Translation and adaptation of the Family Climate for Road Safety Scale to a Spanish speaking population using Confirmatory Factor Analysis and Exploratory Structural Equational Modeling.

Abstract

The Family Climate for Road Safety Scale (FCRSS) was originally developed and validated in Israel to assess young drivers' perception of their family values, practices, and priorities regarding safe driving. The scale consists of seven factors representing various aspects of the parent-offspring relationship relating to safe driving: Modeling, Feedback, Communication, Monitoring, Messages, Limits, and Noncommitment to Safety. The present research aimed to adapt and validate a Spanish-language version of the FCRSS in Argentina via two separate studies. Study 1 (n = 1071) examined the FCRSS' factor structure and internal consistency and the associations between FCRSS factors and sex, age, and self-reported vehicle crashes. Study 2 (n = 487) replicated Study 1 in a separate sample and also examined the associations between FCRSS' dimension on the one hand, and measures of a positive attitude towards traffic safety and the reckless driving style on the other. The results indicate that a seven-factor model consistent with the original study provides the best representation of the FCRSS factor structure in both samples. All factors demonstrated good reliability, and significant differences in FCRSS scores were found as predicted between women and men, and between those who had been involved in vehicle crashes and those who had not. These results were largely consistent across the two studies. Finally, theoretically expected associations were found between FCRSS scores and a positive attitude towards traffic safety and the risky driving style. On the whole, the two studies present convincing evidence in support of the validity and reliability of the FCRSS in Argentina.

Key words: Young drivers, Family climate for road safety, Validation, Reckless driving

1. Introduction

Injuries resulting from traffic crashes are the world's leading cause of death for people between the ages of 15 and 29 (World Health Organization –WHO-, 2018). Argentina is no exception (Agencia Nacional de Seguridad Vial –ANSV-, 2018). In 2017, the last year for which there is official data prior to the outbreak of the COVID-19 pandemic, the age group with the most fatalities from traffic crashes was the 15 to 24 age group, accounting for 22.8% of the total number of deaths (n=1192) (Dirección Nacional de Observatorio Vial -DNOV-, 2018). In 2020, the first year of the COVID-19 pandemic, the number of deaths fell by about 40%, but fatalities among young people still constituted 22% of all deaths (DNOV, 2021).

Recent studies have discussed family relations and parental attitudes about road safety as significant predictors of the traffic behavior of young drivers (e.g., Ginsburg et al., 2009; Schmidt et al., 2014, Simons Morton & Quimet, 2006; Taubman – Ben-Ari, 2014a,b). Taubman – Ben-Ari and Katz – Ben-Ami (2013) developed the concept of the Family Climate for Road Safety (FCRS) and the Family Climate for Road Safety Scale (FCRSS) to study the influence of the parent-offspring relation on road safety. The present series of studies aimed to translate, culturally-adapt, and provide evidence of validity for the FCRSS in the Argentine population.

1.1 Family Climate for Road Safety

Taubman – Ben-Ari and Katz – Ben-Ami (2013) took the concept of workplace Safety Climate and applied it to the family context. They reasoned that just as workers develop their workplace safety priorities from their supervisors, young drivers develop their perceptions, values, priorities and practices regarding safe driving from their families, especially their parents. Indeed, previous research has shown that childrens' behavior is modelled after the traffic behavior and the road safety perceptions of their parents. For example, children tend to mimic their parents' maladaptive or adaptive driving styles (Miller & Taubman – Ben-Ari, 2010; Taubman – Ben-Ari et al., 2005). The more parents tend to monitor their children's behavior, to communicate with them, and to impose clear limits, the less involved young drivers are in reckless driving and traffic crashes (Beck et al., 2005; Ginsburg et al. 2009; Yang et al., 2013).

Importantly, Taubman – Ben-Ari and Katz - Ben-Ami (2013) coined the term Family Climate for Road Safety (FCRS) to conceptualize the complex and multidimensional aspects of the parent-offspring relation regarding driving. They refer to the various modes by which parents may pass on their views and safety behaviors onto their offspring, and include concepts from previous research that only considered partial aspects of the phenomenon. These include the parents' own traffic behavior (Ferguson et al. 2001; Taubman – Ben-Ari et al., 2005), parents' monitoring and control of their children's behavior (Ferguson et al. 2001; Taubman – Ben-Ari et al., 2005), parents' attitudes towards and commitment to traffic safety (e.g., Miller & Taubman – Ben-Ari, 2010; Prato et al., 2009) and the transmission of parental standards in parent-child communication (Howard et al., 1999). According to Taubman – Ben-Ari and Katz – Ben-Ami (2013), when the FCRS is perceived as positive towards traffic safety, young people tend to endorse careful and safe road behaviors. In contrast, when the perception of the Family Climate for Road Safety is negative, they tend to engage more in maladaptive and risky driving.

The Family Climate for Road Safety Scale -FCRSS- was proposed as a measurement tool to assess the different dimensions of the concept (Taubman – Ben-Ari & Katz – Ben-Ami, 2013). The FCRSS is composed of seven dimensions. *Modeling* refers to the role model provided by parents through their own behavior. *Feedback* describes parents' ability to positively reinforce the road safety behavior of their children. *Communication* refers to the predisposition of parents to talk openly with their sons and daughters about the dangers of driving and to clearly define the right way to drive. *Monitoring* describes parental control of the driving behavior of their children, and the context in which it takes place. *Non-Commitment to safety* includes the tendency of the parents to fail to engage with the road safety and the risky behavior of their children. Another important dimension of the FCRSS is the tendency to deliver clear *Messages* about which traffic behaviors are acceptable and to verify that these messages have been understood. The final dimension of the FCRSS is *Limits*, which refers to setting clear rules about safe driving. All the FCRSS' dimensions are weakly to moderately correlated with each other (between -.13 and -.66 and) (Taubman – Ben-Ari & Katz – Ben-Ami, 2013).

In a different study, Taubman – Ben-Ari (2014) analyzed the factor structure of the FCRSS with two samples, one of parents and the other of their children. Through a confirmatory factor analysis, she found that the seven dimensions' theoretical model fit the data well for both parents and young drivers. For the sample of parents,

she removed two items, one from Monitoring and the other from Feedback. No items were removed for the sample of young drivers. All the dimensions showed good indices of internal consistency.

1.2 Translations and adaptations of the FCRSS

Since its publication, the FCRSS has been further validated in Australia (Taubman – Ben-Ari et al., 2018), Belgium (Carpentier et al., 2014), and the U.S.A. (Burns et al., 2020). A summary of these studies is provided in Table 1. While research conducted in Israel and Australia have strongly supported the seven FCRSS factor structure, other studies failed to replicate the original FCRSS dimensions. Burns et al. (2020) applied EFA in two separate samples and found a five-factor solution that retained 27 items out of the 54 items from the original FCRSS. Neither the Messages nor the Limits factors were identified in this study. Further, the authors compared a five-factor model obtained from EFA with two-, six- and seven-factor models based on previous FCRSS findings through confirmatory factor analysis using the whole sample. The results indicated that only the five-factor model had acceptable fit indices. Measurement invariance across sex was also supported for the five-factor model.

Although it is reasonable to argue that the discrepant findings may reflect cultural differences given that parenting behavior and communication within families varies across cultures (Rubin & Chung, 2006; Shearman & Dumlao, 2008), methodological issues may account for the inconsistent findings as well. First, in Israel (Taubman – Ben-Ari et al., 2014b; Taubman – Ben-Ari & Katz – Ben-Ami, 2013) and in Australia (Taubman – Ben-Ari et al., 2018) participants were recruited from the general population while in the studies by Carpentier et al. (2014) and Burns et al. (2020) the participants were university students. Mean age was similar across the studies. The lowest mean age corresponded to the research by Taubman – Ben-Ari et al. (2014) and the highest to that of Carpentier et al. (2014). However, the sample used in Burns et al. (2020) had a broader age range (18-29 years old). In this study participants recalled their parents' behaviors rather than reported on their parents' current behaviors, as in other studies.

