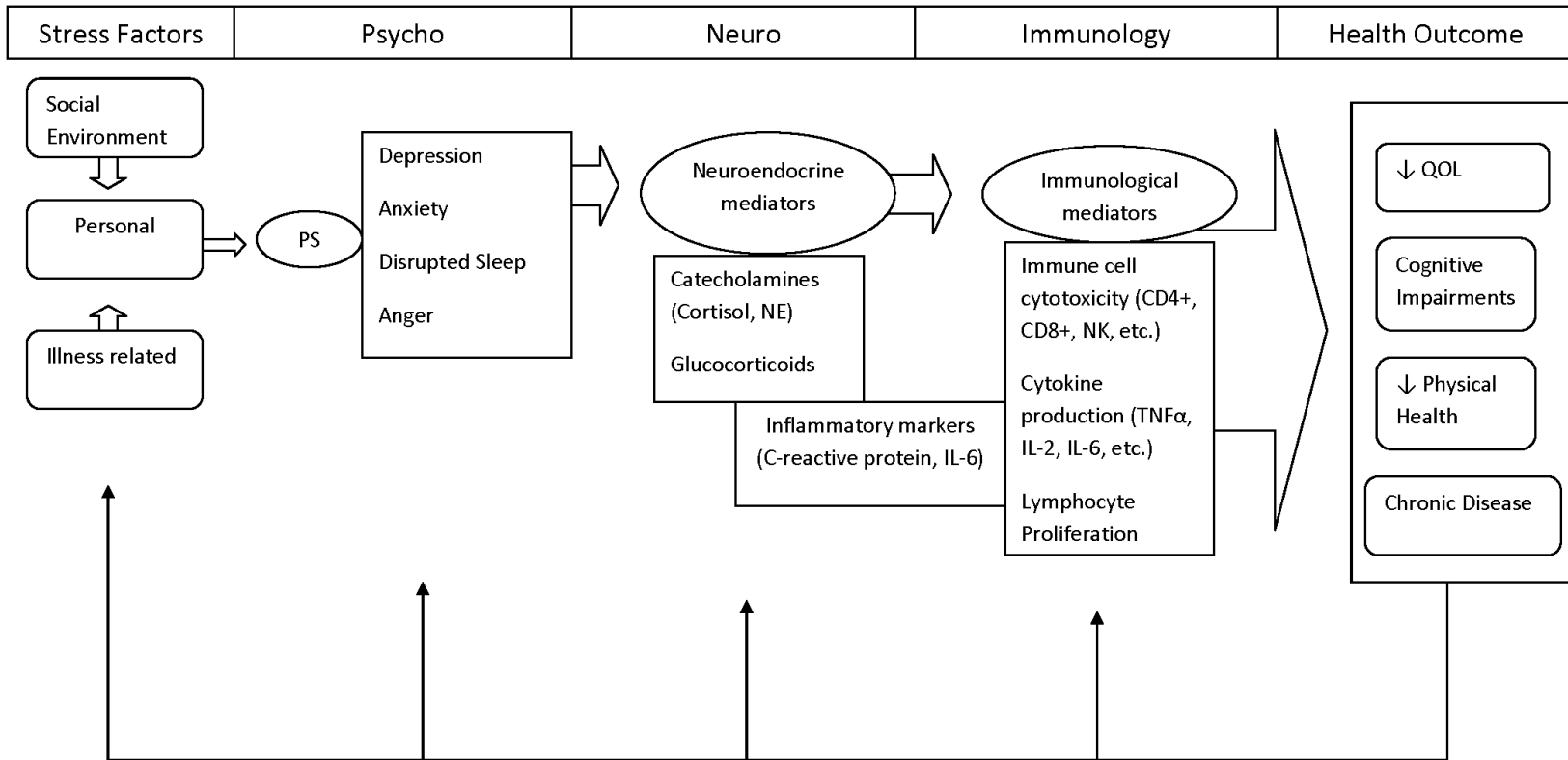# Association of psychological and physiological stress in HIV-infected individuals.

