs outside the towns/villages were associated with involvement in a car crash ($r = -0.12$, $P < .01$), but those within the towns/villages were not. Within the towns/villages, attitudes toward traffic laws and PDDNs were positively associated with traffic law violations ($r = 0.56$, $P < .001$; $r = 0.11$, $P < .001$ respectively), where traffic law violations were directly associated with involvement in a car crash ($r = -0.14$, $P < .001$).

\textbf{Conclusions:} Unsafe PDDNs may add directly and indirectly to unsafe driving and involvement in car crashes in Arab Israelis. Because PDDNs outside towns/villages were better, increased law enforcement within towns/villages may improve these norms and decrease involvement in car crashes.

\subsection*{Introduction}

Previous studies on mortality and morbidity related to traffic crashes indicate that the risk of being involved in a car crash is higher among minorities than in majority populations and in developing countries compared to developed countries (Agran et al. 1998; Braver 2003; Hazen and Ehiri 2006; Malhotra et al. 2008; Stirbu et al. 2006). Generally, road user behaviors are regarded as a major cause of many traffic crashes (PIARC 2003), where social norms may be among the prominent factors that influence road user behaviors (Zaidel 1992).

Social norms have been extensively studied, because they seem to be a major factor influencing individual and the community behaviors in general. Various types of social norms were defined; for example, descriptive norms, which represent what people perceive other people typically do, and injunctive norms, which represent norms that people think ought to be done (Cialdini et al. 1990). Descriptive norms are based on observations of what those around us generally do and do not necessarily involve an obligation or normative expectation to conform (Bicchieri 2006). Descriptive norms have been shown to influence behaviors (Cialdini et al. 1990). It has been suggested that drivers “are influenced by the collective behavior of other drivers." ... and that drivers are sensitive to the ‘culture of driving’ around them and emulate it” (Zaidel 1992, p. 1).

Some studies have looked at the association between social norms and various driving safety behaviors. Mostly, social norms have been studied via Ajzen’s (1980) theory of planned behavior, which addresses subjective norms and is used frequently in traffic research (Castanier et al. 2013; Cestac et al. 2011; Forward 2009). Social norms, whether injunctive or descriptive, may explain to some extent traffic law violations and therefore differences in rates of involvement in car crashes between communities (De Pelsmacker and Janssens 2007; Riquelme et al. 2010; Simons-Morton et al. 2012). For example, social norms were found to influence teenage speeding (Simons-Morton et al. 2012) and talking on a mobile phone while driving (Riquelme et al. 2010).

In Israel, 2 major populations reside, Jews and Arabs. Arabs consist of around 20% of the population (Central Bureau of...
Statistics 2012). About 90% of the Arab population resides in Arab villages and towns where all residents are Arab; only about 10% of Arabs live in mixed towns where both Jews and Arabs live side by side (The Arab Center for Alternative Planning 2012). The Arab community is largely an underprivileged minority with a history of disadvantage in income, education, and employment (Brookdale Institute 2012; Haberfeld and Cohen 2007; Okun and Friedlander 2005; Wolkinson 1999). Arabs differ in their language and culture from the majority Jewish population and generally are regarded as a community in transition from a more traditional lifestyle to a more Western lifestyle (Lavee and Ben-Ari 2003).

Data indicate that Arabs in Israel are involved in more car crashes, as both drivers and pedestrians, compared to Jews (Israel National Road Safety Authority 2011; Magid et al. 2015; Or Yarok 2012). This relatively higher involvement in car crashes can be attributed to such factors as lower socioeconomic conditions (e.g., old and unsafe vehicles), unsafe driving, and unsafe infrastructure within Arab towns/villages. There is evidence that Arab drivers have higher rates of traffic violations, such as speeding and nonuse of seat belts (Baron-Epel et al. 2013; Gitelman et al. 2003). Gitelman et al. (2003) analyzed traffic injuries and fatalities of Arabs and Jews and reported that traffic injury rates per population on nonurban roads were higher among Arabs compared to Jews for all types of casualties: pedestrians, drivers, and passenger. In Arab towns or villages, the rates of fatalities and serious injuries were higher compared to the rates in Jewish towns among pedestrians and drivers. The authors suggested that this could be due to lower level of road infrastructure and more violations of traffic laws in the Arab community (Gitelman et al. 2003).

