Report #17-UM-053

NSTSCE

National Surface Transportation Safety Center for Excellence

Improving Driving Safety for Teenagers with Attention Deficit and Hyperactivity Disorder (ADHD)

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Submitted: September 19, 2017

Technology Impairment Infrastructure Mobility

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ACKNOWLEDGMENTS

The authors of this report would like to acknowledge the support of the stakeholders of the National Surface Transportation Safety Center for Excellence (NSTSCE): Tom Dingus from the Virginia Tech Transportation Institute, John Capp from General Motors Corporation, Chris Hayes from Travelers Insurance, Martin Walker from the Federal Motor Carrier Safety Administration, and Cathy McGhee from the Virginia Department of Transportation and the Virginia Transportation Research Council.

The NSTSCE stakeholders have jointly funded this research for the purpose of developing and disseminating advanced transportation safety techniques and innovations.

EXECUTIVE SUMMARY

The majority of the research assessing the differences in driving performance between medicated and non-medicated Attention Deficit Hyperactivity Disorder (ADHD) teenagers has relied on driving simulators and surveys. This pilot study was conducted in a real-world environment using a naturalistic driving methodology where continuous driving data were collected for 15 to 24 months (9 months of learner's permit driving and at least 6 months of early licensure driving) using the Virginia Tech Transportation Institute's NextGen data acquisition system. Ten teenaged drivers (15.5 and 16 years of age) with learner's permits and diagnoses of ADHD were recruited, and their driving data were compared to a control group of 45 newly licensed teen drivers from the Supervised Practice Driving Study who scored 0 on the Disruptive Behavior Disorder Rating Scale rating scale, and thus were confirmed to be free of ADHD symptoms.

The mean crash and near-crash (CNC) rates per 1,000 hours for the ADHD group and the control group were 22.59 and 11.53, respectively. The data were further analyzed to investigate driver behaviors that contributed to the occurrence of CNC events. Although both groups engaged in risky driver behaviors during CNC events, when the two groups were compared, the results showed that ADHD novice teen drivers engaged in risky driving behaviors, particularly those related to vehicle mishandling, more frequently than non-ADHD teens. The ADHD teens were also more distracted by engagement with high-risk secondary tasks, such as texting and passenger interaction, which have been found to significantly increase the risk of CNC involvement, than non-ADHD teen drivers.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS AND SYMBOLS

ADHD	Attention Deficit Hyperactivity Disorder
ADIS-IV-C/P	Anxiety Disorders Interview Schedule for DSM-IV-Child and Parent Versions
CNC	crash and near-crash
CSC	Child Study Center
DAS	Data Acquisition System
R01	National Institutes of Health Research Project Grant
R03	National Institutes of Health Small Grant
SPDS	Supervised Practice Driving Study
VT	Virginia Tech
VTTI	Virginia Tech Transportation Institute

CHAPTER 1. INTRODUCTION

According to the Centers of Disease Control (CDC), motor vehicle collisions are the leading cause of death for teens between the ages of 16 and 19. Compared to adults, novice teen drivers are involved in four times as many crashes and near-crashes (CNC; Simons-Morton et al., 2015). Furthermore, teenagers diagnosed with Attention Deficit and Hyperactivity Disorder (ADHD) are involved in an even higher number of crashes than non-ADHD teens—four times as many, according to the National Institutes of Mental Health (Barkley & Cox, 2007; Fabiano & Schatz, 2014; Jerome, Segal, & Habinski, 2006). ADHD teens tend to engage in more driving errors and tend to receive more citations (Barkley et al., 1993; Narad et al., 2015; Reimer Mehler, D'Ambrosio, & Fried, 2010; Aduen, Kofler, Cox, Sarver, & Lunsford, 2015). These teens thus represent the highest risk teen drivers.

While crash involvement is much higher for ADHD teenagers, the specific behavioral factors (e.g., eyes-off-road time, hazard detection, decision making/reaction time) behind this large discrepancy are largely unknown. If more in-depth driver behavioral research were conducted, better interventions and crash countermeasures could be developed to efficiently assist this high-risk sub-population of drivers.