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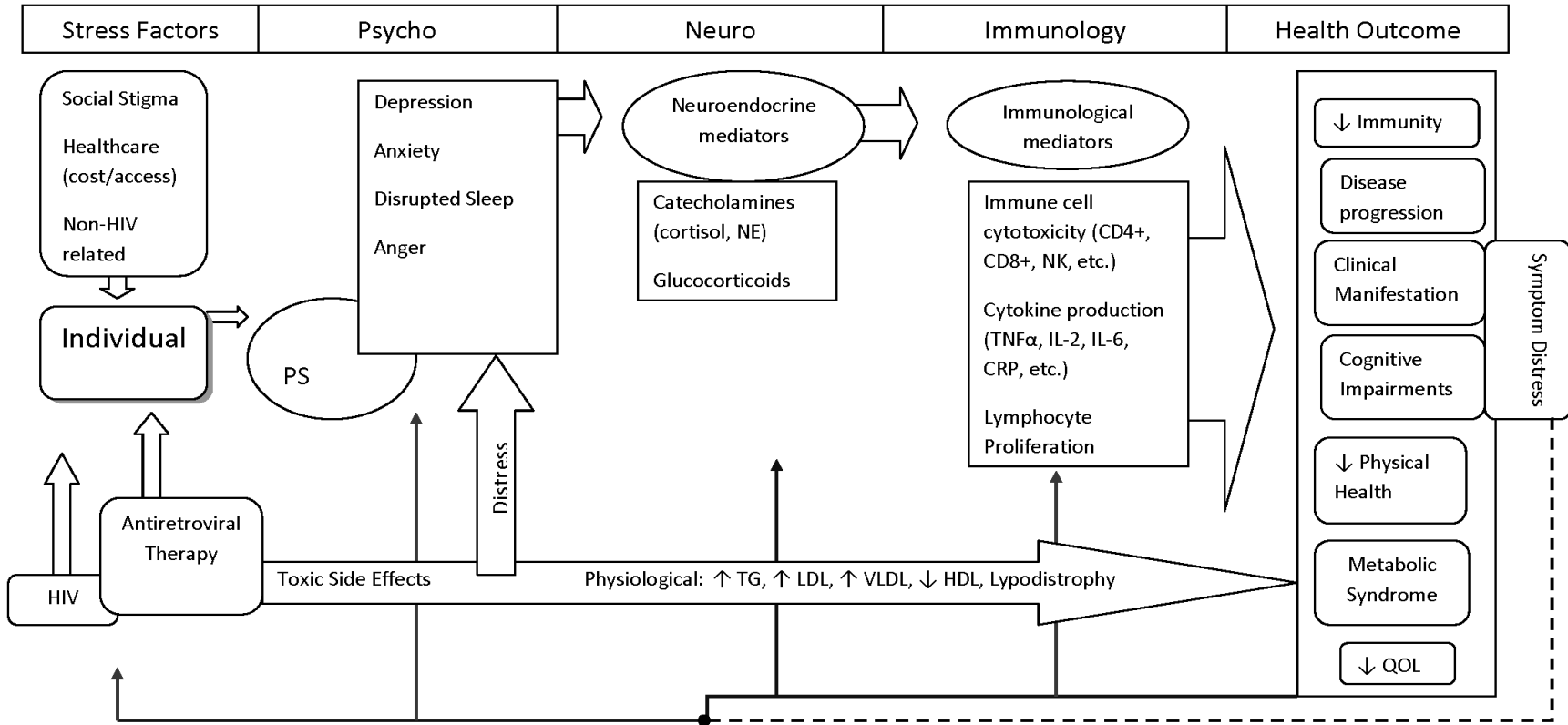Arnold School of Public Health
Dept. of Exercise Science

PNI based model of stress related effects on general health[*]

| Stress Factors | Psycho | Neuro | Immunology | Health Outcome |

Stress Factors
- Social Environment
- Personal
- Illness related

Psycho
PS
- Depression
- Anxiety
- Disrupted Sleep
- Anger

Neuro
- Neuroendocrine mediators
- Catecholamines (Cortisol, NE)
- Glucocorticoids
- Inflammatory markers (C-reactive protein, IL-6)

Immunology
- Immunological mediators
- Immune cell cytotoxicity (CD4+, CD8+, NK, etc.)
- Cytokine production (TNFα, IL-2, IL-6, etc.)
- Lymphocyte Proliferation

