Published in final edited form as:
Accid Anal Prev. 2020 July ; 142: 105563. doi:10.1016/j.aap.2020.105563.

Factor Structure of the Family Climate for Road Safety Scale in Emerging Adults in the United States

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Abstract

The Family Climate for Road Safety Scale (FCRSS) was developed to measure parenting behaviors specific to the driving context. The original validation study found a scale structure composed of seven factors. However, this structure has not be consistently replicated. Two- and six-factor structures have also been identified. Further, this measure has not been validated in the U.S. and has not been subjected to measurement invariance testing to determine the factor structure's suitability across sex. Additionally, its ability to predict the driving style of emerging adults with varied driving experience has not been directly examined. The current study utilized exploratory and confirmatory factor analytic procedures to identify the factor structure of the FCRSS in a sample of emerging adults in the U.S. The sample consisted of 4,392 students recruited from six universities. The sample was predominantly female (68.8%), and was 83.5% White, 6.1% Black or African American, 5.1% Asian American, 4.6% biracial or multiracial, 0.4% American Indian or Alaskan Native, and 0.2% Pacific Islander or Hawaiian. Results

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Declarations of interest
Stephen Becker is supported by award number K23MH108603 from the NIMH. The funding source had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication. The content is solely the responsibility of the authors and does not necessarily represent the official views of the U.S. National Institutes of Health (NIH)

indicated that a five-factor model of the FCRSS provided the best fit to the data compared to one-, two-, six-, and seven-factor models. The five factors identified for the model were: Noncommitment, Monitoring, Feedback, Communication, and Modeling. Further, invariance testing revealed that the five-factor model fit equally well for males and females. Some factors of the FCRSS predicted driving outcomes and driving styles in the expected directions. These findings have implications for family/parenting-based driving interventions for adolescents and young adults.

Keywords

family climate for road safety; driving; united states; emerging adults; confirmatory factor analysis; measurement invariance

1. Introduction

The Centers for Disease Control estimates that 2,364 adolescents died in motor vehicle crashes in 2017 (Centers for Disease Control, 2019). The extant literature examining the factors that influence the driving outcomes of new drivers suggests that parent driving behavior, parenting style, and parenting behaviors influence the driving behavior and outcomes of adolescents (Bingham, Zakrajsek, & Almani, 2015; Ferguson et al., 2001; Schmidt, Morrongiello, & Colwell, 2014; Taubman-Ben-Ari et al., 2005; Williams et al., 2006; Yang et al., 2013). Parenting factors are also linked to the quality and quantity of driving instruction that new drivers get from their parents (Ehsani et al., 2018; Goodwin et al., 2014). Although parenting style and parent driving behavior predict the driving style and outcomes of new drivers, researchers need a measure to assess the specific parental behaviors, values, and attitudes related to driving that influence their children's future driving.

Studies that focus on parenting styles and driving often focus on individual domains. For example, Schmitt et al. (2014) measured parental teaching and modeling using adapted versions of the Domains of Youth Risky Driving Scale that they describe in the article. Additionally, Yang et al. (2013) used the Family Communication Pattern Scale (McLeod, Atkin, &Chaffee, 1972) to measure family communication around driving. Whereas each of these studies focused on a limited number of potential family domains (i.e., modeling, teaching, communication), a comprehensive measure of family climate related to driving looking at multiple domains would provide an opportunity to explore multiple family domains more efficiently. To address this assessment need, Taubman-Ben-Ari and Katz-Ben-Ami (2012) and Taubman-Ben-Ari and Katz-Ben-Ari (2013), developed the Family Climate for Road Safety Scale (FCRSS) to assess various domains of parenting that are specific to driving. The FCRSS was based on previous work in the areas of safety climate and adolescent risk-taking behavior. The original scale included 54 items that contribute to seven subscales identified using principal component analysis: 1) Modeling- safe driving behaviors and attitudes explicitly exhibited by parents; 2) Feedback- positive feedback given to offspring from their parents regarding safe driving; 3) Communication- the openness of the communication regarding safe and dangerous driving; 4) Monitoring- parental supervision of driving behaviors; 5) Noncommittment to road safety- parental commitment to safe driving demonstrated by following rules and regulations and investing in safe driving education; 6) Messages- clear, verbal messages given to offspring by parents regarding driving; and 7) Limits- extent to which parents set limits on the driving behaviors of their offspring. Importantly, there is preliminary evidence that the FCRSS has external validity in that its domains significantly predict risky driving and driving styles. For example, the domains of the FCRSS explained a significant portion of variance of risky driving measures above and beyond general parenting and family factors in a sample of young Israeli drivers, 17–22 years old with 3 months to 2.5 years of driving experience (Taubman-Ben-Ari & Katz-Ben-Ari, 2013).