Our current understanding of teen driving behaviors, particularly those of novice and ADHD drivers, is largely based on studies that examined crash databases along with the corresponding police reports, self-reports, and retrospective interviews, or research conducted via controlled experiments and/or driving simulators (Grabowski, Teft, & Williams, 2013; Ferguson, 2013; Hosking, & Regan, 2006; Curry et al., 2011; Barkley, Murphy, Dupaul, & Bush, 2002; Barkley Murphy, & Kwasnik, 1996). Despite the useful information provided by these studies, their data sources have many inherent limitations, including inconsistent, non-significant, and non-replicable findings (Jerome et al., 2006). Studies based on these types of sources may inaccurately assess driving risks and negative outcomes due to recall bias, potential inaccurate reporting of illegal/sensitive behaviors, and non-response bias (Jerome et al., 2006; Schwarz, N., & Oyserman, D. 2001). For example, ADHD teens in particular are known to inaccurately report their driving behavior and tend to overestimate their driving performance (Jerome et al., 2006). Additionally, controlled and simulated experiments generally fail to depict real-world crash situations or normal driving performance—for instance, drivers have motivation to drive safely and the “actor-observer effect” may cause abnormal behaviors, making it is difficult to generalize the findings (Jerome et al., 2006). Furthermore, observational and simulation studies cannot account for critical driving-related confounding variables, such as driving experience, driving environment, etc. (Jerome et al., 2006). Thus, such studies cannot definitively identify the behavioral factors that contribute to CNCs. Additionally, contradictory findings about the extent of negative driving outcomes are evident in the literature (Fisher, Caird, Horrey, & Trick, 2017). For example, Barkley et al. (1993) found that ADHD teens are four times more likely to be involved in crashes, whereas Vaa (2014) indicated that their crash involvement risk was only 1.23 times as likely. A lack of objective driving exposure measures (e.g., vehicle miles or hours traveled) could be the underlying problem in these discrepant estimates (Fischer et al., 2017).

Naturalistic driving studies (NDSs) offer a novel solution to obtaining objective measures of teens’ behavior, particularly those teens with ADHD. To our knowledge, this study is the first NDS of ADHD teens. Through a collaboration with Virginia Tech’s Child Study Center (CSC)

and Department of Psychology, in which Dr. Tom Ollendick was particularly helpful, the research team had the opportunity to recruit teens diagnosed with ADHD for inclusion in a control Supervised Practice Driving Study (SPDS).

CHAPTER 2. APPROACH

Previous ADHD research has been conducted to assess driving performance differences of medicated versus non-medicated ADHD teenagers, with the vast majority of these studies being conducted, as noted in the introduction to this report, via driving simulators and surveys. This pilot study was designed to understand how ADHD teens learn to drive during the learner's period of licensure and to determine specific driving behaviors that increase their crash risk. The study was conducted in a real-world environment using naturalistic driving methodology where continuous driving data were collected for 15–24 months (9 months of learner's permit driving and at least 6 months of early licensure driving).

The ADHD Cohort Study was conducted in conjunction with the Virginia Tech Transportation Institute's (VTTI's) SPDS. Both SPDS and the ADHD Cohort were completed using identical experimental methods, including subject recruitment, vehicle instrumentation, data collection procedures, and data reduction procedures. Thus, the ADHD Cohort was the experimental group and a sample of the SPDS participants served as the control group.

PARTICIPANTS

Ten teenaged drivers (15.5 and 16 years of age) with learner's permits and diagnoses of ADHD were recruited through the CSC at Virginia Tech or as part of the recruitment for VTTI's SPDS. Participants were paid $500 each for taking part in this study.

As part of the screening for this study, the parent(s) of potential participants were asked if their child had ever been diagnosed with ADHD. If so, the participant was recruited for the ADHD Cohort Study. All 10 participants underwent a full clinical assessment for ADHD at the CSC to ensure that they exhibited ADHD characteristics.

To diagnose ADHD for this study, two evidence-based diagnostic interviews were administered to each adolescent and their family. Adolescents and parents were interviewed separately, but simultaneously, during the assessment session by two trained-to-criterion assessors who were under the direct supervision of Dr. Ollendick.

The Disruptive Behavior Disorder Rating Scale interview (Hartung, McCarthy, Milich, & Martin, 2005) is a semi-structured diagnostic assessment instrument designed to assess the presence of ADHD based on criteria of the Diagnostic and Statistical Manual of Mental Disorders (4th ed., rev., [DSM-IV], American Psychiatric Association, 1994). Research has found that parents provide more consistent and valid reports of ADHD symptoms than adolescents (Hartung et al., 2005). Accordingly, this interview was only administered to parents.