Health Outcome
- ↓ QOL
- Cognitive Impairments
- ↓ Physical Health
- Chronic Disease

PS: Perceived stress; NE: Norepinephrine; NK: Natural Killer cells; IL: Interleukin; TNFα: Tumor necrosis factor; QOL: Quality of Life

[*]Figure modified from McCain et al. (2005)

PNI based model of stress related effects on HIV infection and antiretroviral treatment. *

Stress Factors	Psycho	Neuro	Immunology	Health Outcome

Social Stigma

Healthcare (cost/access)

Non-HIV related

Individual

PS

HIV

Antiretroviral Therapy

Depression

Anxiety

Disrupted Sleep

Anger

Distress

Toxic Side Effects

Neuroendocrine mediators

Catecholamines (cortisol, NE)

Glucocorticoids

Immunological mediators

Immune cell cytotoxicity (CD4+, CD8+, NK, etc.)

Cytokine production (TNFα, IL-2, IL-6, CRP, etc.)

Lymphocyte Proliferation

Physiological: ↑ TG, ↑ LDL, ↑ VLDL, ↓ HDL, Lypodistrophy

↓ Immunity

Disease progression

Clinical Manifestation

Cognitive Impairments

↓ Physical Health

Metabolic Syndrome

↓ QOL

Symptom Distress

PS: Perceived stress; NE: Norepinephrine; NK: Natural Killer cells; IL: Interleukin; TNFα: Tumor necrosis factor; CRP: C - reactive protein; TG: Trigylcerides; LDL: Low-density lipoproteins; VLDL: Very-low density lipoproteins; HDL: High-density lipoproteins; QOL: Quality of Life

*Figure modified from McCain et al. (2005)

Demographic characteristics of HIV-infected males and females (N=104)

Gender n (%)		Marital Status (%)	
Male	84 (80.6)	Married	64 (61.5)
Female	20 (19.4)	Single	10 (9.6)
		Living with sig. other	10 (9.6)
		Seperated	5 (4.8)
		Divorced	9 (8.7)
Mean age (range)	42 (23-66)	Widowed.	3 (2.9)
		No answer	3 (2.9)

Race n (%)		Income	
African-American	74 (70.3)	$0 - $4,999	21 (20.2)
Caucasian	24 (23.8)	$5,000 - $9,999	13 (12.5)
Asian	2 (2)	$10 - $19,999	18 (17.3)
Other	4 (4)	$20,000 - $29,999	12 (11.5)
		$30,000 - $39,999	11 (10.6)
		$40,000 - $49,999	8 (7.7)
		$50,000 +	5 (4.8)
HIV Status n (%)		N/A or Declined	16 (15.3)
HIV +, asymptomatic	66 (63.4)		
HIV+, symptomatic	13 (12.5)		
AIDS	22 (21.2)		
No answer	3 (2.9)		
		Mean CD4+ Cell count (range)	430.38 (7 − 900)

Taking ART n (%)	
Yes	70 (67.3)
No	13 (12.5)
No answer	21 (20.2)

Data Collection

- Psychometrics
  - Perceived Stress Scale (PSS)
  - Spielberger's state anxiety inventory(SAI)
  - Symptom Distress Scale (SDS)
    - Sub-scales
      - Symptom Frequency
      - Distress

- Waking Cortisol
  - Area under the curve determined using 3 time points
    - Wake
    - Wake +1 hour
    - Wake +2 hour

Results

		PSS	SAI	Symp	Dis	Cortisol
PSS	r value	1.00	.557**	.413**	.382**	0.07
	p value		0.00	0.00	0.00	0.83
SAI	r value	.557**	1.00	.244*	0.17	-0.03
	p value	0.00		0.01	0.09	0.42
Symptom	r value	.413**	.244*	1.00	.821**	0.56*
	p value	0.00	0.01		0.00	0.04
Distress	r value	.382**	0.17	.821**	1.00	0.34
	p value	0.00	0.09	0.00		0.31
Waking Cortisol	r value	0.07	-0.03	0.56*	0.34	1.00
	p value	0.83	0.42	0.04	0.31	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Conclusion

These data indicate that physiological and perceived stress are strongly associated with HIV-related symptoms. Only perceived stress was associated with symptom distress. Further, there was not an association between perceived stress and physiological stress.

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