The multidimensional driving style inventory a decade later: Review of the literature and re-evaluation of the scale

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ARTICLE INFO

ABSTRACT

The *Multidimensional Driving Style Inventory* (MDSI; Taubman - Ben-Ari, Mikulincer, & Gillath, 2004a), a self-report questionnaire assessing four broad driving styles, has been in use for the last ten years. During that time, numerous studies have explored the associations between the MDSI factors and sociodemographic and driving-related variables. The current paper employs two large data sets to summarize the accumulated knowledge, examining MDSI factors in samples of young drivers aged 17–21 (Study 1, n = 1436) and older drivers aged 22–84 (Study 2, n = 3409). Findings indicate that driving-related indicators are coherently and systematically related to the four driving styles in the expected directions, revalidating the structure of the MDSI. The results also help clarify the relationships between the driving styles and variables such as gender, ethnicity, car ownership, age, and experience, and suggest that driving styles are largely unaffected by sociodemographic characteristics, except for gender and ethnicity, and appear to represent a relatively stable and universal trait. The two studies highlight the validity and reliability of the MDSI, attesting to its practical value as a tool for purposes of research, evaluation, and intervention.

1. Introduction

Since its publication in 2004, the *Multidimensional Driving Style Inventory* (MDSI; Taubman - Ben-Ari et al. 2004a) has been the subject of studies conducted around the world, and especially in Israel, where the instrument was originally designed. In the current analysis, data presented in both published and unpublished Israeli studies were combined to enable a comprehensive evaluation of the associations between the MDSI factors and sociodemographic and driving-related variables explored in smaller and more limited studies. The aim here, therefore, is to review the knowledge that has accumulated over the past ten years regarding variables related to driving styles, and to readdress several basic questions through the use of two large-scale data sets.

1.1. MDSI

The MDSI was constructed to conceptualize an individual's habitual driving style as a driving-specific factor that can explain involvement in car crashes and traffic violations both directly and in terms of more general sociodemographic and personality factors (Taubman - Ben-Ari et al., 2004a). It relies on Elander et al. (1993) differentiation between driving skill and driving style. The authors define "skill" as the driver's performance, that is their ability to maintain control of the vehicle and respond adaptively to complex traffic situations. Driving skill is expected to improve with practice or training. "Style" is defined as the way the driver chooses to drive or habitually drives, including choice of driving speed, headway, and level of attentiveness and assertiveness. Driving style is expected to be influenced by attitudes and beliefs regarding driving, as well as by more general needs and values. The MDSI was designed to assess the second aspect of driving, i.e., the characteristic style of a person's driving.

The MDSI was premised on three basic principles. First, that driving styles reflect the complex and multidimensional nature of the phenomenon of driving. Secondly, that integration of existing definitions and scales into a single, multidimensional conceptualization of driving style is warranted. And finally, that while most earlier research relates to driving behaviors associated with crashes, it is important to broaden the scope to include behaviors and habits characterizing driving in general in order to understand the whole range of variables that predict how people drive, including safe and considerate behaviors.

A review of the literature and existing instruments led to the design of a scale assessing four broad driving styles: (a) reckless

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and careless; (b) anxious; (c) angry and hostile; and (d) patient and careful. The *reckless and careless driving style* refers to deliberate violations of safe driving norms and the seeking of sensations and thrills while driving. It is characterized by driving at high speeds, passing in no-passing zones, and driving while intoxicated. The a*nxious driving style* reflects feelings of alertness and tension, as well as ineffective engagement in relaxing activities during driving. The a*ngry and hostile driving style* refers to expressions of irritation, rage, and hostility while driving, along with a tendency to act aggressively on the road, including cursing other drivers, honking the horn, or flashing headlights. The *patient and careful driving style* reflects well-adjusted driving behaviors, such as planning ahead, paying full attention to the road, displaying patience, courtesy, and calm behind the wheel, and obeying the traffic rules.

Studies employing the scale revealed eight coherent and reliable factors which could be categorized into the four global styles (Taubman - Ben-Ari et al., 2004a): risky and high velocity driving (which come under the heading of the reckless and careless driving style); anxious, dissociative, and distress reduction driving (included in the anxious driving style); angry and hostile driving; and careful and patient driving (components of the patient and careful driving style). Most studies have therefore used the 4-factor version of the scale. However, reasonable to high reliabilities and good validity have been found for both the four global styles and the eight factors.

The MDSI has been translated into numerous languages (English, Italian, Russian, and Arabic, to name just a few), and used in various countries (e.g., England, Italy, the United States). Culturally adapted Spanish (Poó and Ledesma, 2013) and Romanian (Holman and Havârneanu, 2015) versions have also been validated.

