

# Comparing Performance in Those Diagnosed with ADHD Using Programmed Feedback

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## INTRODUCTION

- “not qualified for certification”
- Diagnosis of Attention Deficit Hyperactivity Disorder (ADHD)
- Taking medications (FAA) for ADHD
- FAA concerns
  - Medications for ADHD treatment may result in cognitive deficits
  - Pilot unsafe to perform the requisite flying duties
- FAA neuropsychological testing
  - Medication must be discontinued for at least 90 days prior to testing

## ADHD STATISTICS

- Retrieved from ADDitude (2019).
  - Total children and adults in US 2011 statistics: 11%
  - 4-17 years of age 2016 statistics: 11%=6.1 million
  - Teens only: 3-5%=2 million
  - Boys: 13.2%
  - Girls: 5.6%
  - Adults: 4.4%
    - Reported diagnoses
    - Many remain undiagnosed especially ADHD-I (primarily females)
- Over lifetime diagnosis:
  - 12.9% of men
  - 4.9% of women

## CAR ACCIDENT RATES

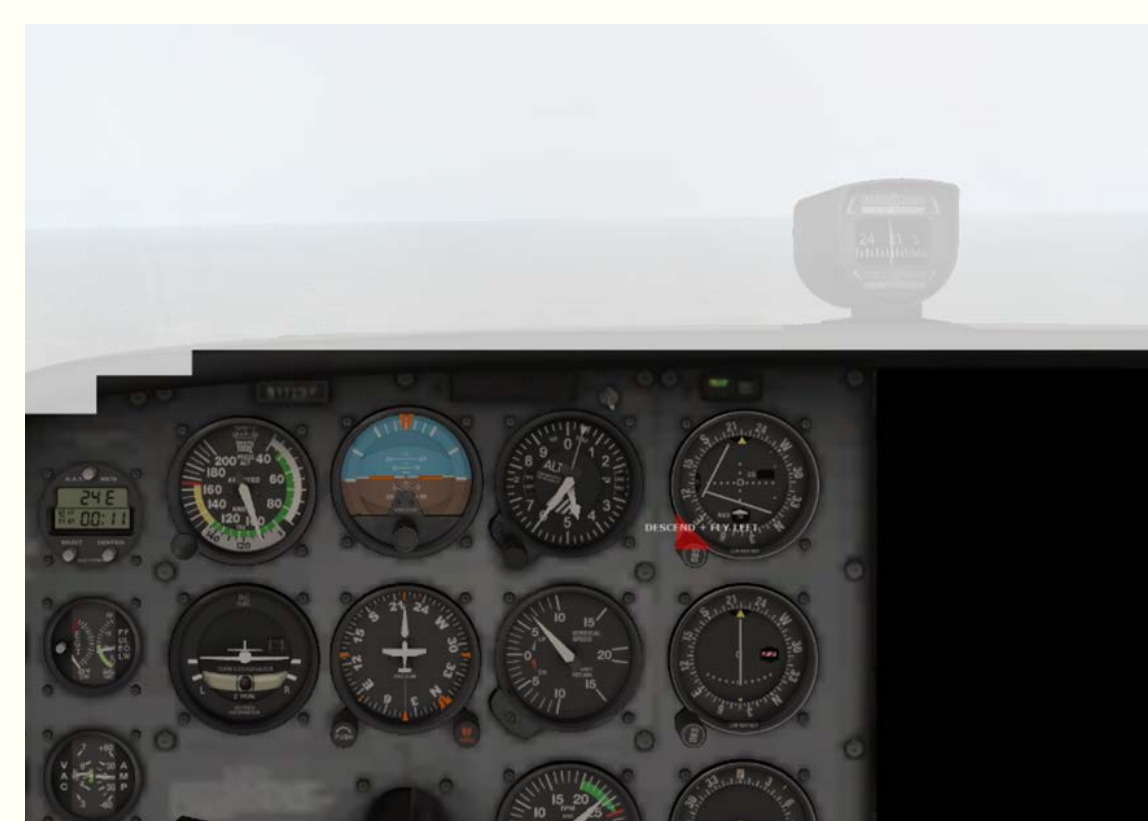
- Compared to peers without ADHD
  - 2-4 times as many citations
  - 4 times as many accidents
  - 7 times more likely to have second accident
  - 4 times more likely to be at fault
  - 6-8 times more likely to have license revoked

## PROBLEM

- Testing for impact of diagnosis
  - Learning to land an aircraft using instruments
  - X-Plane© (11): Desktop flight simulator
  - Instrument flight configuration
- Experimenter bias issues
  - Careful monitoring of actions
  - Corrective feedback
  - Reinforcing feedback
  - Automation of recording
  - Required due to amount and pace of data
  - Inevitable human researcher errors had to be controlled

## FEEDBACK SYSTEM DEVELOPMENT

- Electronic training system
  - How to perform each procedure
  - Presented prior to each procedure
  - Automated feedback system
  - Corrective and reinforcing feedback



## DESIGN AND MEASURES

- Pretesting delivered through Qualtrics©
  - Demographic information
- Adult ADHD self-report scale (ASRS 1.1) (World Health Organization, 2003)
  - Reliability and validity established (Garnier-Dykstra, 2010; Kessler, et al., 2005)
- Two scales
  - ADHD-Inattentive
  - ADHD-Hyperactive- Impulsive
- Cutoff criteria for either scale
  - 0-16: Unlikely to have ADHD
  - 16-23: Likely to have ADHD
  - 24+: Highly likely to have ADHD