Given the overlap in symptomatology between ADHD and other psychiatric disorders, parents and adolescents both completed the Anxiety Disorders Interview Schedule for DSM-IV-Child and Parent Versions (ADIS-IV-C/P; Silverman & Albano, 1996). The ADIS-IV-C (child version) and ADIS-IV-P (parent version) are semi-structured interviews designed to facilitate diagnosis of common psychiatric disorders in youth between 6 and 17 years of age. The ADIS-IV has been shown to be a valid measure of ADHD (Jarrett, Wolff, & Ollendick, 2007), as well as other disorders (Silverman & Albano, 1996). Diagnoses based on both the parent and child

interviews were obtained using the guidelines outlined by Silverman and Nelles (1988) and Albano and Silverman (1996) for arriving at composite diagnoses.

VEHICLE INSTRUMENTATION

VTTI's NextGen data acquisition system (DAS) (Figure 1), developed in-house by VTTI's Center for Technology Development, was used to collect the data analyzed in the study. The DAS allows instrumentation of a participant's own car, and can be tailored for specific data-collection efforts. The DAS gathers and records data streams asynchronously, and ties into the vehicle network to obtain accelerator position, brake pedal activation, steering wheel angle, and speed. The variety of sensors and capabilities allow for direct assessment of performance measures and the creation of metrics, including lane maintenance, speed variance, yaw rate, car-following behavior, and steering entropy. The DAS also records multiple camera views (forward, rear, driver face, and over the shoulder, as shown in Figure 2.

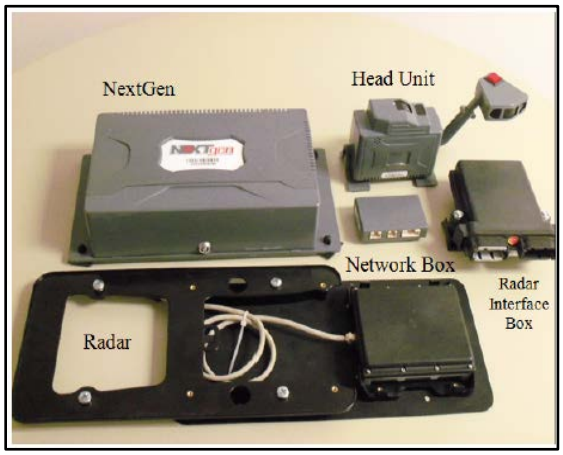

Figure 1. Photo. NextGen DAS.

DATA COLLECTION

Participants enrolled for 10–15 months (9 months of the learner's permit phase and up to 8 months of early licensure). In situ, real-world driving data were collected during this period using VTTI's NextGen DAS system, described above. In-house developed software synchronized the driving performance data with the video and audio data, allowing driver behavior and the surrounding traffic conditions to be analyzed with respect to driving performance.

DATA RETRIEVAL

A VTTI researcher was tasked with maintaining a cycle of data retrieval appointments with all participants. Researchers either set up separate appointments with participants, or a convenient, central location in each participant's general locale was selected for these appointments. Data retrieval occurred every 2–3 months for each participant to prevent the hard drives from exceeding their available storage space. Researchers used a software program to wirelessly connect to the DAS, after which the hard drive containing data was retrieved from the vehicle

and a new hard drive was installed in the DAS. If participants met the researcher at a central location, they were paid $10 for each appointment to compensate them for their time and travels. Appointments typically took about 30 minutes.

At every hard drive swap, various data were checked to ensure that proper collection was taking place. The researcher made notes of missing or unusual variables and discussed these issues with the appropriate hardware and software groups at VTTI. If needed, additional appointments were scheduled to remedy data issues. Examples of potential issues were non-functional camera or audio, poor cellular communication, improper sensor readings (e.g., left turn is collected as right turn), etc.

DATA REDUCTION

Data reductionists were assigned to the ADHD Cohort Study by the Data Reduction Group Leader. The reductionists were trained on the reduction tool using a formal protocol. Data reduction was completed using Hawkeye, VTTI's proprietary Web-based software (Figure 2), which allows for events to be identified in the data stream and reviewed by reductionists.