Despite the promise of the FCRSS, its factor structure has been inconsistent across samples. Carpentier et al. (2014) examined factors that moderated the influence of family climate for road safety on risky driving behaviors in novice drivers in a sample of young drivers, 17–24 years old, with less than one year of driving experience, from Belgium. In this study, the authors found that a six-factor solution that retained 36 of the original items from the FCRSS fit the data best. The six factors included: Communication, Modeling, Feedback, Monitoring, Limits, and Noncommitment. Items from the original Messages factor loaded onto the Communication and Noncommitment factors. In this study, the only domain of FCRSS that emerged as a significant predictor of risky driving was the Noncommitment factor.

Another study with a sample of young male drivers, 17–21.5 years old, in their first year of driving, in Israel found that a two-factor solution for the FCRSS fit the data the best (Taubman-Ben-Ari, Musicant, Lotan, & Farah, 2014). While the Feedback, Communication, Monitoring, Noncommitment, and Limits factors were all significantly associated with risky driving, significant intercorrelation between the factors (*r*s up to .66) prompted the authors to conduct a factor analysis of the FCRSS. This factor analysis revealed a two-factor solution that accounted for 71% of the variance in responses; one factor pertained to Communication and one pertained to Restrictive Actions taken by parents. The authors did not use these two factor scores as predictors of driving risk scores, but instead used Noncommitment subscale scores to represent the Communication factor and Monitoring subscales scores to represent the Restrictions factor as items from these subscales loaded prominently onto the two factors identified via the factor analysis. In a hierarchical regression analysis, Noncommitment and Monitoring predicted driving risk above and beyond parental driving risk scores.

Although the FCRSS has demonstrated good psychometric properties and the ability to predict driving styles in certain samples, several areas related to the FCRSS should be evaluated. First, the existing literature identifying the factor structure underlying the FCRSS calls into question the applicability of some of the original domains of the FCRSS in certain samples. The original seven-factor solution has not been replicated as the best fitting model in any studies since the original. Second, the factor structure of the FCRSS has yet to be subjected to rigorous measurement invariance testing. Measurement invariance analyses are vital to establishing the suitability of the factor structure of the FCRSS across various groups. Establishing the suitability of the FCRSS between males and females is an important step as some evidence suggests that parenting behaviors of parents and perceptions of parenting by adolescents may differ by sex (Endendijk et al., 2016; Phillipson & McFarland, 2016). Moreover, previous work has also demonstrated sex differences in mean level of each of the domains of the FCRSS (Taubman-Ben-Ari & Katz-Ben-Ari, 2013). Invariance analysis, a statistical method of establishing that a measure functions comparably across groups (Chen, Sousa, & West, 2005), should be established before any conclusions can be made regarding differences in levels of FCRSS factors between males and females. Third, the external validity of the FCRSS has not been assessed in terms of its ability to predict driving behavior in a sample of emerging adults who have a variety of years of driving experience. Previous studies have assessed external validity by using the FCRSS to predict risky driving styles in samples of younger and more novice drivers. Additionally, the validity of the FCRSS has not been examined for use in the U.S. It is likely that differences exist in parenting behaviors around driving in different cultural contexts.

The current study seeks to examine the factor structure of the FCRSS in a large, sex diverse sample of college students from six universities across the U.S. In order to identify the domains that best capture the concept of family climate for road safety in a way that could be more replicable, strategies that test the replicability of the factor structure within the sample are utilized. Specifically, we randomly split our sample of over 4,000 participants into two subsamples and conducted separate exploratory factor analyses in both to evaluate whether a similar factor structure emerged within each subsample. Additionally, using the full sample, five levels of invariance testing were examined to determine the invariance of the FCRSS between males and females given varying levels of constraints. Consistent with previous research, the ability of FCRSS to predict self-reported driving style was also examined.

