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Workload and Stress of crews Operating Future Manned Vehicles

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ARL-HRED Fort Knox Field Element

Overview

- **Introduction**
- **Method**
- **Results**
- **Discussion**
- **Recommendations**

- **Operators of future vehicles must perform many functions with a reduced crew size**
- **Workload and stress will likely increase**
- **Examined workload and stress of operators by:**
 - Live versus virtual simulation
 - Two types of tasks
 - Autonomous versus standard driving
 - Driving speed
 - Two crew positions (driver and gunner)

- **Participants were twelve Soldiers comprising four vehicle crews**
- **Ten participants were either scouts or armor Non-Commissioned Officers or Officers**
- **Each crew consisted of a vehicle commander, driver, and gunner**
- **Participants received hands-on training with actual interfaces and controls**

Driving

Shooting (including beyond line of sight)

Communicating

Method (Continued)

- **One crew performed in a live environment and three crews performed in a virtual environment**
- **For live crew driver and gunner in a vehicle and commander (platoon leader) at crew station in a simulator**
- **All crews conducted missions under two types of threat (enemy RPG teams present or absent)**

Method (Continued)

- **Live crew also conducted missions with autonomous and manual driving; and at two speeds (manual driving only)**
- **Measures consisted of :**
 - **Ratings of workload (NASA TLX)**
 - **Stress survey (physical and mental)**

Method (Continued)



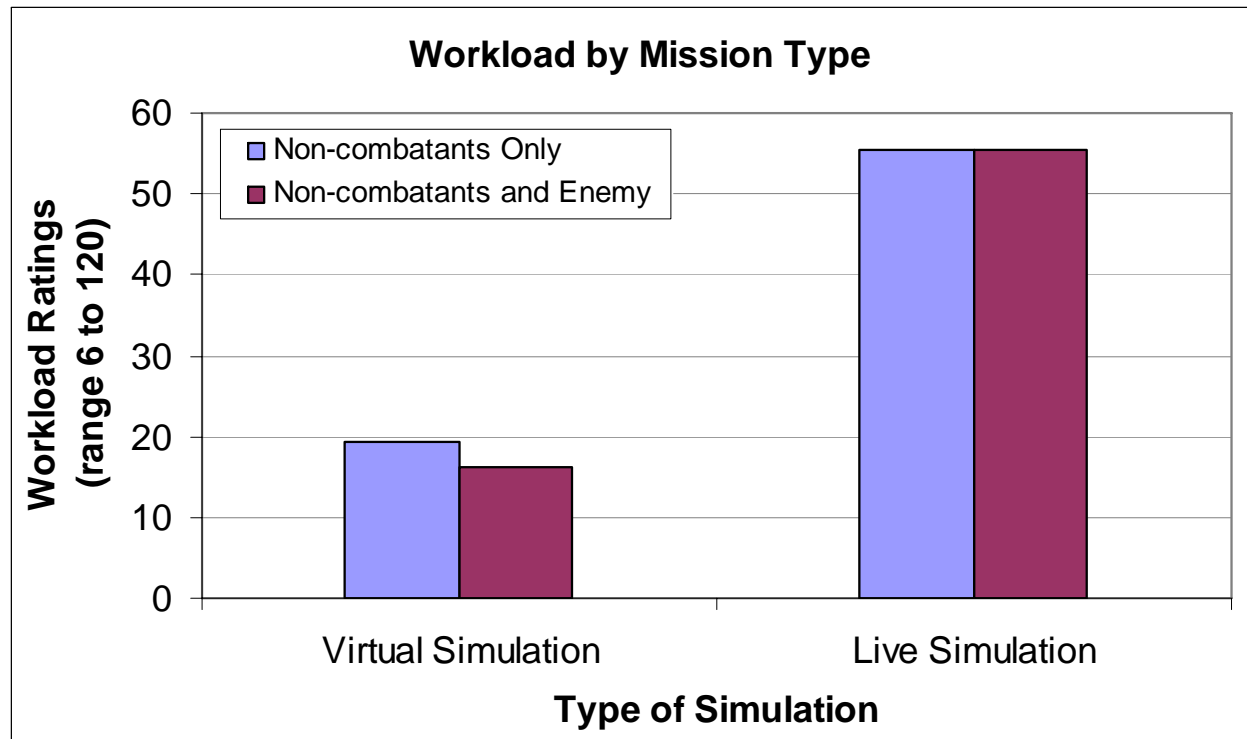
Advanced Concepts Research Tool (ACRT)

