

# Teen Drivers Driving Distracted

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# Current Situation

- Crashes are significant threat to teens' wellbeing
- 38% of all deaths among 16-19-year-olds in US
- Leading cause of death for this age-group in the US
- In contrast to:
  - 15% Homicide
  - 13% Suicide
  - 12% Non-MVC-related unintentional injuries
- Majority driving/riding with teen driver at time of crash

# Previous Research

Teen characteristics related to increased crash risk:

- **inexperience**
- **under-developed driving skills**
- **immaturity**
- **being male**
- **licensed at a younger age**
- **fatigue**

# Previous Research

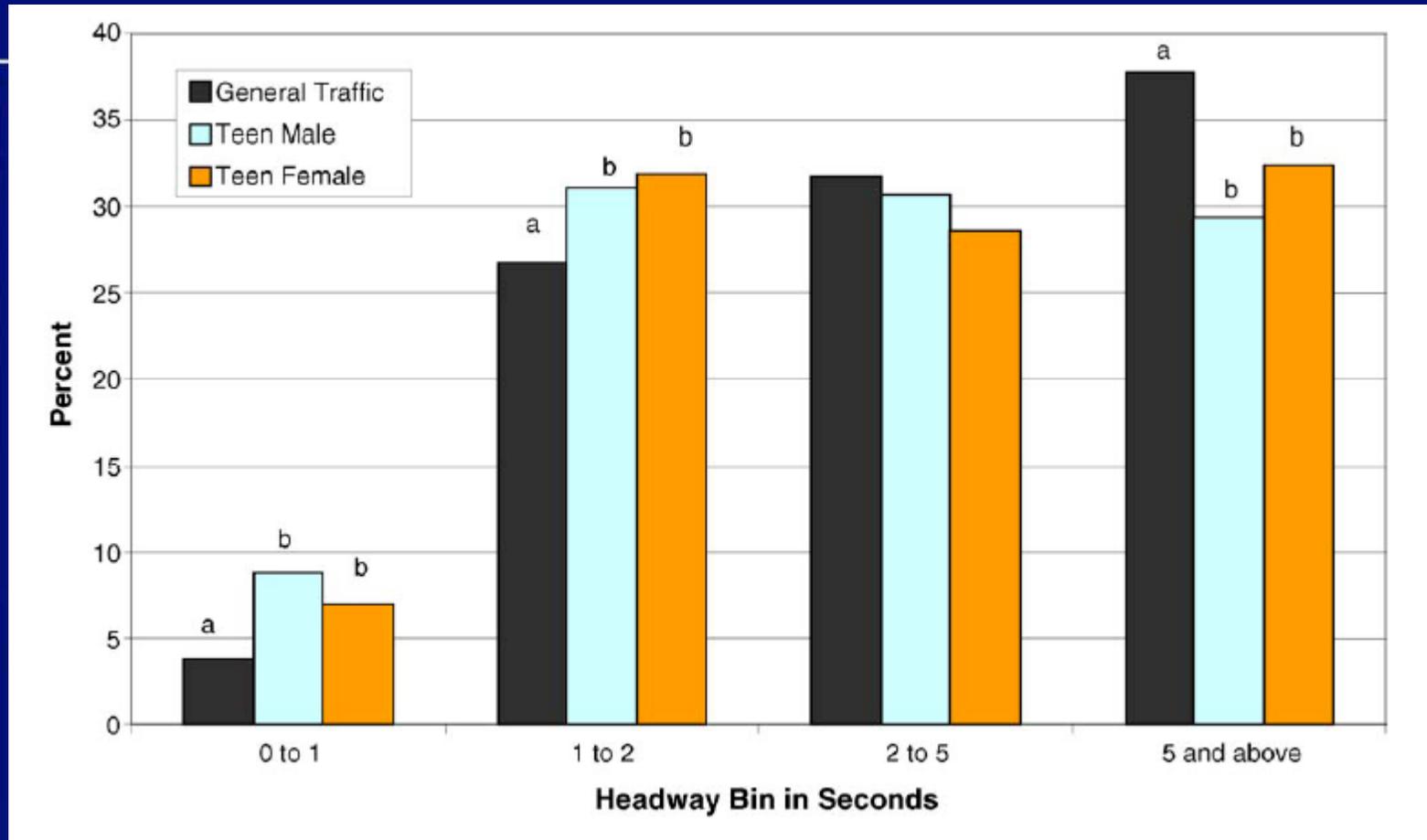
Compared to older drivers, teen crashes occur more often:

- at night
- on the weekend
- while speeding
- when driving in a risky manner
- after using alcohol

# What are teen drivers doing?

- Speeding
- Following too closely
- Changing lanes illegally
- Weaving through traffic
- Failing to yield
- Failing to perceive traffic risks
- Driving drowsy or fatigued
- Driving distracted

# Percent of Drivers by Headway



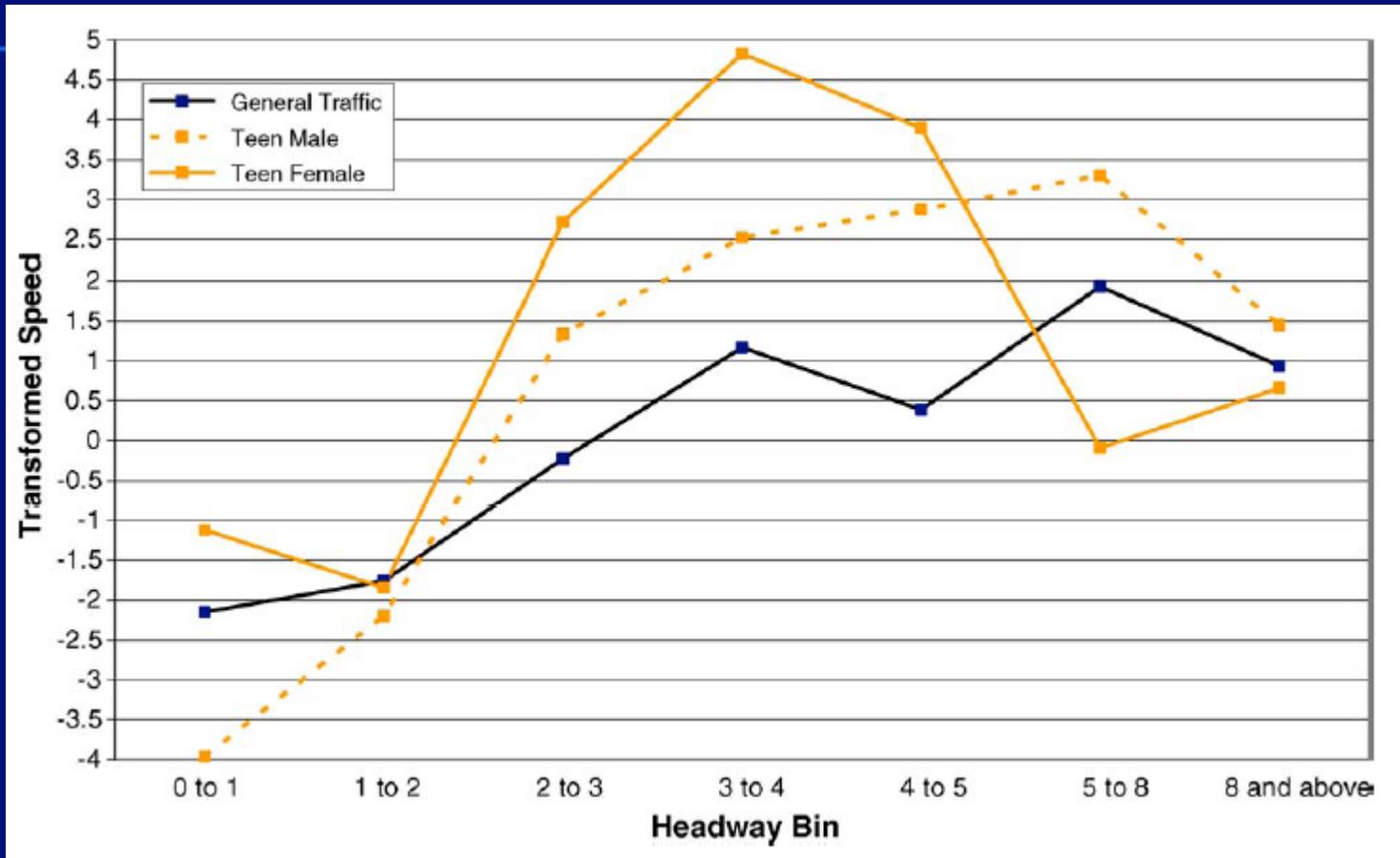
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# Headway by Deviation from Average Traffic Speed



