

*Individual differences in the psychobiological  
stress response to psychosocial stress*



Dra. Carolina Villada Rodríguez

Departamento de Psicología  
División de Ciencias de la Salud  
Universidad de Guanajuato

# GENERAL INTRODUCTION

# THE STRESS RESPONSE



STRESS



ACUTE



ADAPTIVE RESPONSE

VS.

CHRONIC



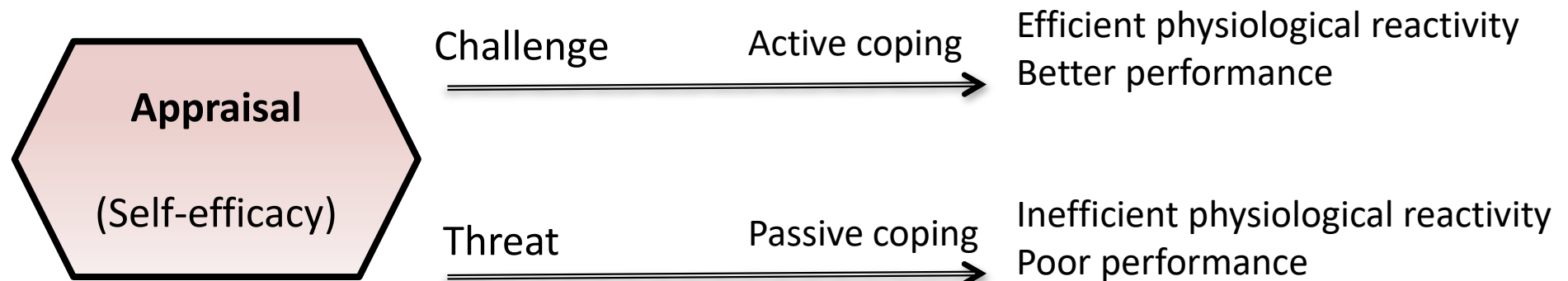
STRESS-RELATED DISEASES



# GENERAL INTRODUCTION

## THE STRESS RESPONSE

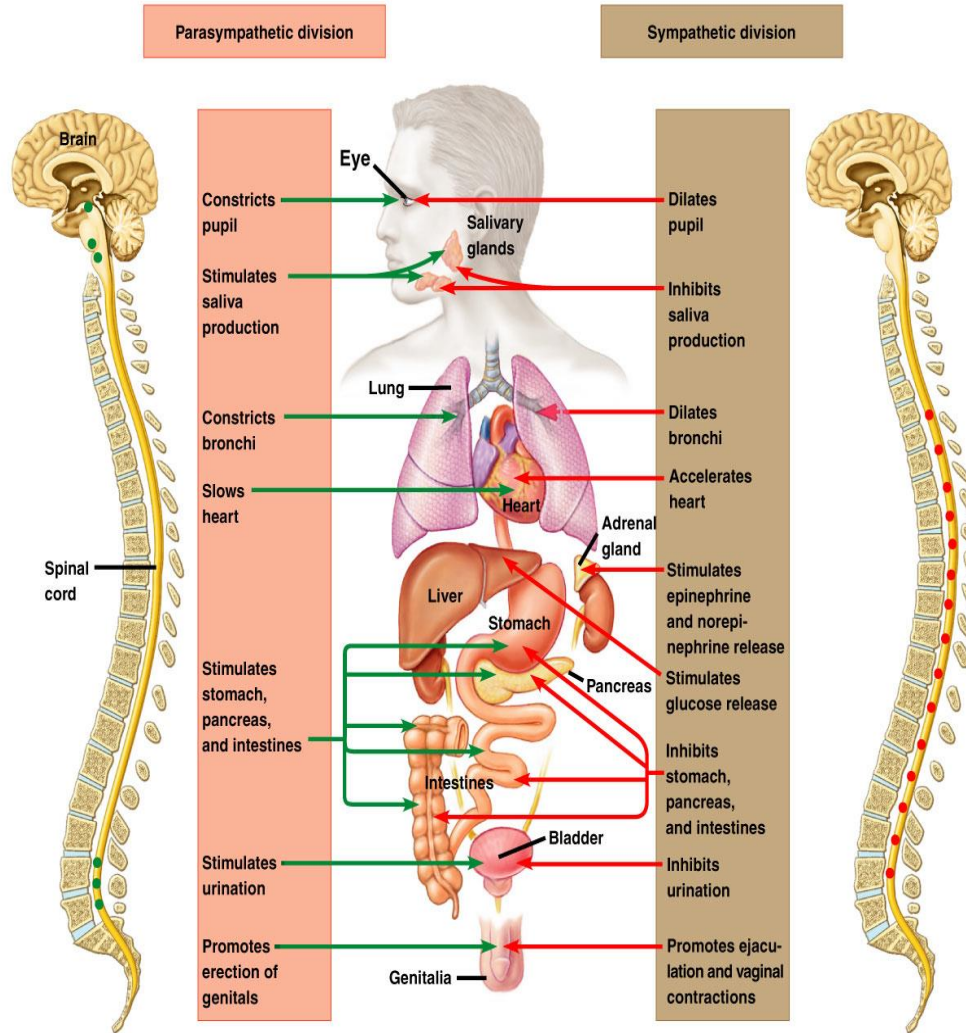
