Task 308: Assessment of Screening and Training Requirements for SFPs regarding Anxiety during Repeated Exposures to Sustained High Acceleration

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Agenda

• Team Members
• Task Description
• Schedule
• Goals
• Results
• Conclusions and Future Work
Team Members

- Principal Investigator: James Vanderploeg, MD, MPH
- Co-Investigators: Rebecca Blue, MD, MPH; Charles Mathers, MD, MPH; Tarah Castleberry, DO, MPH; Johnene Vardiman, MS
- Collaborators: Frederick Bonato, PhD; Andrea Bubka, PhD; Kim Seaton, PhD
- Students: Rahul Suresh, MD

Organizations

- University of Texas Medical Branch
- NASTAR Training Center
- Saint Peter’s University
Task Description

• SFP anxiety or panic attack may present a significant problem for the commercial spaceflight industry
  • Industry depends upon layperson participation
  • Requires a perception that flights are safe and enjoyable

• SFPs likely to have expectations: training and risk mitigation
  • Efforts towards meeting expectations or educating the public: beneficial effects for the industry?

• SFPs may have difficulty performing tasks in stressful scenarios
  • May not fully understand how their own actions affect the risk profile of spaceflight activities
Preliminary Studies

• Multiple studies designed to provide understanding of layperson physiological response to hypergravity/acceleration (2012-2017)
  • 2012: 77 Subjects
  • 2014: 86 Subjects
  • 2016-7: 157 Subjects
Schedule

• 2014: Tolerance of Centrifuge-Simulated Suborbital Spaceflight by Medical Condition
• 2014: Subject Anxiety and Psychological Considerations for Centrifuge-Simulated Suborbital Spaceflight
• 2016: Screening and Mitigation of Layperson Anxiety in Aerospace Environments
• 2017: Effects of Training on Anxiety and Task Performance in Simulated Suborbital Spaceflight
Goals

• Understand how minimally trained laypersons perform during simulated emergency scenarios in centrifuge-simulated suborbital spaceflight

• Identify preconceptions of risk, training requirements, emergency preparedness, and the safety of the commercial spaceflight industry

• Identify opportunities for public outreach or SFP education to address risk and better enable the informed consent process
Centrifuge Profiles

• Centrifuge profiles:
  • Single-directional acceleration
    • $+G_z$ (head-to-toe)
    • $+G_x$ (chest-to-back)

• Combined profiles
  • Designed to simulate flight

• Simulated Emergency Scenario
Results

In brief:
- Most subjects felt training sufficient
  - Positives:
    - Clear explanations
    - Trainer experience / first-hand knowledge
    - Practice sessions / hands-on training
  - 80% believe training should be required
- Emergency task performance:
  - Significant discrepancy between performance and perception
  - Common errors:
    - “Wait to start” commands
    - Task details
    - Harness application
  - 86%: address at more detail, practice before flight / simulation
Results

PUBLICATIONS


PRESENTATIONS

• Aerospace Medical Association Annual Scientific Meeting, Denver, CO, May 2017 – 6 panel presentations

• Aerospace Medical Association Annual Scientific Meeting, Dallas, TX, May 2018 - anticipated
Conclusions and Future Work

• Numerous further publications planned
  • The Role of Public Opinion in the Viability of the Commercial Human Spaceflight Industry
  • Insight and Task Performance in Simulated Suborbital Spaceflight: Implications for Informed Consent
  • Training Effects on Motion Sickness During Simulated Commercial Spaceflight
  • Aggregate Findings of Layperson Tolerance in Centrifuge-Simulated Suborbital Spaceflight

• Follow on Studies
  • Facial Recognition of Anxiety for Early Intervention?
TASK 308. ASSESSMENT OF SCREENING AND TRAINING REQUIREMENTS FOR SFPs REGARDING ANXIETY DURING REPEATED EXPOSURES TO SUSTAINED HIGH ACCELERATION

PROJECT AT-A-GLANCE
- University: The University of Texas Medical Branch
- Principal Investigator: James Vanderploeg, MD, MPH
- Co-Investigators: Rebecca Blue, MD, MPH; Tarah Castleberry, DO, MPH; Charles Mathers, MD, MPH; Johnene Vardiman, MS
- Residents: Rahul Suresh, MD

RELEVANCE TO COMMERCIAL SPACE INDUSTRY
- The viability of the commercial spaceflight industry will be dependent upon layperson participation, which requires a perception that flights are safe and enjoyable.
- Spaceflight participants are likely to have expectations regarding training and risk mitigation; efforts towards meeting expectations or educating the public may have beneficial effects for the industry.
- Spaceflight participants may have difficulty performing tasks in stressful scenarios, but may not fully understand how their own actions affect the risk profile of spaceflight activities

STATEMENT OF WORK
- Understand how minimally trained laypersons perform during simulated emergency in centrifuge-simulated suborbital spaceflight
- Identify preconceptions of risk, training requirements, and commercial spaceflight safety

STATUS
- Project data collection completed
- 157 subjects recruited, centrifuge trials completed June 2016
- Data analysis completed 2017

FUTURE WORK
- Presentation and publication of significant findings – publication anticipated 2018, presentation expected at Aerospace Medical Association Annual Scientific Meeting 2018
- Publication anticipated 2018, Aerospace Medicine and Human Performance