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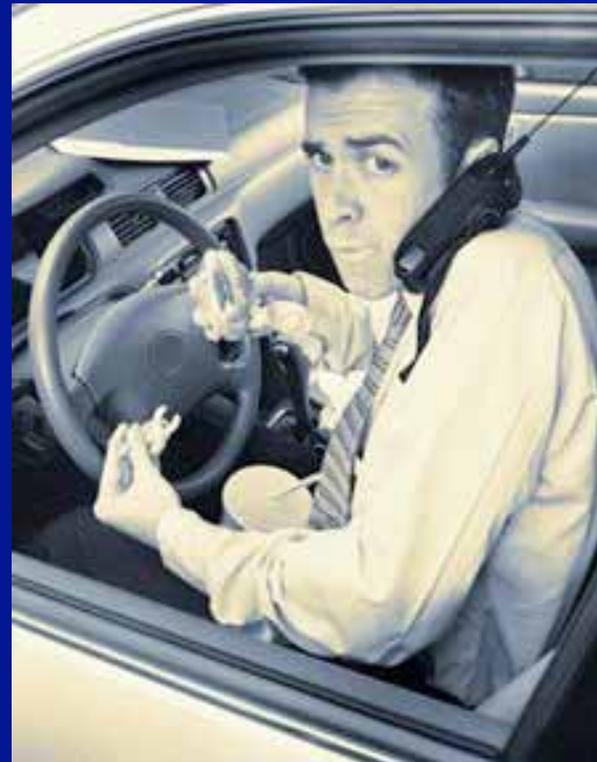


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# What is Distraction?

A process or condition that draws away driver attention, thereby disturbing driver control.

- Lack of:
  - Attention/focus
  - Alertness
  - Vigilance
  - Situation awareness
- Presence of:
  - Heavy mental load
  - Stress
  - Fatigue
  - Drowsiness



[blogs.importtuner.com](http://blogs.importtuner.com)

# Rapid Increases in Technology



# Sources of Distraction

<u>Specific Distraction</u>	<u>% of Drivers</u>
Outside person, object or event	29.4
Other distractions	25.6
Adjusting radio, cassette, CD	11.4
Other occupant in vehicle	10.9
Moving object in vehicle	4.3
Other device/object brought into vehicle	2.9
Adjusting vehicle/climate controls	2.8
Eating or drinking	1.7
Using/dialing cell phone	1.5
Smoking related	0.9
Unknown distraction	8.6

(Stutts et al., 2001)

# Distraction Effects all Drivers

- At least 25% of police-reported crashes involve driver inattention (NHTSA)
- Variation by age-group
  - Age 65 and older: outside objects and events
  - Ages 20-29: other occupants (e.g., young children)
  - 16-20-year-olds: Adjusting radio, cassette or CD
- Drivers under 20 most likely to be in distraction-related crashes, as distracted at the time of their crash

(Stutts et al., 2001)

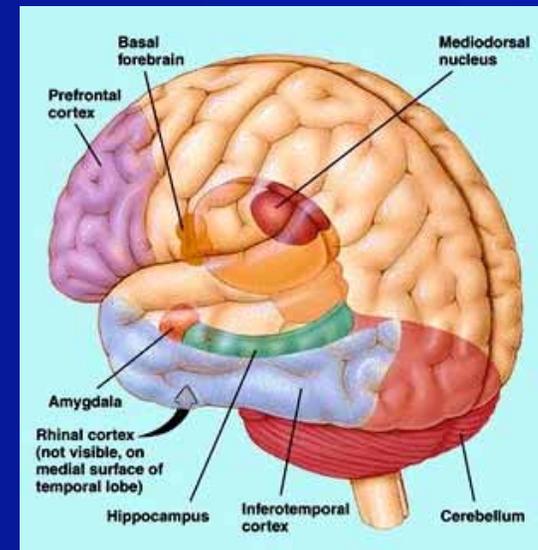
# Immaturity

- Thought to be a major reason for teens' increased distractibility, and increased crash risk
- Research at UMTRI examined this issue
  - Social/psychological indicators of maturity
  - Maturity predicted less high risk driving behavior
- Maturity is multidimensional
  - Physiological
  - Social
  - Sexual

# Brain Development

## Fastest period of brain development since infancy

- Teens' brains are different
- Process information differently  
(Yurgelun-Todd, 2002)
- Pre-frontal lobe less active
- Amygdala more active
- Affects insight, reasoning power, self-control,  
judgment, emotions, and organization



(Source: Driesen, 2002)

# Brain Development

**Activity influences brain development  
(Giedd et al., 1999)**

**Excess neuronal connections form**

**Unused connections are pruned**



# Sleep/Drowsiness

## During adolescence:

- Sleep patterns change
- Excessive daytime sleepiness
- Bad for performance, health, and safety

## Sleep-patterns change during adolescence:

- Decreased sleep duration with increasing age
- Delayed bedtime and rise time
- Discrepant school-night/weekend sleep patterns
- Adolescents need 9-10 hours of sleep/night

# Psychosocial Development

- Identity Development
- Hallmark of adolescence (Erik Erikson)
- Progresses through various stages
- Exploration of alternative selves
  - Different behaviors
  - Alternative appearance
  - Explore ideas and philosophies
- Becoming licensed drivers



# Psychosocial Development

## Independence/Individuation

- Achieve separation from parents
- Develop self-reliance
- Establish a private life
- Make own judgments, decisions, & mistakes



# Psychosocial Development

## Character Traits

- **Develop trustworthiness**
  - Must be trusted
- **Develop responsibility**
  - Must be given responsibility
- **Give trust/responsibilities in safe environment**

# Sexual Development

## Puberty and Sexual Maturation

- Physical sexual maturity, increased sex drive
- Interest in the opposite sex
- Similarity to courting rituals of other animals
- Want to look 'good' to the other sex

Metamorphosis from child;



To young adult



# What distracts teen drivers?

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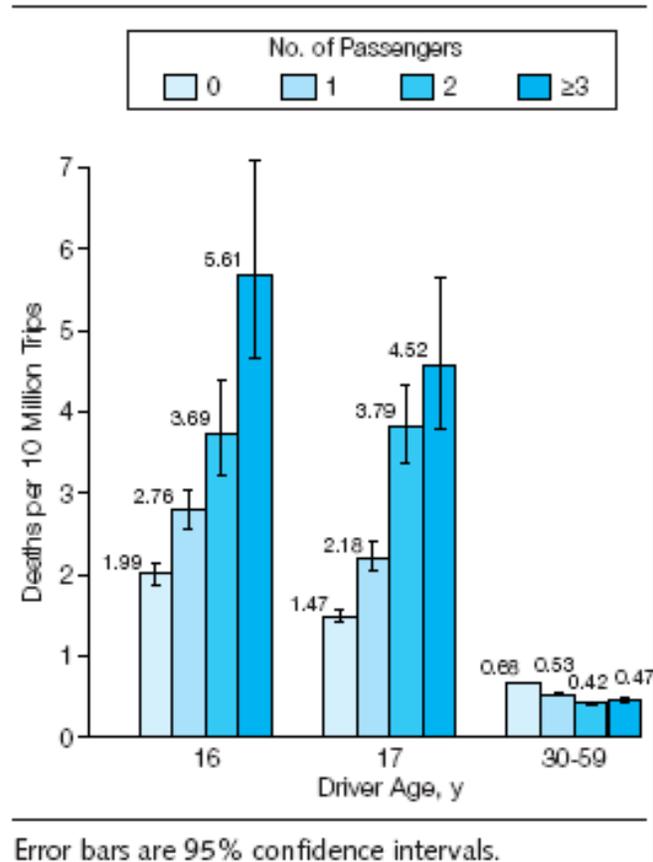
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# Passengers