A qualitative study reported attitudes and beliefs of Israeli Arabs regarding causes of road crashes (Moran et al. 2010). Participants in the focus groups brought up issues such as the differences between Arabs and Jews in driving behaviors, social driving norms, road infrastructure, and traffic law enforcement. Participants mentioned that Arabs regularly drive unsafely in their villages and towns, whereas outside their villages they drive safely and obey traffic safety laws (Moran et al. 2010).

This study aims to characterize perceived descriptive driving norms (PDDNs) within and outside of the Arab towns and villages in Israel and to explore the association of these PDDNs with age, gender, distance driven, traffic law violations, attitudes toward traffic safety laws, and involvement in car crashes.

Methods

A stratified random sampling process was performed to achieve a cross-sectional face-to-face survey with 594 Israeli Arab drivers from 19 Arab villages and towns. The interviewees were aged 18 and over, and the survey was conducted during the year 2009. The sample was a 2-stage sample, first sampling 19 towns/villages by size and socioeconomic status (SES) and then sampling a representative number of interviewees, depending on the size of the town or village. The number of inhabitants in each town or village ranged between 48,000 for the largest town and 3,000 for the smallest village. The SES level of the towns and villages ranged between 2 and 4 on a scale of 1 to 10 (Central Bureau of Statistics 2006). Houses were chosen randomly using a planned map and the person opening the door was interviewed if he or she had a driver’s license; if not, another available respondent in the house with a driver’s license was asked to participate. The interviewers were Arab speaking from the Arab community. The response rate was 77.3%. The study received the approval of the Ethics Committee at the University of Haifa.

The questionnaire

The questionnaire included questions about involvement in car crashes, PDDNs, attitudes toward traffic safety laws, traffic law violations, and socioeconomic and demographic variables. The questionnaire was translated into Arabic and translated back to Hebrew to validate the correct translation.

Involvement in a car crash

Drivers were asked to report whether they were involved in a car crash of any kind over the last 3 years as a driver.

Perceived descriptive safety-related driving norms

The process of developing the measure is described in the Appendix (see online supplement) and in Obeid et al. (2014). The measure consisted of a list of 8 unsafe behaviors that were common in the Arab towns/villages. These included behaviors such as use of seat belts for adults and children, parking in places that disturb other drivers or pedestrians, driving without a driver's license, and driving while speaking on a handheld cell phone. The behaviors are presented in Table 1. For each behavior, the respondents estimated the percentage of drivers performing the behavior within and outside their town/village on a scale of 1 to 5, where 1 indicated a very low percentage of drivers and 5 indicated a very high percentage of drivers. Therefore, high scores indicated unsafe driving. In Table 1, categories 1 and 2 and categories 4 and 5 were combined. Cronbach's alpha for the 8 behaviors was .76.

Attitudes toward traffic safety laws

Statements describing attitudes toward traffic safety laws were based on Iverson's questionnaire (Iverson 2004). For example: “You cannot keep all the traffic laws because the traffic will not flow.” The respondents were asked to rate their answers on a scale from 1 to 5, where 1 indicated full agreement and 5 indicated no agreement; a “do not know” option was available. Cronbach's alpha for the 10 statements was .85.

