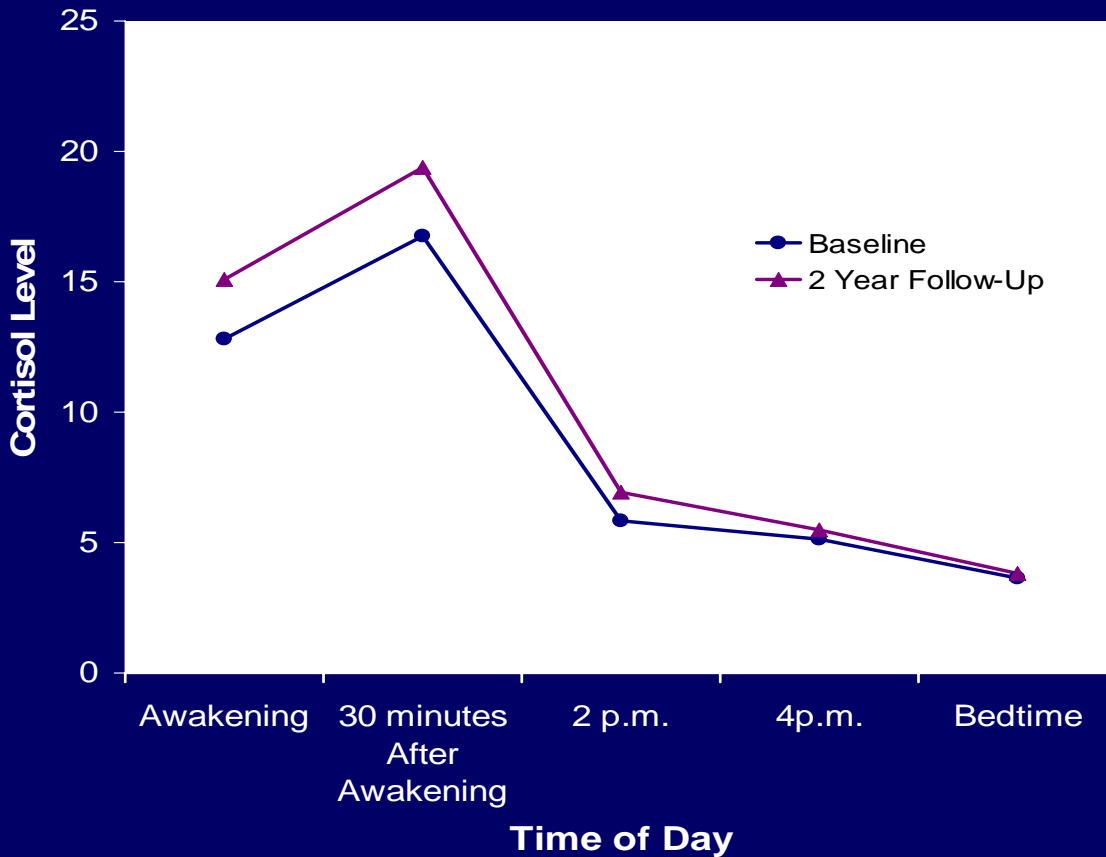


# Psychological Profiles Predicting Changes in Diurnal Cortisol Secretion in Older Adults

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# Cortisol



- Hormone produced by the hypothalamic-pituitary-adrenal (HPA) axis in response to stress
- Follows a 24 hour diurnal pattern



# Diurnal Cortisol Dysregulation

- Can effect individuals' immune responses & pose serious threats to long-term health (*Heim, Ehlert, & Hellhammer, 2000; Phillips et al., 2005*)
  
  - Can take on many forms (*Miller, Chen, & Zhou, 2007; Sternberg, 1990*)
    - Elevated Levels
      - Cardiovascular disease, diabetes, & hypertension
  