Figure 2. Screen capture. NDS data coding software with synchronized video (right) and driving performance data (left).

This software allowed reductionists to record a battery of variables by using drop-down menus. Key information recorded for each epoch included time of day, roadway type, weather conditions, seat belt use, etc. The remaining categories concentrated on any observable distractions, the sequence of events for CNCs, and any driver behavior and/or driver errors that were observed.

As coding of the video data was largely subjective, an inter- and intra-rater reliability test, comprised of 20 randomly selected events, was administered to reductionists. This test was given to measure the accuracy both among reductionists as a group and to measure individual reductionist precision to that of a predetermined "gold standard." This test was administered three times throughout the course of the study: at the beginning of the study, at the midway point of the study, and near the study's conclusion. The results from inter-rater tests indicated that the four trained coders were 86% accurate to the gold standard across the entire reduction. Additionally, the overall intra-rater test combined with quality assurance indicated that trained coders were 89% accurate to the gold standard across the entire reduction.

SURVEYS, QUESTIONNAIRES, AND INTERVIEWS

Potential participants completed initial screening using a survey created by VTTI with LimeSurvey, an open source online survey tool. Participants who met all of the survey's selection criteria (see section Methods: Participants) were asked to come to VTTI for informed consent and vehicle instrumentation. While the vehicle was being instrumented, participants were thoroughly informed of the study's purpose, requirements, compensation, and consent forms. Upon providing consent and having their vehicle instrumented, participants were asked to complete a series of LimeSurvey questionnaires. Both parents and teens completed surveys at the following intervals:

- Beginning of study
- Six months into participation
- Upon receipt of licensure
- Three months post-licensure
- End of study

The final closeout interview was completed 6 months after teens had received their independent license, concluding the enrollment period in the study. The closeout interviews were completed on-site at VTTI. Parent and teen interviews were conducted concurrently but separately while the instrumentation was being removed from the participants' vehicles.

The various questionnaires and surveys asked teens about a wide range of topics, including perceived risk, parent trust/knowledge, parent restrictions, friends' risky behaviors, risky driving prevalence in the general population, estimated exposure, driving knowledge, etc. Likewise, parents were asked about their limits on teen driving, consequences, attitudes toward supervised practice driving, etc.

CHAPTER 3. RESULTS

DRIVER CHARACTERISTICS

The ADHD Cohort included 10 newly licensed teen drivers (six males and four females), while the SPDS Control group included 45 newly licensed teen drivers (20 males and 25 females) who scored 0 on the Disruptive Behavior Disorder Rating Scale rating scale, and thus were confirmed to be free of ADHD symptoms.

The mean mileage among participants during the study period was 3,360 miles (range: 666 to 10,765 miles; median: 2,602 miles). Sixty percent of the instrumented vehicles were older than 10 years.

CRASHES AND NEAR-CRASHES

ADHD teen drivers experienced 30 CNC events, whereas the Control group participants experienced 87 CNC events. Table 1 shows the CNC rates per 1,000 hours for both groups; the mean difference between both groups was found to be significantly different at $p < 0.05$.

Table 1. CNC rates per 1,000 hours.

	ADHD	Control	*p* value
Mean	22.59	11.53	0.03886* (0.67, 21.44)
Median	22.62	9.11	NA
Standard deviation	14.07	11.18	NA
Variance	197.91	125.10	
Minimum	0.00	0.00	
Maximum	43.89	39.62	

* $p < 0.05$

DRIVER BEHAVIORS PRESENT IN CRASH AND NEAR-CRASH EVENTS

We further analyzed the data to investigate driver behaviors prevalent during CNC events. Both groups engaged in risky driver behaviors during the CNC events. However, when compared to the Control group the ADHD Cohort engaged in more risky behaviors related to vehicle handling (i.e., taking improper turns, improper starts, improper backing). Additionally, the ADHD Cohort engaged in risky driving behaviors (i.e., following too closely, failing to signal, exceeding safe speed) and exhibited general inexperience driving when compared to the Control group. These trends can be seen in Figure 3.