- Effect of passengers on teens is unique
- Adults benefit from passengers
- Passengers increase teen crash risk
- Crash rate increases with each additional passenger
- Siblings or friends, makes no difference

# Effect of Passengers by Age

**Figure.** Trip-Based Driver Death Rates by Driver Age and Number of Passengers



Chen, Baker, Braver, Li

JAMA, March 22/29, 2000—Vol 283, No. 12

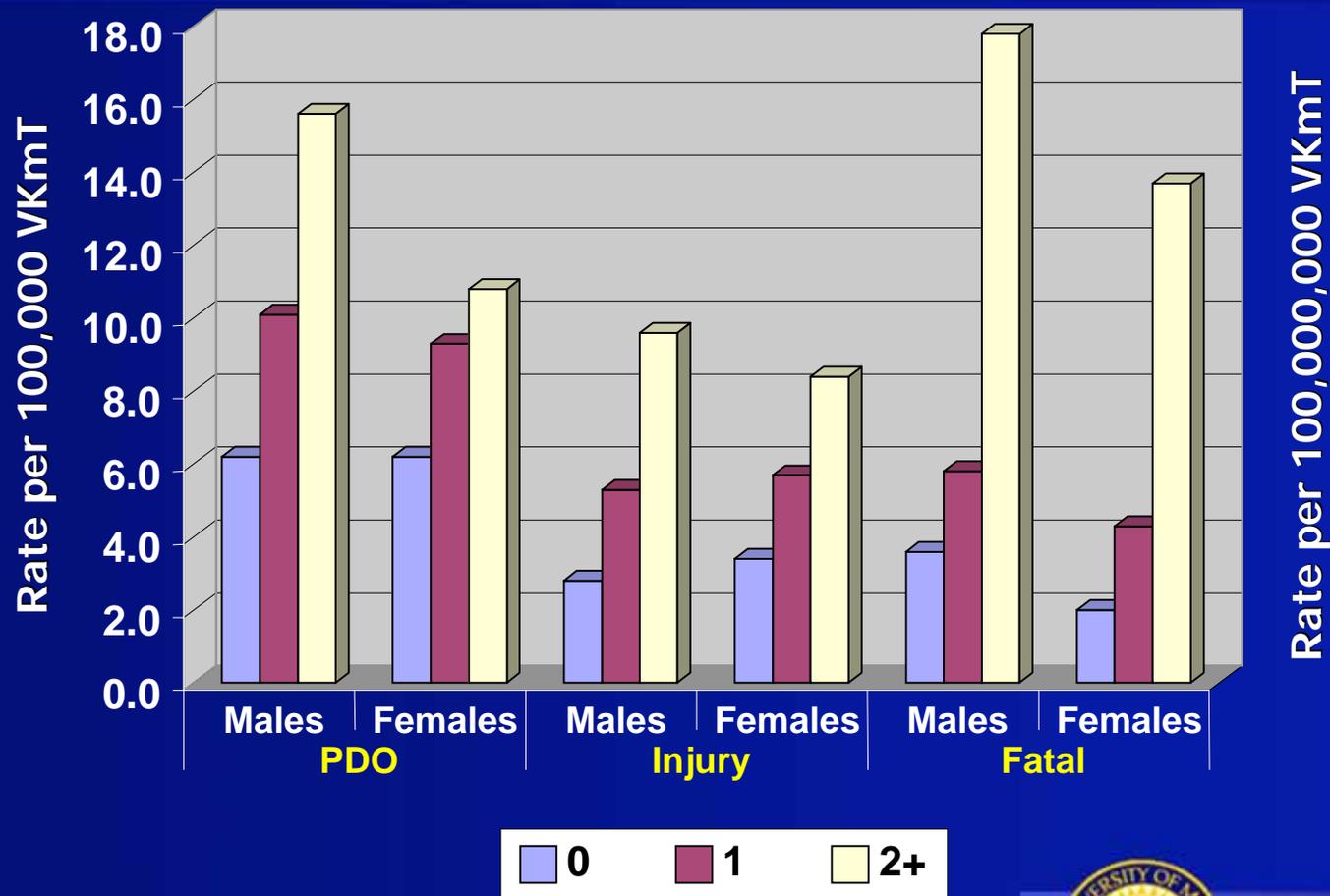
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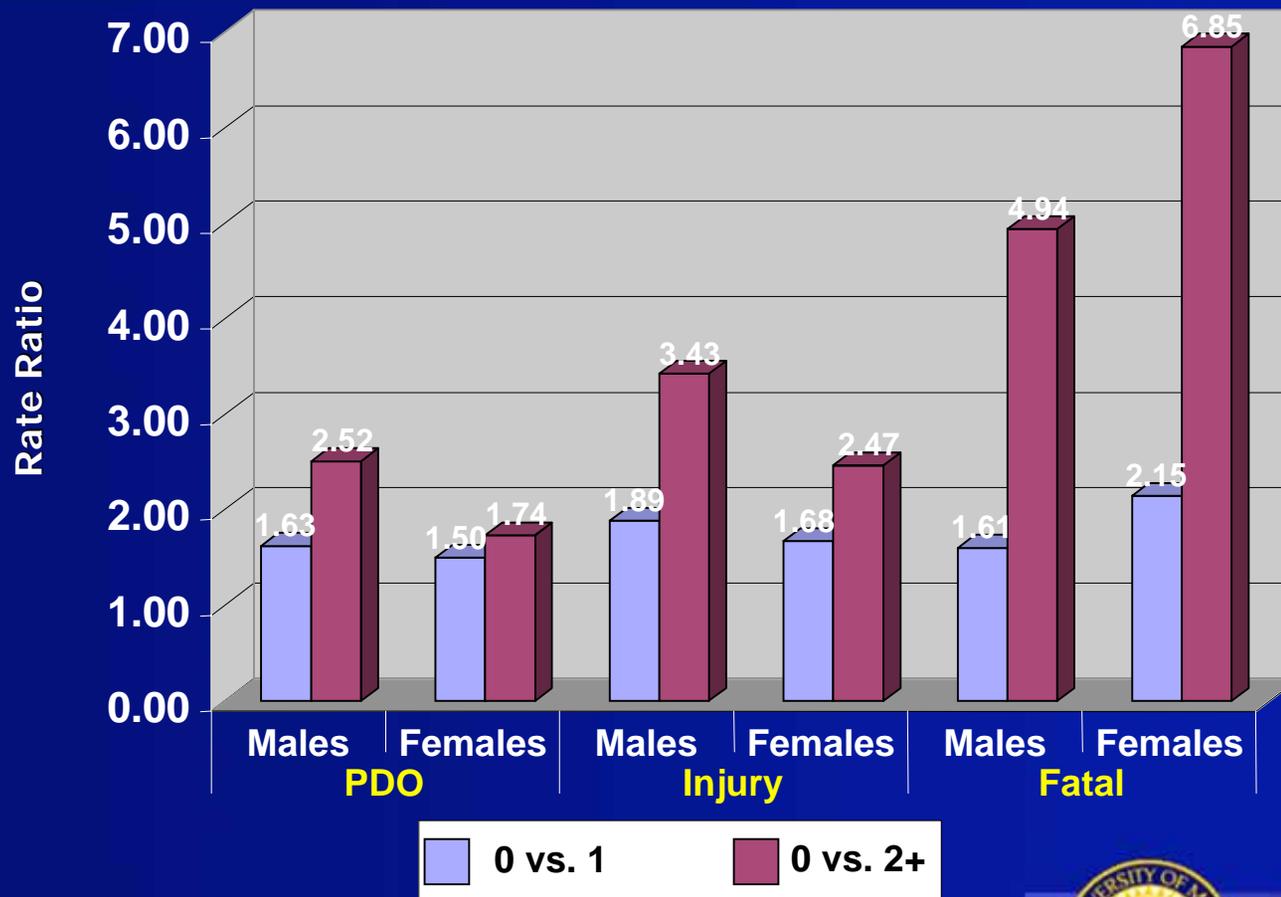
# Crash Rate by Sex and Number of Passengers