Second, the methods used for evaluating the factor structure of the FCRSS vary in each study. Taubman – Ben-Ari (2014) and Taubman – Ben-Ari & Katz – Ben-Ami (2013) used the Little Jiffy approach (Principal

Component Analysis, Kaiser rule, Varimax rotation), a procedure that was occasionally criticized (e.g., Ledesma et al. 2021; Osborne, 2014). Carpentier (2014) also conducted a Principal Component Analysis, but relied on the scree plot as a criterion to decide the numbers of factors to retain. They used an oblique rotation (Promax) which is more appropriate when factors correlate with each other as is the case of the FCRSS (Meyers et al., 2013). Burns et al. (2020) used a Maximum Likelihood Estimator (MLR) and Oblimin rotation. However, they did not mention the extraction method used nor the criterion applied to decide on the number of factors to retain. They decided to only include items that loaded at least .50 in any of the factors, which is a criterion that far exceeds the commonly accepted minimum of .30 or .40 (Osborne, 2014) that was used in previous studies (Carpentier at al. 2014; Taubman – Ben-Ari & Katz – Ben-Ami, 2013). Finally, both Taubman – Ben-Ari (2014), Taubman – Ben-Ari et al. (2018) and Burns et al. (2020) used Confirmatory Factor Analysis. In some of these studies, the original FCRSS factor structure was supported afterwards to allow a large number of errors between pairs of items to co-vary based on modification indices rather than theoretically-based (e.g., Taubman – Ben-Ari, 2015).

In summary, there are differences in the sample composition and in the factor-analytic procedures used that may explain the discrepant findings in the FCRSS dimensionality across the studies. Additional research using more recommended and updated factor analysis procedures are therefore necessary.

[Table 1 near here]

1.3 Evidence of FCRSS validity

The aforementioned studies provide evidence for the validity of the FCRSS. In general, they showed that when the Family Climate of Road Safety was perceived as positive, young people were less involved with risky, angry or anxious driving, drove more carefully, had more positive attitudes towards traffic safety, and reported lower involvement in traffic crashes (Burns et al., 2020; Carpentier, 2014; Taubman – Ben-Ari, 2014; Taubman – Ben-Ari & Katz – Ben-Ami, 2013; Taubman – Ben-Ari et al., 2014). More specifically, high levels of Monitoring, Modeling and Communication were associated with higher levels of careful driving and lower levels

of risky, anxious or angry driving, as well as fewer traffic crashes (Burns et al., 2020; Taubman – Ben-Ari, 2014; Taubman – Ben-Ari & Katz – Ben-Ami, 2013). Conversely, higher levels of Noncommitment to safety predicted self-reported risky driving (Burns et al., 2020; Tubman – Ben-Ari, 2014). Moreover, young people tended to drive aggressively when their parents' Noncommitment to safety was higher and they did not act as models of safe driving (Burns et al., 2020).

Sex and age differences in the perception of the family climate for road safety have been explored. Taubman – Ben-Ari and Katz – Ben-Ami, (2013) identified sex and age differences in the perception of young drivers' family climate for road safety. Women had a greater perception of their parents as role models, sources of positive messages and monitors of their driving. In contrast, men perceived their families as less committed to traffic safety. However, Burns et al. (2020) did not find differences in mean levels of men and women in the U.S.A. With respect to age, the older of the younger drivers, when compared to their younger counterparts, perceived their parents as less committed to traffic safety, less communicative and less interested in monitoring their behavior (Taubman– Ben-Ari & Katz – Ben-Ami, 2013). Taubman – Ben-Ari and Katz – Ben-Ami (2013) also reported that global parenting dimensions such as involvement, autonomy granting and warmth (Robbins, 1994) and family general functioning (Epstein et al. 1983) were related to but did not overlap with the dimensions of the FCRSS. In summary, the more positive the young drivers' perception of their parents, the better the family climate for road safety (Taubman – Ben-Ari, 2014; Taubman – Ben-Ari & Katz – Ben-Ami, 2013).

Carpentier et al. (2014) assessed the relations between the FCRSS and socio-cognitive variables such as attitudes, locus of control and social norms. They found that when the attitudes of young drivers were supportive of risky behaviors (i.e., drinking and driving, drug use, speeding, tailgating, non-use of seat belts and use of a cellphone while driving) the Noncommitment to safety of their parents was higher, Communication and Limits were poorer, and parents were perceived as poorer models of safe behavior. They also found that locus of control and social norms play a role in moderating the effects of the FCRS and contribute to better risky driving predictions. In a further study, Taubman – Ben-Ari (2016) observed that parents' positive perception of FCRS was related to positive attitudes to the accompanied driving phase during the Graduated Driving Licensing process of their offspring. Also, the author reported that parents' positive FCRSS scores were positively related to the

careful driving style of their children, and negatively related to their endorsement of angry, anxious and reckless driving styles.

Since its introduction, the FCRSS has accumulated evidence as a valid measurement tool to assess young drivers' perception of their families' values, practices and priorities regarding safe driving. However, as previously mentioned, the FCRSS factor structure has not been consistently replicated across prior studies. This could be a consequence of the differences in sample composition which may limit the generalizability of the findings, or the methodological criteria used to assess the factor structure of the FCRSS. The evidence of external validity is somewhat consistent, but as far as the authors are aware, there are no similar studies with Spanish speaking or Latin American populations. Studies of this kind are necessary in countries with traffic cultures (Özkan & Lajunen, 2011) that differ from the countries where the FCRS has been studied thus far. New evidence of validity will allow researchers to refine the knowledge available on the subject, evaluate its generalizability and suggest future lines of research. For these reasons, this study aimed to adapt and validate a Spanish-language version of the FCRSS in young drivers in Argentina and to provide new evidence of this tool's external validity.

In Study 1 we examined the factor structure of the FCRSS using both Confirmatory Factor Analysis (CFA) and Exploratory Structural Equation Modeling (ESEM), the reliability of the scales, and the differences in FCRSS scores by age, sex and self-reported traffic crashes in the previous two years in a sample of 1071 young drivers. In Study 2, we re-analyzed the factor structure and reliability of the scales in a second sample of 487 young drivers. We also provided new evidence of external validity by analyzing the correlations between the FCRSS dimensions and measures of risky attitudes and risky driving.

2. Study 1

The aims of Study 1were to translate the FCRSS into Spanish and to provide initial evidence of its psychometric properties in Argentina, particularly its factor structure and internal consistency reliability. Due to the inconsistency of previous findings on the FCRSS factor structure, different measurement models were tested using both confirmatory factor analysis (CFA) and exploratory structural equation modeling (ESEM). Then, we examined differences in FCRSS scores according to sociodemographic variables (sex and age) and self-reported

traffic crashes. We expected that a better perception of the FCRSS dimensions would be negatively related with traffic crashes, and that women and the youngest of the younger drivers would report a better perception of the family climate.

2.1. Method

2.1.1. Participants and procedure

A total of 1071 young drivers (57.5% women and 42.5% men) from different cities of Argentina participated in the study. Participants were eligible if they met the following criteria: (a) between 18 and 25 years of age; (b) possessed a valid driver's license; and (c) drove regularly (i.e., at least once a week) during the past two months. Professional drivers and drivers using vehicles for job-related purposes were excluded. The mean age of the respondents was 21.6 (SD = 2.08). The majority of the participants drove every day (51.4%) or most days of the week (30.1%), in their own (47.2%) or a family vehicle (52.8%). The most used vehicle was the automobile (74.8%). Nearly 30% of the drivers had a history of road traffic crashes: 20.5% indicated that they had been involved in a vehicle crash as drivers during the past two years, 5% participated in two crashes and 2.2% in more than two crashes. The educational background of the majority of the drivers (92.4%) was at least high school level. Data were collected using an open mode online sampling method (International Test Commission, 2006). An online survey format through the Google Forms platform was created and delivered by different social networks (e.g., Facebook) as well as by e-mail to the researchers' contacts. A total of 1091 drivers completed the survey, 20 of whom did not meet the inclusion criteria for participation and were therefore excluded. The final sample consisted of 1071 drivers. All participants were clearly informed about the study's purposes and assured of the anonymity of their responses. Participation was voluntary, and no incentive or compensation was offered.