    - Blunted Levels
      - Long term chronic stress can lead to below normal or blunted levels of cortisol secretion (*Miller, Cohen, & Ritchey, 2002*)
      - Autoimmune diseases (i.e., rheumatoid arthritis)
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# Cortisol Secretion & Aging

- Cortisol secretion typically increases as a function of age (*Otte et al., 2005*)
    - Age may diminish the body's ability to bring cortisol levels back to baseline following a stressor (*Sapolsky, 1992*)
    - However, psychosocial factors may moderate these increases in cortisol secretion in older adults
      - Positive affect has been associated with cortisol secretion levels in older adults (*Simpson et al., 2008*)
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# Moderators of Age Effects: Positive Affect

- The relationship between positive affect (PA) and cortisol secretion is mixed
  - PA has been associated with lower cortisol concentrations in women (*Polk et al., 2005*)
  - Extreme PA has been associated with increases of cortisol secretion in healthy males (*Huber, Moller, & de Jong-Meyer, 1993*)
  - High variability of PA has been associated with higher evening cortisol concentrations in older adults (*Simpson, et al., 2008*)



# Moderators of Age Effects: Perceived Stress

- Distress is usually associated with elevated levels of cortisol secretion
  - Older adults with high levels of perceived stress also had higher levels of cortisol secretion (*Goldman et al., 2005*)
  - Adults with high levels of perceived stress experienced elevated diurnal cortisol secretion throughout the day (*van Eck & Nicolson, 1994*)



# Moderators of Age Effects: Social Support

- High levels of social support is usually associated with lower levels of cortisol secretion
  - Intimacy has been associated with significantly reduced levels of cortisol secretion in adults (*Ditzen, Hoppmann, & Klumb, 2008*)
  - Adaptive coping aimed at support seeking was associated with lower overall levels of cortisol in older adults (*O'Donnell, Badrick, Kumari, & Steptoe, 2008*)

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# Rationale

- Previous research provides some evidence to support these variables as moderators for increases in older adults' diurnal cortisol secretion
  - However no research to date has examined the levels of cortisol secretion among older adults with maladaptive psychological profiles
  - It is unclear whether it is those older adults with these psychological profiles that will experience increases in diurnal cortisol secretion
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# Present Study

1. Cortisol secretion increases over time for older adults
  2. Maladaptive psychological profiles characterized by low positive affect, high perceived stress, and low social support quality will lead to increased cortisol secretion over time in older adults
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# Present Study: Methodology

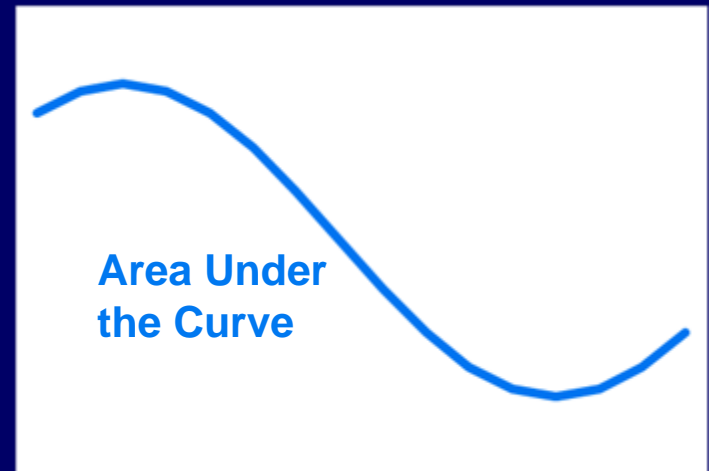
- 2-year longitudinal study
  - Participants
    - 215 older adults ( $M = 72$  yrs,  $SD = 5.9$ ,  $range = 63-94$ )
  - Self-Report Measures Assessed at Baseline
    - Positive Affect (PANAS; *Watson et al., 1988*)
    - Perceived Stress (*Cohen et al., 1983*)
    - Social Support Satisfaction (*Sarason et al., 1983*)
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# Measurement of Cortisol Secretion