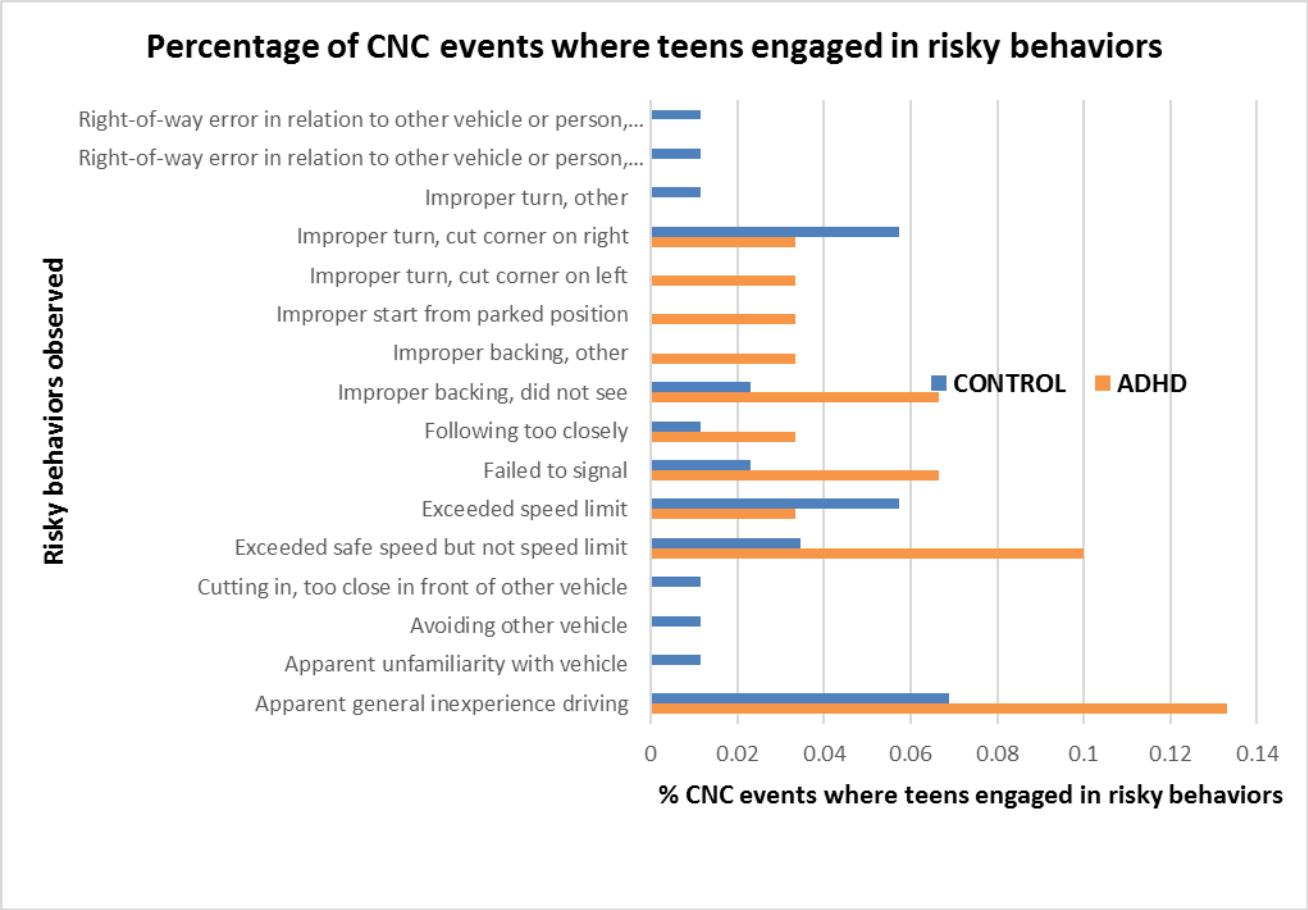

Figure 3. Chart. Percentage of CNC events where driver behaviors were present among ADHD Cohort (10 drivers) and Control group (45 non-ADHD drivers).

