



# Individual Differences in Stress Reactivity: The Role of Personality

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## Introduction

- Older participants typically show greater stress reactivity than younger adults (e.g., *Otte, Hart, Neylan, Marmar, Yaffe, & Mohr, 2005; Uchino, Birmingham, & Berg, 2010*).
- There is conflicting evidence regarding the association between personality and stress reactivity. Some studies show a relationship (e.g., neuroticism and cortisol reactivity - *Houtman & Bakker, 1991; Phillips, Carroll, Burns, & Drayson, 2005*). Others have found no associations (e.g., *Roy, Kirschbaum, & Steptoe, 2001; Schommer, Kudielka, Hellhammer, & Kirschbaum, 1999; Van Eck, Nicolson, Berkhof, & Sulon, 1996*).
- Past work has focused on the relationship between personality traits and stress reactivity, without consideration of the more specific facets or age differences.

## Current Study

- We examined the association between age, personality (both traits and specific facets) and reactivity (physiological and self-reported measures) to an induced stressor, and whether age differences in stress reactivity were moderated by personality.

## Research Questions

- Are there age differences in the cortisol stress response and self-rated stress?
- Which traits and facets of the Big Five Personality Factors contribute to stress reactivity?
- Are age differences in stress reactivity moderated by personality traits and/or facets?

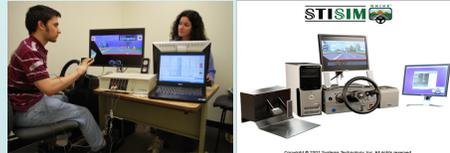
## Method

### Participants

- 152 people from a probability sample (West suburban Boston)
- Age range: 22-84 ( $M=57.24$ ,  $SD=15.63$ )
- Exclusion criteria: Neurological disorders, stroke, no driver's license, education level below HS diploma or equivalent, non-native English speaker, low Pfeiffer SPMSQ score
- 46.7% Women, 93% White
- Education: 17.1% - less than college, 30.3% - college degree, 52.6% graduate school or higher

### Procedure

Lab Stressor = Challenging Driving Scenario with Simulator: navigating winding/slippery roads and intersections, with periods of divided attention involving cognitive and perceptual tasks.



STISIM Drive™ Driving Simulator - M100 [www.stisimdrive.com](http://www.stisimdrive.com)

### Measures

#### STRESS

##### Saliva Samples (Cortisol)

Stress Reactivity [Hypothalamic-Pituitary-Adrenocortical (HPA) System Reactivity]= sample taken 20 minutes after the stressor minus sample before the stressor (baseline)

##### Self-report

On a scale of 1 to 5 where 1 is no stress and 5 is a lot of stress, how much stress did you feel during the driving segment? (1 = no stress; 5 = a lot of stress)

#### PERSONALITY

##### NEO-PI-R (Costa & McCrae, 1992)

Five-Factor Model, 6 facets of each factor  
240 items, 5-point Likert scales (disagree-agree)

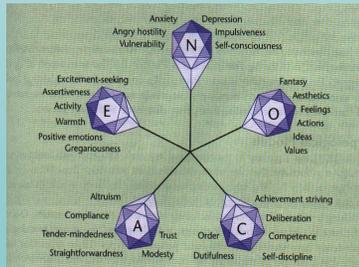


Figure 1. Personality Facets of Big Five Traits Model; Source: *Papaia, Wendkos Olds, and Duskin Feldman (2003)*

##### O = Openness to Experience

Cronbach's  $\alpha = .88$ ;  $\alpha$  range for facets: .61 (Values) to .82 (Fantasy)

##### C = Conscientiousness

Cronbach's  $\alpha = .92$ ;  $\alpha$  range for facets: .65 (Dutifulness) to .83 (Self-Discipline)

##### E = Extraversion

Cronbach's  $\alpha = .78$ ;  $\alpha$  range for facets: .64 (Excitement Seeking) to .84 (Warmth)

##### A = Agreeableness

Cronbach's  $\alpha = .82$ ;  $\alpha$  range for facets: .50 (Tender-Mindedness) to .82 (Trust)

##### N = Neuroticism

Cronbach's  $\alpha = .94$ ;  $\alpha$  range for facets: .76 (Impulsiveness) to .85 (Depression)

