Published in final edited form as:

J Atten Disord. 2018 October ; 22(12): 1109–1112. doi:10.1177/1087054715575063.

Negative Consequences of Poor Driving Outcomes Reported by Adolescents with and without Attention Deficit Hyperactivity Disorder

Megan E. Narad, Ph.D.¹, Annie, A. Garner, Ph.D.¹, Tanya N. Antonini, Ph.D.¹, Kathleen M. Kingery, M.A.^{1,2}, Leanne Tamm, Ph.D.¹, H.R. Calhoun¹, and Jeffery N. Epstein, Ph.D.^{1,2}

¹Cincinnati Children's Hospital Medical Center

²University of Cincinnati

Abstract

Objectives—While adolescents with ADHD report less driving experience, a greater proportion of adolescents with ADHD report receiving at least one ticket; however, no study has examined the severity of infractions committed by adolescent drivers with ADHD.

Method—A total of 61 adolescents (28 ADHD, 33 controls) aged 16–17 with a valid driver's license completed a self-report Driving History Questionnaire (DHQ) which asked about months of driving experience, negative driving outcomes, and severity of consequences.

Results—A greater proportion of adolescents with ADHD reported receiving fines, points on their driver's license and remedial driving class. Further, adolescents with ADHD reported attending a greater number of hours in remedial driving class, and a greater expense associated with fines.

Conclusion—Importantly, ADHD-related negative driving outcomes manifest early in driving careers. Further, increased negative consequences of poor and/or risky driving among adolescents with ADHD were evident despite having fewer months of independent driving.

Introduction

Motor vehicle safety is a significant area of public health concern. Motor vehicle crashes (MVCs) result in an estimated 32,788 deaths (National Highway Traffic Safety Administration, 2011) and 2.8 million injuries per year (Centers for Disease Control and Prevention, 2011). Adolescent drivers, especially newly licensed drivers (Lee, 2007; McKnight & McKnight, 2003; Williams, 2003), contribute disproportionately to rates of MVCs. In fact, adolescents are four times more likely to be involved in an MVC than drivers who are over 20 years old (Insurance Institute for Highway Safety, 2010). While drivers aged 15–24 years represent 14% of the population, they account for 28%–30% of the costs associated with motor vehicle injuries (Finkelstein, Corso, & Miller, 2006). Furthermore, in 2010, 2,700 teens between the ages of 16–19 years were killed and 282,000 were injured in

MVCs with MVCs being the leading cause of death for teens in the United States (Center for Disease Control and Prevention, 2011).

While adolescents as a group are at an increased risk for MVCs and negative driving outcomes, those diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) are at an even greater risk. Individuals with ADHD have higher rates of MVCs and experience greater tactical and operational driving impairments than their non-ADHD counterparts (Barkley & Cox, 2007). Further, surveys of driving records show that individuals with ADHD receive twice as many traffic violations, are more likely to have their license suspended, and are six times more likely than drivers without ADHD to be involved in multiple MVCs (Barkley, Murphy, Dupaul, & Bush, 2002). Moreover, both driving simulation studies and a recent study using in-car mounted video cameras to assess on-road driving demonstrate that drivers with ADHD are more likely to be involved in MVCs than drivers without ADHD (Fischer, Barkley, Smallish, & Fletcher, 2007; Weafer et al., 2008).

The majority of research examining ADHD-related driving impairments has been conducted with adults with ADHD (Barkley & Cox, 2007) even though adolescent drivers, especially those within their first six months of licensure, have the highest accident rates of any age group (Shope & Bingham, 2008; Williams, 2003).