SECONDARY TASK ENGAGEMENT PRIOR TO CRASH AND NEAR-CRASH EVENTS

Distracted driving is a major contributing factor for motor vehicle crashes, and the risk of being involved in a CNC event is even higher among teen drivers (Klauer et al., 2014; Guo et al., 2016). Accordingly, we investigated how often ADHD teens were involved in this risky behavior by analyzing the presence of any secondary task prior to a CNC, as shown in Figure 4. Findings showed that teens in the ADHD Cohort engaged in frequent secondary tasks related to cell phone use, particularly texting. This task is known to be a high-risk secondary task engagement, increasing a teen driver's odds of being in a CNC event by 5–23 times (Guo et al., 2016). Additionally, ADHD teens were frequently involved in talking and interaction with passengers, which has also been found to increase crash risk for teen drivers (Guo et al., 2016).

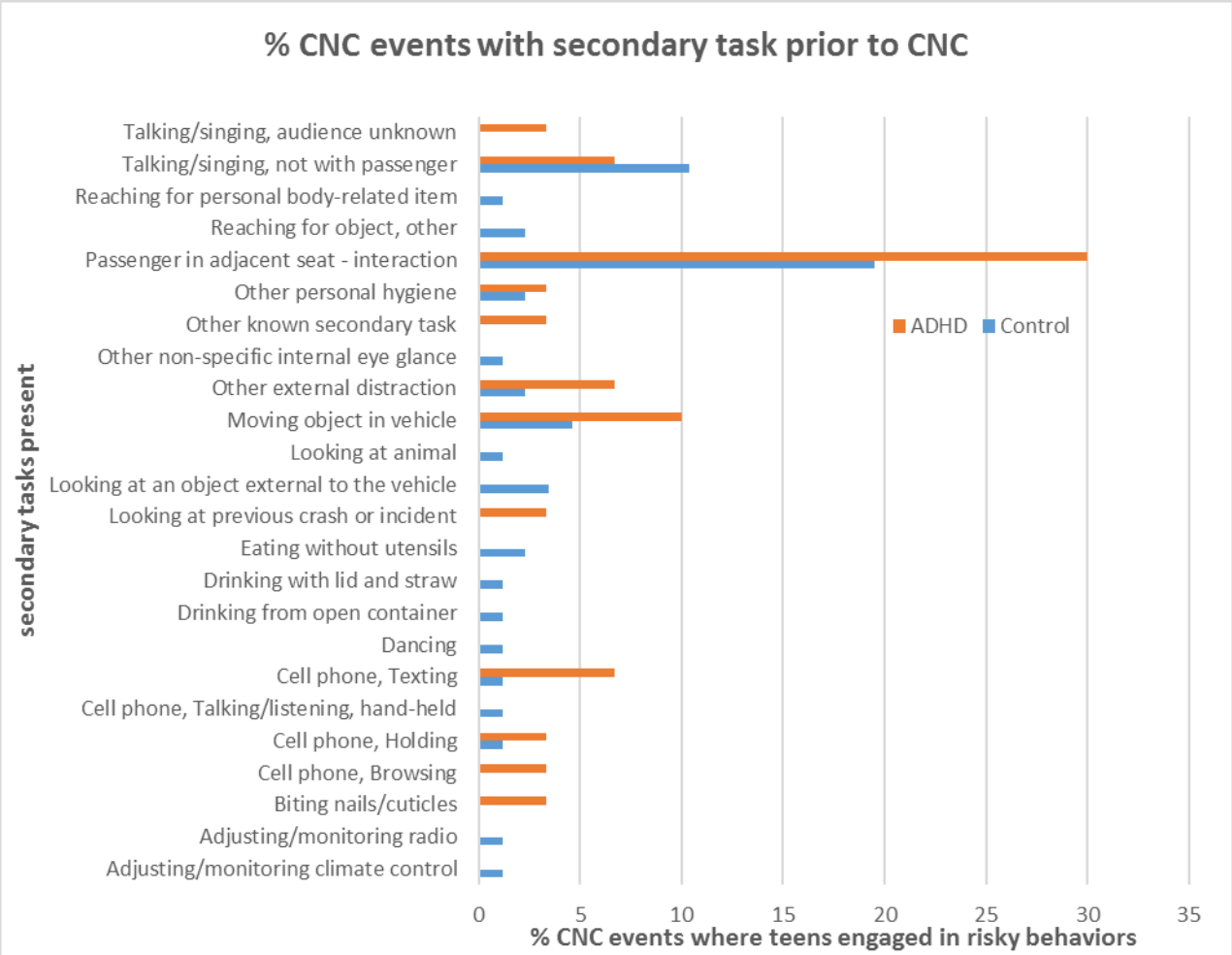

Figure 4. Chart. Presence of secondary task prior to a CNC event.