2. Method

2.1 Participants

Undergraduates from six universities (N=4,392) in the U.S. were given a battery of self-report measures as part of a larger study. Initially, there were 4,955 participants, but non-licensed participants were excluded from the present study. The sample was predominantly female (68.8%). Racially, the sample was 83.5% White, 6.1% Black or African American, 5.1% Asian American, 4.6% biracial or multiracial, 0.4% American Indian or Alaskan Native, and 0.2% Pacific Islander or Hawaiian. On average, participants were 19.08 years old (SD = 1.36; min = 18, max = 29). In terms of marital status, the sample was 96.5% single, 0.4% married, 2.1% not married and cohabitating, and 0.1% divorced. The mean number of years since obtaining a driver's license was 3 years (SD = 1.37; min = 0, max = 13). The mean number of tickets was 0.55 (SD = 1.07; min = 0, max = 18) with 32.5% of the sample indicating they have received a ticket. The mean number of crashes was 0.70 (SD = .98; min = 0, max = 12) with 45.5% of the sample indicating they have been involved in a crash as the driver.

2.2 Measures

2.2.1 Family Climate for Road Safety Scale.—The Family Climate for Road Safety Scale (FCRSS; Taubman-Ben-Ari & Katz-Ben-Ami, 2013) is a 54-item measure designed to be used with adolescent and young adult drivers assessing perceptions of parents' involvement in adolescent driving and the family climate for road safety. Given that our sample was comprised of emerging adults, rather than adolescents, we adapted the instructions and questions to reflect that participants should rate their parents' involvement in their driving when participants were learning to drive as adolescents (before they were driving independently). Participants rate their parents' involvement and driving safety behaviors on a 5-point scale ("Not at all" to "Very much"). The measure previously demonstrated good psychometric properties (α range = .74 to .91) in an Israeli sample and in that sample was associated with commonly used measures of reckless driving in the expected directions (Taubman-Ben-Ari & Katz-Ben-Ami, 2013). As noted above, it has previously been modeled with a seven-factor structure, with those factors being Modeling (11 items, Cronbach's alpha = .88), Feedback (5 items, Cronbach's α = .90), Communication (9 items, Cronbach's α = .83), Monitoring (7 items, Cronbach's α = .82), Noncommitment (8 items, Cronbach's α = .75), Messages (8 items, Cronbach's α = .81), and Limits (6 items, Cronbach's α = .78) (Taubman-Ben-Ari & Katz-Ben-Ami, 2013). Although other factor structures have been identified in the literature, the original scale was initially used in the current study. Additionally, the scale was originally published in English (Taubman-Ben-Ari & Katz-Ben-Ami, 2013) and no translation was used in the current study.

2.2.2 DULA Dangerous Driving Index.—The DULA is a 28-item questionnaire assessing three dimensions of problematic driving (Dula & Ballard, 2003). Participants rate their driving behaviors on a 5-point scale ("Never" to "Always") on three subscales. The Aggressive Driving scale consists of 7 items that assess drivers' purposeful behaviors intended to annoy, irritate or punish other drivers (e.g., "I verbally insult drivers who annoy me"; Cronbach's α = .84). Negative Emotional Driving consists of 9 items assessing irritability and anger in the driving context (e.g., "I feel that passive drivers should learn how to drive or stay home"; Cronbach's α = .83). The Risky Driving scale consists of 12 items assessing willingness to engage in risky driving behaviors (e.g., "I will drive when I am drunk"; Cronbach's α = .83).

3. Procedure

Participants were undergraduates recruited online using SONA, a cloud-based research and participant management system for universities, at six universities, where they received course credit for participating. They were all recruited during the 2016–2017 academic year, were over 18 years of age, and spoke sufficient English to complete the measures. After recruitment, they completed the battery in an approximately one-hour session using Qualtrics survey software, with the exception of one site, where participants completed consent in-person and the surveys on their own. The IRB at each university approved the study.

3.1 Analytic Strategy

Data analysis was conducted using SPSS Version 23 and the 'lavaan' (Rosseel Et al., 2019), 'semTools' (Jorgensen et al., 2019), 'dplyr' (Wickham et al., 2019), 'GPArotation' (Bernaards & Jennrich, 2015), 'psych' (Revelle, 2019), 'QuantPsych' (Fletcher, 2015), 'moments' (Komsta & Novomestky, 2015), and 'haven' (Wickham & Miller, 2019) packages in the R statistical program.