Traffic law violations

Traffic law violations were measured by the Driver Behavior Questionnaire originally developed by Reason et al. (1990). The questionnaire measures the frequency of self-reported traffic law violations on a scale from 1 to 5, where 5 indicate full agreement with the item and 1 indicates total disagreement. Higher scores indicate better driving. The Driver Behavior Questionnaire was originally divided into 3 dimensions: intentional violations, mistakes, and mishaps. Previous studies found that intentional violations were associated with involvement in accidents more than the dimensions of errors and mishaps (de Winter and Dodou...
Table 1. Distribution of PDDNs within and outside of the town/village.

| In your opinion what percentage of drivers: | PDDNs within the town/village | PDDNs outside of the town/village |
|---------------------------------------------|------------------------------|----------------------------------|
| Category                                    | n   | %    | n   | %    |
| Do not use the restraint system              |     |      |     |      |
| Very high and high                          | 529 | 89.1 | 75  | 12.5 |
| Median %                                    | 49  | 8.2  | 175 | 29.5 |
| Low and very low                            | 16  | 2.7  | 344 | 57.0 |
| Do not restrain their children in the car    |     |      |     |      |
| Very high and high                          | 455 | 76.9 | 73  | 12.2 |
| Median %                                    | 89  | 15.0 | 121 | 20.4 |
| Low and very low                            | 48  | 8.1  | 396 | 67.1 |
| Park their car in places that could disturb others | 444 | 74.7 | 56  | 9.4  |
| Very high and high                          |     |      |     |      |
| Median %                                    | 106 | 17.8 | 113 | 19.0 |
| Low and very low                            | 45  | 7.5  | 426 | 71.6 |
| Drive around with their car radio at full volume (young drivers) | 444 | 74.6 | 211 | 35.6 |
| Very high and high                          |     |      |     |      |
| Median %                                    | 107 | 18.0 | 163 | 27.5 |
| Low and very low                            | 44  | 7.4  | 219 | 36.9 |
| Drive without a license                      |     |      |     |      |
| Very high and high                          | 222 | 37.8 | 19  | 3.2  |
| Median %                                    | 173 | 29.4 | 60  | 10.2 |
| Low and very low                            | 191 | 32.8 | 509 | 86.6 |
| Talk on their cell phone with no hands-free device | 465 | 78.3 | 155 | 26.1 |
| Very high and high                          |     |      |     |      |
| Median %                                    | 105 | 17.7 | 178 | 30.0 |
| Low and very low                            | 24  | 4.1  | 260 | 43.9 |
| Do not adhere to road signs                  |     |      |     |      |
| Very high and high                          | 440 | 74.1 | 51  | 8.6  |
| Median %                                    | 108 | 18.2 | 115 | 19.3 |
| Low and very low                            | 46  | 7.8  | 429 | 72.1 |
| Carry more people than allowed by law in their car | 286 | 48.3 | 25  | 4.2  |
| Very high and high                          |     |      |     |      |
| Median %                                    | 162 | 27.4 | 70  | 11.8 |
| Low and very low                            | 144 | 24.3 | 497 | 84.0 |

Table 1. Distribution of PDDNs within and outside of the town/village.

Statistical analysis

For each set of norms, attitudes, and behaviors described above, Cronbach’s alpha was calculated (see above) and a combined mean variable was created.

Bivariate analysis, 2-level hierarchical linear modeling with a random effects, and path analysis were used to explore the relationship between norms, attitudes, traffic law violations, and involvement in a car crash. Further description of the statistical analysis is presented in the Appendix.

Results

A third of the interviewees were female and two thirds were male. This is consistent with the distribution of driver gender in the Arab population (Central Bureau of Statistics 2013). Half of the drivers were under the age of 38 (mean age = 36.9, SD = 12.3 years). About 23% reported between 12 and 15 years of education and 12% of the participants reported 16 years of education or more. Most survey participants were Muslims and the rest were Christians and Druze, representing relevant sectors within the Arab community (Central Bureau of Statistics 2013).