Doherty et al, 1998



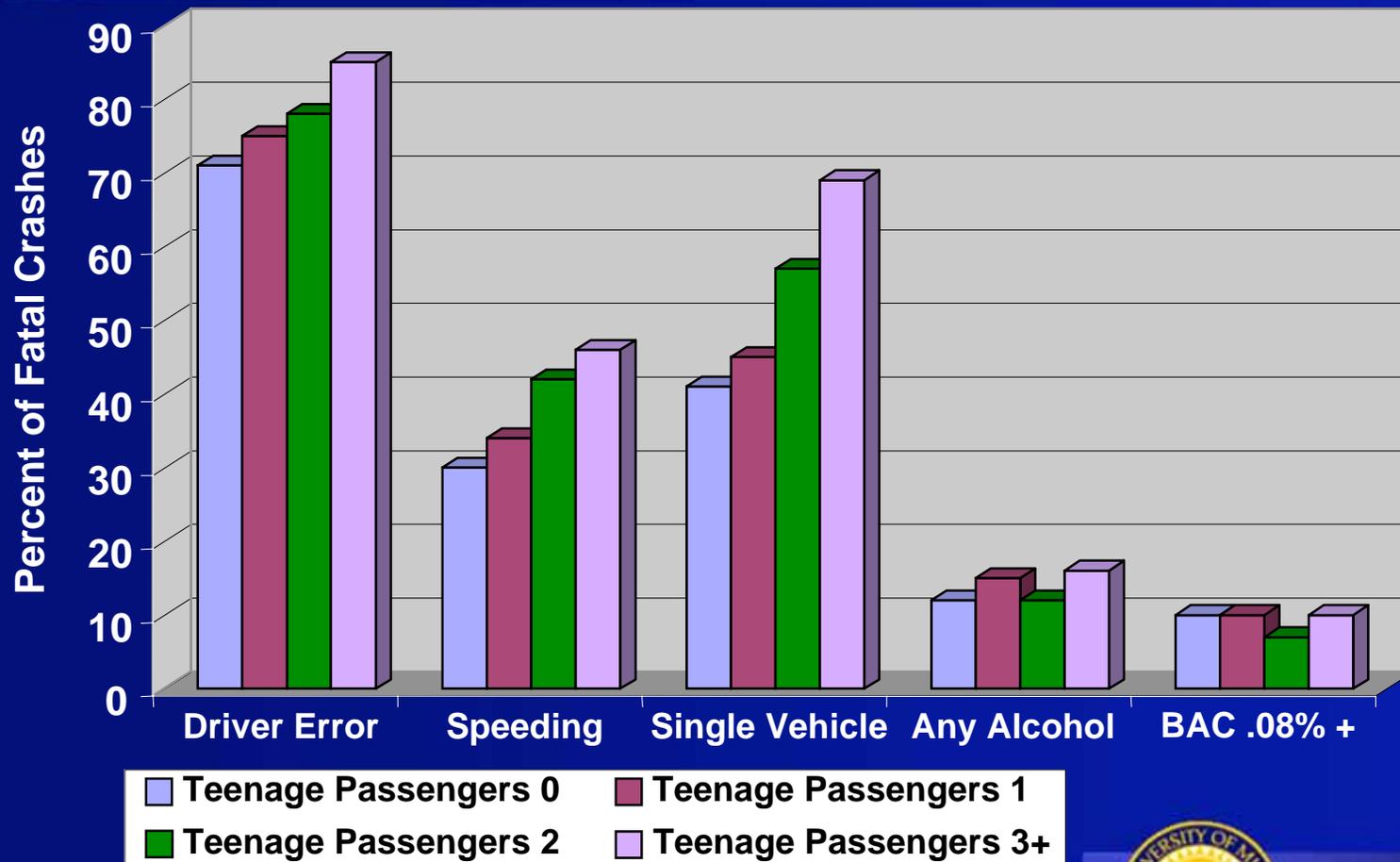
# Rate Ratio by Sex and Number of Passengers

Doherty et al, 1998



# Percent of Fatal Crashes by Number of Passengers

Williams, Ferguson, McCartt, 2007



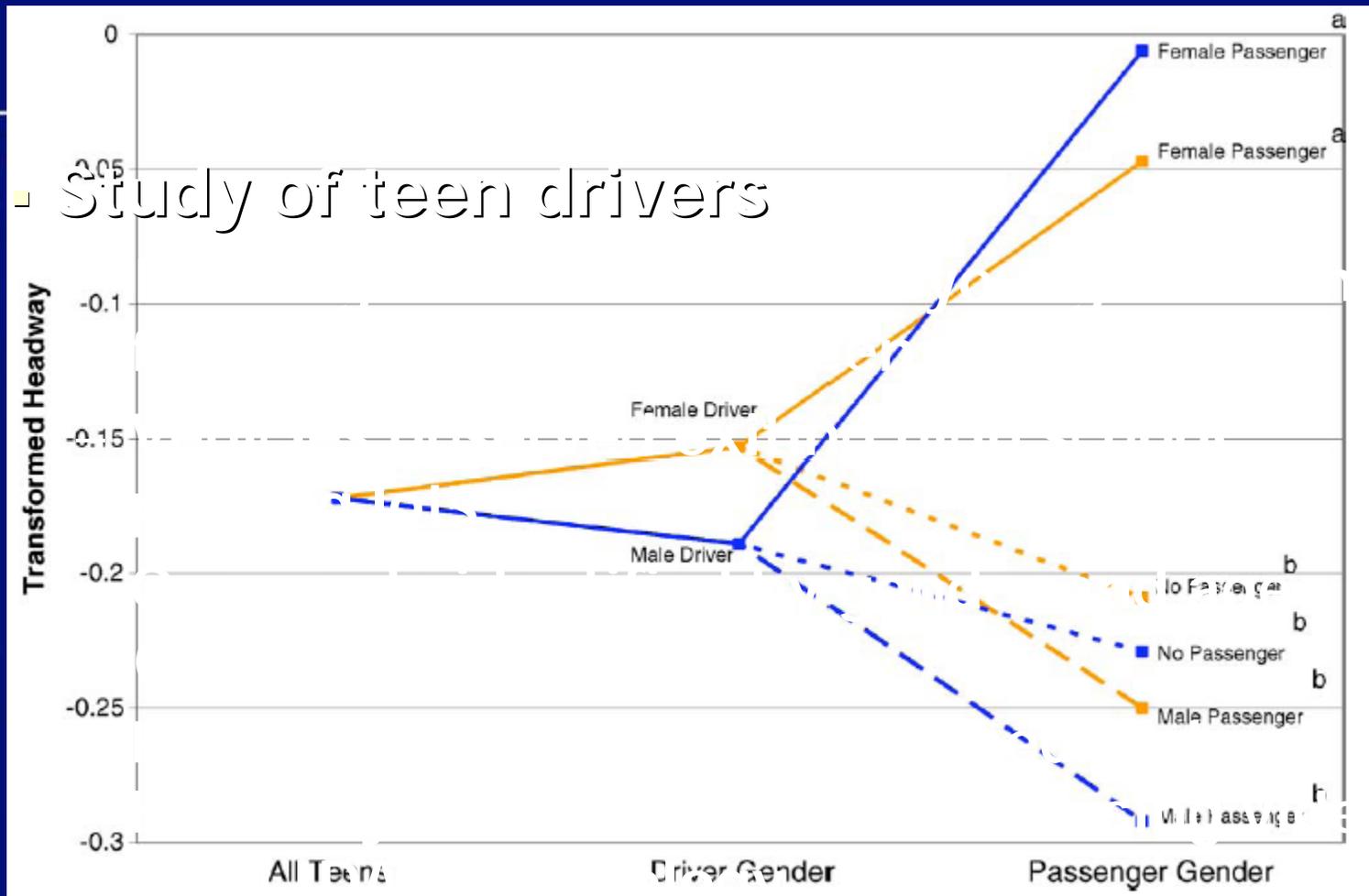
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# Headway by Passenger Sex