1.2. MDSI and sociodemographic variables

Among the major characteristics that have been shown to predict risky driving are lower age and male gender (e.g., Sagberg et al., 2015; Shinar and Compton, 2004). The same characteristics emerge as relevent in examinations employing the MDSI. Men of all ages have been found to endorse both the reckless and careless and the angry and hostile driving style more than women. On the other hand, women tend to engage more in the anxious and the patient and careful styles (e.g., Holland et al., 2010; Poó and Ledesma, 2013; Poó et al. 2013; Taubman - Ben-Ari, 2006, 2014a; Taubman - Ben-Ari and Yehiel, 2012), although some studies did not find a gender difference in the anxious driving style (e.g., Taubman - Ben-Ari and Katz-Ben-Ami, 2012).

Age has been found to correlate significantly and negatively with maladaptive driving styles, including the reckless and careless and the angry and hostile styles, and significantly and positively with the patient and careful style, in both genders (Gwyther and Holland, 2012; Poó et al., 2013; Taubman - Ben-Ari, 2014a; Taubman - Ben-Ari and Yehiel, 2012). In the same vein, young drivers tend to report being more angry and hostile when driving than older ones (Farah et al., 2007). Some studies have also found an inverse association between age and the anxious style (Taubman - Ben-Ari et al., 2004a), particularly its dissociative component (Trógolo et al., 2014). In one sample of young drivers, age was significantly associated only with the angry and hostile driving style, so that the older the young driver, the higher the tendency for angry driving (Taubman - Ben-Ari and Katz-Ben-Ami, 2012), whereas in other samples older age was also associated with the reckless and careless driving style (e.g., Taubman - Ben-Ari, 2014a).

Driver's experience, that is, the length of time the individual has had a driving license, which is closely related to age, has also been found to be a relevant characteristic. In one sample of men and women aged 18–29, significant negative associations emerged for both genders between experience and the anxious driving style,

indicating that the more experienced the driver, the less anxious their driving (Holland et al., 2010). In another sample representing a wider age range, this association was found only for women, along with a positive association with the patient driving style, whereas among men, driving experience correlated negatively with the risky, angry and high velocity styles, and positively with the patient and careful styles (Gwyther and Holland, 2012). Driving experience was also found to correlate positively with the careful and patient style and negatively with the anxious and dissociative styles in a Romanian sample (Holman and Havârneanu, 2015).

In other words, studies show that maladaptive driving styles tend to lessen with years of experience, while the careful and patient style becomes more dominant as people get older. Interestingly, however, among young drivers, it was found that the longer they had a license, the higher their tendency for risky (Taubman - Ben-Ari, 2014a) and angry (Taubman - Ben-Ari, 2014a; Taubman - Ben-Ari and Katz-Ben-Ami, 2012) driving.

Only a small number of studies have examined the direct connection between education and driving style, finding either a weak positive correlation between level of education and the anxious driving style (Taubman - Ben-Ari et al., 2004a) or no significant associations with any of the MDSI factors (Poó et al., 2013; Taubman - Ben-Ari and Yehiel, 2012). However, explorations of the connections between this variable and other driving-related measures suggest that education, too, may be a relevant characteristic. Driver aggression, for example, was found to be least prevalent among drivers without a high school diploma (Wickens et al., 2012). In contrast, level of education has been negatively associated with deliberate traffic violations, so that the more years of schooling the drivers had, the fewer deliberate violations they reported (Zhang et al., 2015). Similarly, another study found that the probability of being involved in a car crash decreased as the driver's level of education increased (Factor et al., 2008).

Finally, ethnicity was examined in a single study comparing young Arab and Jewish drivers in Israel. The results revealed that young Arab drivers tended to report higher anxious and lower careful driving styles than their Jewish counterparts (Taubman - Ben-Ari, 2014a).

1.3. MDSI and driving-related variables

In addition to the associations between driving styles and sociodemographic variables, studies have explored the relationships between the MDSI factors and a variety of driving-related measures. In respect to driving history, higher reckless and angry styles and lower careful style have been associated with previous involvement in car crashes (Poó et al., 2013; Taubman - Ben-Ari et al., 2004a). The reckless driving style was also found to be positively related to the individual's history of traffic violations (Taubman - Ben-Ari et al., 2004a).

Furthermore, MDSI scores were found to correlate with performance measures collected in a driving simulator (Farah et al., 2007; Farah et al., 2009). Participants with lower critical passing gaps scored higher on the angry and hostile driving style (Farah et al., 2009), whereas higher critical passing gaps were found among drivers scoring higher on the anxious and the patient and careful styles. In addition, speed and number of completed passing maneuvers, and to a lesser extent critical gaps, correlated significantly with higher scores on the reckless and careless driving style (Farah et al., 2007). The MDSI factors were also found to correlate with real driving data collected by an In-Vehicle Data Recorder (IVDR), with the rate of risky events correlating positively with the reckless and careless and the angry and hostile driving styles and negatively with the anxious and the careful and patient styles (Taubman - Ben-Ari et al., 2015).