2.1.2. Measures

Family Climate for Road Safety Scale (FCRSS; Taubman – Ben-Ari & Katz-Ben-Ami, 2013). The FCRSS is a 54-item scale designed to measure the perceptions that young drivers have of their families' or

parents' values, practices and involvement regarding safe driving. Specifically, the FCRSS assesses seven dimensions: Modeling (11 items), Feedback (5 items), Communication (9 items), Monitoring (7 items), Noncommitment to safety (8 items), Messages (8 items), and Limits (6 items). Participants are instructed to indicate the extent to which each statement describes them and their family using a 5-point scale ranging from 1 (*not at all*) to 5 (*very much*). A high score in a factor reflects a young driver's positive perception of the family climate regarding safe and careful driving; the exception is the Noncommitment to safety factor, in which a high score is indicative of a low level of family commitment to safety.

The original FCRSS was translated from English into Spanish using forward and backward procedures. Forward translation was conducted separately by two bilingual translators. One is a researcher with specific knowledge in Traffic Psychology and an author of this paper. The other is a professional translator without training in Psychology. Both translated the scale's instructions, items and response format into Spanish emphasizing the semantic equivalence rather than literal, word-by-word, translation. The two draft translations were then evaluated by bilingual experts and non-experts (i.e. with and without training in Traffic Psychology). They were asked to evaluate the conceptual, semantic and functional equivalence of each of the translated versions. A preliminary version of the scale was created with the better version of each item. Subsequently, a professional bilingual translator carried out a backward translation into English. Lastly, the correspondence between the original and back-translated versions was compared in terms of conceptual, semantic and linguistic equivalence. The FCRSS Spanish-language version was administered to a pilot sample of young drivers (n = 20) to identify poorly worded, ambiguously interpreted or misunderstood items. All individuals indicated that the content of the scale was clear and therefore no changes to the items, instructions or response format were necessary.

Sociodemographic characteristics and driving information. A self-reporting questionnaire was used to collect data on participants' age, sex, and educational background, as well as on different driving-related variables, such as type of vehicle driven, driving frequency, years of driving experience, and involvement in vehicle crashes as a driver during the previous two years.

2.1.3. Data analysis

First, the factor structure of the FCRSS was examined. Second, reliability analysis of the FCRSS factors was evaluated by computing ordinal alpha for each factor. Finally, Pearson correlations were calculated to examine relations between age and FCRSS factors, and multivariate analysis of covariance (MANCOVA) to examine differences in FCRSS' scores according to sex and self-reported traffic crashes during the past two years.

The factor structure of the FCRSS was examined via CFA and ESEM. As Morin et al. (2016) noted, CFA relies on the independent cluster model (ICM), which assumes that each factor is defined by a distinct cluster of items, and items are expected to load only on their respective factors while cross-loadings between items and non-target factors are assumed to be exactly zero. However, items are rarely pure indicators of a latent factor and tend to present minor or even substantial associations with other constructs that are typically expressed through cross-loadings in EFA. This phenomenon is more likely to be present in multidimensional scales assessing multiple conceptually-related factors (such as the FCRSS), in which case forcing cross-loading to zero may result in model misspecifications and biased estimation of model parameters (i.e., inflated factor correlations; see Xiao et al., 2019). Due to the overly restrictive assumptions underlying CFA, more flexible approaches have been proposed, such as ESEM (Asparouhov & Muthén, 2009). In ESEM, cross-loadings are estimated into the model, like in EFA, while at the same time providing access to statistical information typically reserved to CFA/ESEM, such as standard errors, goodness-of-fit-indices, and estimation of latent factor correlations adjusted for measurement error. Thus, ESEM integrates the flexibility of EFA and statistical advances of SEM/CFA into the same measurement model. In addition, ESEM can be estimated using target rotation (Browne, 2001), which allows for testing specific hypotheses related to the factor structure and thus to the use of ESEM for purely confirmatory purposes.

Since CFA and ESEM are considered as complementary rather than opposites (Marsh et al., 2014), we estimated different FCRSS measurement models using both approaches. In all CFA models, item loadings were freely estimated in the theoretically expected factor and no cross-loadings on the remaining factors were allowed. In the ESEM models, item loadings were freely estimated in the factor that they were assumed to

measure while cross-loadings on non-target factors were allowed and specified as close to zero (≈ .0). If (a) the ESEM model provides a substantially better fit to the data than the equivalent CFA, and (b) ESEM factor correlations are lower than the CFA factor correlations, then the ESEM model is preferable. Otherwise, the CFA model should be retained due to its greater parsimony (Marsh et al., 2013). Different competing models were tested: Model 1 (M1) and Model 2 (M2) consist, respectively, of CFA and ESEM seven-factor models including Modeling, Feedback, Communication, Noncommitment to safety, Monitoring, Limits, and Messages. Thus, these models correspond to the original factor structure of the FCRSS (Taubman – Ben-Ari & Katz – Ben-Ami, 2013). Model 3 (M3) and Model 4 (M4) are based on the findings of Burns et al. (2020) and consist, respectively, of CFA and ESEM five-factor models including Noncommitment to safety, Monitoring, Feedback, Communication, and Modeling. For purposes of comparison, this model included only the 27 items that were retained in Burns' study. Finally, Model 5 (M5) and Model 6 (M6) are, respectively, CFA and ESEM models comprising six factors (Communication, Modeling, Feedback, Monitoring, and Limits) and 36 items that were previously identified in Carpentier et al. (2014). All models were estimated using the robust weighted least squares (WLSMV) estimator based on the polychoric correlation matrix, which has shown to outperform Maximum Likelihood for categorical-ordered observed variables with five or less response categories (Holgado-Tello et al., 2010; Finney & DiStefano, 2006). Given the oversensitivity of the chi-square test to sample size and minor misspecifications (Marsh et al., 2005), additional statistical fit indices were calculated for assessment of model fit: the root mean square error of approximation (RMSEA) with its 90% confidence interval (CI); the comparative fit index (CFI); the Tucker-Lewis index (TLI); and the weighted root-mean-square residual (WRMR). Typically, CFI and TLI values greater than .90 and .95 are interpreted as an adequate and excellent fit to the data, respectively, whereas RMSEA values smaller than .08 and .06 indicate good and excellent model fit, respectively (e.g., Browne & Cudeck, 1993; Hu & Bentler, 1998). For WRMR, values smaller than 1.00 are expected to be indicative of good model fit (Yu, 2002). Importantly, these cut-off values represent rough guidelines and the quality of a model should also take into account detailed evaluation of parameter estimation considering their statistical plausibility and theoretical adequacy (Morin et al., 2016). The

factor structure of the scale was examined using Mplus 7.11. The remaining analysis was conducted using SPSS 23.0.

2.2. Results

2.2.1. Factor structure and reliability of the FCRSS

Table 2 summarizes model fit indices of the various models. As indicated, M1 did not account well for data according to all fit indices. M2 provided an excellent fit to the data according to CFI, TLI, RMSEA, while the WRMR (1.04) was substantially close to the recommended cut-off value of 1.00. M3 and M4 also provide an excellent fit to the data, with nearly identical statistical fit indices, except for WRMR, which revealed an acceptable value in M4 (0.667) but not in M3 (1.529). Accordingly, M4 provides a better representation of the data. M5 had an acceptable degree of fit to the data according to CFI and TLI but not the RMSEA and WRMR. Finally, M6 had an acceptable (RMSEA) to excellent (CFI, TLI, RMSEA) degree of fit to the data. However, a detailed examination of M6's model parameters revealed out-of-range parameter estimates (i.e., three items with factor loadings greater than 1.00 – the data is available upon request from the lead author of this paper). In other words, M6 yielded anomalous results and can therefore be considered suboptimal; hence, this model was rejected. In summary, based on an assessment of model fit, it can be concluded that the seven-factor ESEM model (M2) and five-factor ESEM model (M4) best represent the FCRSS factor structure. However, M2 is theoretically more consistent with the original FCRSS factor structure than M4; moreover, the extent to which the significant reduction in the number of items (27 out of 54 items) in M4 may have affected the proper assessment of each domain of the construct is unknown. For these reasons, M2 was retained.