A recently published study examined the driving performance of adolescents, aged 16–17 years of age, with and without ADHD found that despite having fewer months of driving experience (ADHD = 6.45 months; Controls = 10.45 months), a greater proportion of adolescents with ADHD (17%) reported a history of having received at least one written traffic violation, compared to typical controls (6%; Narad et al., 2013). Narad et al (2013) documented that ADHD-related driving impairments begin early in an individual's driving career; however, it did not present information regarding the severity of these infractions. While previous studies have documented the frequency of infractions, no study to date has examined the severity of infractions committed by adolescent drivers with ADHD. The current study aims to address this gap in the literature, and build upon the findings of Narad et al (2013) by examining the severity of the negative consequences experienced by drivers with and without ADHD. We hypothesized that adolescent drivers with ADHD would report a greater frequency of fines, points on their license, and hours in remedial driving class compared to drivers with ADHD. Additionally, we hypothesized that the severity of these consequences would be greater for drivers with ADHD compared to those without ADHD.

Method

Participants

A total of 61 adolescents (ADHD = 28, control = 33) aged 16–17 with a valid driver's license participated in the study. All participants with ADHD received an ADHD diagnosis (ADHD-Combined Type $n=3$, ADHD-Predominantly Inattentive Type $n=25$) based on the Kiddie Schedule for Affective Disorders and Schizophrenia for School Age Children – Present and Lifetime Version (K-SADS-PL; Kaufman, Birmaher, Brent et al., 1997). See Table 1 for demographic information. Participants completed a self-report Driving History Questionnaire (DHQ) which asked about 1) months of independent driving experience, 2)

driving outcomes such as previous accidents, citations, and risky driving behavior, and 3) consequences such as fines, points on license, and hours in driving school. Written informed assent and consent were obtained for each participant and a parent before being enrolled in the study. All study procedures were approved by the Cincinnati Children's Hospital Medical Center and University of Cincinnati Institutional Review Boards.

Results

No significant differences were observed between the ADHD and control groups in terms of age, sex distribution or IQ (Table 1). Since adolescents with ADHD had fewer months of driving experience than controls ($t(60) = 2.22, p = .03$), all analyses included months of driving experience as a covariate.

Using logistic regression, controlling for months of driving experience, a greater proportion of adolescents with ADHD reported receiving fines ($X^2(1) = 4.86, p = .03$) and points on their license than controls ($X^2(1) = 6.74, p = .01$). Also, adolescents with ADHD were more likely to attend remedial driving class than controls ($X^2(1) = 4.18, p = .04$). Of those who were required to take additional driving classes, the average time spent in class was 5.67 hours for adolescents with ADHD and 3 hours for control participants. Additionally, of the individuals who received fines, the average fine for adolescents with ADHD was \$120, while the average fine for controls was \$37.50.

Discussion

This study demonstrates that adolescent drivers with ADHD experience more negative consequences due to their driving behavior (e.g., fines, points, and hours in driving class) than adolescents without ADHD, and these consequences appear to be more severe for the those with ADHD (e.g., greater fines and more hours in remedial driving class). Though previous studies have documented poor driving outcomes in adult ADHD drivers (Barkley & Cox, 2007), findings from the present investigation extend our knowledge of young drivers with ADHD and suggest that these outcomes manifest early in driving careers. Notably, the negative consequences of poor and/or risky driving among adolescents with ADHD were evident despite having fewer months of independent driving.

While graduate driver licensing (GDL) laws have reduced fatal accidents among teen drivers (McCartt, Teoh, Fields, Braitman, & Hellinga, 2010), adolescents with ADHD are in need of additional programming to address their increased risk. As Williams and Shults (2010) point out, there is little knowledge regarding how drivers progress through stages of driving skill. Results of the present study along with Narad et al. (2013), suggest that novice drivers with ADHD may be delayed in acquiring the necessary skills to drive safely and successfully. Delaying licensure may reduce risk (McCartt, Teoh, Fields, Braitman, & Hellinga, 2010); however, simply delaying licensure without having supports and interventions in place that focus on remediating deficits in driving skills is unlikely to reduce negative driving outcomes associated with ADHD. Future studies and policy work should be directed at determining the public's knowledge of the increased risk of adolescent drivers with ADHD, and develop specific recommendations for this high risk population.

