



## SUSTAINING WELLNESS: STRESS, COPING, IMMUNITY & RESILIENCE

**Christopher Fagundes, Ph.D.**

Associate Professor, Department of Psychological Sciences, Rice University

Courtesy Appointments: Department of Psychiatry, Baylor College of Medicine; Behavioral Science, MD Anderson Cancer Center; Department of Psychology, University of Houston; UT Health Sciences, Institute for Stroke & Cardiovascular Disease

[glasscock.rice.edu/openrice](http://glasscock.rice.edu/openrice) | [openrice@rice.edu](mailto:openrice@rice.edu)



### No conflicts of interest



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## Mind-body connection

- *“Psyche and body react sympathetically to each other, it seem to me. A change in the state of the psyche produces a change in the structure of the body, and, conversely, a change in the structure of the body produces a change in the state of the psyche”*

Aristotle, Physiognomica

The screenshot shows the top portion of a Discover magazine article. At the top, the Discover logo is visible along with navigation links for 'THE SCIENCES | MIND | TECHNOLOGY | HEALTH | ENVIRONMENT | PLANET EARTH'. Below this is a promotional banner for 'Discover 70% OFF + FREE GIFT'. The article title is 'Can Stress, Loneliness and Sleep Deprivation Make You More Prone to COVID-19?'. A sub-headline reads: 'Scientists know these factors can take a toll on your immune system. In turn, they may weaken your ability to fight off the novel coronavirus.' The byline is 'By Amy Orlovic | March 25, 2020 12:53 PM'.



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## Major modifiable risk factors for depression

```

graph LR
    A["Poor Diet  
Impaired Sleep  
Reduced Physical Activity"] --> B["Neuroprogression  
Immuno-inflammation  
Neurotransmitter Imbalances  
Oxidative & Nitrosative Stress  
HPA Imbalances  
Mitochondrial Disturbances"]
    B --> C["Major Depressive Disorder"]
    C --> A
  
```

Lopresti, A. L., Hood, S. D., & Drummond, P. D. (2013). A review of lifestyle factors that contribute to important pathways associated with major depression: diet, sleep and exercise. *Journal of affective disorders*, 148(1), 12-27.

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## Additional risk factors for depression

- Early adversity
- Lifetime traumas
- Genetic predisposition
- History of depression
- **Exposure to recent stressful life event**
  - Stress → depression (also comorbid)
- **Excessive alcohol consumption**
- **Helplessness, inability to control external environment**
- **Rumination**
- **Lack of structure/routine**
- **Social Isolation**

Muñoz, R. F., Cuijpers, P., Smit, F., Barrera, A. Z., & Leykin, Y. (2010). Prevention of major depression. *Annual review of clinical psychology*, 6, 181-212.

Lopresti, A. L., Hood, S. D., & Drummond, P. D. (2013). A review of lifestyle factors that contribute to important pathways associated with major depression: diet, sleep and exercise. *Journal of affective disorders*, 148(1), 12-27.

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## COVID-19 Prevention Recommendations—especially for high risk groups

- Social distancing recommendations
  - Stay at home as much as possible
  - Do not let people in your home that you do not live with
  - Stay six feet away from other people, with a mask, if you need to go leave your home

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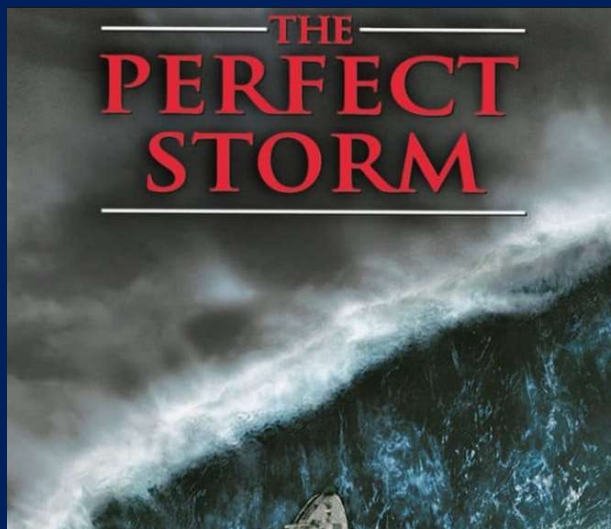
## We have a problem


- There is a world-wide pandemic
  - Major life stressor 
- I can do little to modify the course of this stress
  - Helplessness 
- To stay safe, I need to
  - Socially isolate 
  - Loneliness 
  - Stay relatively sedentary 

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## What do I do with all of this time?