[Table 2 near here]

The parameter estimates from M2 are presented in Table 3. All factors are well-defined, with most items loading strongly (ranging from $|\lambda| = .00$ to .98, $M = .60$) in their theoretically expected factor, while cross-loading on non-target factors is substantially lower and generally negligible or small in magnitude (ranging

from |λ| .00 to .49; *M* = .08). It should be noted that four items — two of which originally correspond to Modeling (items 15 and 24) and two to Messages (items 11 and 37) — presented weak target factor loadings and strong cross-loadings in Noncommitment to safety (see Table 2). For this reason, and because of their content and their contribution to the internal consistency of the subscale, these items were re-allocated to the Noncommitment to safety factor. Additionally, item 23 loaded on different factors and item 38 had factor loadings above .30 in all factors; for these reasons, they were eliminated. Thus, the final model comprised 7 factors and 52 observed indicators. The correlations among factors are displayed in Table 4. As can be seen, the estimated factor correlations are much lower in ESEM (|*r*| = .02 to .53, *M* = .29) than in CFA (|*r*| = .32 to .83, *M* = .57). Since past studies have shown that ESEM provides a better representation of the true factor correlations and CFA results in inflated factor correlations when cross-loading is present in the population model (e.g., Asparouhov et al., 2015), the observation of the reduced factor correlations provides further support for the ESEM model. In particular, Modeling, Feedback, Communication, Monitoring, Messages and Limits were positively related to each other, although to varying degrees. Noncommitment to safety was negatively and weakly related to Modeling and unrelated to the remaining factors. The reliability coefficients (ordinal alpha) of the FCRSS factors were: Modeling (8 items), .86; Feedback (5 items), .95; Communication (8 items), .89; Monitoring (7 items), .91; Noncommitment to safety (10 items), .74; Messages (8 items), .78; and Limits (6 items), .80.

[Table 3 near here]

[Table 4 near here]

2.2.2. FCRSS and sociodemographic variables

We next examined the relationship between FCRSS factors and age and sex. Pearson correlations revealed that age was negatively, albeit weakly, related to Feedback, $r(1071) = -.08$, $p < .05$; Monitoring, $r(1071) = -.24$, $p < .01$; and Limits, $r(1071) = -.14$, $p < .01$; and positively to Noncommitment to safety,

$r(1071) = .08$, $p < .05$. With regard to sex, a one-way MANCOVA (including age as covariate) indicated a significant main effect, Wilks' lambda = .934, $F(7,1055) = 10.72$, $p < .001$, $\eta_p^2 = .066$. Univariate ANOVAs for each of the FCRSS factors revealed significant differences in all the factors, except for Modeling. As shown in Table 5, women scored higher than men on Feedback, Communication, Messages and Limits, whereas men scored higher than women in Noncommitment to safety.

[Table 5 near here]

2.2.3. FCRSS and self-reported traffic crashes

Data on involvement in traffic crashes during the previous two years fell into the following categories: (a) None (72.2%); (b) One (20.5%); (c) Two (5.5%); and (d) More than two (2.2%). However, due to the very low percentage of participants who reported involvement in two or more crashes, categories (c) and (d) were merged into one. A one-way MANCOVA (including sex, age, educational level, and driving frequency as covariates) revealed a significant main effect for road traffic crashes, Wilks' lambda = .967, $F(14,2086) = 2.51$, $p < .001$, $\eta_p^2 = .017$. Univariate ANOVAs for each of the FCRSS factors indicated significant differences in Feedback, Communication, Monitoring, and Limits. The group means for each of the factors appear in Table 6. Hochberg's GT2 was used for post-hoc test comparisons since it is a recommended method when group sizes vary greatly (Field, 2005). As seen in the table, drivers who had not been involved in vehicle crashes during the previous two years scored significantly higher than those who were involved in one and two or more crashes in Feedback, Monitoring and Limits. A significant difference was also found in Communication between drivers who had been involved in one crash and those involved in two or more crashes, with the former scoring higher than the latter on this factor.

[Table 6 near here]

2.3. Discussion

Study 1 was conducted to examine the factor structure and reliability of a Spanish language version of the FCRSS in Argentina, as well as to explore the associations of FCRSS scores with socio-demographic

characteristics and self-reported traffic crashes. Results indicate that a seven-factor model including Modeling, Feedback, Communication, Noncommitment to safety, Monitoring, Messages, and Limits accounted best for the Argentine data. Thus, our findings provide support for the seven domains proposed in the original conceptualization of the Family Climate for Road Safety construct (Taubman – Ben-Ari & Katz – Ben-Ami, 2013). Reliability analysis revealed acceptable to excellent internal consistency for all FCRSS factors, with ordinal alpha coefficients ranging from .74 to .95. Moreover, most of the factors were significantly related to each other. In particular, positive and strong associations were found between Communication on the one hand, and Feedback, Messages and Limits, on the other; between Feedback and both Messages and Limits; between Messages and Limits; and between Monitoring and Limits. Thus, the higher a young driver's perception of direct and open family communication regarding driving, the higher the positive feedback they perceive for safe driving, the higher the clarity of messages conveyed by parents regarding their expectations for safe driving, and the higher the limits on their driving. In addition, the higher the positive feedback from parents, the clearer the safety messages and the higher the limits concerning driving. Moreover, the higher the level of parental monitoring, the higher the limits young drivers report on their driving. Moderate and positive correlations were found between Modeling on the one hand, and Feedback, Communication, Messages, and Limits, on the other; between Monitoring on the one hand, and Feedback and Communication, on the other. In other words, higher perceived modeling was associated with higher positive feedback from parents, better communication, clearer messages, and higher limits. Greater monitoring was also related to more positive feedback from parents and better communication.

Lastly, positive and weak associations were found between Monitoring on the one hand, and Modeling and Messages on the other; and negative associations between Noncommitment to safety on the one hand, and Modeling and Limits on the other. Thus, to a certain degree, the higher the level of parental monitoring, the more parents are perceived as positive role models and the clearer their messages about safe driving; conversely, the lower the parental commitment to safety, the less they are perceived by young drivers as positive role models and as the setters of limits on their driving.

Overall, the direction of the associations among FCRSS factors was consistent with those of previous studies (Carpentier et al., 2014; Taubman – Ben-Ari & Katz – Ben-Ami, 2013; Taubman – Ben-Ari et al., 2014), but the size of the correlations was rather smaller (Mean r = .29) than in previous studies (Mean r ranging from .39 and .52), resulting in a clearer differentiation among factors. The most discrepant findings relate to Noncommitment to safety, which yielded negative but small and generally non-significant correlations with the remaining FCRSS factors, contrary to the negative and moderate-to-strong relation found in previous studies. There are two possible explanations for this result. First, the higher the age, the lower the direct parental influence on driving (Taubman – Ben-Ari & Katz – Ben-Ami, 2013). In the present study, participants were older than in previous studies. Second, it should be noted that several items from different factors (i.e., items 11, 15, 23, 24, 30, 31, 37, 47) had substantial cross-loadings on the Noncommitment to safety factor (see Table 2). These cross-loadings, when forced to zero, as in CFA, are likely to express themselves as inflated factor correlations. A simulation study conducted by Asparouhov and Muthén (2009) showed that even unmodeled cross-loadings as small as .10 can result in a substantial distortion of the parameter estimates. Thus, a possible reason for this inconsistent finding lies in the estimation of cross-loading in ESEM, which, unlike the CFA approach used in previous research, may result in a more accurate estimation of the factor correlations. A finding that supports this contention is the observed substantial decrease in the size of the factor correlations in ESEM compared to CFA, particularly for the Noncommitment to safety factor (see Table 3).

With regard to differences by sex, young women tend to perceive their parents as providing more feedback, maintaining more open and direct communication about driving issues, delivering clearer messages and expectations regarding careful driving, exerting a closer monitoring of their driving and setting more limits on driving compared to young men. On the other hand, men perceived a lower family commitment to safety. These findings are in line with the results in Taubman – Ben-Ari and Katz – Ben-Ami's (2013). Moreover, age was found to be negatively but weakly correlated with Feedback, Monitoring and Limits, and positively correlated with Noncommitment to safety. In other words, the older the participant, the lower the reported positive feedback from their parents, the perceived parental monitoring and the limits on their driving behavior; conversely, the higher the perception of their parents' lack of commitment to safety. However, as noted, these

correlations were very weak. These results are also in agreement with those found in Taubman – Ben-Ari and Katz – Ben-Ami's (2013), particularly for Limits and Noncommitment to safety. It thus appears that, as the young driver grows up, the perception of family involvement in their driving decreases while the perception of the family's Noncommitment to safety increases. Lastly, the analysis of self-reported road crashes revealed significant differences in Feedback, Communication, Monitoring, and Limits. Specifically, participants who had been involved in vehicle crashes as drivers reported lower scores on all factors compared with those who had not been involved in vehicle crashes (Taubman – Ben-Ari & Katz – Ben-Ami, 2013; Taubman – Ben-Ari et al., 2018).