Until effective interventions are developed to remediate ADHD driving risk, parents and health care providers need to play an active role in relaying information to teens with ADHD about the impact of ADHD on their driving risk. Clinicians, particularly pediatricians, are in a unique position to educate and provide guidance surrounding the risks associated with teenage driving. The American Academy of Pediatrics (AAP, 2006) has a set of recommendations with guidance for pediatricians on addressing this topic with teens and their families. These recommendations include discussing risks (i.e., inexperience, distractions, speeding, drugs and alcohol), encouraging safe behaviors, discussing state laws and GDLs, and encouraging driving contracts (AAP, 2006). Additionally, despite the fact that there are studies demonstrating improvements in driving performance following stimulant medication use (Cox, Davis, Mikami, Sing, Merkel, & Burket, 2012; Cox, Merkel, Kvatchev, & Seward, 2000), there are few recommendations specific to ADHD adolescent drivers.

While medical professionals have the potential to play a significant role in the improved safety of these adolescents, parents and families do as well. Williams (2003) reported that increased parental monitoring of driving, particularly being present in the car while the adolescent is driving, has been shown to substantially decrease risk of MVC in teen drivers. In addition to in-car monitoring provided during the learning period, parents are also responsible for setting limits surrounding driving time, passengers, and laws (Williams & Shults, 2010).

Limitations of this study include reliance on self-report rather than official driving records. While this allows for the collection of information regarding minor accidents that may not have been reported to authorities, it does introduce the possibility of error in retrospective reporting. Additionally, though we statistically controlled for the influence of months driving experience in our analyses, we did not collect any information regarding how many miles participants had driven since receiving their license, but instead relied on months of licensure as a proxy for driving experience.

Acknowledgements

This study was funded in part by the support of an APA dissertation award.

Dr. Garner was supported by funds from the Bureau of Health Professions (BHPr), Health Resources and Services Administration (HRSA), Development of Health and Human Services (DHHS), under grant number T32HT1002 National Research Service Award for \$40,764. The information or content and conclusions are those of the author and should not be construed as the official position or policy of, nor should any endorsements be inferred by the BHPR, HRSA, DHHS of the US government.

References

- Weiss JC. American Academy of Pediatrics, Committee on Injury, Violence, and Poison Prevention, Committee on Adolescents. The teen driver. *Pediatrics*. 2006; 118:2570–2581. [PubMed: 17142548]
- 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. *Journal of Safety Research*. 2007; 38(1):113–128. [PubMed: 17303170]
- Barkley RA, Murphy KR, Dupaul GI, Bush T. Driving in young adults with attention deficit hyperactivity disorder: Knowledge, performance, adverse outcomes, and the role of executive

functioning. *Journal of the International Neuropsychological Society*. 2002; 8(5):655–672. [PubMed: 12164675]

Centers for Disease Control and Prevention. [Retrieved May 25 2011] Web-based Injury Statistics Query and Reporting System. www.cdc.gov/injury/wisqars

Cox DJ, Davis M, Mikami AY, Sing H, Merkel RL, Burket R. Long acting methylphenidate reduces collision rates of young adult ADHD drivers. *The Journal of Clinical Psychopharmacology*. 2012; 32:225–230. [PubMed: 22367664]

Cox DJ, Merkel R, Kvatchev B, Seward R. Effect of stimulant medication on driving performance of young adults with Attention-Deficit Hyperactivity Disorder: A preliminary double-blind placebo controlled trial. *Journal of Nervous & Mental Disease*. 2000; 4:230–234.

Finkelstein E, Corso P, Miller T. *The Incidence and Economic Burden of Injuries in the United States*. New York: Oxford University Press; 2006.

Fischer M, Barkley RA, Smallish L, Fletcher K. Hyperactive children as young adults: Driving abilities, safe driving behavior, and adverse driving outcomes. *Accident Analysis and Prevention*. 2007; 39(1):94–105. [PubMed: 16919226]

Insurance Institute for Highway Safety. *Fatality Facts 2009: Teenagers*. 2010 Retrieved from http://www.iihs.org/research/fatality_facts_2009/teenagers.html.