Interviewees reported high rates of PDDNs within their towns/villages (Table 1). For example, more than 89% of respondents reported that a high or very high percentage of drivers do not restrain themselves in the car when driving within the town/village, 77% reported that a high or very high percentage of drivers do not restrain their children in the car, and 38% estimated that a high percentage of the population drive without a driver’s license within the town/village. Other illegal driving behaviors such as use of a handheld cell phone while driving or not complying with road signs were also attributed to a large share of the population within their town/village. These estimates demonstrate the PDDNs that prevail within the towns/villages the interviewees live in.

Interviewees were also asked to estimate the fraction of the towns’ inhabitants performing the same unsafe driving behaviors when driving outside of the town/village. Substantial differences were observed when comparing the rate of PDDNs reported within and outside the town/village (Table 1). For example, only 12.5% of respondents estimated that a high or very high percentage of drivers do not restrain their children in the car, and 38% estimated that a high percentage of the population drive without a driver’s license within the town/village. Other illegal driving behaviors such as use of a handheld cell phone while driving or not complying with road signs were also attributed to a large share of the population within their town/village. These estimates demonstrate the PDDNs that prevail within the towns/villages the interviewees live in.

When calculating a combined scale for each type of PDDN on a range of 1–5, the mean value of PDDNs within the towns/villages was 3.76 (SD = 0.63) and that outside of the towns/villages was 2.12 (SD = 0.64), where the difference was statistically significant ($P < .0001$). The PDDNs of driving outside and within the towns/villages varied significantly between various towns/villages but were not dependent on socioeconomic variables such as religion, education, income, or distance driven per month.

Twenty-six percent of participants reported being involved in a car crash as a driver during the previous 3 years. PDDNs outside the town/village were associated with the reported involvement in a car crash, where those within the town/village were not. Outside the town, respondents not involved in a car crash reported safer PDDNs (mean = 3.65, SD = 0.64), whereas those...
involved in a car crash reported less safe PDDNs (mean = 3.79, SD = 0.62); the difference was statistically significant (P < .01).

Furthermore, involvement in a car crash was not associated with age, education, income, and attitudes. However, men were involved in more car crashes and so were those reporting more kilometers driven. No significant differences in involvement in car crashes in the 19 towns/villages were identified (data not presented).

The correlation analysis of the variables measured (Table A1, see online supplement) demonstrated that PDDNs within and outside the towns/villages were significantly correlated with each other.

Because PDDNs in and outside the town/village differed significantly between each town/village, there was a need to take this second level into account when identifying factors associated with descriptive norms. Therefore, a 2-level hierarchical linear model with a random effect analysis was applied to identify factors associated with both the descriptive norms within and outside the town/village (Tables A2–A3, see online supplement). The size of the town and its socioeconomic level were not statistically significantly associated with PDDNs, both within and outside the town/village.

Path analysis results

Following the conceptual model (Figure 1), a path analysis was performed suggesting the model presented in Figure 2. The best fit model was chosen by the indices of quality of the model. The indices for the quality of the model fit were as follows: $\chi^2 = 10.02$, $P = .44$, normed fit index $= 0.982$, comparative fit index $= 1.000$, root mean square error of approximation $= 0.002$.

The path model revealed a pattern of influences of PDDNs, traffic law violations, attitudes, gender, age, and mean driving distance, as presented in Figure 2.

Involvement in a car crash

PDDNs outside the town, traffic law violations, mean driving distance, and gender were directly associated with involvement in a car crash. However, PDDNs within the town were not associated with involvement in a car crash.

Traffic law violations

Attitudes and PDDNs within the town/village were directly and significantly related to traffic law violations. Age and mean driving distance were also significantly correlated to traffic law violations, revealing expected changes of behavior between the generations. Gender was only indirectly related to traffic law violations, through attitudes. It may be that women and men perceive traffic laws in a similar way and that the main difference is in their attitudes.

Interestingly, PDDNs outside the town were not related to attitudes toward traffic laws. Age was not found to be directly related to involvement in car crashes, suggesting that the PDDNs outside the town and traffic law violations are more significant than biological factors that originate in the age of the driver. Unexpectedly, attitudes were also only indirectly related to involvement in car crashes, through traffic law violations.