3.1.2 Data Quality Check.—To protect against careless responding, an instructional manipulation check (IMC; Oppenheimer, Meyvis, & Davidenko, 2009), trap questions (e.g., "Please click on the response 'sometimes'"), and questions regarding participants' effort were embedded in the battery. Participants could only continue the survey after correctly answering the IMC. Participants successfully completed the trap questions if they answered more than 50% of the questions correctly and rated their effort as 5 or higher on a 10-point scale (0 = "Not Much Effort," 10 = "My Best Effort"). For additional details, see Becker et al. (2018).

3.1.3 Internal Validity.—First, the participants were randomly spilt into two samples to allow for the assessment of replication of the factor solution across samples (Osborne & Fitzpatrick, 2012). Then, an exploratory factor analysis using a robust maximum likelihood estimator (MLR) and Oblimin rotation was conducted in both samples. Oblique rotation (i.e., Oblimin) was used for multiple reasons. First, it is expected that family factors would theoretically be correlated. For example, it's reasonable to hypothesize that families with a higher commitment to safe driving would also show greater levels of modeling safe driving behavior and monitoring the driving behavior of new drivers. Second, oblique rotation should theoretically produce a more replicable solution. Third, if the factors are truly uncorrelated, then there should be minimal difference between solutions found using an oblique versus orthogonal rotation (Tabachnick & Fidell, 2007).

Consistent with previous literature (Willcutt et al., 2014), items that loaded onto the same factor with a factor loading of at least .60 in one sample and .50 in the other sample were retained. Additionally, in order to form stable factors, only factors that contained 3 or more items were retained. Using the factor solution from the exploratory factor analysis, a confirmatory factor analysis also using an MLR estimator was then conducted in the full sample to compare the solution found in the EFA to a one-factor, two-factor, six-factor, and seven-factor model. Adequate fit was defined as CFI and TFI values above .90 and RMSEA and SRMR values less than .10. Good fit was defined as CFI and TFI values above .95 and RMSEA and SRMR values below .05. When comparing models, those models with higher CFI and TLI values and lower chi-square, RMSEA, and SRMR values were determined to provide a better fit to the data. The two-, six-, and seven-factor models have been previously identified in the literature (Carpentier et al., 2014; Taubman-Ben-Ari et al., 2014; Taubman-Ben-Ari & Katz-Ben-Ami, 2013).

Measurement invariance between sexes was tested at five levels of invariance. The weakest level of invariance, configural invariance, does not apply any parameter constraints. This model is equivalent to testing the overall model in each group. The next level of invariance, weak invariance, constrains all factor loadings to be equal. Strong invariance constrains the factor loadings and group intercepts to be the equal. Strict invariance constrains the factor loadings, intercepts, and error variances to be equal. Finally, mean level invariance constrains the factor loadings, intercepts, error variances, and factor means to be equal. At each level, if the model still provides good fit, using the criteria outlined above, and does not fit appreciably worse than the configural model (i.e., if the change in fit indices between the free model and invariant model is not substantial), then the factor structure can be considered invariant.

3.1.4 External Validity.—Regressions were used to assess the external validity of the FCRSS. A path analysis framework with a maximum likelihood estimator and bootstrapped standard errors was used to examine the ability of the FCRSS to predict the three dimensions of the DULA (i.e., aggressive driving, negative emotion, risky driving) controlling for age, sex (0 = male, 1 = female), and site/university (site 1 versus all others, site 2 versus all others, site 3 versus all others, site 4 versus all others, and site 5 versus all others). The Hessian matrix of the models predicting probability of tickets and crashes was singular, rendering the validity of the models uncertain. Thus, the results of these models are not presented in the results.

4. Results

4.1 Internal Validity

4.1.2 Exploratory Factor Analysis.—As summarized in Table 1, exploratory factor analysis yielded a six-factor solution in sample A and a five-factor solution in sample B. Overall, 27 items and five factors met criteria to be retained for the confirmatory factor analysis.

4.1.3 Confirmatory Factor Analysis.—Using the full sample, only the five-factor model demonstrated at least adequate fit in all fit indices. The five-factor model, Noncommitment (9 items), Monitoring (6 items), Feedback (5 items), Communication (3 items), and Modeling (4 items), provided the best fit to the data ($\chi^2(351)= 3834.36$, CFI= .94, TLI= .93, RMSEA= .058 (90% confidence interval [.056–.059], SRMR= .046). Table 2 summarizes the fit of all models tested.