Kaufman J, Birmaher B, Brent D, et al. Schedule for affective disorders and schizophrenia for school age children-present and lifetime version (KADS-PL): Initial reliability and validity. *Journal of the American Academy of Child and Adolescent Psychiatry*. 1997; 36:980–988. [PubMed: 9204677]

Lee JD. Technology and teen drivers. *Journal of Safety Research*. 2007; 38(2):203–213. [PubMed: 17478191]

McCart AT, Teoh ER, Fields M, Braitman KA, Helling LA. Graduated licensing laws and fatal crashes of teenage drivers: a national study. *Traffic Injury Prevention*. 2010; 11:240–248. [PubMed: 20544567]

McKnight AJ, McKnight AS. Young novice drivers: careless or clueless? *Accident Analysis and Prevention*. 2003; 35(6):921–925. [PubMed: 12971927]

Narad ME, Garner AA, Brassell AA, Saxby D, Antonini TN, O'Brien KM, Tamm L, Matthews G, Epstein JN. Impact of distraction on the driving performance of adolescents with and without Attention-Deficit/Hyperactivity Disorder. *JAMA Pediatrics*. 2013; 167:933–938. [PubMed: 23939758]

National Highway Traffic Safety Administration. Washington, D.C.: 2011. *Traffic Safety Facts Early Estimate of Motor Vehicle Traffic Fatalities in 2010*. Retrieved from <http://www-nrd.nhtsa.dot.gov/Pubs/811451.pdf>.

Weafer J, Camarillo D, Fillmore MT, Milich R, Marcinski CA. Simulated driving performance of adults with ADHD: Comparisons with alcohol intoxication. *Experimental & Clinical Psychopharmacology*. 2008; 16(3):251–263. [PubMed: 18540785]

Williams AF. Teenage drivers: patterns of risk. *Journal of Safety Research*. 2003; 34(1):5–15. [PubMed: 12535901]

Williams AF, Shults RA. Graduated driver licensing research, 2007-present: A review and commentary. *Journal of Safety Research*. 2010; 41:77–84. [PubMed: 20497792]

Table 1

Demographic characteristics of the ADHD and Control Groups

	ADHD (n=28)	Control (n=33)	Test Statistic	<i>p</i>
Age	M=16.86, SD=.59	M=17.14,SD=.59	$t = 1.63$	.11
Sex (% male)	60%	63%	$\chi^2=.06$	.81
WASI Full Scale IQ	M=106.9, SD=11.55	M=104.7, SD=8.24	$t = .85$	.40
ADHD Medication (% yes)	75%	0%	$\chi^2= 37.74$	<.01
ODD diagnosis	7.1%	0%	$\chi^2= 2.44$	.12

Note: M= mean, SD = standard deviation, WASI = Weschler Abbreviated Scale of Intelligence, ADHD = Attention Deficit Hyperactivity Disorder, ODD = Oppositional Defiant Disorder.

Table 2

Descriptive Statistics and Group Differences for Self-Reported Driving History of ADHD and Control Groups

	ADHD (n=28)	Control (n=33)	Test Statistic	<i>p</i>
Months of experience	6.45 (5.91)	10.45 (7.84)	$t = 2.22$	.03
History of a Violation	17%	6%	$\chi^2 = 4.73$	.03
History of a Crash	28%	21%	$\chi^2 = 1.78$	.18
History of a Fine	14%	6%	$\chi^2 = 4.86$	.03
Average fine	\$120	\$37.50		
History of Points on License	7%	0%	$\chi^2 = 6.74$	.01
Remedial driving class	10%	3%	$\chi^2 = 4.18$	.04
Average hours	5.67	3		

Note: Violations are a combination of written warnings and tickets received for driving offenses.