## □ Cortisol

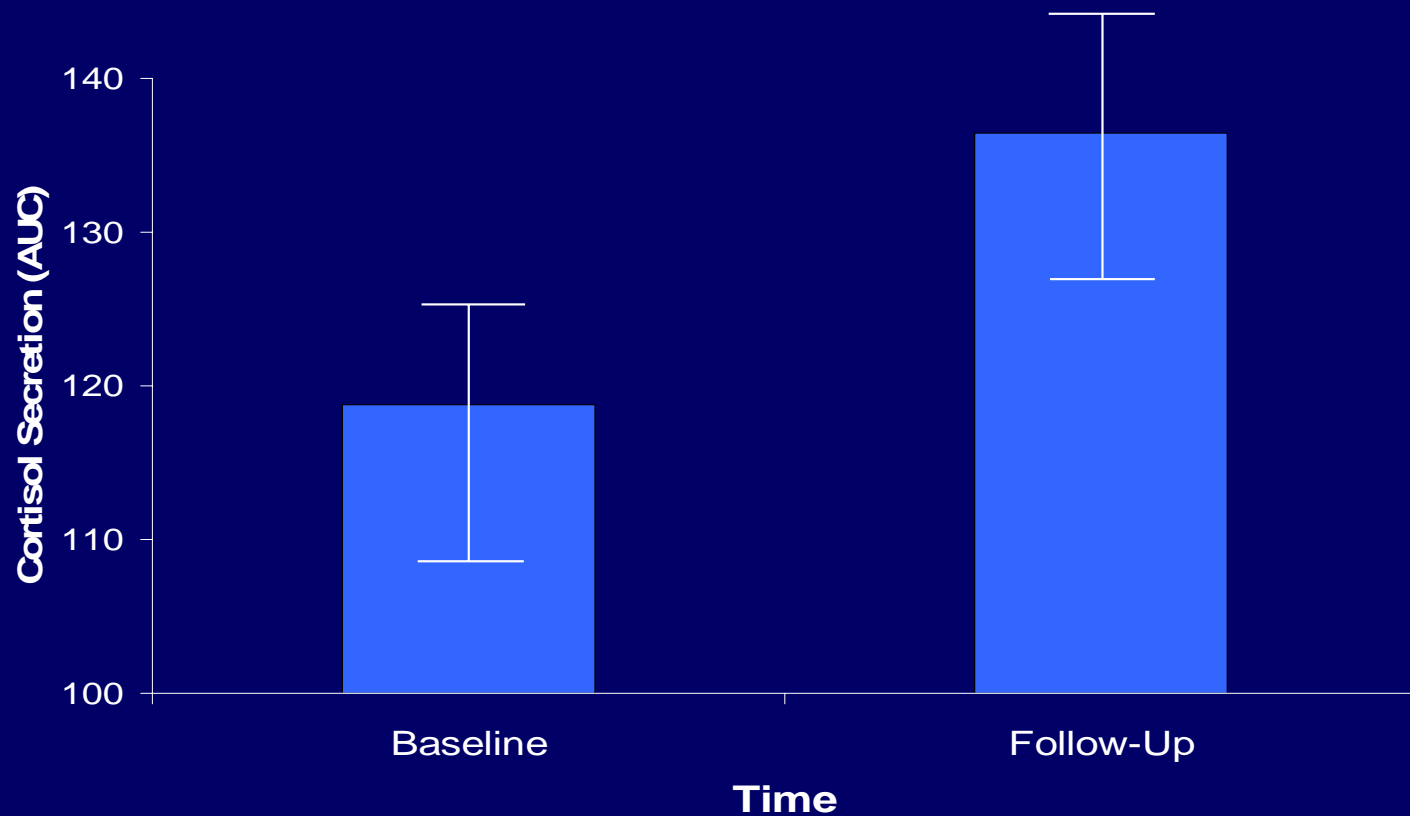
- Cotton swab 5X/day:
  - Awakening
  - + 30 minutes
  - 2 p.m.
  - 4 p.m.
  - Before bed
- 3 non-consecutive days
- Baseline & 2 year follow-up