Study of teen drivers



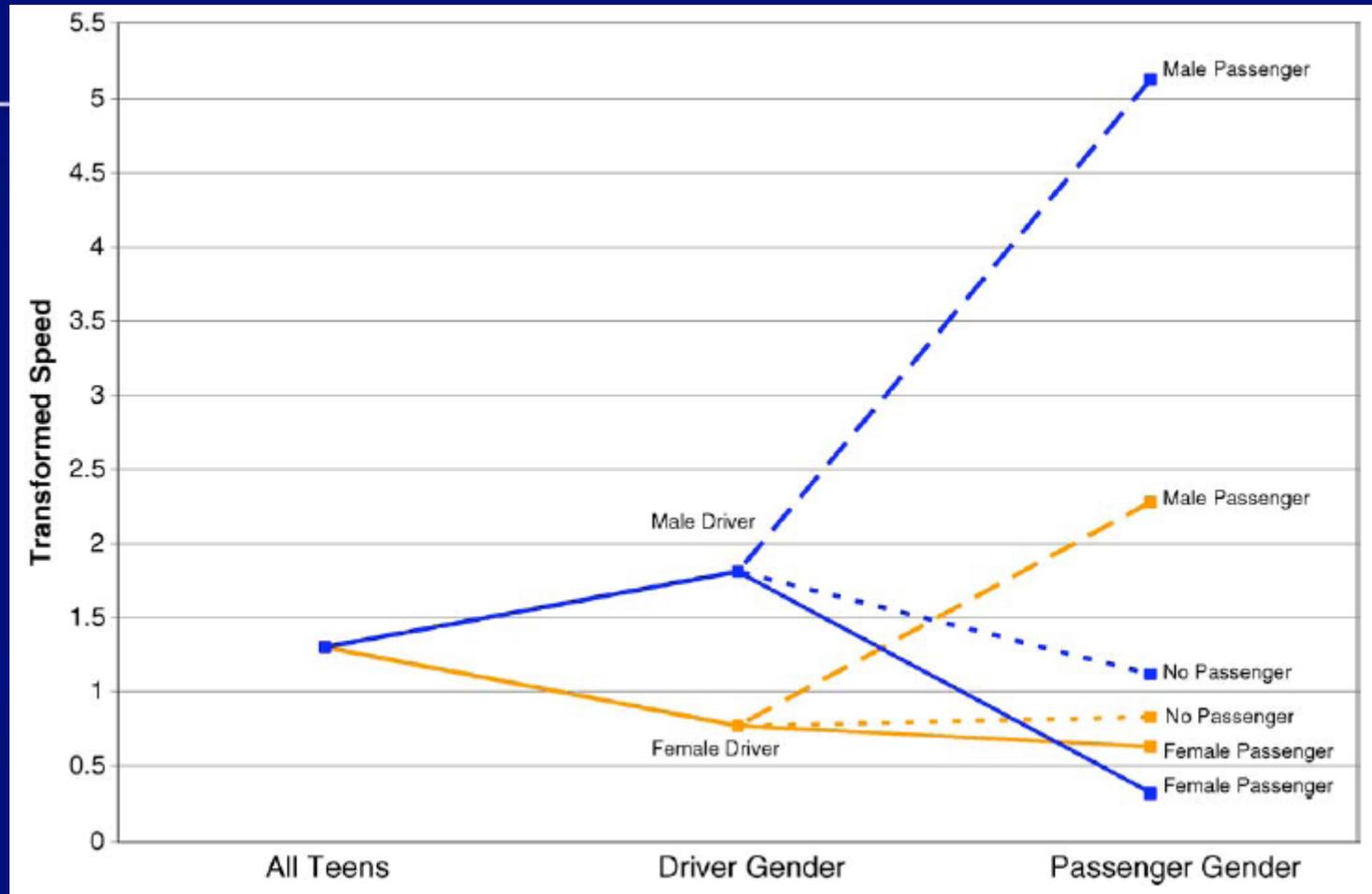
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# Speed by Passenger Sex



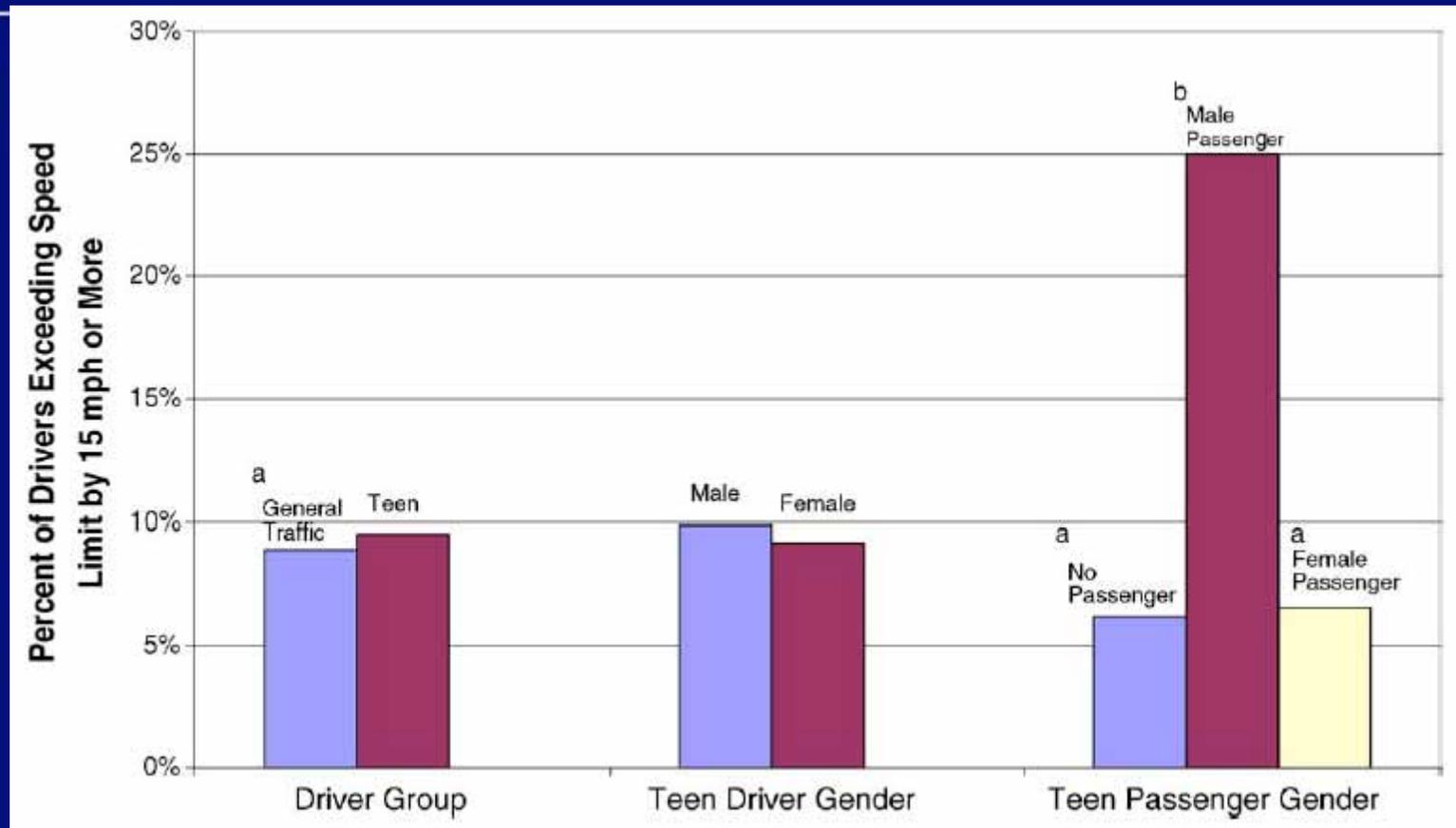
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# 15 MPH Over by Passenger Sex