Altogether, ADHD teens were found more likely than non-ADHD teems to engage in high-risk secondary tasks shown to increase CNC risk significantly for young drivers (Guo et al., 2016; Klauer et al., 2014).

CHAPTER 4. CONCLUSIONS AND FUTURE WORK

The results of the SPDS supported the hypothesis that ADHD novice teen drivers had higher CNC rates compared to their non-ADHD peers. Furthermore, ADHD novice teen drivers engaged in risky driving behaviors, particularly those related to vehicle mishandling, more frequently than non-ADHD teens. ADHD novice teens were also more distracted by engagement with high risk secondary tasks, such as texting and passenger interaction, which have been found to significantly increase the risk of CNC involvement. Further analyses of the database are necessary to gain insights into specific driving behaviors (e.g., eye-glance behavior, kinematics, risky driving, etc.) and contributing factors that increase crash risk for ADHD teens.

The analyses conducted in this study were utilized to submit a recent National Institutes of Health Small Grant Program (R03) request titled "Behavioral Factors Contributing to the High Crash Rates of ADHD Teens: Analysis of Naturalistic Driving Data from Practice Driving and Early Licensure." The study proposed for the grant will investigate several unanswered research questions, including the following:

- Does the quantity, consistency, and diversity of supervised practice driving differ between ADHD teen drivers and non-ADHD teen drivers?
- Do the communication styles of parents during supervised practice driving differ between ADHD teen drivers and non-ADHD teen drivers?
- Do ADHD teens engage in risky driving behaviors (e.g., speeding and secondary tasks) more often than non-ADHD teens?

These questions will be addressed by coding objective measures, such as elevated g-force events (e.g., hard braking), quantity and quality of supervised practice driving, and parent-teen communication styles. Identifying key differences in driving practice and early driving behavior between teens with and without ADHD will greatly improve our understanding of the factors contributing to this population's high crash rate. This information will guide the development of intervention strategies to improve the learning-to-drive process for ADHD teens, with the goal of reducing ADHD teen drivers' crash rates and saving lives.

In addition to helping ADHD teens drive more safely, the proposed analysis will serve as a pilot study to guide future investigations that objectively examine the effects of practice driving on independent driving behaviors after licensure.

The long-term goal is to obtain a National Institutes of Health Research Project Grant (R01) to conduct a large-scale naturalistic study to further not only our understanding of the differences in ADHD and non-ADHD teen driving performance, but also to develop evidence-based effective countermeasures to improve driving safety for the high-risk ADHD teen subgroup.

REFERENCES

Aduen, P. A., Kofler, M. J., Cox, D. J., Sarver, D. E., & Lunsford, E. (2015). Motor vehicle driving in high incidence psychiatric disability: Comparison of drivers with ADHD, depression, and no known psychopathology. *Journal of Psychiatric Research, 64*, 59–66. http://dx.doi.org/10.1016/j.jpsychires.2015.03.009

American Psychiatric Association. (1994). Diagnostic and statistical manual of mental disorders: DSM-IV. 4th ed. Washington, DC: American Psychiatric Association.

Barkley, R. A., Guevremont, D. C., Anastopoulos, A. D., DuPaul, G. J., & Shelton, T. L. (1993). Driving-related risks and outcomes of attention deficit hyperactivity disorder in adolescents and young adults: a 3- to 5-year follow-up survey. *Pediatrics, 92*(2), 212–218.

Barkley, R. A., Murphy, K. R., & Kwasnik, D. (1996). Motor vehicle driving competencies and risks in teens and young adults with attention deficit hyperactivity disorder. *Pediatrics, 98*(6 Pt 1), 1089–1095.

Barkley, R. A., Murphy, K. R., Dupaul, G. I., & Bush, T. (2002). 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, 8*(5), 655–672.