Within the five-factor model, the Noncommitment factor had strong loadings (.59–.73), as did the Monitoring (.71–.85), Feedback (.79–.89), Communication (.72–.81), and Modeling (.78–.84) factors (See Table 3). Correlation between the factors ranged from weak ($r = -.18$) to strong ($r = .73$). Noncommitment was negatively correlated with all other factors and all of the other factors were positively correlated with each other. Reliability coefficients were calculated using Cronbach's alpha. All five factors demonstrated acceptable internal reliability: Noncommitment (α= .87), Monitoring (α=.91), Feedback (α= .93), Communication (α= .81), Modeling (α= .88).

4.1.4 Sex Invariance.—Invariance testing provided strong evidence for the invariance of the five-factor structure between sexes (See Table 4). At the strictest level of invariance testing, mean level invariance, the model provided good fit ($\chi^2(704)= 5906.60$, CFI= .93, TLI= .93, RMSEA= .058, SRMR= .057). Further, changes in the fit indices between the models indicate that the mean level invariance model does not fit the data appreciably worse ($\Delta\chi 2= 237.99$, ΔCFI= .003, ΔTLI= .003, ΔRMSEA= .001, ΔSRMR= .009).

4.2 External Validity

External validity was assessed by examining the ability of the FCRSS factors to predict self-reported driving behaviors and driving outcomes in the expected direction. Table 5 summarizes these results. Overall, the regression coefficients were fairly small and should be interpreted with caution. After controlling for age, sex, and site, aggressive driving was statistically significantly predicted by greater levels of reported parent Noncommitment (β= .14) and lower levels of reported parent Modeling (β= −.15) of safe driving behaviors; self-reported negative emotion was statistically significantly predicted by greater levels of reported parental Monitoring (β= .05) and Communication (β= .07), and by lower levels of reported Modeling (β= −.24) and Feedback (β= −.04); and self-reported risky driving was statistically significantly predicted by greater levels of reported parent Noncommitment (β= .21) and lower levels of reported parent Monitoring (β= −.05), Communication (β= −.04), and Modeling (β= −.13). Reported parent Modeling and Noncommitment emerged as the most consistent and relatively stronger predictors of self-reported driving behaviors.

5. Discussion

The current study addressed three areas related to the FCRSS: identifying a stable factor structure in a sample of emerging adults in the U.S., a lack of measurement invariance testing, and the external validity related to driving behaviors in emerging adults in the U.S.

First, the Family Climate for Road Safety Scale was developed to capture the behaviors, values, and attitudes that exist within a family regarding safe driving. In the original conception of the FCRSS, there were seven factors: Modeling, Feedback, Communication, Monitoring, Noncommittment to road safety, Messages, and Limits. However, this factor structure of the FCRSS has not been replicated in the literature using samples from other countries or of different ages. The current study identified a five-factor structure that best fit the data. The factor structure in our U.S. sample includes the following factors: 1) Noncommitment to road safety- parental commitment to safe driving demonstrated by following rules and regulations and investing in safe driving education; 2) Monitoring- parental supervision of driving behaviors; 3) Feedback- positive feedback given to offspring from their parents regarding safe driving; 4) Communication- the openness of the communication regarding safe and dangerous driving; and 5) Modeling- parental modeling of safe driving behavior. Except for Noncommitment, the new factors are composed of items from the corresponding factor in the original model of FCRSS. The new Noncommitment to road safety factor includes items from the original Messages and Modeling factors, as well as the original Noncommitment factor. The items from the original Messages and Modeling factors have a clear association with parents not being committed to safe driving (e.g., “Sometimes my parents encouraged me to ignore traffic regulations,” “My parents only followed the rules for safe driving because they didn’t want to get caught”). Thus, these items conceptually and empirically appear to fit within the new Noncommitment factor. The Limits and Messages factors were dropped in the five-factor structure identified in the current study. Some items from the Messages factor did load onto the new Noncommitment factor, which partially explains why the Messages factor did not remain. Interestingly, no items from the Limits factor loaded onto any factor at .50 or above. Our findings suggest that a five-factor solution of the FCRSS provided the best fit to our data.