Method (Continued)



CAT SIL (MCS) crew station

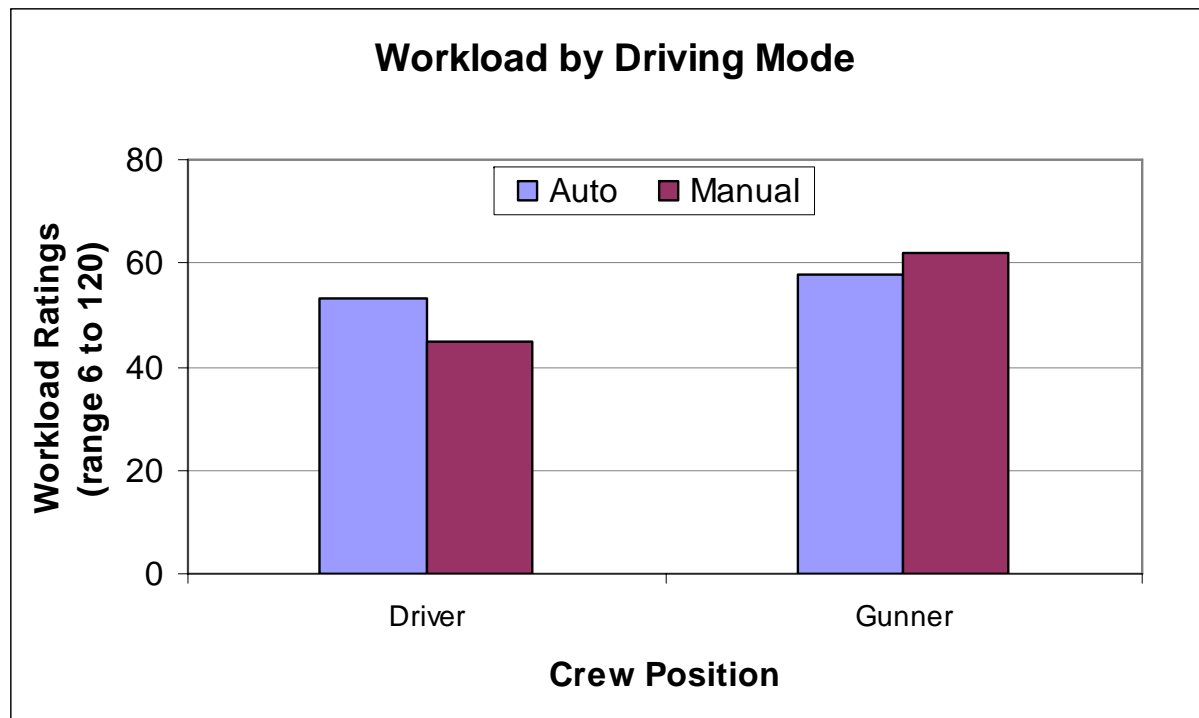
Results



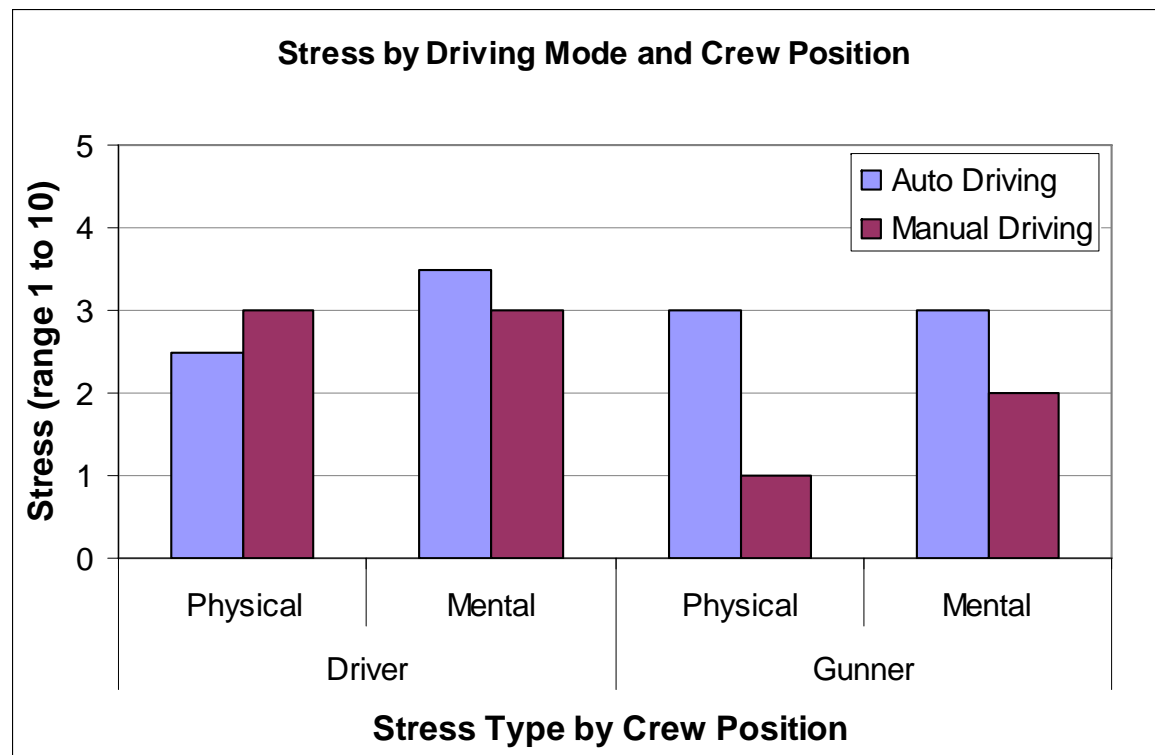