Other relationships

Gender and age were correlated in this sample. This correlation may suggest a changing environment for women in Arab society because in the past, driving among women was not as common in Arab societies as it is today.

PDDNs outside the town were not expected to be related to attitude toward driving laws, because these norms may be more affected by police law enforcement.

Although the association between driving distance per month and traffic law violations was not significantly correlated, as measured by a bivariate Pearson’s correlations, this regression equation was added to the path analysis depicted in Figure 2 and a better model fit was achieved than without this path. Therefore, the model with this path is presented. The indices of quality of the model without this path between mean driving distance and traffic law violations were as follows: $\chi^2 = 17.33$, $P = .10$, normed fit index $= 0.969$, root mean square error of approximation $= 0.031$, which are acceptable but not as good as for the model presented in Figure 2. The negative effect revealed by the path analysis can be explained as a statistical artifact (Cole and Preacher 2014). It could also be possible that the adjustment revealed a true effect. If this effect indeed exists, it suggests the assumed relation: the great distance driven, the more law violations are performed. At the same time, as the mean driving distance per month increases, attitudes toward driving laws improve.

Discussion

The difference in PDDNs reported by Arab Israelis within and outside their towns and villages is an interesting phenomenon. Within the towns/villages people reported that a very low rate of residents adopt traffic safety behaviors. However, whenever they drive outside the town/village, respondents reported that most of their towns’ men and women adopt safety driving behaviors. This large difference is reported for all towns and villages. The fact that other socioeconomic variables such as education and income were not associated with PDDNs suggests that these behaviors are widely adopted norms in all subgroups of the Arab population.

This phenomenon was originally reported in a qualitative study where focus group participants indicated that Arab drivers typically drive unsafely in their towns and villages, whereas outside their villages/towns and especially in Jewish cities they usually drive safely and obey the law (Moran et al. 2010). Focus
group participants described the unsafe driving style as a social norm that "everyone does."

An explanation for this phenomenon suggested in the focus groups was that Arabs perceive their villages and towns as their private homes, where the law of the State of Israel does not have jurisdiction (Moran et al. 2010). Other researchers stated that Arabs in Israel are an ethnic nondominant minority that, to some extent, may not feel full identity with the Jewish state of Israel. They may be alienated from the dominant majority population (Factor et al. 2013; Gavison and Hacker 2000; Obeid et al. 2014) and therefore perceive their towns and villages, where Jews do not reside, as within their jurisdiction and not the "Jewish" law. This may prevent the adoption of traffic safety laws that were set by the state. However, when residents exit their areas of residency they accept the prevailing laws and more or less abide by the state law.

The differences in driving within and outside the towns/villages can be attributed to the separate communities of Jews and Arabs, where most Arabs live in communities that include only Arabs. This phenomenon adds to the feeling of a separate identity as Arabs and not as a part of the Jewish state and maybe they feel less obligated to accept the Jewish law.

Research suggests that nondominant minority communities that are alienated from the majority have reduced commitment to comply with the law and they engage in more risky behaviors (Rattner and Yagil 2004; Rattner et al. 2001) and may tend to see the laws enacted by the majority as less than legitimate and not regard compliance as a social obligation. In addition, nondominant minorities are involved in car crashes more often than the majority population, maybe as a consequence of not complying with traffic safety laws (Department of Transport 2001; Hilton 2006). Factor and Mahalel (2012) reported that traffic law violations were higher among Arabs, per kilometer driven, compared to Jews and that they are also involved in more fatal car crashes.

Another factor affecting driving behaviors is police enforcement. Within Arab towns/villages it is not common for the police to patrol and give fines for traffic law violations (Moran et al. 2010). However, on nonurban roads and in Jewish towns the police are active in enforcing traffic safety laws even though the effect on road accidents is not clearcut (Beenstock et al. 2001). It seems that drivers are aware of where they are driving and change their driving behaviors in accordance with the environment and the chance of being caught by the police for traffic law violations. However, this distinction is not always made and drivers may drive unsafely out of habit on intercity roads, showing the association between the 2 descriptive norms. Beenstock et al. (2001) found weak evidence that policing one road section spills over onto other road sections.