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# Cell Phones

- **Phoning while driving increases crash risk**
  - **Field of visual search limited** (Atchley & Dressel, 2004)
  - **Attention to traffic and signs/signals**
  - **Vehicle control less precise and smooth**
  - **Conversation itself impairs**
  - **Hands free as impairing as hand-held**
- **Conversation content determines distraction**

(Sven & Patten, 2005)

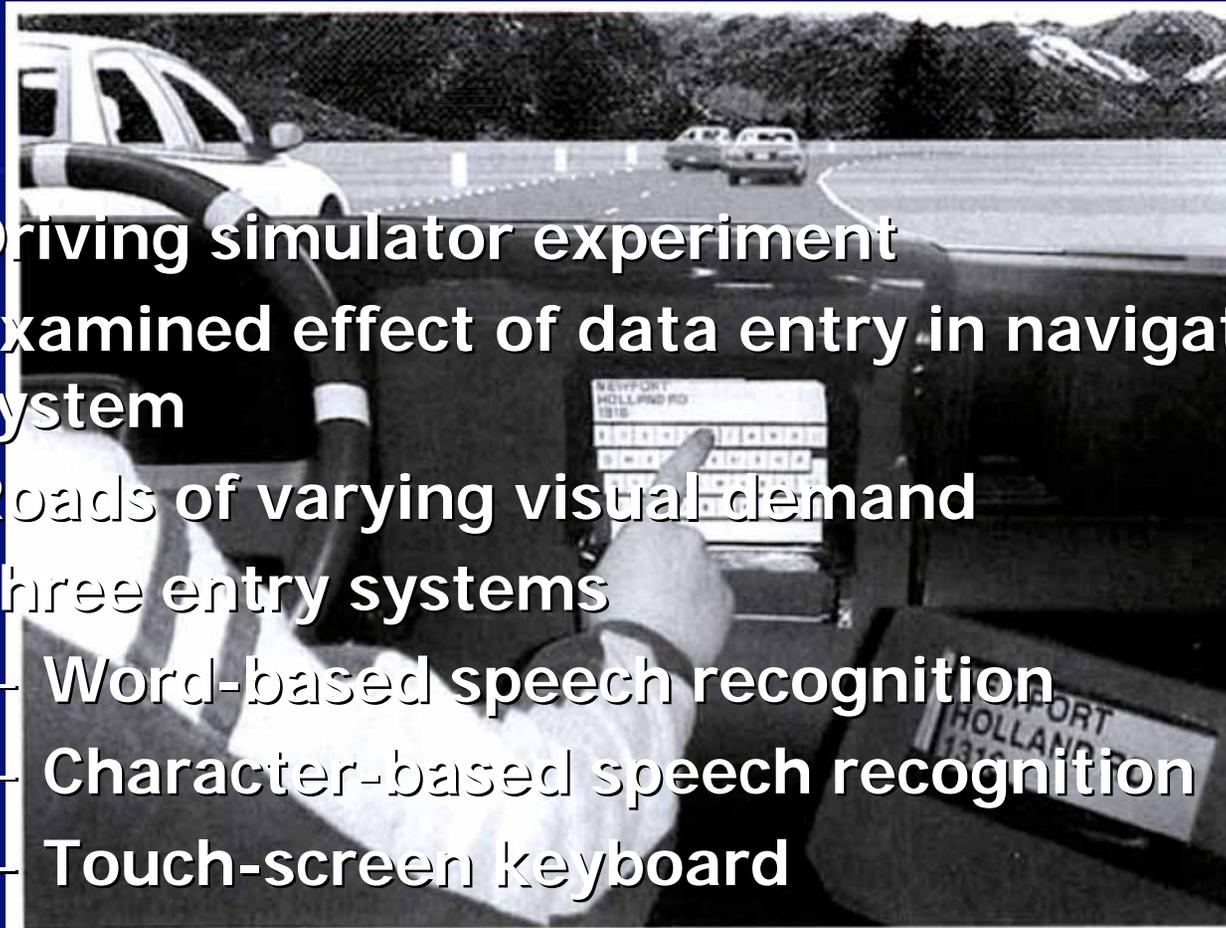


# Technology

- Rapid increase in amount of in-car technology
  - Entertainment
    - ◆ Increased number
    - ◆ Demand more attention
  - Navigation
  - E-mail
  - Video