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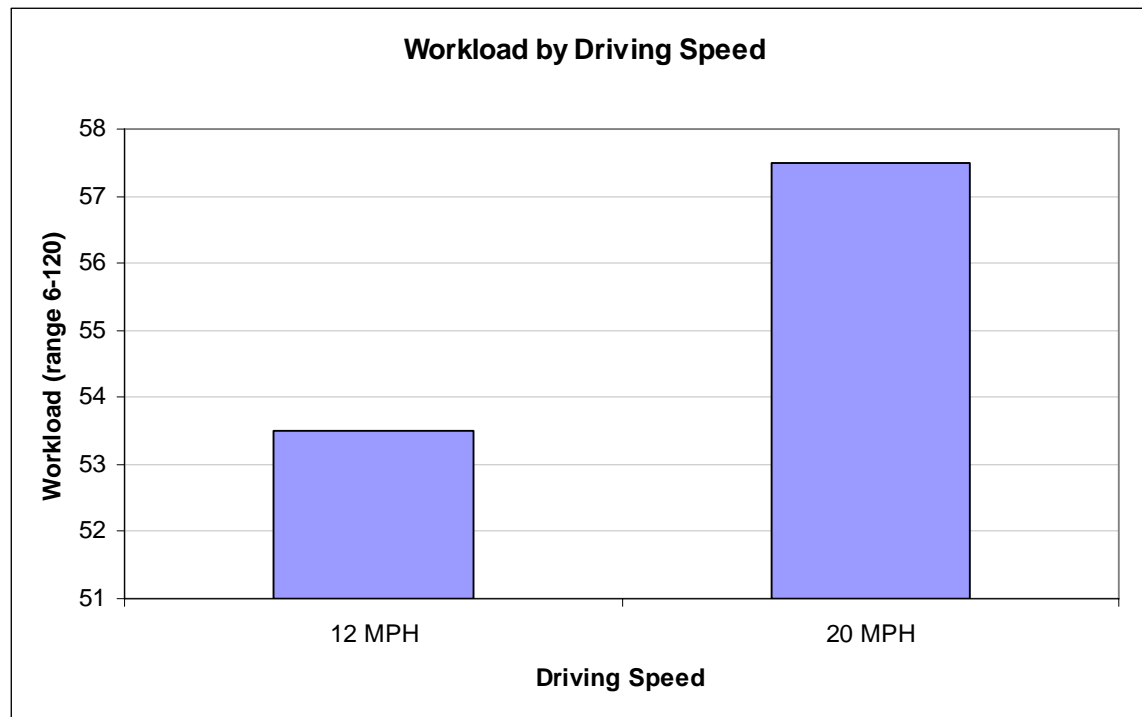
Results