### SOCIAL STRESS



# GENERAL INTRODUCTION

## THE STRESS RESPONSE

### Autonomic Nervous System (ANS)



✓ The first system activated

✓ Prepares the body for action

✓ Sympathetic activation:

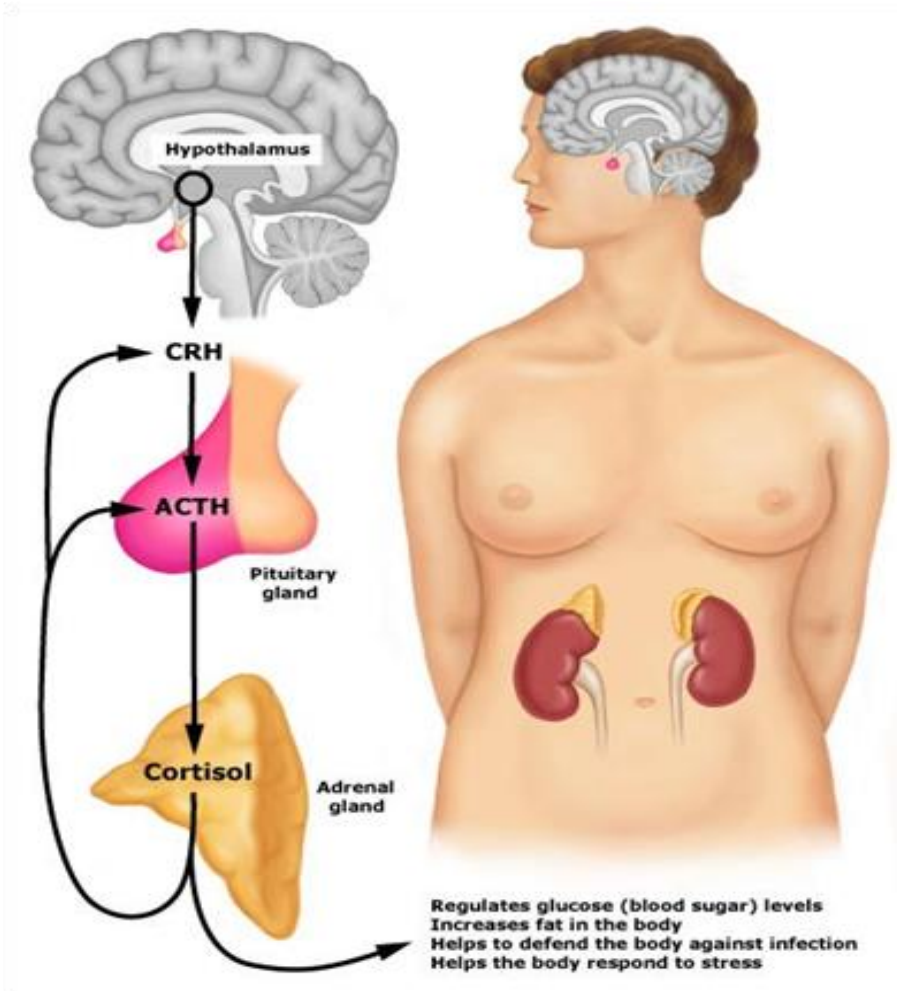
- Catecholamines secretion
- Increases in heart rate (HR)
- Decreases in heart rate variability (HRV)



# GENERAL INTRODUCTION

## THE STRESS RESPONSE

### HPA-axis



- ✓ The second system activated
- ✓ Cortisol secretion → catabolic effects  
Increases availability of energy substrates
- ✓ Negative feedback to return to baseline levels