There are several reasons that may explain the identification of a five-factor solution in the current study compared to the solutions previously identified in the literature. One reason could be that the current study uses exploratory factor analysis rather than principal component analysis that has been used previously. Similarly, the current study utilized an oblique rotation method and all but one previous study (Carpentier et al., 2014) utilized an orthogonal rotation method. Cultural variation in the climate around driving could also explain the variability in the factor structure of the FCRSS in previous studies and the current study. Previous studies examined the structure of the FCRSS in an Israeli and Belgian sample, whereas, the current study examines the structure of the FCRSS in a sample from the U.S. Finally, the current sample is also older, has more driving experience overall than previous samples, and participants retroactively reported on family climate rather than reporting on current family climate.

Second, measurement invariance of the five-factor model of the FCRSS between sexes was tested. At the strictest level of invariance, mean level invariance, the five-factor model still provided good fit to the data. Finding support for the invariance of FCRSS allows for conclusions to be made about differences in FCRSS in males and females. For example, previous research suggests that females perceived higher levels of modeling, feedback, communication, messages, limits, and monitoring from parents, whereas males perceived higher levels of noncommitment to safe driving from parents (Taubman-Ben-Ari & Katz-Ben-Ari, 2013). However, given that we found the FCRSS to be invariant at the mean level, males and females did not report having received significantly different levels of these parenting behaviors. Differences in the age of the study samples may explain why we did not find sex differences regarding mean levels of FCRSS factors. Specifically, our sample consisted of emerging adults who were recalling their parents' behaviors and attitudes regarding driving versus Taubman-Ben-Ari et al.'s (2013) sample which consisted of adolescent drivers who were reporting on their parents' current behaviors and attitudes. Our findings should be replicated with adolescent samples in the U.S. using current report.

Third, examining the external validity of the FCRSS, some domains of the FCRSS were able to predict ratings of driving style in the expected directions. Overall, reported parent Modeling and Noncommitment emerged as the strongest and most consistent predictors of self-reported driving behavior. They predicted driving behavior in the directions expected and consistent with other studies showing the importance of modeling and commitment in predicting driving styles (Carpentier et al., 2014; Taubman-Ben-Ari et al. 2014; Taubman-Ben-Ari & Katz-Ben-Ari, 2013).

Somewhat counterintuitively, higher levels of reported parent Communication and Monitoring predicted higher levels of self-reported negative emotionality while driving. Although we might expect more open communication to contribute to lower levels of negative emotion while driving, talking freely about driving does not inherently mean the communication is positive. It could be such that the communication style around driving while open, is conflictual and leads to negative emotion, or perhaps when discussing driving, parents model a communication style that demonstrates negative emotion toward other drivers. Similarly, higher levels of monitoring may be perceived negatively by adolescents learning to drive and lead to negative emotion while driving. Additionally, parents of adolescents that are high in negative emotionality may feel the need to provide more communication and monitoring. Although these findings were somewhat surprising, the strength of the relations were fairly weak. Still, further research is needed to clarify these relations.

5.1 Practical Implications

Taken together, the results of this study have multiple implications regarding interventions for driving safety. The results suggest that family factors, especially parental modeling of safe driving, play an important role in the driving behaviors of emerging adults. This is consistent with much of the current literature on how new drivers learn driving behavior based on what their parents model for them (Bingham et al., 2015; Schmidt et al., 2014; Taubman-Ben-Ari et al., 2014).

Driving interventions that utilize parents should consider specific elements of family climate for road safety as mechanisms of change. Specifically, they should capture all the various aspects of family climate for road safety. For example, the Checkpoints Program (Simons-Morton, Hartos, Leaf, & Preusser, 2006) focuses specifically on monitoring and setting restrictions on the driving of adolescents, especially in high-risk conditions. This intervention could potentially benefit from also including components related to parents modeling safe driving, as well as, being consistent in their commitment to driving safety.

5.2 Limitations

One limitation of the current study is the reliance on self-report data. Reports of driving behavior and family factors may be biased. Family status of the participants and whether or not a participant has children could influence the perception of parental behaviors. Unfortunately, this information was not available for the current study. Additionally, the results may be subject to same-method bias. Further, asking emerging adults to retrospectively report on parents’ behavior when they were learning to drive presents a limitation regarding the ability of the participant to accurately report. The study is also cross-sectional in design, this limits the ability to make a causal inference in terms of family climate factors actually predicting future driving behaviors. A final limitation of the current study is the largely homogenous sample in terms of race and sex.