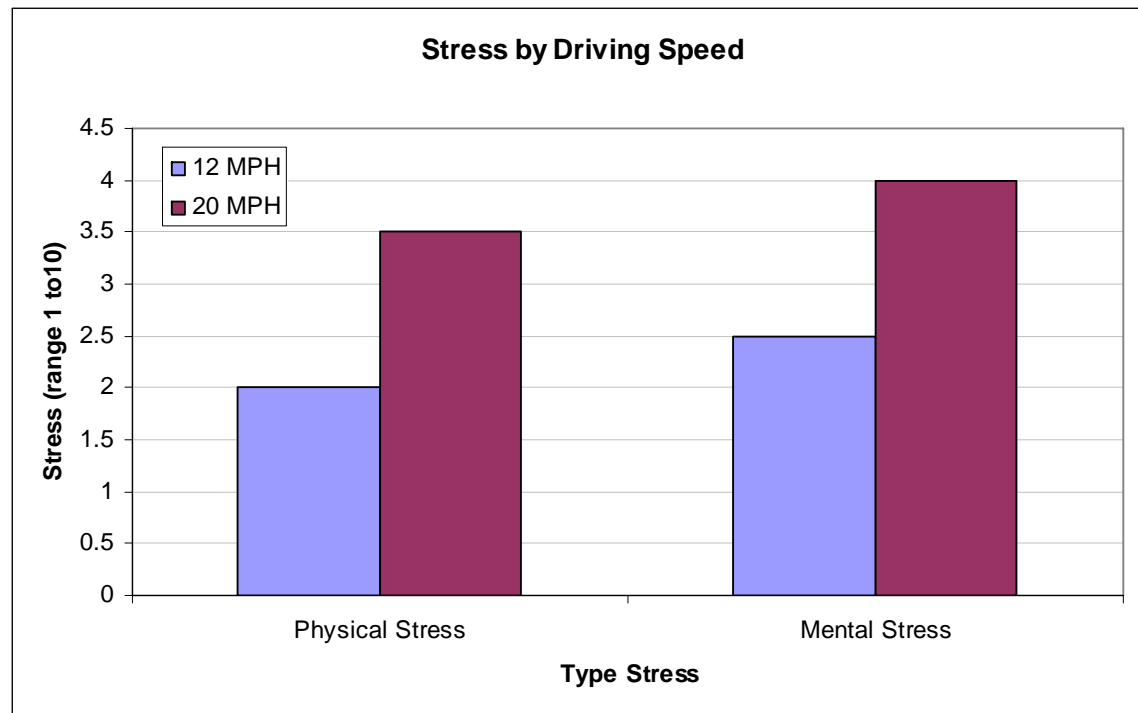


Results



Results





- **Higher workload and stress in live environment likely due to task - Driving**
- **Not enough differences in two threat conditions to result in different workloads**
- **Workload and mental stress higher for driver in autonomous mode – perhaps due to requirement to start and stop automatic driving**
- **Workload and stress higher at higher driving speed**

- **Must consider type of task when comparing workload and stress in live and virtual environments**
- **Missions must differ in types of tasks to differ in workload and stress**
- **Task automation does not always decrease stress and workload – depends on design of automation**
- **May need workload reduction at higher speeds – automatic driving?**

Questions?