In summary, the results of Study 1 are consistent with those obtained by Taubman – Ben-Ari and Katz – Ben-Ami (2013), and provide preliminary evidence in support of the validity and reliability of the FCRSS in Argentina.

3. Study 2

Study 2 was conducted to provide complementary evidence of the reliability and validity of the FCRSS. Specifically, we reexamined the seven-factor structure and its reliability in a second sample. We also provide new evidence of validity for the FCRSS factors by examining their associations with self-reported measures of attitudes towards traffic safety and risky driving. In line with Taubman – Ben-Ari and Katz – Ben-Ami (2013) and subsequent studies (Burns et al., 2020; Carpentier et al., 2014; Taubman – Ben-Ari, 2014; Taubman – Ben-Ari, 2016; Taubman – Ben-Ari et al., 2014; Taubman –Ben-Ari et al., 2018), we expected to find that higher perceptions of the family's Noncommitment to safety would be associated with less positive attitudes towards traffic safety and a higher endorsement of the risky driving style, while positive aspects of the family climate to safety (i.e., Modeling, Feedback, Communication, Monitoring, Messages, and Limits) would be associated with a higher positive attitude towards traffic safety and lower risky driving.

3.1. Method

3.1.1. Participants and procedure

The sample consisted of 487 young drivers (56.7% women and 43.3% men) between the ages of 18 and 26 (M = 21.77, SD = 2.34) from two cities of Argentina. All participants had a valid driver's license and drove regularly (i.e., at least once a week). Ninety-two percent of the respondents drove automobiles and 31.2% were involved in vehicle crashes as drivers during the previous two years, of which 4.3% were involved in two or more crashes. The educational level of most of the drivers (97.1%) was at least high school. The sample was recruited through a convenience sample: a paper-and-pencil version of the questionnaire was initially distributed to a sample of college students enrolled in Psychology courses, who collaborated with the data collection by administering the questionnaire to friends and acquaintances. All students were previously instructed in the research protocol and the voluntary nature and confidentiality of the information were guaranteed. No incentive was given to participate.

3.1.2. Measures

Family Climate for Road Safety Scale (FCRSS; Taubman – Ben-Ari & Katz – Ben-Ami, 2013). Described in Study 1.

Attitude towards traffic safety. We used the Argentine adaptation of the Attitudes toward Traffic Safety Scale (Trógolo et al., 2019). The scale consists of 16 items assessing attitudes towards: (a) speeding and rule violations; (b) drinking and driving; and (c) careless driving by others. Respondents were asked to indicate their agreement with each statement on a 5-point scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores on each factor are indicative of a positive attitude towards risky driving. The subscale scores can be summed into a single score. In the current study, ordinal alpha coefficient for the total scale was .78.

Risky driving style. The risky driving subscale of the Argentine version of the Multidimensional Driving Style Inventory (MDSI-S; Poó et al., 2013) was used to assess risky driving. The subscale contains 9 items related to a driver's tendency to seek stimulation and engage in risky behaviors while driving. It is characterized by behaviors such as exceeding the speed limit and illegal passing. Participants are asked to indicate the extent to which each item reflects their feelings, thoughts and behaviors while driving on a 6-point scale ranging from 1 (*not at all*) to 6 (*very much*). In the present study, ordinal alpha reliability for the subscale was .91.

Sociodemographic characteristics and driving information. As described in Study 1.

3.1.3. Data analysis

The same data analytic strategy used in study 1 was applied to evaluate the factor structure and reliability of the FCRSS. Pearson correlations were used to examine associations between FCRSS, positive attitudes towards traffic safety, and the risky driving style.

3.2. Results

3.2.1. Factor structure and reliability of the FCRSS

The fit of a seven-factor model including Modeling, Feedback, Communication, Monitoring, Noncommitment to safety, Messages and Limits was tested using CFA and ESEM. Results indicate that the seven-factor CFA model did not fit well to the data according to all fit indices, $\chi^2(1356) = 8133.795$, $p < .001$, CFI = .732, TLI = .718, RMSEA = .101 (90% CI: .099, .103), WRMR = 3.159. On the other hand, the seven-factor ESEM model had an acceptable to excellent fit to the data, $\chi^2(1074) = 2473.668$, $p < .001$, CFI = .955, TLI = .936, RMSEA = .052 (90% CI: .050, .054), $p > .05$, WRMR = 0.885. As Table 6 shows, all factors are well-defined by the presence of strong target factor loadings (varying from $|\lambda| = .01$ to .93; $M = .53$) of most FCRSS items. Cross-loadings on non-target factors were generally much lower (varying from $|\lambda| = .00$ to .66; $M = .12$). Nine items (11, 15, 22, 24, 31, 37, 42, 47, and 52) showed weak target factor loadings and strong cross-loadings on non-target factors. Due to the consistency between the items' content and the definition of each factor, these items were reassigned to a different factor considering their contribution to the factor's internal consistency. Finally, items 3, 23, 38, and 39 loaded above .30 on different factors, and therefore were eliminated. Thus, the final model consisted of 50 items and seven factors. The ESEM correlations among factors revealed positive and weak-to-moderate associations among Modeling, Feedback, Communication, Monitoring, Messages and Limits ($|r|$ ranging from .10 to .40, $M = .23$, at least with $p < .01$). Noncommitment to safety was found to be only negatively associated with Communication ($r = -.30$, $p < .001$). The reliability coefficients (ordinal alpha) for the FCRSS factors were as follow: Modeling (5 items), .87; Feedback (5 items),

.89; Communication (9 items), .81; Monitoring (7 items), .85; Noncommitment to safety (9 items), .70; Messages (9 items), .81; and Limits (6 items), .83.

[Table 7 near here]

3.2.2. FCRSS and risky driving

Pearson correlations were calculated between the seven FCRSS scores on one hand, and positive attitudes towards traffic risk, and reckless driving style on the other (See Table 8). As shown in Table 8, a positive attitude towards risky driving was negatively related to Feedback, Communication, Monitoring, Limits and Messages, and positively related to Noncommitment to safety. The risky driving style was negatively related to Communication, Monitoring and Messages, and positively related to Noncommitment to safety.

[Table 8 near here]

3.3. Discussion

Study 2 provides further evidence of the FCRSS' factor structure and reliability in a new independent sample. First, results from ESEM indicated that the seven-factor model of the FCRSS factor structure provided an adequate fit to the data. This adds to the evidence of validity for the factorial structure of the FCRSS (Taubman – Ben-Ari & Katz – Ben-Ami, 2013; Taubman – Ben-Ari, 2014; Taubman – Ben-Ari et al., 2014b; Taubman – Ben-Ari, 2018). However, some items were reallocated to factors other than those they were intended to measure based on information provided by the model parameters (factor loadings) and substantive criterion. All factors demonstrated good internal consistency. In addition, all FCRSS dimensions reflecting positive aspects of the safety climate (Modeling, Feedback, Communication, Monitoring, Messages, and Monitoring) were positively related to each other, and Noncommitment to safety was unrelated to the remaining FCRSS factors, except for Communication. All factors yielded weak-to-moderate correlations, indicating that they are separate dimensions of the safety climate for road safety. Moreover, age was weakly and negatively associated with Feedback, Monitoring, and Messages, and positively associated with Noncommitment to safety.

This result reflects the decrease in the direct involvement of parents in the driving behavior of their children as the children grow older (Taubman – Ben-Ari & Katz – Ben-Ami, 2013).

Second, in line with the previous literature, we found that greater perception of a positive safety climate (Feedback, Communication, Messages, Monitoring, Limits) was associated with a less positive attitude towards risky driving and a lower reporting on the risky driving style (Carpentier et al., 2014; Taubman – Ben-Ari, 2016). In contrast, the perception of a lower family commitment to safety was associated with a more positive attitude towards risky driving and a greater endorsement of the risky driving style. In summary, Study 2 replicates the results of study 1 and provides new evidence of validity by demonstrating theoretically expected significant associations between FCRSS scores and the perception of risky driving.