# Technology

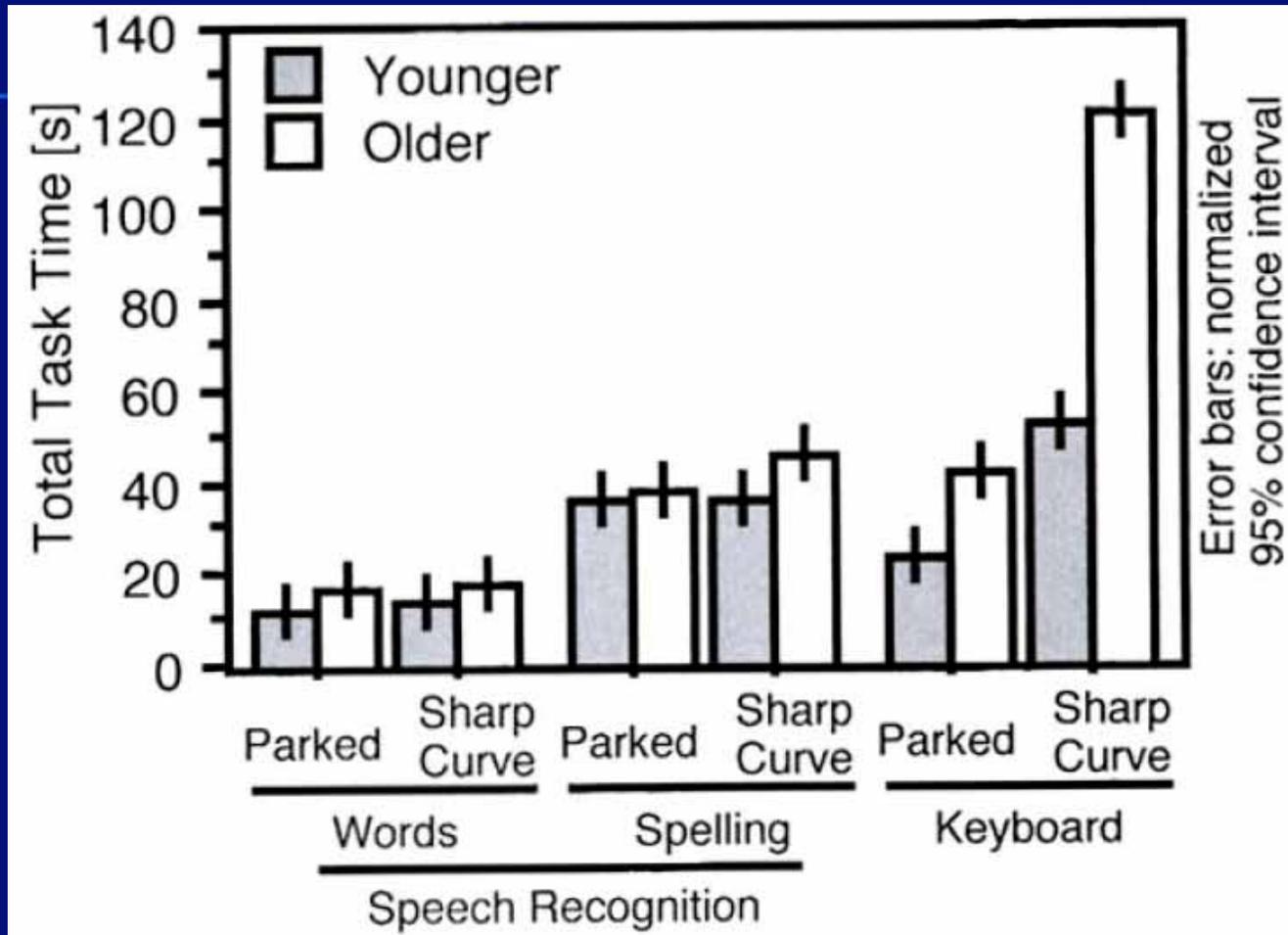
- Driving simulator experiment
- Examined effect of data entry in navigation system
- Roads of varying visual demand
- Three entry systems
  - Word-based speech recognition
  - Character-based speech recognition
  - Touch-screen keyboard



*Figure 1. Driver's view of the road and touch screen.*

Tsimhoni, Smith, Green, 2004

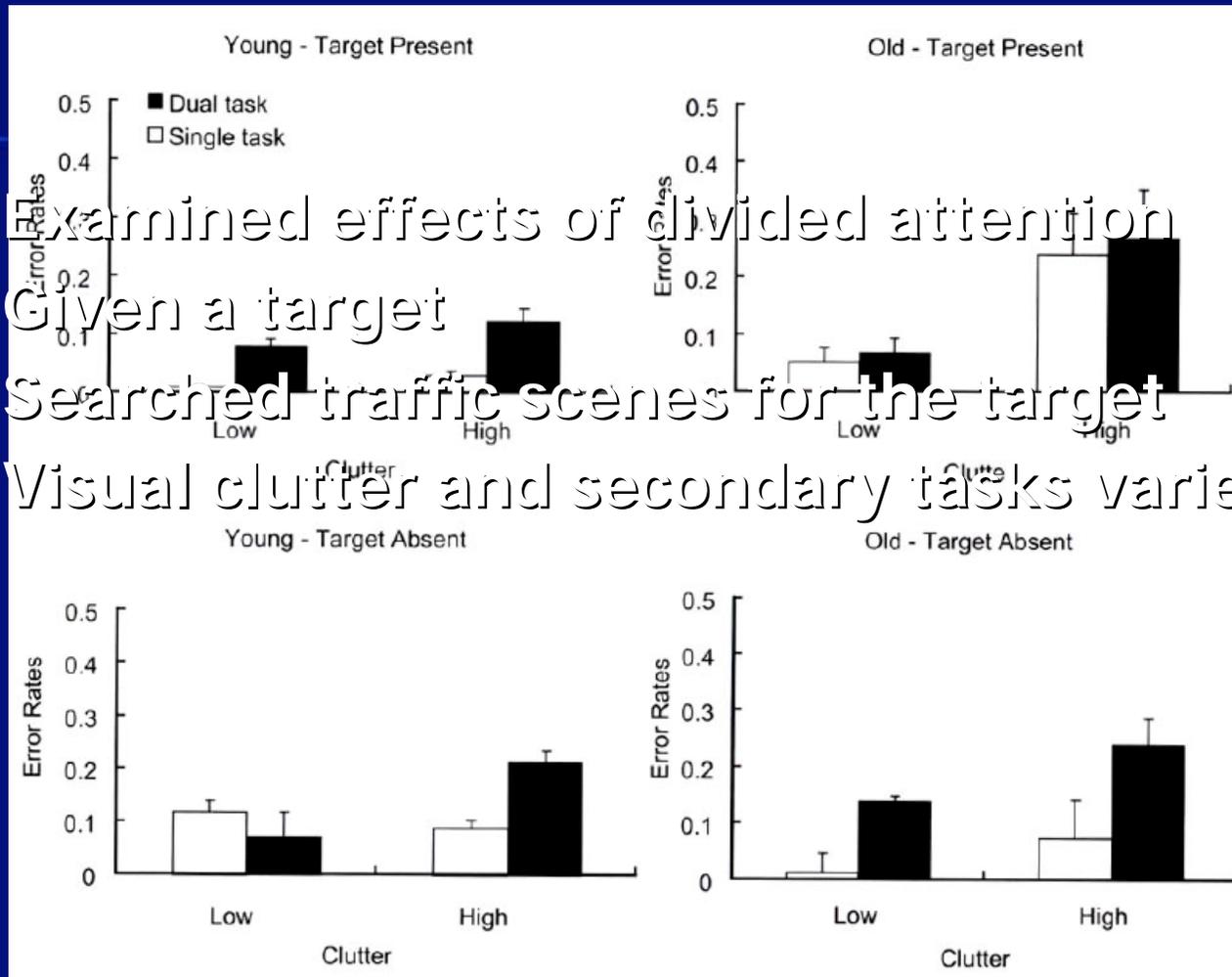
# Technology



Tsimhoni, Smith, Green, 2004

# Technology

- Examined effects of divided attention
- Given a target
- Searched traffic scenes for the target
- Visual clutter and secondary tasks varied