### Statistical Analyses

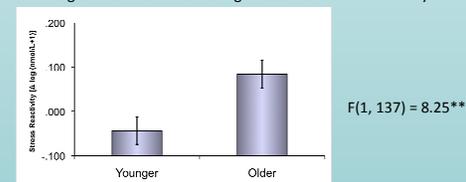
- Filter:** We included only the participants with complete data (questionnaires and driving section); six participants were excluded due to motion sickness during the driving simulation
  - Statistical Models:** MANCOVA  
DVs: two measures of stress (Cortisol and Self-report); IVs:
    - Age group (younger =22-59; older = 60-84)
    - Personality (median split): separate models were tested for the personality traits and each set of six facets
    - Age by Personality interactions
- Covariates: sex and time of the interview

## Results

- Correlation between self-reported stress and cortisol reactivity:  $r(140) = .28^{**}$

### 1. Are there age differences in the cortisol stress response and self-rated stress?

There were significant age differences in stress reactivity for cortisol. Older age was associated with higher levels of stress reactivity.



### 2. Which traits and facets of the Big Five Personality Factors contribute to stress reactivity?

#### Cortisol

Higher levels of stress reactivity were associated with:

- Depression (**Neuroticism**):  $F(1, 67) = 4.07^*$  (lower tendency to experience feelings of guilt, sadness, despondency, and loneliness)
- Compliance (**Agreeableness**):  $F(1, 61) = 5.80^*$  (lower response to interpersonal conflict)
- Extraversion**:  $F(1, 121) = 3.90^*$  (higher quantity and intensity of energy directed outwards into the social world)

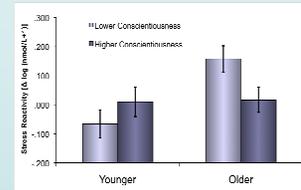
#### Self-reported Stress

Higher levels of self-reported stress were associated with:

- Warmth (**Extraversion**):  $F(1, 60) = 6.45^*$  (higher interest in and friendliness towards others)
- Openness to Experience**:  $F(1, 121) = 3.83^*$  (greater active seeking and appreciation of experiences for their own sake)

\*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$

### 3. Are age differences in stress reactivity moderated by personality traits and/or facets?



Cortisol Reactivity as a Function of Age and Levels of **Conscientiousness**

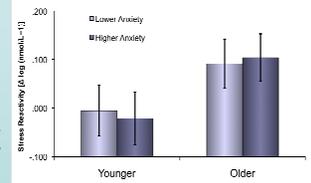
$F(1, 121) = 5.47^*$

**Conscientiousness:** degree of organization, persistence, control, and motivation in goal directed behavior

Cortisol Reactivity as a Function of Age and Levels of Anxiety (**Neuroticism**)

$F(1, 69) = 9.25^{**}$

**Anxiety (Neuroticism):** level of free floating anxiety



Cortisol Reactivity as a Function of Age and Levels of Impulsiveness (**Neuroticism**)

$F(1, 69) = 3.95^*$

**Impulsiveness (Neuroticism):** tendency to act on cravings and urges rather than reining them in and delaying gratification

#### Summary of interaction results:

Older people with lower levels of Conscientiousness and higher levels of Anxiety and Impulsiveness (facets of Neuroticism) show greater stress reactivity.

## Conclusions

- Consistent with past findings, older participants displayed greater cortisol reactivity.
- Personality traits and facets were related to cortisol stress reactivity - especially for extraversion and the facets of neuroticism (depression) and agreeableness (compliance). Past work has found the neuroticism trait to be related, but it appears that it is the specific subcomponent of depression that is related.
- Although older adults have generally been found to react more, we found that individual differences in personality can moderate these effects. Older participants with higher levels of conscientiousness, lower levels of anxiety, and lower levels of impulsiveness showed less cortisol reactivity in the challenging situation.

## Future Directions

- In future work we will look at other physiological indicators of reactivity (e.g., heart rate and skin conductance), to see if different systems show similar relationships with age and personality. In addition, we will examine the congruence between self-reported stress and physiological indicators with a goal of understanding the mechanisms linking age, personality, and responses to stressful situations.