4. General discussion

The purpose of this series of studies was to provide evidence for the validity and reliability of the FCRSS in Argentina. Results of Study 1 indicate that the original FCRSS factor structure including Modeling, Feedback, Communication, Noncommitment, Monitoring, Messages, and Limits accounted well for the data. This factor structure was cross-validated on a second sample (Study 2), thus supporting the stability and robustness of the factor structure. All factors are composed of the items that correspond to the original factor in the FCRSS (Taubman – Ben-Ari & Katz – Ben Ami, 2013). The only exception was Noncommitment to safety, which included items from the original Noncommitment factor and items from Modeling and Messages ("My parents don't always say anything about my driving, even when I do something dangerous on the road"; and "Sometimes my parents encourage me to ignore traffic regulations"). These items have a clear association with a lack of parental commitment to safe driving. Importantly, the strong factor loadings of such items on the Noncommitment factor were consistent across samples, and similar results were also reported by Burns et al. (2020). Thus, these items conceptually and empirically appear to fit into the Noncommitment factor. Additionally, three items from the original Noncommitment factor ("My parents are willing to accept it if I get home late because I didn't want to speed"; "Sometimes my parents urge me to speed up when the light turns

yellow"; "My parents make it clear that driving safely is more important than getting somewhere on time") loaded on the Messages factor, particularly in Study 2. Since these items reflect parents' verbal safety messages and clear communication about expectations regarding safe driving, it makes sense to consider them as indicators of Messages. Notwithstanding these differences, all FCRSS factors were clearly defined and reliable across both studies according to the internal consistency estimations.

Additionally, significant predictable differences in FCRSS scores according to sex were found. These results are also in line with previous studies (Taubman – Ben-Ari & Katz – Ben-Ami, 2013) suggesting that the family context and the parenting practices regarding safety may differ for women and men. Age was also found to be associated with FCRSS factors; in particular, the older the participants, the lower they perceived parents' feedback, monitoring and limits, and the higher their perception of their family's lack of commitment to safety. However, the correlations were very small, similar to those found in Taubman – Ben-Ari and Katz – Ben-Ami (2013), suggesting that age is not an important factor in the family climate for road safety. It should be noted, though, that the age range was narrow in all the studies, which could account for this invariance. Further, we found that a higher perception of positive aspects of the safety climate (e.g., Feedback, Monitoring, Limits) was associated with less favorable attitudes towards traffic risk, and lower self-reported risky driving and vehicle crashes. Conversely, the negative aspect of safety climate, i.e., the perception of the family's lack of commitment to safety, was associated with a negative attitude towards traffic safety and a higher endorsement of risky driving. Overall, these findings are consistent with the results of previous studies indicating the benefits of the family's involvement in their adolescent children's traffic safety (Burns et al., 2020; Carpentier et al., 2014; Taubman – Ben-Ari & Katz – Ben-Ami, 2013). All in all, the similarities between the results of Study 1 and Study 2, together with the coherence of the findings with previous studies, support the validity of the current results.

Certain limitations of the present study should be acknowledged. Firstly, although the results of the two studies converge, the samples were selected using non-random sampling methods; consequently, the generalizability of the findings may be limited. It would therefore be worthwhile to examine the psychometric properties of the FCRSS in a more representative sample of drivers. Secondly, the FCRSS assesses the

perceptions of the family's practices, attitudes and values with regard to safe driving as a unit. However, parents may differ in terms of driving style, driving attitudes, and compliance to traffic rules; furthermore, it is well-known that mothers and fathers interact differently with their sons and daughters (Taubman – Ben-Ari et al., 2005). Consequently, future studies should assess young drivers' perception of each parent separately, looking for similarities and differences according to the sex of the parent and the sex of the offspring, and examining the unique contribution of these perceptions on the risky driving behavior of young drivers. Thirdly, drivers' attitudes, values and behaviors are influenced by their culture (Lund & Rundmo, 2009; Nordfjærn et al., 2011), which in turn is likely to influence the perception of the safety climate within the family. Accordingly, cross-cultural studies would be particularly useful to examine possible differences in the level of different FCRSS dimensions between countries with different cultural backgrounds, and their relative contribution to the safe driving behavior of young drivers. Lastly, more work is needed on criterion-related validity focused on the associations between FCRSS and measures of attitudes, self-reported risky driving behavior and vehicle crashes. Future studies may extend this and examine the associations between FCRSS and other driving-related measures (e.g., risk perception, driving self-efficacy, and resistance to peer pressure on risky driving).

Despite these limitations, the present study makes available a valuable research tool in Argentina that could stimulate research aimed at understanding how family impacts different aspects of a young person's driving behavior. The FCRSS can also be useful for assessing the effectiveness of training programs and road safety interventions focused on specific aspects of the family climate.

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Table 1. Synthesis of methodological approaches and results from the different studies of the FCRSS

Country	Sample	Factor analysis	Number of factors	Item factor loadings	Number of items retained	Reliability (Cronbach's alpha)
Israel (Taubman – Ben-Ari & Katz – Ben-Ami (2013)	Young drivers (17 to 22 years old, M = 19.10) from general population (n = 631)	EFA: Little Jiffy (PCA, Eigenvalues > 1, and Varimax rotation)	Seven factors: Modeling, Feedback, Communication, Monitoring, Noncommitment to safety, Messages, Limits	From .85 to.33	54	.71 to .91
Israel (Taubman – Ben-Ari et al., 2014)	Young drivers (17 to 21 years old, M = 17.54) from the general population (n = 166)	EFA: Little Jiffy. FCRSS dimensions are factor-analyzed instead of items	Two factors: Noncommitment and Monitoring	From.69 to .92	54	.60 to .94
Israel (Taubman – Ben-Ari, 2014)	Young drivers (n = 234; 17 to 24 years old, M = 18.95) and their parents (n = 549; 36 to 65 years old, M = .49.86) from the general population.	CFA (separately for the two subsamples)	Seven factors: Modeling, Feedback, Communication, Monitoring, Non Commitment to safety, Messages, and Limits	Unspecified	Parents: 52; Young drivers: 54	For Parents: .75 to .89 For young drivers: .72 to .91
Australia (Taubman – Ben-Ari et al., 2018)	Young drivers (17 to 22 years old; M = 19.5) from the general population (n = 161)	Bayesian CFA	Seven factors: Modeling, Feedback, Communication, Monitoring, Non Commitment to safety, Messages, and Limits	Unspecified	54	Not shown
Belgium (Carpentier et al., 2014)	Undergraduate students (n = 171) aged 17 to 24 years old (M = 19.71)	EFA (PCA, Scree Plot, Promax rotation)	Six factors : Communication, Modeling, Feedback, Monitoring, Limits and Noncommitment to safety	From .32 to 1.00	36	Not shown

USA (Burns et al., 2020)	Undergraduate students (n = 4392) aged between 18 and 29 years old (M = 19.08)	EFA (MLR estimator, Oblimin rotation) and CFA (MLR)	Five: Noncommitment to safety, Monitoring, Feedback, Communication, and Modeling	From .52 to .93	27	.81 to .93

Note. EFA = Exploratory Factor Analysis. CFA = Confirmatory Factor Analysis

Table 2. Summary of goodness-of-fit indices for CFA and ESEM measurement models

N°	Description	χ^2	df	CFI	TLI	RMSEA (90% IC)	WRMR
M1	7-factor 54-items CFA model (Taubman – Ben-Ari & Ben-Ami, 2013)	1080.278*	1356	.895	.889	.081 (.079, .083)	3.002
M2	7-factor 54-items ESEM model	3781.656*	1074	.970	.960	.049 (.047, .051)[a]	1.04
M3	5-factor 27-items CFA model (Burns et al. 2020)	1034.333*	289	.991	.990	.049 (.046, .052)[a]	1.529
M4	5-factor 27-items ESEM model	621.282*	205	.995	.992	.044 (.040, .047)[a]	0.667
M5	6-factor 36-items CFA model (Carpentier et al., 2014)	665.318*	545	.920	.912	.102 (.100, .104)	3.067
M6	6-factor 36-items ESEM model	2069.233*	400	.978	.967	.062 (.060, .065)	0.965