McPhee et al., 2004

# Technology

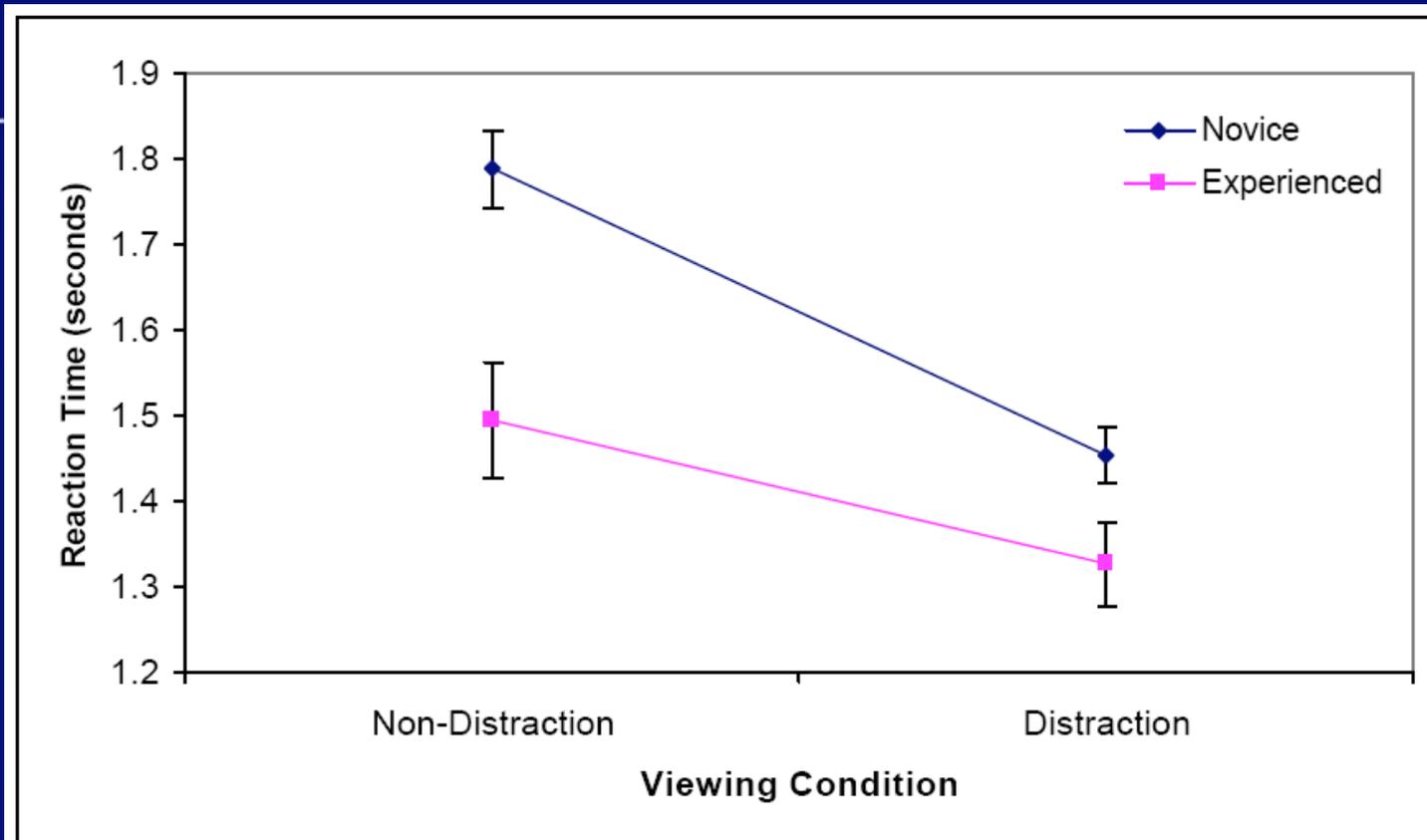


Figure 6.1 Mean reaction times (in seconds) to detect the primary hazard by Viewing Condition.

Whelan et al, 2004

# Technology

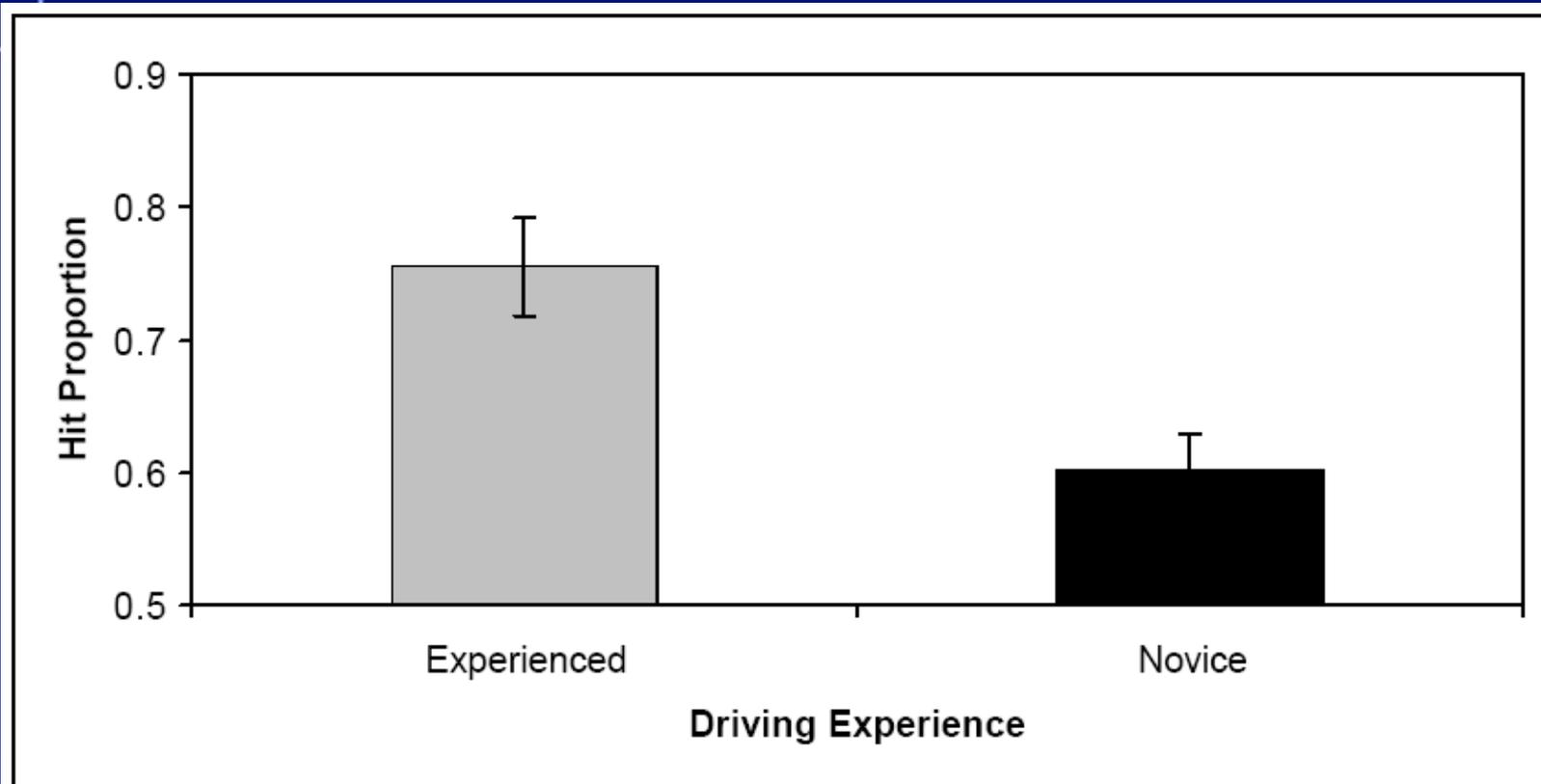


Figure 6.3 Mean hit proportions as a function of Driving Experience

Whelan et al, 2004

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# Implications

- **Two programs increase teen driver safety**
  - GDL
  - Checkpoints Program
- **Why does GDL work?**
  - Restricts teens' exposure to highest driving risk
  - Lengthens the licensure process
- **How does this help?**
  - Protects teens while they learn
  - Allows them more time to practice driving
  - They're older, more mature, when fully licensed

# Implications

- **What is the Checkpoints Program**
  - Intervention for parents
  - Helps parents negotiate driving privileges and rules with their teens
- **How does this help?**
  - Parents can set more restrictions than law requires
  - Parents judge teen's readiness for more privileges
  - Parents can base decisions on what they know about their teen

# Implications

- **What should be done:**
  - Promote GDL and encourage parents to be involved
  - Increase GDL restrictions
    - ◆ On-going study at UMTRI
      - Parents like GDL restrictions
      - Would be supportive of more
      - Are willing to play a role in enforcement
  - Restrict in-car use of technology
    - ◆ Can be enforced
    - ◆ Records

# Implications

- Support development of technology that enhances the good things drivers do on their own
  - Not so good: Anti-lock brakes
  - Good example: Electronic stability control
- Future holds a lot:
  - Lane departure warnings
  - Headway warning devices
  - Lane incursion warnings
  - Intelligent cruise control

# Questions

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