There is evidence that repeated performance of the same behavior in a stable context can become automatic (Xu et al. 2013). In our study, the unsafe driving norms may become automated and habitual behaviors within the town/village may promote automatic unsafe driving behaviors when outside of the towns/villages, although less frequently.

Arab women seem to estimate PDDNs to be more unsafe compared to men only outside the town/village. Women with better safety behaviors may be critical toward the negative driving social norms that they observe. They may wish that driving was safer. However, the difference in association between norms within and outside the towns is not clear. In another study, descriptive norms were also higher among women regarding driving faster than 110 km/h (Cestac et al. 2011).
Studies in other communities support the importance of PDDNs in forming safety behaviors in the individual. Previous studies found that descriptive and injunctive norms were associated with unsafe driving behaviors, such as use of mobile phones (Riquelme et al. 2010; White et al. 2010), excessive speeding, drunk driving, following a car too closely, and more (Castanier et al. 2013; De Pelsmacker and Janssens 2007). In our study, PDDNs within the Arab towns/villages were associated with traffic law violations, whereas the norms outside the towns/villages were not. This association within the towns/villages may be due to the automatic behaviors formed due to these norms only within the towns/villages. Outside the Arab towns/villages individuals may use a more conscious cognitive process and take deliberate effort regarding driving behaviors, abiding with traffic laws, so no association between the norms outside the towns/villages and traffic law violations is identified. We would like to add that the association between PDDNs within the towns and traffic law violations was not high; therefore, further research should look at this association. It may also be that other factors influence traffic law violations, such as the risk of being stopped by the police and being fined. The chance of this happening is much higher outside the towns/villages compared to within the towns/villages and may drive the behavior more so than norms (Moran et al. 2010). Therefore, PDDNs outside the towns may not effect traffic law violations, whereas the respondents’ PDDNs within the towns seem to be associated with violations.

Involvement in car crashes was associated with both traffic law violations and PDDNs outside the towns/villages. Other studies have provided evidence that people reporting traffic law violations also report more involvement in car crashes and those estimating norms to be less safe are also involved in more car crashes (Lawton et al. 1997; Sullivan and Meadows 2000). However, why PDDNs within the town are not associated with reported car crashes is not clear and further studies are needed to elucidate this point. We need to remember that negative PDDNs do not necessarily imply that the respondent will report his or her own driving as unsafe.

Nearly all respondents reported very high levels of unsafe behaviors within the towns/villages. Therefore, there may be no association between those PDDNs within the towns/villages and involvement in a car crash. On the other hand, PDDNs outside the towns were much safer, and those reporting more unsafe norms may also adopt more unsafe driving behaviors not expressed in the traffic law violation measure we used.

The limitations of this study lie mainly in the self-reported variables considered by the study, which do not always represent the actual drivers’ behaviors. In addition, PDDNs may be overestimated.

The response rate of 77% may leave room for a response bias; however, when approached, the study subjects were not aware of the main variables studied (norms). Further research is needed to elucidate the importance of the norms within the towns/villages as distinct norms different from the way people drive outside the towns/villages.

Unsafe driving norms (PDDNs) may add directly and indirectly to unsafe driving and involvement in car crashes among Arab Israelis. Interventions aimed at changing driving norms in the Arab population may increase safe driving and reduce involvement in car crashes. The study suggests that increasing police presence and enforcement of driving laws could be beneficial to the residents of Arab Israeli towns, because driving norms outside the Arab towns, where the police enforce the law, seem to be safer than within the towns where little enforcement of the laws exist. Therefore, increased enforcement within towns/villages may improve PDDNs and decrease involvement in car crashes.

The population in this study can represent other minorities that live in separated communities in other countries.

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