* $p < .001$; [a] $p > .05$

Table 3. Standardized factor loadings for the seven-factor ESEM model (Study 1)

Item description	Modeling	Feedback	Communication	Monitoring	Noncommitment	Messages	Limits
(6) …example by obeying traffic laws	**.80**	.01	.06	.08	.20	.07	.00
(20) …drove safely even when they were in a hurry	**.81**	.01	.03	.09	.19	.08	-.02
(50) …obeyed the traffic laws even when they were tired or feeling stressed	**.81**	-.01	.02	.07	.21	.11	.00
(31) ...but they don't drive so safely themselves [–]	**-.67**	.09	.01	.01	.35	.16	.03
(47) ...even though they're not very careful drivers[–]	**-.63**	.15	-.03	.00	.36	.18	.01
(30) ...role models for safe driving	**.76**	.06	.15	.03	.13	.05	.02
(1) ...won't be pressed for time when they're driving	**.49**	.09	.19	-.06	.17	.02	.02
(24) ...aren't very committed to the issue of safe driving [–]	**-.17**	.00	-.04	-.02	.44	.12	-.11
(39) ...even when it doesn't result in a crash	**.37**	.11	.03	.16	.07	.19	.00
(23) ...don't like to admit it when they make a mistake on the road [–]	**-.34**	-.12	.01	.01	.37	.20	-.05
(15) ...follow the rules for safe driving because they don't want to get caught [–]	**-.22**	.05	-.06	.07	.49	.01	-.10
(49) ...from my parents whenever they see me drive safely	.04	**.87**	.02	.04	.00	-.01	.02
(26) ...compliment me for driving safely	-.01	**.97**	.01	.01	-.02	-.03	.01
(14) ...praise me when I drive safely and carefully	-.08	**.98**	.01	.01	-.01	-.04	.01
(35) ...applaud me when they see I make sure to drive safely	-.05	**.95**	.04	.02	-.02	-.01	.02
(53) ...proud of me when I drive safely	.02	**.70**	.14	-.05	-.02	.10	.00
(46) ...how to prevent or avoid dangerous situations on the road	.08	.14	**.74**	.17	-.04	-.23	-.01
(4) ...about mistakes on the road or near accidents so I can learn from them	.07	.07	**.84**	.07	-.01	-.14	-.08
(51) ...dangerous situations I've been in on the road	.02	-.01	**.73**	-.03	.05	.07	-.11
(8) ...about anything related to driving	.04	-.04	**.84**	-.10	.00	.03	.02
(2) …potential problems on the road before they occur	-.03	-.05	**.83**	.01	-.06	.03	.05
(33) ...about possible hazards on the road	.02	-.04	**.76**	.07	-.06	.08	.07
(36) ...about different driving situations	.08	-.01	**.67**	-.14	.06	.20	.04
(34) ...the family contract about my driving	.03	.21	**.36**	.01	.08	.01	.08
(38) ...take an interest in how I drive	.05	.28	**.27**	.12	-.06	.29	.02
(21) ...to tell them if there's a change in where I'm going	.06	.05	.04	**.81**	.01	-.05	.02
(18) ...every time I want to go out in the car	-.04	-.05	-.11	**.76**	.04	.01	.25
(54) ...to tell my parents when I'll be home	.03	-.06	.04	**.89**	.01	.00	.03
(13) ...to tell my parents where I'm going	.03	-.06	.03	**.91**	.02	.06	.01
(7) ...have to call my parents and tell them if I'm going to be late	.09	.03	.02	**.86**	.01	.04	-.01
(25) ...to tell my parents who I'm taking with me wherever I go	.05	.11	-.03	**.80**	.03	-.07	.05
(3) ...sure I don't fool around on the road	.07	.11	.16	**.40**	-.04	.16	.17
(40) ...whether I'm driving safely if something like a car crash happens	-.02	.01	-.05	.17	**.44**	-.09	-.01

(10) ...considered a nuisance to have to obey all the traffic regulations	-.31	.02	.08	.01	**.49**	-.17	.00
(44) ...ignore it when I drive dangerously	-.10	-.02	.00	-.09	**.54**	-.18	-.10
(29) ...time teaching me how to drive safely	-.04	.08	-.19	.08	**.47**	.01	-.20
(42) ...if I get home late because I didn't want to speed [–]	.06	.01	.20	-.01	**.12**	.38	.12
(41) ...if someone complains that they're not driving safely	-.22	-.09	.01	.13	**.43**	.16	-.08
(22) ...urge me to speed up when the light turns yellow	-.18	-.06	.17	.09	**.44**	-.25	.09
(52) ...driving safely is more important than getting somewhere on time [–]	.24	.12	.11	.04	**.04**	.42	.09
(16) ...when they think I'm driving dangerously	-.21	.02	.15	.20	-.18	**.85**	-.08
(5) ...when I take unnecessary risks on the road	-.23	-.01	.23	.22	-.19	**.81**	-.04
(12) ...really care that I drive safely	.22	.10	.09	.01	.04	**.57**	.18
(9) ...my parents expect me to drive	.10	.11	.08	-.19	.14	**.49**	.33
(28) ...that driving safely is very important	*.32*	.06	.08	-.03	.06	**.53**	.21
(11) ...even when I do something dangerous on the road [–]	.11	.02	-.04	.02	.49	**.00**	-.07
(48) ...about driving safely are very clear to me	.14	.10	.09	-.09	.06	**.44**	.35
(37) ...encourage me to ignore the traffic regulations [–]	-.27	-.17	.24	-.04	.46	**-.29**	.07
(43) ...if I didn't obey the traffic regulations they would restrict my driving	.05	.03	-.02	.21	.02	-.05	**.71**
(19) ...even if it would make it easier for them if I drove (to go to the store, to pick someone up)	-.05	-.08	.03	.12	-.06	.11	**.71**
(32) ...they would impose limits on my driving	-.12	.02	-.07	.13	-.05	.05	**.83**
(27) ...between me and my parents about my driving safely	-.02	.03	.06	.01	.01	.03	**.58**
(45) …more often when they feel I drive safely	.03	.16	.03	.11	.07	.06	**.51**
(17) …clear rules about driving carefully	.15	.11	.13	.02	-.03	.15	**.45**

Notes: Numbers in brackets represent the order of the items in the scale. Target factor loadings in the ESEM model are in bold. Substantial cross-loadings (> .3 are underlined. [–] reversed item

Table 4. Intercorrelations among FCRSS factors obtained from CFA (above the diagonal) and ESEM (below the diagonal) seven-factor models (Study 1)

	1	2	3	4	5	6	7
1. Modeling	—	.45***	.58***	.32***	-.69***	.63***	.53***
2. Feedback	.35***	—	.64***	.38***	-.52***	.56***	.53***
3. Communication	.39***	.54***	—	.43***	-.68***	.74***	.58***
4. Monitoring	.12***	.28***	.27***	—	-.39***	.47***	.64***
5. Noncommitment	-.19***	.02	.06	.06	—	-.84***	-.65***
6. Messages	.37***	.40***	.54***	.24***	.06	—	.72***
7. Limits	.39***	.43***	.44***	.46***	-.07**	.48***	—

** $p < .01$ *** $p < .001$

Table 5. Univariate ANOVA, means and standard deviations of FCRSS factors by sex (Study 1)

FCRSS factors		Men (n = 451)	Women (n = 613)	$F(1,1064)$	P	η_p^2
Modeling	*M*	30.88	31.44	2.13	.144	0.002
	SD	5.93	6.40			
Feedback	*M*	17.03	18.29	10.49	.001	0.01
	SD	6.40	6.20			
Communication	*M*	28.13	29.69	12.13	.001	0.011
	SD	7.32	7.22			
Monitoring	*M*	17.80	21.62	54.92	.000	0.049
	SD	8.32	8.79			
Noncommitment	*M*	20.91	19.56	11.82	.001	0.011
	SD	6.33	6.36			
Messages	*M*	32.63	33.79	9.12	.003	0.009
	SD	6.17	6.27			
Limits	*M*	19.39	21.36	24.38	.000	0.022
	SD	6.64	6.41			