- Area under the curve (AUC)
- Residualized change score





# Longitudinal Patterns of Cortisol Secretion



$t(1,178) = -3.548, p < 0.001$



# Regression Analysis

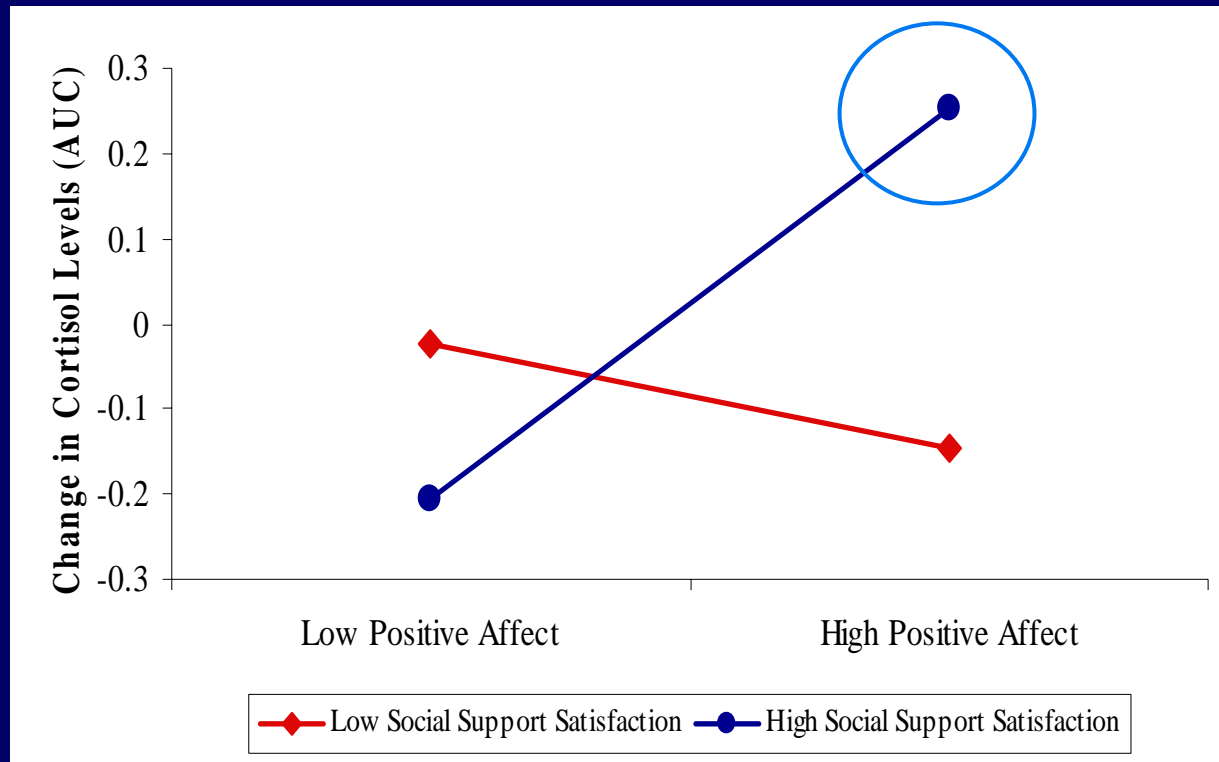
## Predicting Cortisol Secretion

Predictors	Change in cortisol (AUC)	
	$R^2$	$\beta$
<u>Main Effects</u>	0.02	
Positive Affect (PA)	0.00	0.07
Perceived Stress (PS)	0.01	-0.12
Social Support Satisfaction (SSQS)	0.00	0.04
<u>Interactions</u>	0.12	
PA x PS	0.04*	-0.27*
PA x SSQS	0.03*	0.20*
PA x PS x SSQS	0.04*	-0.45*