Slower recovery after stress



Negative health consequences (Sapolsky et al., 2000)



# General Introduction

## Social Stress Response

Challenge/Threat appraisal

Individual differences:  
age, gender, sexual hormones, personality traits, previous experience



Coping styles:  
Active vs. Passive

Psychobiological and behavioral response



## Sex differences in the psychophysiological stress response

- Men higher cortisol response than women (phase of the cycle) (Childs et al., 2010, Kudielka et al., 2004 a,b)
- Women higher affective response (Childs et al., 2010, Kelly et al., 2008)
- Other authors did not find sex differences (Bouma et al., 2009; Cornelisse et al., 2011)

Other factors could moderate stress  
responsiveness?  
**Personality and coping**



# Introduction

- Trait anxiety can moderate stress reactions (stress-related diseases)
- Positive psychological traits and state (positive mood) related to reduced HPA axis reactivity

Chida and Hamer (2008):

Coping strategies:

- Active coping → Optimal activation of ANS and cortisol release after stress
- Passive coping → Inefficient activation of ANS and cortisol response after stress

Salvador (2012)





# Objectives

- ✧ To verify the two psychophysiological stress patterns hypothesized: active vs. passive coping
- ✧ To analyze the role of trait anxiety and coping style as possible adaptive mechanisms



# Methods

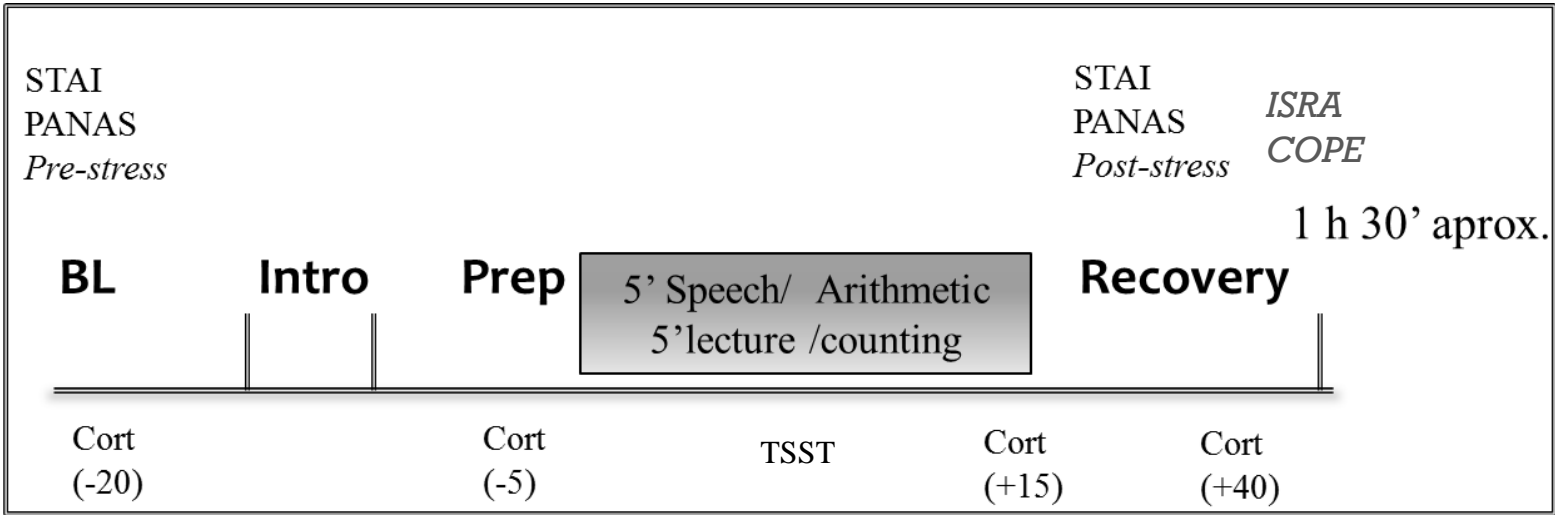
- Participants:

35 healthy young students:

- 17 women (early follicular phase)
- 18 men

- Exclusion criteria:
- Smoking > 5 cigarettes/day
  - Alcohol/drug abuse
  - Visual/hearing problems
  - Cardiovascular, endocrine, neurological, psychiatric diseases.
  - Using medication related to cardiac, emotional or cognitive function.
  - In women:
    - Irregular menstrual cycles
    - Gynecological problems