Note: η_p^2 = partial eta squared

Table 6. Univariate ANOVA, means and standard deviations of FCRSS factors by history of traffic crashes (Study 1)

FCRSS factors		Road traffic crashes during last two years			$F(2,1056)$	p	η_p^2	Post-hoc test
		(a) None (n = 758)	(b) One (n = 220)	(c) Two or more (n = 78)				
Modeling	*M*	31.30	31.34	29.58	2.51	.064	0.005	—
	SD	6.26	5.89	6.54				
Feedback	*M*	17.99	17.37	16.01	2.74	.02	0.007	a>c
	SD	6.29	6.21	6.69				
Communication	*M*	29.07	29.46	27.13	2.96	.048	0.006	b>c
	SD	7.29	7.12	7.69				
Monitoring	*M*	21.24	17.37	15.17	11.99	.000	0.054	a>b; a>c
	SD	8.75	8.24	7.55				
Noncommitment	*M*	20.15	20.20	20.27	0.17	.983	0.000	—
	SD	6.48	6.09	6.29				
Messages	*M*	33.38	33.33	32.10	1.11	.235	0.003	—
	SD	6.27	6.12	6.32				
Limits	*M*	21.05	19.38	17.83	5.378	.000	0.024	a>b; a>c
	SD	6.47	6.46	6.81				

Note: η_p^2: squared partial eta. Post-hoc tests were performed using Hochberg's GT2 method

Table 7. Standardized factor loadings for the seven-factor ESEM model (Study 2)

Item description	Modeling	Feedback	Communication	Monitoring	Noncommitment	Messages	Limits
(6) …example by obeying traffic laws	**.74**	-.05	.18	.04	-.05	-.03	.00
(20) …drove safely even when they were in a hurry	**.90**	-.04	.03	-.09	-.05	-.01	.04
(50) …obeyed the traffic laws even when they were tired or feeling stressed	**.93**	-.04	.02	-.05	-.02	-.07	.05
(31) ...but they don't drive so safely themselves [–]	**.09**	-.12	-.26	-.16	.58	.30	.14
(47) ...even though they're not very careful drivers[–]	**.01**	-.12	-.23	-.22	.55	.29	.15
(30) ...role models for safe driving	**.67**	.07	.18	-.09	-.13	-.01	.04
(1) ...won't be pressed for time when they're driving	**.58**	.13	-.14	.13	.28	.16	.07
(24) ...aren't very committed to the issue of safe driving [–]	**-.11**	-.08	-.11	-.14	.46	-.29	.00
(39) ...even when it doesn't result in a crash	**.02**	.20	-.16	.14	.30	.42	.03
(23) ...don't like to admit it when they make a mistake on the road [–]	**.05**	-.32	.11	-.14	.33	-.11	.18
(15) ...follow the rules for safe driving because they don't want to get caught [–]	**.06**	-.26	.01	-.09	.39	.12	.11
(49) ...from my parents whenever they see me drive safely	.04	**.80**	.02	-.04	.00	.05	.04
(26) ...compliment me for driving safely	.00	**.84**	.09	-.14	.09	-.13	.15
(14) ...praise me when I drive safely and carefully	.04	**.85**	.14	-.14	.01	-.05	.10
(35) ...applaud me when they see I make sure to drive safely	.02	**.75**	.33	-.11	-.01	-.03	.07
(53) ...proud of me when I drive safely	.01	**.69**	.21	-.09	.09	.14	.07
(46) ...how to prevent or avoid dangerous situations on the road	.10	.07	**.77**	.08	.05	-.24	.05
(4) ...about mistakes on the road or near accidents so I can learn from them	.06	.07	**.75**	.07	.12	-.37	.05
(51) ...dangerous situations I've been in on the road	.12	.17	**.60**	.00	.10	-.23	-.01
(8) ...about anything related to driving	-.07	.12	**.50**	.11	.24	.22	-.15
(2) …potential problems on the road before they occur	.13	.09	**.70**	.16	.11	.15	-.07
(33) ...about possible hazards on the road	.18	.10	**.68**	.12	-.13	.18	-.05
(36) ...about different driving situations	.18	.19	**.46**	.04	.07	.23	-.15
(34) ...the family contract about my driving	.10	.25	**.30**	.06	-.22	.11	.12
(38) ...take an interest in how I drive	.12	.33	**.25**	.07	-.11	.43	.10
(21) ...to tell them if there's a change in where I'm going	-.10	-.04	.00	**.71**	.04	.07	.17

(18) ...every time I want to go out in the car	.03	-.07	-.08	**.83**	.01	.02	.15
(54) ...to tell my parents when I'll be home	.05	-.12	.09	**.92**	.07	.02	.04
(13) ...to tell my parents where I'm going	-.01	-.14	.08	**.89**	.03	.13	.02
(7) ...have to call my parents and tell them if I'm going to be late	-.08	-.18	.29	**.44**	-.17	.13	.26
(25) ...to tell my parents who I'm taking with me wherever I go	-.14	-.02	.16	**.44**	.05	-.11	.25
(3) ...sure I don't fool around on the road	-.10	.02	.24	**.26**	-.25	.37	.32
(40) ...whether I'm driving safely if something like a car crash happens	-.05	.11	-.06	-.12	**.48**	.12	-.07
(10) ...considered a nuisance to have to obey all the traffic regulations	.13	-.01	-.04	.11	**.57**	.21	-.08
(44) ...ignore it when I drive dangerously	-.09	.14	-.07	.14	**.47**	.24	-.06
(29) ...time teaching me how to drive safely	-.07	-.01	.12	.03	**.51**	.27	-.09
(42) ...if I get home late because I didn't want to speed [–]	-.14	.04	.00	.18	**.21**	.50	-.05
(41) ...if someone complains that they're not driving safely	-.08	-.02	-.01	.00	**.59**	.16	.06
(22) ...urge me to speed up when the light turns yellow	.09	-.09	.08	-.12	**.23**	.38	-.09
(52) ...driving safely is more important than getting somewhere on time [–]	.08	.07	.14	-.12	**.01**	.66	.01
(16) ...when they think I'm driving dangerously	.02	-.08	.21	-.01	-.32	**.61**	.08
(5) ...when I take unnecessary risks on the road	.06	.11	-.07	.14	.13	**.63**	-.01
(12) ...really care that I drive safely	.12	.17	-.17	.25	.27	**.58**	-.11
(9) ...my parents expect me to drive	.08	.20	-.17	.25	.21	**.53**	-.09
(28) ...that driving safely is very important	.11	.02	-.10	.28	.34	**.61**	-.16
(11) ...even when I do something dangerous on the road [–]	-.16	-.12	.40	-.24	.02	**.23**	.14
(48) ...about driving safely are very clear to me	.03	.11	-.10	.25	.28	**.58**	-.19
(37) ...encourage me to ignore the traffic regulations [–]	.17	-.18	.22	-.35	-.03	**.21**	.15
(43) ...if I didn't obey the traffic regulations they would restrict my driving	.01	.06	-.05	.14	-.15	-.11	**.74**
(19) ...even if it would make it easier for them if I drove (to go to the store, to pick someone up)	.06	.04	-.10	.13	-.10	-.01	**.80**
(32) ...they would impose limits on my driving	-.06	.14	-.15	.11	-.03	.03	**.83**
(27) ...between me and my parents about my driving safely	.06	.04	.06	.18	.17	-.04	**.55**

(45) …more often when they feel I drive safely	.13	.14	-.07	.13	.06	-.05	**.62**
(17) …clear rules about driving carefully	.08	.05	.05	.10	.13	-.01	**.55**

Notes: Numbers in brackets represent the order of the items in the scale. Target factor loadings in the ESEM model are in bold. Substantial cross-loadings (> .30) are underlined. [–] reversed item

Table 8. Pearson correlations among FCRSS factors and attitudes towards risky driving and risky driving style

	Attitude towards risky driving	Risky driving style
Modeling	-.06	.08
Feedback	-.13**	.08
Communication	-.23**	-.17**
Monitoring	-.15**	-.23**
Noncommitment	.26**	.49**
Messages	-.29**	-.45**
Limits	-.30**	.01

** $p < .01$