## PARTICIPANTS

- 1 Female
  - 20 years old
  - ADHD-Inattentive: 20
  - ADHD-Hyperactive-Impulsive: 17
- 1 Male
  - 23 years old
  - ADHD-Inattentive: 23
  - ADHD-Hyperactive-Impulsive: 19

## BASELINE ASSESSMENT

- Aircraft on final approach
- Instruction
  - “Land the aircraft”



## INTERVENTION PROCEDURES

- Multimedia presentation of each skill in the behavioral chain
  - Video
  - Static
  - Quiz
  - All questions must be at 100% success
  - Repeat of any portion of presentation is participant’s option
- All aircraft procedures to mastery
  - Three consecutive correct executions of task
- Backward chaining procedure for taxiing tasks (Cooper, Heron, & Heward, 2007a)
- Backward chaining and stimulus prompting and fading procedure for VOR and ILS tasks (Cooper, Heron, & Heward, 2007b)

## TAXIING

- Aircraft configuration
  - Cessna 172S
  - X-Plane 11 model
  - Braking maintaining centerline
    - 1200 RPM
    - 1500 RPM
- Full stop
  - Braking + Rudder maintaining centerline

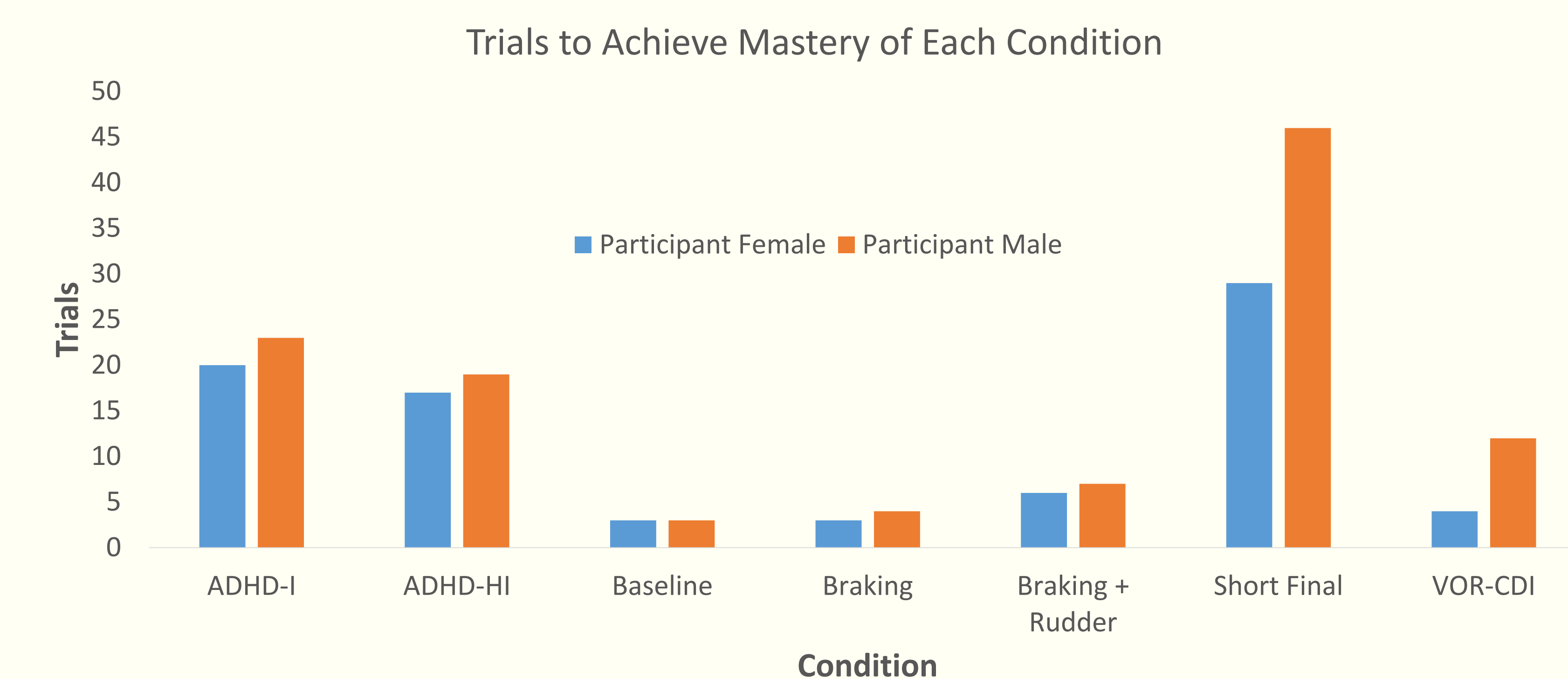


## FLIGHT SCENARIOS

- Multimedia procedure demonstration included stimulus prompting and fading
- Aircraft configuration for following scenarios
  - 80 KIAS
- Tracking at 10 NM
  - VOR CDI heading
  - Yoke + Rudder
- VOR CDI 30 degree interception at 10 NM
  - Yoke + Rudder
- ILS CDI GS descending to intercept at 5 NM
  - Maintaining glideslope
    - Rudder
    - Braking to full stop
- ILS CDI GS climbing to intercept at 5 NM
  - Maintaining glideslope
    - Rudder
    - Braking to full stop
- ILS CDI GS turn to intercept at 5 NM
  - Maintaining glideslope
    - Rudder
    - Braking to full stop



## RESULTS



## CONCLUSION

- Computerized feedback is effective in shaping desirable behavior
  - Both conditions required maintaining aircraft down centerline
    - Braking alone
    - Braking + rudder
  - Short final approach
    - Per the flying demand, required more feedback
  - Substantive improvement for VOR-CDI performance
  - Demonstrates proof of concept

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