## Intra-subject design



Trier Social Stress Test (Kirschbaum et al., 1993)



## Psychological measures:

- State anxiety: (STAI, Seisdedos, 1988)
- Mood states: (PANAS, Sandin et al., 1999)
- Trait anxiety: (Situations and Responses Anxiety Inventory: ISRA, Miguel-Tobal & Cano-Vindel)
  - Cognitive
  - Physiological
  - Motor
  - Test evaluation anxiety
- Coping styles: (COPE, Carver et al., 1989)
  - 60 items – 15 scales





## Psychophysiological stress response patterns

- × Cluster 1: Low psychological reactivity (anxiety and negative mood) with moderate cortisol reactivity (15 ♂ 5 ♀)
- × Cluster 2: High psychological reactivity (anxiety and negative mood) with low cortisol reactivity (3 ♂ 12 ♀)



# Results

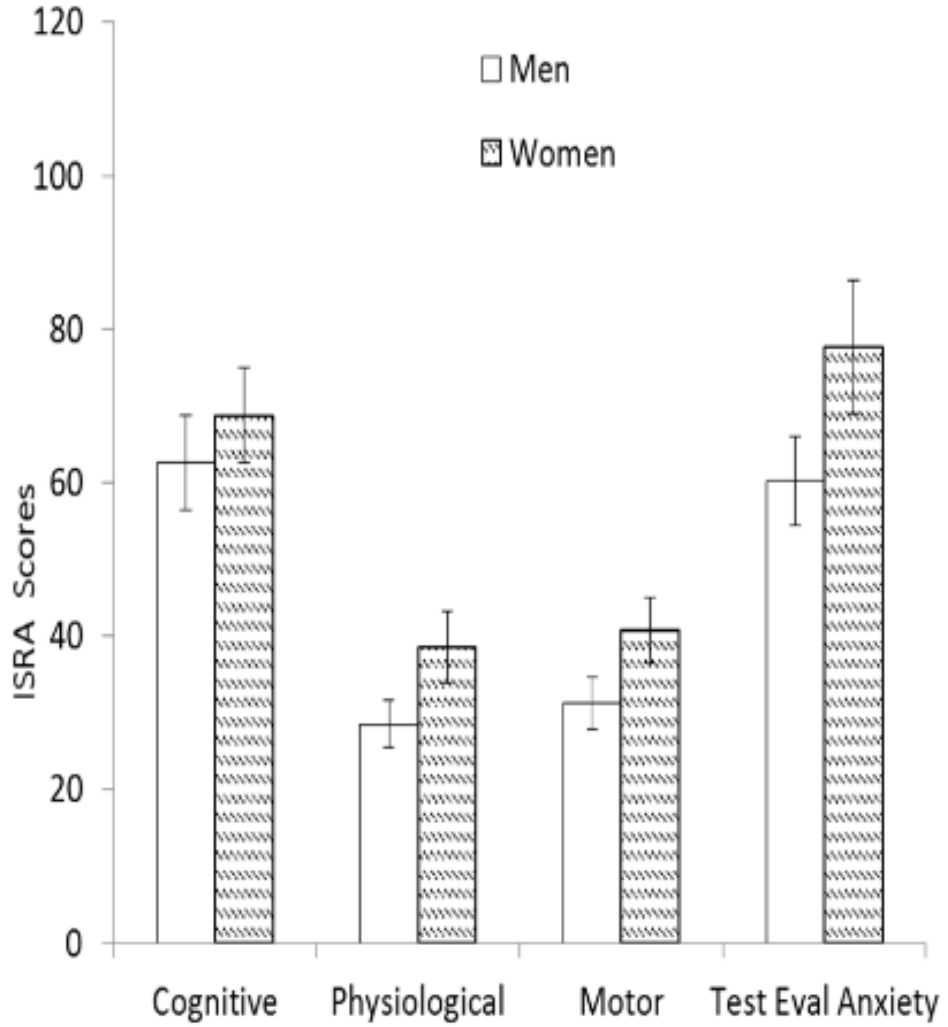
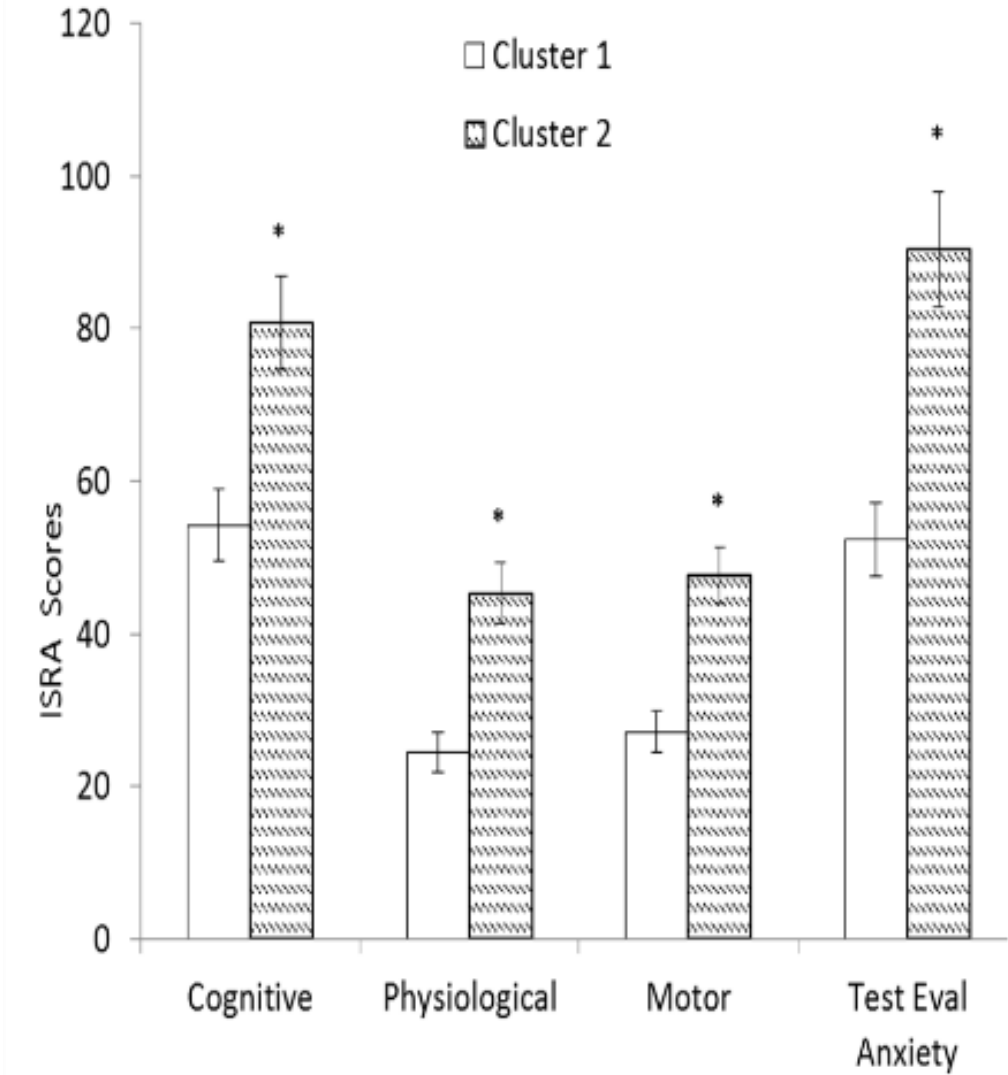
Mean scores $\pm$ SEM	Cluster 1 (N = 20)	Cluster 2 (N = 15)	ANOVA
<u>State anxiety</u>	2.16 $\pm$ 1.97	19.47 $\pm$ 2.24	F (1, 33) = 30.437, $p < 0.001$
<u>Negative mood</u>	3.10 $\pm$ 1.16	11.39 $\pm$ 1.43	F (1, 33) = 22.293, $p < 0.001$
Cortisol	7.95 $\pm$ 1.82	5.9 $\pm$ 1.14	F (1, 33) = 0.779, $p = 0.384$

