Is ADHD a Unique Risk Factor for Adverse Driving Outcomes? Comparison of Drivers With ADHD, Depression, and No Known Psychopathology

Paula A. Aduen[1], Michael J. Kofler[1,2], Dustin E. Sarver[3], Daniel J. Cox[1], Suzanna Gluck[1] & Erin Lunsford[1]

[1]University of Virginia, [2]Florida State University, [3]University of Mississippi Medical Center

Introduction

- Adult ADHD studies have identified motor vehicle driving as an area of concern and implicated ADHD as a risk factor for traffic collisions and citations (1).
- Individuals with ADHD are more likely to have a greater number of collisions, citations, more severe and expensive collisions, as well as license suspensions and revocations (2).
- ADHD driving studies to date have relied primarily on self-selected samples recruited specifically to participate in research examining the impact of ADHD on their driving behavior.
- Additionally, no study to date has addressed risk specificity by comparing drivers with ADHD to drivers with other psychological diagnoses (e.g., depression).
- Drivers with depression also show increased collision risk based on driving simulator studies (3).

Present Study

- The present study addressed above limitations by examining self-reported traffic violations and collisions in a large, nationwide, and non-referred sample of drivers with self-reported a) ADHD or b) Depression relative to c) drivers without no known psychological diagnosis participating in the nationally representative, Strategic Highway Research Program 2 (SHRP-2) Naturalistic Driving Study of U.S. drivers.

Method

Participants *N*=3,226

- SHRP-2 Naturalistic Driving Study of 3,600 drivers from six U.S. sites. Participants were selected through a probability-based sampling approach and consented to have their vehicles outfitted with a sophisticated data acquisition system to capture day-to-day driving data continuously for 1-2 years.
- ADHD Group (*n*=275)
  - ADHD status was assigned based on self-reported ADHD diagnosis with or without comorbidity, and/or positive Barkley Adult ADHD Quick Screen of 7+ (BAQS; 2008).
- Depression Group (*n*=251)
  - Drivers with self-reported depression, not meeting ADHD criteria; no BAQS score criteria set.
- Healthy Control Group (*n*=1,828)
  - Drivers with negative BAQS screen (< 4) and no self-reported psychiatric disorders
- Exclusion: Self-reported personality, bipolar, or psychotic disorders (*n*=33) or incomplete data (*n*=374)

Procedure

- The current study is based on self-report data collected during the initial evaluation that included driver demographic, driving history, and psychiatric screening questionnaires.

Outcome Variables

- Collision and Violation Frequency
  - Participants reported collision and violation frequency over the past 3 years (0, 1, 2+)
- Crash Severity and Crash Fault
  - For up to 2 collisions

Analyses

- Preliminary analyses
- Multinomial logistic regression to predict relative risk for collisions, violations, collision-related injuries, and collision fault for drivers with ADHD and drivers with Depression relative to drivers with no known psychopathology (Healthy Controls), as well as relative risk for ADHD relative to Depression.

Results

Preliminary Analyses

- Bonferroni-corrected post hocs
- ADHD overrepresented in youngest (ages 16-25) and underrepresented in oldest age groups (51+).
- Drivers with ADHD less likely to have high school diploma or college degree, overrepresented in the extreme income groups (< $29K/year, > $150K/year), and less likely to be married (all $p<.05$).
- Drivers with depression more likely to be female and report driving more than 20,000 miles/year (both $p<.05$).
- These demographic variables were included as covariates in all subsequent analyses. Results are reported both before and after controlling for these factors given that most of these variables are known outcomes or correlates of ADHD and/or Depression.

Primary Analyses

Traffic Violations

- ADHD and Depression associated with 56% and 43% increased risk for a single traffic violation (OR=1.56, 1.43), respectively.
  - No longer significant after controlling for demographic covariates
- ADHD portended 222% increased risk for multiple violations (OR=3.22), relative to a 76% increased risk for Depression.
  - After correcting for demographic covariates, drivers with ADHD but not Depression remained significantly at risk for multiple violations (127% increased risk).
- When compared to Depression, ADHD portended an 83% to 85% increased risk for multiple violations (OR=1.83, 1.85).