Barkley, R. A., & Cox, D. (2007). 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, 38*, 113–128. http://dx.doi.org/10.1016/j.jsr.2006.09.004

Curry, A. E., Hafetz, J., Kallan, M. J., Winston, F. K., & Durbin, D. R. (2011). Prevalence of teen driver errors leading to serious motor vehicle crashes. *Accident Analysis & Prevention, 43*(4), 1285–1290. doi: http://dx.doi.org/10.1016/j.aap.2010.10.019

Fabiano, G. A., & Schatz, N. K. (2014). Driving interventions for youth with attention-deficit/hyperactivity disorder. In R. A. Barkley (Ed.), *Handbook on diagnosis and treatment of ADHD* (pp. 705–727). New York, NY: Guilford Press.

Fisher, D. L., Caird, J., Horrey, W., & Trick, L. (Eds.). (2016). *Handbook of teen and novice drivers: Research, practice, policy, and directions*. Boca Raton, FL: CRC Press.

Ferguson, S. A. (2013). *Speeding-related fatal crashes among teen drivers and opportunities for reducing the risks*. Washington, DC: Governors Highway Safety Association.

Grabowski, J., Teft, B., & Williams, A. (2013). *Timing of driver's license acquisition and reasons for delay among young people in the United States 2012*. Washington, DC: AAA Foundation for Traffic Safety.

Guo F., Klauer S. G., Fang Y., Hankey J. M., Antin J. F., Perez M. A., Lee S. E., & Dingus T. A. (2017). The effects of age on crash risk associated with driver distraction. *International Journal of Epidemiology, 1*(46): 258–65.

Hartung, C. M., McCarthy, D. M., Milich, R., & Martin, C. A. (2005). Parent-adolescent agreement on disruptive behavior symptoms: A multitrait-multimethod model. *Journal of Psychopathology and Behavioral Assessment, 27*(3): 159–168. doi:10.1007/s10862-005-0632-8

Hosking, S. G., Young, K. I., & Regan, M. A. (2009). The effects of text messaging on young drivers. *Human Factors, 51*(4): 582–592.

Jarrett, M. A., Wolff, J. C. & Ollendick, T. H. (2007). Concurrent validity and informant agreement of the ADHD module of the Anxiety Disorders Interview Schedule for DSM-IV. *Journal of Psychopathology and Behavioral Assessment, 29*, 159–168. doi:10.1007/s10862-006-9041-x

Jerome, L., Segal, A., & Habinski, L. (2006). What we know about ADHD and driving risk: A literature review, meta-analysis and critique. *Journal of the Canadian Academy of Child and Adolescent Psychiatry, 15*, 105–125

Klauer S., Guo F., Simons-Morton B., Ouimet M. C., Lee S., & Dingus T. (2014). Distracted driving and risk of road crashes among novice and experienced drivers. *The New England Journal of Medicine, 307*(1), 54–59.

Narad, M. E., Garner, A. A., Antonini, T. N., Kingery, K. M., Tamm, L., Calhoun, H. R., & Epstein, J. N. (2015). Negative consequences of poor driving outcomes reported by adolescents with and without ADHD. *Journal of Attention Disorders*. doi: 10.1177/1087054715575063

Reimer, B., Mehler, B., D'Ambrosio, L. A., & Fried, R. (2010). The impact of distractions on young adult drivers with attention deficit hyperactivity disorder (ADHD). *Accident Analysis & Prevention, 42*(3), 842–51. doi: 10.1016/j.aap.2009.06.021

Schwarz, N., & Oyserman, D. (2001). Asking questions about behavior: Cognition, communication, and questionnaire construction. *American Journal of Evaluation, 22*(2), 127–160. doi: 10.1177/109821400102200202

Simons-Morton, B. G., Klauer, S. G., Ouimet, M. C., Guo, F., Albert, P. S., Lee, S. E., … Dingus, T. A. (2015). Naturalistic Teenage Driving Study: Findings and lessons learned. *Journal of Safety Research, 54*, 41.e29–41.e44. doi: 10.1016/j.jsr.2015.06.010

Silverman, W. K. & Albano, A. M. (1996). *The Anxiety Disorders Interview Schedule for Children (ADIS-C/P).* San Antonio, TX: Psychological Corporation.

Silverman, W. K. & Nelles, W. B. (1988). The Anxiety Disorders Interview Schedule for Children. *Journal of American Academy of Child & Adolescent Psychiatry, 27*, 772–778.

Vaa, T. (2014). ADHD and relative risk of accidents in road traffic: A meta-analysis. *Accident Analysis & Prevention, 62*, 415–425.