5.3 Future Directions

Future studies should further test the five-factor model of the FCRSS in diverse populations. It is reasonable to expect that the factor-structure will look different depending on general attitude or frequency regarding driving within different cultures. There may also be implications if a more stable factor structure is determined across cultures. Future studies should also further explore the relationship between family climate for road safety and sex and how they interact in predicting driving outcomes. Additionally, examining the relationship between family climate for road safety and other family factors may be beneficial. Further examination of the surprising and interesting results found in this study, especially those regarding the Communication domain is warranted preferably using longitudinal study designs. Finally, future studies that assess family/parent-based driving interventions should use the FCRSS to measure domains of family climate that may serve as potential mechanisms for improving driving outcomes.

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Highlights

- Evidence of a Five-factor solution for the FCRSS in emerging adults in the U.S.
- Factors include Noncommitment, Monitoring, Feedback, Communication, and Modeling.
- The five-factor model fit equally well with males and females.
- Noncommitment and Modeling predicted driving behavior in emerging adults.

Table 1

Exploratory Factor Analysis for the Family Climate for Road Safety Scale (FCRSS)

	Sample A							Sample B						
Item	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**	**Factor 7**	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**	**Factor 7**
FCRSS37	0.73	-	-	-	-	-	-	0.71	-	-	-	-	-	-
FCRSS29	0.69	-	-	-	-	-	-	0.66	-	-	-	-	-	-
FCRSSI1	0.68	-	-	-	-	-	-	0.63	-	-	-	-	-	-
FCRSS44	0.67	-	-	-	-	-	-	0.70	-	-	-	-	-	-
FCRSS40	0.63	-	-	-	-	-	-	0.61	-	-	-	-	-	-
FCRSS31	0.62	-	-	-	-	-	-	0.52	-	-	-	-	-	-
FCRSS10	0.62	-	-	-	-	-	-	0.59	-	-	-	-	-	-
FCRSS24	0.62	-	-	-	-	-	-	0.60	-	-	-	-	-	-
FCRSSI5	0.61	-	-	-	-	-	-	0.57	-	-	-	-	-	-
FCRSS22	0.52	-	-	-	-	-	-	0.53	-	-	-	-	-	-
FCRSS25	-	0.89	-	-	-	-	-	-	0.84	-	-	-	-	-
FCRSS21	-	0.88	-	-	-	-	-	-	0.88	-	-	-	-	-
FCRSS18	-	0.81	-	-	-	-	-	-	0.83	-	-	-	-	-
FCRSS54	-	0.79	-	-	-	-	-	-	0.81	-	-	-	-	-
FCRSS13	-	0.74	-	-	-	-	-	-	0.74	-	-	-	-	-
FCRSS7	-	0.68	-	-	-	-	-	-	0.68	-	-	-	-	-
FCRSS26	-	-	0.92	-	-	-	-	-	-	0.93	-	-	-	-
FCRSS14	-	-	0.87	-	-	-	-	-	-	0.90	-	-	-	-
FCRSS35	-	-	0.83	-	-	-	-	-	-	0.84	-	-	-	-
FCRSS49	-	-	0.83	-	-	-	-	-	-	0.85	-	-	-	-
FCRSS53	-	-	0.59	-	-	-	-	-	-	0.61	-	-	-	-
FCRSS4	-	-	-	0.71	-	-	-	-	-	-	0.67	-	-	-
FCRSS8	-	-	-	0.68	-	-	-	-	-	-	0.74	-	-	-
FCRSS2	-	-	-	0.53	-	-	-	-	-	-	-	-	-	-
FCRSS36	-	-	-	0.52	-	-	-	-	-	-	0.65	-	-	-
FCRSS20	-	-	-	-	0.71	-	-	-	-	-	-	0.75	-	-
FCRSS6	-	-	-	-	0.70	-	-	-	-	-	-	0.73	-	-
FCRSS50	-	-	-	-	0.67	-	-	-	-	-	-	0.68	-	-
FCRSS30	-	-	-	-	0.63	-	-	-	-	-	-	0.65	-	-
FCRSS9	-	-	-	-	-	0.51	-	-	-	-	-	-	-	-
FCRSS28	-	-	-	-	-	0.50	-	-	-	-	-	-	-	-

Note: Only items that loaded onto at least one factor at .5 are included. Only factor loadings above .5 are reported.

