Personality and Crash Risk

Johnathon P. Ehsani, Bruce G. Simons-Morton, Kaigang Li, Jessamyn G. Perlus, & Fearghal O'Brien

Health Behavior Branch, *Eunice Kennedy Shriver* National Institute of Child Health and Human Development, National Institutes of Health

1. Background

- Personality characteristics are associated with risk behaviors.[1]
- Previous research examining the association between personality and driving is limited by self-reported measures of driving behavior.[2]

2. Method

Study Design

- The vehicles of 42 newly licensed teenage drivers were instrumented.
- Driving exposure, kinematic risky driving (KRD), secondary task engagement, and frequency of crashes/near crashes (CNCs) were assessed over 18 months.
- Participants completed personality inventories at baseline.

Measures

- ***Crashes and Near Crashes***
    Coders identified CNCs by viewing video footage of highly elevated gravitational-force (g-force) events.

Mediators

- ***Kinematic Risky Driving***
    Rate of g-force events (e.g. hard breaking and sharp turning) per 10,000 miles.

- ***Secondary Tasks***
    Secondary tasks (e.g. cellphone use, eating, adjusting the radio, etc.) were recorded if they occurred within randomly sampled 6-second period stratified by miles driven.

Personality

- ***NEO-Five Factor Inventory (NEO-FFI)***
    Widely used 60-item measure of five personality traits:
    – Extraversion
    – Agreeableness
    – Conscientiousness
    – Neuroticism
    – Openness

- ***Sensation Seeking Scale (SSS-V)***
    40-item measure of thrill-seeking, disinhibition, experience seeking, and susceptibility to boredom.

Analyses

- Linear regression models were fit using trip level event rate of CNCs. CNC rate, KRD rate, and secondary tasks were log transformed. Given the relatively small sample size, significance was set at $p = .10$.
- Mediation analysis was conducted to examine if participants' KRD or secondary tasks mediated the relationship between personality and CNCs based on the causal steps approach.

3. Results

- Conscientiousness was the only personality variable that was directly related to CNCs (with marginal significance).

$r = -0.034, p = 0.09$
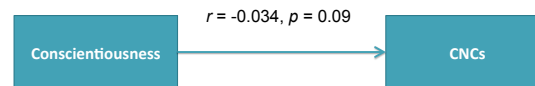
Conscientiousness	→	CNCs

Figure 1. Direct association between conscientiousness and crashes and near crashes (CNC).

- Conscientiousness was negatively associated with KRD (path a in Figure 2) and secondary tasks with incidence being lower among those who were more conscientious.
- KRD was found to mediate the association between conscientiousness and CNC. The association between conscientiousness and CNC reduced from -0.034 (Figure 1, $p = .09$) to -0.025 (path c in Figure 2, $p = .20$) when controlling for KRD.
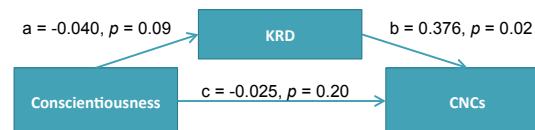
$a = -0.040, p = 0.09$ **KRD** $b = 0.376, p = 0.02$

$c = -0.025, p = 0.20$

Conscientiousness		CNCs

Figure 2. Mediation effect of kinematic risky driving (KRD) on the relationship between conscientiousness and CNCs.

- Secondary tasks were not found to mediate the association between conscientiousness and CNC.

4. Discussion

- Conscientiousness was negatively associated with risky driving behavior (KRD), and this relationship entirely mediated the effect of conscientiousness on CNCs.
- These findings are consistent with a meta-analysis which found conscientiousness to be negatively associated with all risky health-related behaviors.[3]
- The context and mechanism through which personality traits elevate or mitigate risky driving behaviors requires further investigation. For example, do young drivers with low conscientiousness engage in lower KRD under all circumstances or only certain conditions?

Limitations
- The small sample size limits the generalizability of the findings.

Strengths
- This study represents one of the first applications of naturalistic driving research methods to the association between personality traits and driving behavior among novice teenage drivers.
- This study adds to the literature on personality and driving by presenting a causal model of the personality and risky driving behaviors as interactive factors associated with crashes, using objective driving data.

References

1. Cooper ML, Wood PK, Orcutt HK, Albino A. (2003). *Journal of Personality and Social Psychology*
2. Begg D, Sullman M, Samaranayaka A. (2012). *Accident Analysis and Prevention*
3. Bogg T, Roberts BW. (2014). Psychological Bulletin

Acknowledgement