Motivation and Vigilance: Do Engagement Levels and Performance on Vigilance Tasks Interact?

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Engagement and Vigilance

- Vigilance is defined as an individual's ability to maintain focus in detecting an infrequent and unpredictable target stimulus over prolonged periods of time; furthermore, this ability degrades over time, typically around 30-40 minutes (Durso, 2007).
- Vigilance is important to maintain for operators across many domains, such as air traffic control and plant operators, in order to minimize errors that could compromise safety.
- Thus, a better understanding of individual differences that contributes to enhanced vigilance is needed for the safety of operators.
- Researchers have tried to relate both state and intrinsic (trait) motivation with performance on vigilance tasks with mixed results.
- Mixed results may be due to motivation being too broad of a construct, and therefore difficult to measure.
- However, motivation and engagement are related, such that higher levels of engagement are associated with higher levels of motivation and vice versa.
- Further, engagement is well-defined and easy to measure using the Dundee Stress State Questionnaire (Matthews *et al.*, 1999).
- Prior research has also suggested that engagement may be a useful predictor of vigilance. (Finomore *et al.*, 2009; Matthews *et al.*, 1999, 2001, 2007).

Purpose of Present Study

- The purpose of the present study was to generalize prior findings of engagement correlating with vigilance task performance to a new vigilance task that has high face validity with an operational setting, specifically control monitoring operators.
- Consistent with prior research, we predict that better vigilance task performance will be associated with higher levels of self-reported task engagement.

Method

Participants

- 24 participants (3 men and 18 women; mean age = 19.5, standard deviation age = 2.71) were recruited from Introduction to Psychology courses at Texas Tech University.

Gauge Monitoring Task

- Participants performed the gauge monitoring task, a task in which they were asked to respond to when they saw a tilted needle (critical/target) and to not respond when the needle was straight (neutral/non-target).
- Participants completed a 10-minute practice session before engaging in the actual experiment, which consisted of four 10-minute blocks (40 minutes total).

Neutral (non-target) image ***Critical (target) image***

Procedure

- Levels of task engagement were measured after the gauge monitoring task, using the shortened DSSQ (Matthews *et al.*, 1999; Helton, 2004).

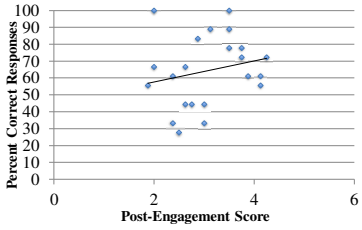
Data Analysis

- Performance was defined as % of correct responses to targets.
- Performance was broken down by block, so that a decrement in vigilance could be observed.
- Three Pearson correlations were conducted between post-task engagement and blocks 2, 3, and 4.
- Prior research using gauge monitoring task does not suggest a vigilance decrement after the first 10 minutes; therefore, we did not analyze block 1.

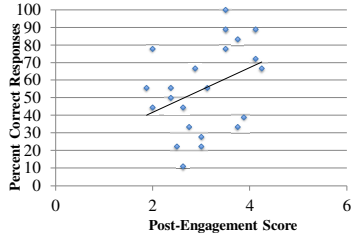
Results

- No significant correlations were found for any of the blocks, although there were a positive trends.

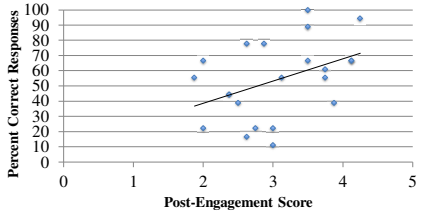
Block 2: ($r = .217, p = .332$)



Block 3: ($r = .376, p = .085$)



Block 4: ($r = .421, p = .051$)



Discussion

- The lack of significant correlations might suggest lower engagement does not have a significant impact on performance in vigilance tasks as previous research suggested.
- Alternatively, participants could have inaccurately self-reported their levels of engagement.

References

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