

REPPERGER RESEARCH INTERN PROGRAM

RESEARCH PROJECT #: AFRL-RHB-21-07

BUILDING MODEL CAPABILITY TO PREDICT PERFORMANCE ON MEDICALLY RELEVANT TASKS WHILE IN MOPP GEAR

PROJECT DESCRIPTION: The Warfighter Effectiveness Research Center is the research arm of the Department of Behavioral Sciences and Leadership at the United States Air Force Academy, facilitating faculty and cadet research that enhance warfighter effectiveness. The WERC conducts a wide range of research and design projects for operational customers including special operations forces, the Air Force Office of Scientific Research, Air Force Research Laboratory, and Army Research Laboratory. These projects are based in the behavioral sciences and connect to a wide range of disciplines and collaborators across government labs, academia, industry, and military operators in order to generate the most innovative and effective solutions.

As state and non-state actors threaten U.S. forces with the use of Chemical, Biological, Radiological and Nuclear (CBRN) weapons, it is of utmost importance that the Mission Oriented Protective Posture (MOPP) gear consistently be evaluated for its impacts on military personnel. The vast majority of MOPP gear task degradation studies are extremely antiquated, with some studies being more than 20 years old, utilize outdated equipment and tasks, and lack any medically relevant task evaluation. Additionally, due to the current SARS-CoV-2 pandemic, the military medical community is now in greater need of updated information regarding the MOPP gear.

The lack of medically specific MOPP task degradation studies has left a substantial gap in medical CBRN response planning and operations. In order to fill this gap, one of the goals of this study is to assess the impact of different MOPP levels on performance when engaged in medically relevant tasks. The second goal of this study is to identify and evaluate one or more existing human performance assessment models designed to provide leadership with actionable information on the impact of MOPP gear as a stressor.

For the intern, the short term goal is to focus on the second goal, helping us to assess the validity of the task analysis model from study 1 and optimizing it for study 2. The scope of this project will be finalized once data is collected in the winter. It is envisioned the summer project will involve analyzing predicted model outcomes vs. data observed from human trials. Model strengths, weaknesses and possible modifications will be examined and the intern will develop recommendations for improvements or modifications to improve model performance. The project will involve collaborations with the Air Force Institute of Technology, other military branches, DTRA, etc.

The support provided from the intern will also help our team achieve our long term goal, which is to build expertise and capability designed to measure the impact of protective measures and then predicting the impact on an operational mission. The current study is the first year of a longer range research objective and future research in modeling of mission impact.

ACADEMIC LEVEL: Bachelors, Masters, PhD

DISCIPLINE NEEDED:

- Mathematics and Statistics
 - Operations Research
 - Probability and Statistics

PREFERRED QUALIFICATIONS:

- A strong background in Operations Research, Human Factors or Statistics.
- Masters or PhD preferred.
- Experience with modeling desired.
- Ability to analyze data, draw conclusions and report findings.

RESEARCH LOCATION: Wright-Patterson AFB Dayton, OH

RESEARCH ADVISER: Douglas Lewis, PhD
Biodefense, George Mason University, 2012

Dr. Douglas Lewis spent 27 years in the military and the last two have been as an Air Force civilian with the 711th HPW. Most of that time has been spent working on chemical weapon and biological weapon defense. Within this area he has primarily focused on detection of biological agents, decontamination of military assets and have also investigated the effects of ionizing radiation on bacteria. Currently Dr. Lewis' team is starting to investigate the decrement protective equipment places on mission accomplishment. The team's first study is looking at chemical protective gear and its impact on time and accuracy to complete first aid tasks. The data gathered from this project will be used to assess and possibly modify existing models (or possibly develop novel models) which predict human task performance imposed by protective measures. The ultimate goal of this research is to predict operational impacts of protective measures and then balance that impact against the danger of the threat.