Table 2

Fit Indices for Factor Models of the Family Climate for Road Safety Scale

Models	***df***	**$\chi 2$**	***p*-value**	**CFI**	**TLI**	**RMSEA**	**RMSEA 90% CI**	**SRMR**
1-Factor	1377	45706.50	<.001	0.60	0.58	0.098	.098–.099	0.102
2-Factor	1376	40923.83	<.001	0.63	0.62	0.093	.092–.094	0.106
5-Factor	351	3834.36	<.001	0.94	0.93	0.058	.056–.059	0.046
6-Factor	544	11235.99	<.001	0.86	0.84	0.068	.067–.069	0.073
7-Factor	1356	26651.81	<.001	0.77	0.76	0.074	.073–.075	0.101

Note: Reported fit indices are robust fit indices from a robust maximum likelihood estimator

Table 3

Items and Factor Loadings for the Five-Factor Solution

Factor	Item Number	Item Description	Factor Loading
1 (Noncommitment)			
	37	…ignore traffic regulations	0.73
	29	…teaching me how to drive safely	0.71
	11	…didn't always say anything…something dangerous on the road	0.65
	44	…ignored it when I drove dangerously	0.71
	40	…if something like a car crash happened	0.60
	31	…they didn't drive so safely themselves	0.62
	10	…nuisance to have to obey all traffic regulations	0.63
	24	…weren't very committed to the issue of safe driving	0.64
	15	…because they didn't want to get caught	0.59
2 (Monitoring)			
	25	…tell my parents who I was taking with me wherever I went	0.82
	21	…tell them if there was a change in where I was going	0.85
	18	…permission every time I wanted to go out in the car	0.78
	54	…had to tell my parents when I would be home	0.85
	13	…had to tell my parents where I was going	0.81
	7	…tell them if I was going to be late	0.71
3 (Feedback)			
	26	…complimented me for driving safely	0.88
	14	…praised me when I drove safely and carefully	0.83
	35	…applauded me when they saw I made sure to drive safely	0.87
	49	…parents whenever they saw me drive safely	0.89
	53	…proud of me when I drove safely	0.79
4 (Communication)			
	4	…openly about mistakes on the road or near accidents…	0.72
	8	…openly about anything related to driving	0.79
	36	…my parents about different driving situations	0.81
5 (Modeling)			
	20	…drove safely even when they were in a hurry	0.79
	6	…example by obeying traffic laws	0.78
	50	…obeyed the traffic laws even when they were tired or feeling stressed	0.80
	30	…role models for safe driving	0.84

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Table 4

Invariance Fit Indices for FCRSS Five-Factor Structure Across Sex

Models	***df***	**χ2**	***p*-value**	**Δχ2**	**Δχ2 *p-Value***	**CFI**	**ΔCFI**	**TLI**	**ΔTLI**	**RMSEA**	**ΔRMSEA**	**SRMR**	**ΔSRMR**
Configural	628	5310.10	<.001			0.94		0.93		0.058		0.045	
Weak	650	5333.90	<.001	22.90	0.407	0.94	0.000	0.93	0.002	0.057	0.001	0.046	0.000
Strong	672	5439.50	<.001	41.70	0.006	0.93	0.002	0.93	0.000	0.056	0.001	0.047	0.001
Strict	699	5680.50	<.001	126.35	<.000	0.93	0.003	0.93	0.000	0.056	0.000	0.048	0.001
Mean Level	704	5906.60	<.001	237.99	<.000	0.93	0.003	0.93	0.003	0.058	0.001	0.057	0.009

Note: Fit indices are robust fit indices from a robust maximum likelihood estimator. χ2 is the standard test statistic as a robust difference test is a function of standard statistics.

Table 5

Summary of regression results with standardized regression coefficients

	Aggressive Driving		**Negative Emotion**		**Risky Driving**	
	β	**SE**	***β***	**SE**	***β***	**SE**
Sex	**−0.07**	0.02	−0.01	0.02	**−0.12**	0.02
Noncommitment	**0.14**	0.02	0.03	0.02	**0.21**	0.01
Monitoring	−0.02	0.01	**0.05**	0.01	**−0.05**	0.01
Feedback	−0.01	0.01	**−0.04**	0.01	−0.02	0.01
Communication	−0.02	0.02	**0.07**	0.02	**−0.04**	0.01
Modeling	**−0.15**	0.02	**−0.24**	0.02	**−0.13**	0.01

Note: Controling for age and site; Sex (0 = Male, 1 = Female); ***Bold*** = p ≤ .05