Collisions

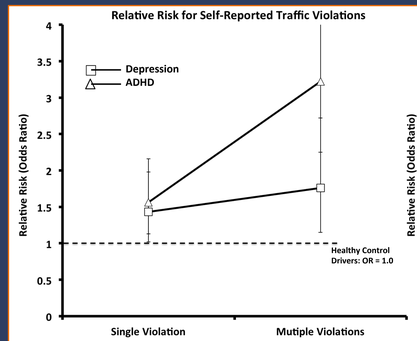
- ADHD associated with increased risk for single collision (OR=1.41) and multiple collisions (OR=2.63) relative to Healthy Controls.
- The difference in relative risk between ADHD and Depression did not reach significance for single or multiple collisions.

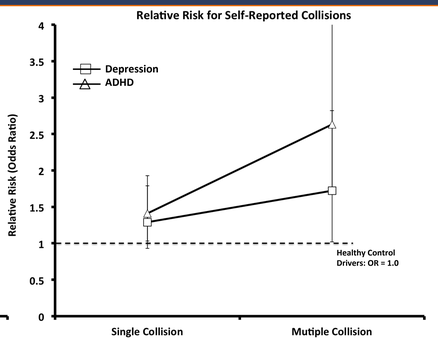
Injury

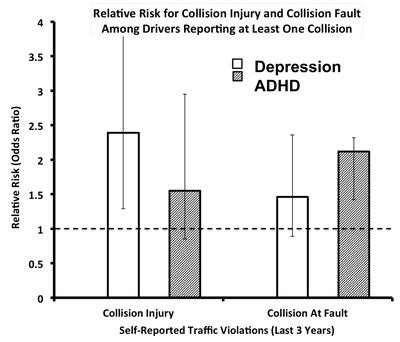
- Among drivers reporting at least one collision, Depression portended 125% increased risk for self-reported injury that was robust after accounting for demographic factors (OR=2.25).

Collision Fault

- Among drivers reporting at least one collision, ADHD associated with 112% increase in self-reported fault (OR=2.12) relative to Healthy Control but not relative to drivers with Depression.
- Depression not associated with significant increased risk for collision fault.







Discussion

- Self-reported ADHD and Depression are both associated with adverse driving outcomes.
- Both groups showed increased risk for single collision and single violation relative to drivers with no known psychopathology.
  - Risk for single collision/violation no longer significant after controlling for younger age, male gender, lower SES, unmarried status, and increased exposure (i.e., more annual miles driven).
- ADHD but not Depression was a unique risk factor for multiple violations, multiple collisions, and being at-fault for collisions, even after control for demographic factors described above.
- Depression but not ADHD was uniquely associated with self-reported injury following collision.
- Prospective, longitudinal studies with clinically defined samples are needed to elucidate mechanisms and processes linking these high incidence disabilities with adverse driving outcomes.

References

1. Jerome L, Habinski L, Segal A. Attention-deficit/hyperactivity disorder (ADHD) and driving risk: a review of the literature and a methodological critique. *Curr Psychiatry Rep.* 2006; 8(5), 416–26.
2. Bulmash EL, Moller HJ, Kayumov L, et al. Psychomotor disturbance in depression: assessment using a driving simulator paradigm. *J Affect Disord.* 2006; 93(1), 213-218.
3. Barkley RA, Cox D. A review of driving risks and impairments associated with attention-deficit/hyperactivity disorder and the effects of stimulant medication on driving performance. *J Safety Res.* 2007; 38(1), 113–28.
4. Cox DJ, Madaan V, Cox BS. Adult attention-deficit/hyperactivity disorder and driving: why and how to manage it. *Curr Psychiatry Rep.* 2011; 13(5), 345–50.