*Note:* Results were controlled for sex, age, socioeconomic status, functional health status, chronic illness and medication

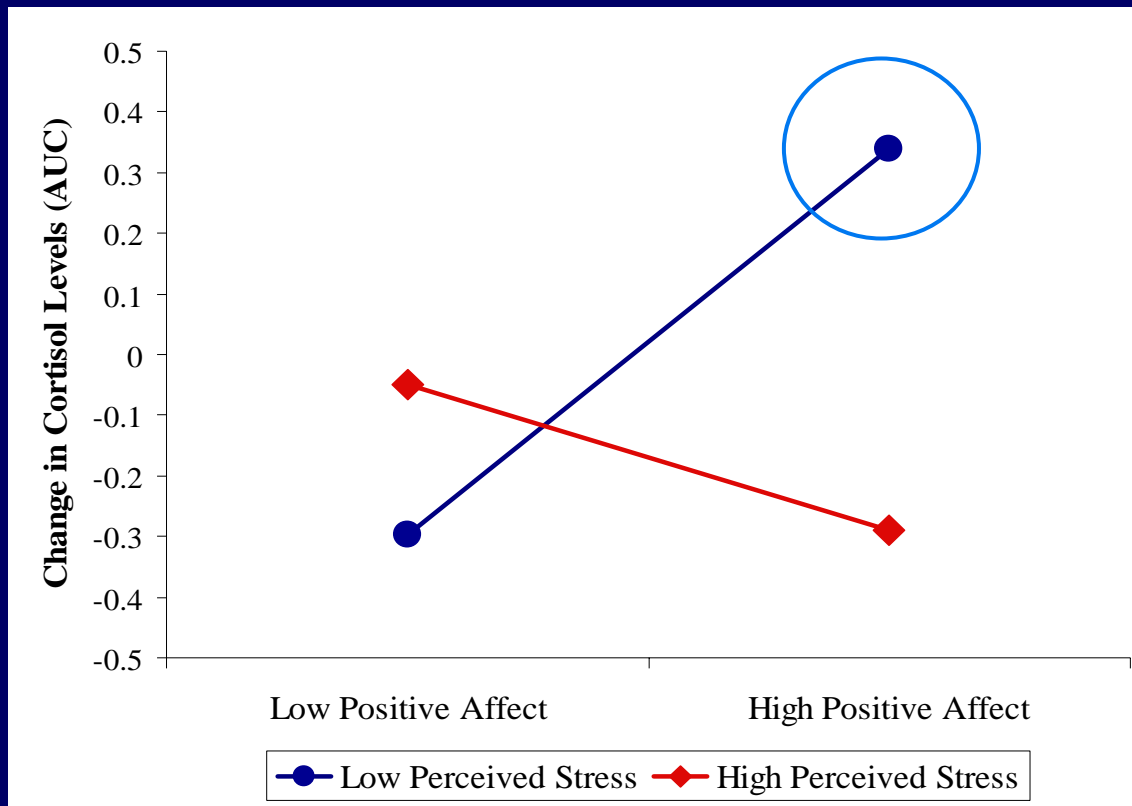
\* $p < 0.05$

# 2-Way Interaction: PA X SSQS



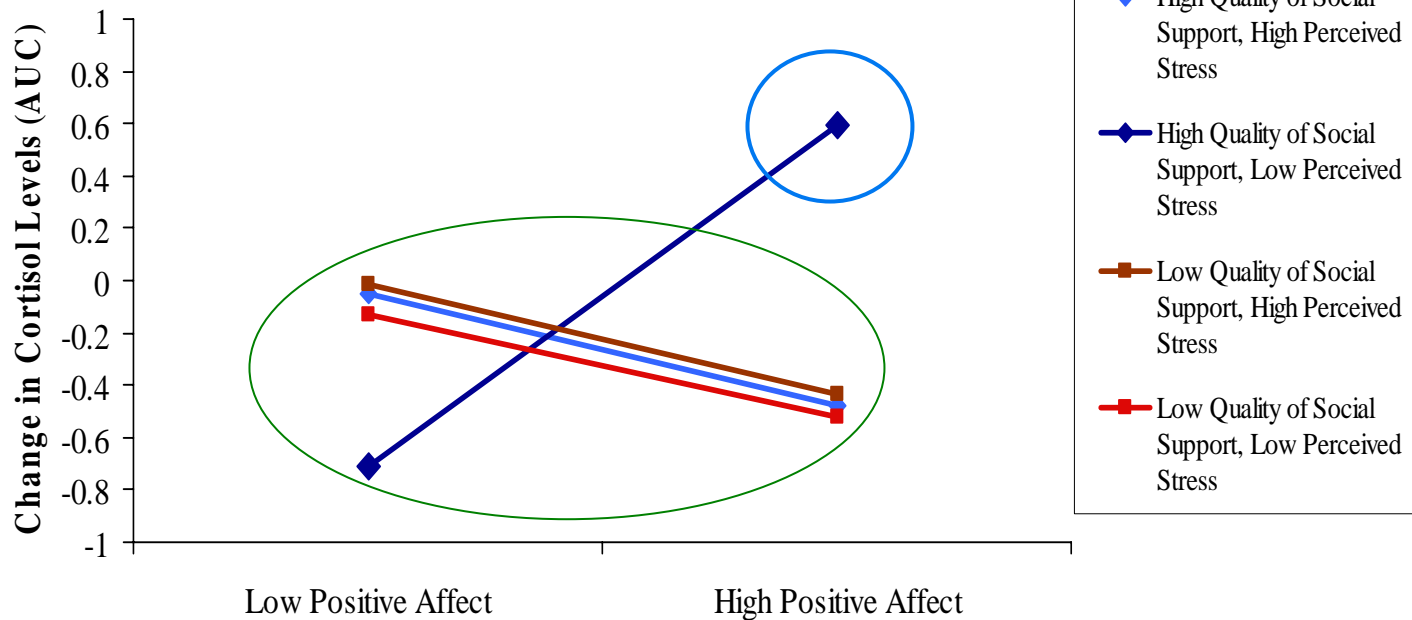
$F(1,161) = 4.858, p < 0.05$

# 2-Way Interaction: PA X PS



$F(1,159) = 7.05, p < 0.05$

# 3-Way Interaction: PA X PS X SSQS



$F(1, 158) = 5.00, p < 0.05$



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## Could Extremely Positive Psychological Profiles be Maladaptive?

- Extreme levels positive affect can be associated with biological dysregulation and physical health (*Cohen & Pressman, 2005*)
    - Positive affect seems to have a curvilinear association with health outcomes (*Cohen & Pressman, 2005*)
    - Under-reporting of symptoms
      - High positive affect associated with decreased reported cold symptomatology despite objective presence of a cold (*Cohen et al., 2003*)
    - Lack of adherence to treatments
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# Could Low Levels of Cortisol Secretion be Maladaptive?

- Those who show the smallest increases or relative decline could rebound to below normal levels of cortisol secretion
  - Patients suffering from PTSD show reduced cortisol secretion (*Yehuda, Resnick, Kahana, & Giller, 1993*)
  - Hypocortisolism has been reported for people experiencing chronic stress, such as chronic fatigue syndrome and fibromyalgia (*Demitrak et al., 1991, Boisset-Piorro, Esdaile, & Fitzcharles, 1995*)

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# Future Studies

- Examine health behaviours and the long-term physical health of individuals with extremely positive psychological profiles
  - Identify whether the different groups of individuals are experiencing some form of long-term chronic stress
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