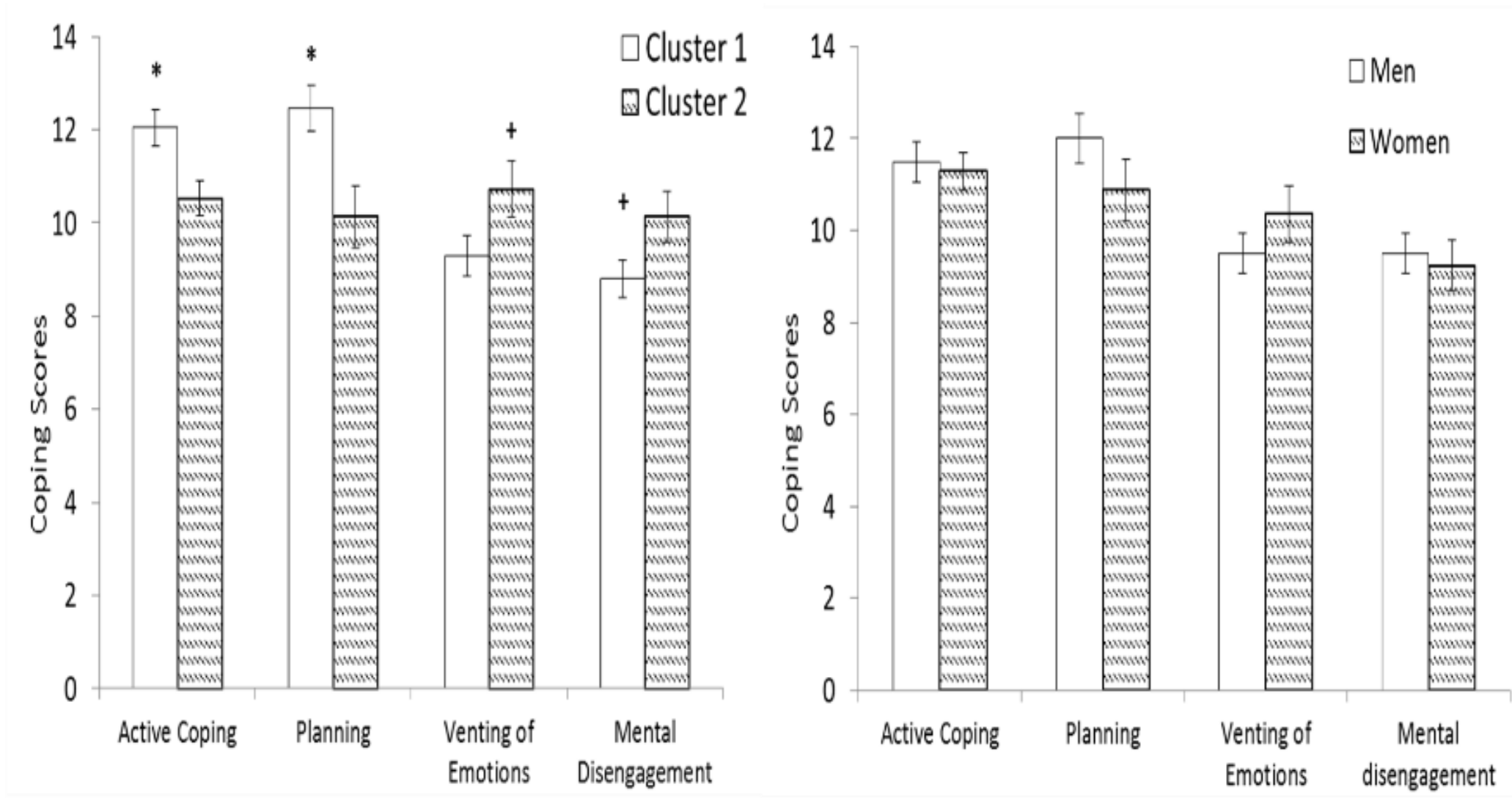
Mean scores $\pm$ SEM	Men (N =18)	Women (N =17)	ANOVA
<u>State anxiety</u>	4.94 $\pm$ 3.12	14.49 $\pm$ 2.19	F (1, 33) = 6.122, $p = 0.019$
Negative mood	5.33 $\pm$ 1.64	8.05 $\pm$ 1.54	F (1, 33) = 1.446, $p = 0.238$
Cortisol	8.08 $\pm$ 1.72	6.00 $\pm$ 1.50	F (1, 33) = 0.816, $p = 0.373$



# Results



# Results





# Conclusions

- ✓ **We have verified the two patterns hypothesized: active vs. passive coping**
  - ✓ **Cluster 1:** Lower anxiety and negative mood reaction + moderate cortisol response.
    - ✓ - trait anxiety
    - ✓ + active coping strategies
  - ✓ **Cluster 2:** greater anxiety and negative mood reaction + lower cortisol response
    - ✓ + trait anxiety (test evaluation anxiety)
    - ✓ + focused on emotions, mental disengagement

Adaptive stress  
response

Maladaptive stress  
response

**The relevance of personality characteristics in the  
adaptive stress response beyond sex**

