The Effects of Working Memory on High and Low Working Memory Capacity

Colleen M. Parks, Christine A. Agnir
Department of Psychology, Honors College

INTRODUCTION
Stress is known to have detrimental effects on memory. Acute stressors can trigger an increase in cortisol, which are adrenal hormones that respond to stress (McHugh et al., 2010). Trait anxiety is the psychological, physiological state and stable tendency to respond to threatening stimuli. It has emotional, behavioral, and somatic components and is considered to be a stable characteristic of personality (Endler & Okada, 1975; Vigneau & Corrêa, 2008). Individuals with high levels of trait anxiety are vulnerable to increased stress levels compared to individuals with low levels of trait anxiety.

Working memory is how information is stored over a short amount of time and is used for complex tasks, such as reasoning and problem solving (Baddeley, 2000; Porcelli et al., 2008). Individuals vary in working memory capacity. Working memory capacity predicts performance on higher level cognitive tasks like reasoning, for example. High span working memory individuals have a greater capacity to withhold remembered information than low spans, but high spans are more susceptible to “choke under pressure” compared to low spans. “Choking under pressure” refers to decreased skill performance in high-pressure situations (Belloc et al., 2004).

Acute stress is a factor that impairs working memory (McHugh et al., 2010). Emotional stimuli have been used in long-term memory studies. The emotional content of information is important in long-term memory studies that have focused on stress, but it is unknown if the valence of the stimuli matter for working memory tasks. Little research is known to use emotional pictures for 2-back stimuli. Our goal is to determine whether these factors may significantly disrupt the working memory process of efficiently completing complex tasks.

PURPOSE
• Investigate whether an acute stress will have the same or different effects for individuals with high and low working memory capacity
• Investigate whether stress effects on working memory capacity differ for emotional and neutral materials

METHODS
STUDY
• UNLV students will be recruited from the Psychology Subject Pool for course credit
• Participants will be randomly assigned to the stress condition (Cold Pressor Test) or control condition (warm water)
• Participants will complete the following tasks in order

OSPAN Task
The OSPAN task requires participants to solve mathematical operations and participants are to decide whether the statement is true or false. After each problem, an unrelated circle will be displayed to be remembered for immediate recall.

State V.s. Trait Anxiety Inventory (STAI)
The STAI is a self-report questionnaire that measures current and trait levels of anxiety.

2-back Task
Participants will do the task once with neutral stimuli and once with negative emotional stimuli. They are to respond yes for a stimulus that is the same as the 2-back presented and respond no otherwise.

Cold Pressor and Warm Water Conditions
Participants will be randomly assigned to the condition or cold pressor condition. In the cold pressor test, participants will submerge their dominant arm in ice water for a few minutes. In the control condition, participants will submerge their dominant arm in warm water.

PREDICTIONS
• High working memory capacity individuals will have increased performance in the control condition compared to lower working memory capacity individuals.
• High working memory capacity individuals will have better performance than lower working memory capacity individuals when exposed to the stress condition.
• Performance in low working memory capacity individuals will increase because they are less susceptible to “choke under pressure” compared to high working memory capacity individuals.

REFERENCES