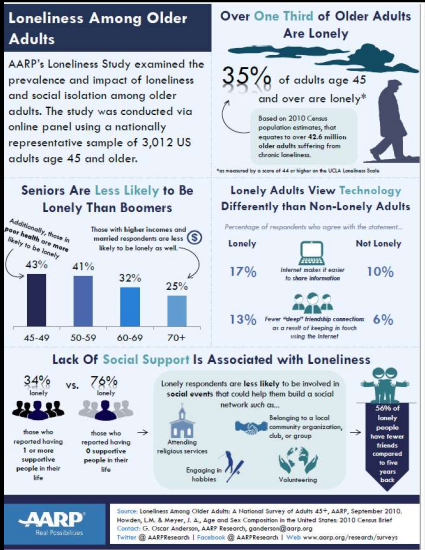
- “It is 11 a.m., I have nothing to do, I’ll have my first glass of wine today”
  - Excessive alcohol use 
- “It is 12:30 p.m., I have nothing to do, I guess I will take a nap” 
  - Lack of routine
  - Dysregulated sleep
- Lots of time on my hands
  - Rumination 





# Social Isolation

- Social isolation
  - Depression
  - Anxiety
  - Cardiovascular disease
  - Stroke
  - Mortality (equivalent to smoking)
  - Immunogenic tumors
  - Colds/viruses



**Loneliness Among Older Adults**

AARP's Loneliness Study examined the prevalence and impact of loneliness and social isolation among older adults. The study was conducted via online panel using a nationally representative sample of 3,012 US adults age 45 and older.

**Over One Third of Older Adults Are Lonely**

35% of adults age 45 and over are lonely\*

Based on 2010 Census population estimates, that equates to over 42.6 million older adults suffering from chronic loneliness.

\*As measured by a score of 44 or higher on the UCLA Loneliness Scale

**Seniors Are Less Likely to Be Lonely Than Boomers**

Additionally, those in poor health are more likely to be lonely

Age Group	Lonely
45-49	43%
50-59	41%
60-69	32%
70+	25%

Those with higher incomes and essential respondents are less likely to be lonely as well.

**Lonely Adults View Technology Differently than Non-Lonely Adults**

Percentage of respondents who agree with the statement...

Statement	Lonely	Not Lonely
Internet makes it easier to share information	17%	10%
Fewer "help" knowledge connections as a result of spending too much using the internet	13%	6%

**Lack of Social Support Is Associated with Loneliness**

Lonely respondents are less likely to be involved in social events that could help them build a social network such as...

- Attending religious services
- Belonging to a local community organization, club, or group
- Engaging in hobbies
- Volunteering

34% lonely vs. 76% lonely

Items who reported having 1 or more supportive people in their life


Items who reported having 0 supportive people in their life

56% of lonely people have fewer friends compared to five years ago

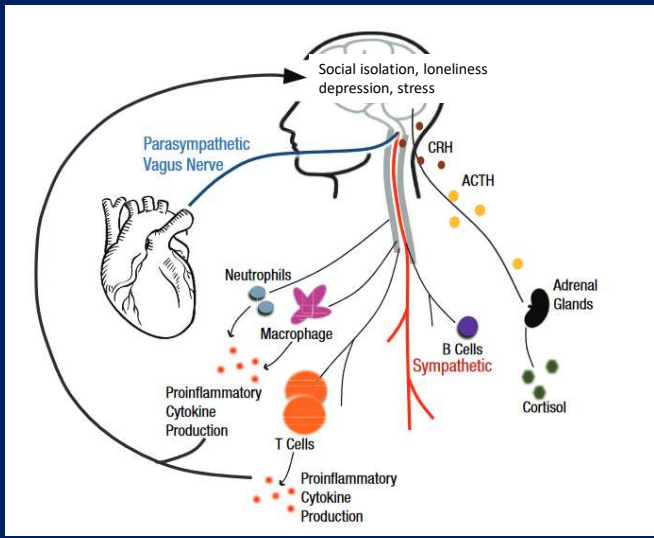
**AARP**  
Real Possibilities

Source: Loneliness Among Older Adults: A National Survey of Adults 45+. AARP, September 2010. Howden, L.M. & Meyer, J. A. Age and Sex Composition in the United States: 2010 Census Brief. Current: C. David Anderson, AARP Research, gandersd@aarpp.org. Twitter: @AARPFResearch | Facebook: @AARPFResearch | Web: www.aarp.org/research/surveys

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# Stress and Immunity



Social isolation, loneliness, depression, stress

CRH

ACTH

Adrenal Glands

Cortisol

Sympathetic

B Cells

T Cells

Proinflammatory Cytokine Production

Parasympathetic Vagus Nerve

Neutrophils

Macrophage

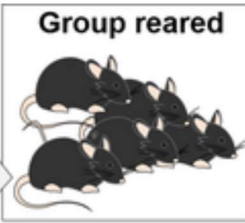
Proinflammatory Cytokine Production

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## Social Isolation & virus

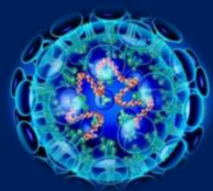
**Group reared**



**Isolation reared**



**Virus**



- Isolated
  - Longer duration of illness
  - Shortened incubation time

Clausing, P., Bocker, T., Diekgerdes, J., Gärtner, K., Güttner, J., Haemisch, A., ... & Weimer, A. (1994). Social isolation modifies the response of mice to experimental Mengo virus infection. *Journal of experimental animal science*, 36(2-3), 37-54.

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## Cohen's cold studies

Large scale prospective experimental investigations  
of stress and the common cold

PSS=social support

•PSS  
•Life events  
•Mood

→

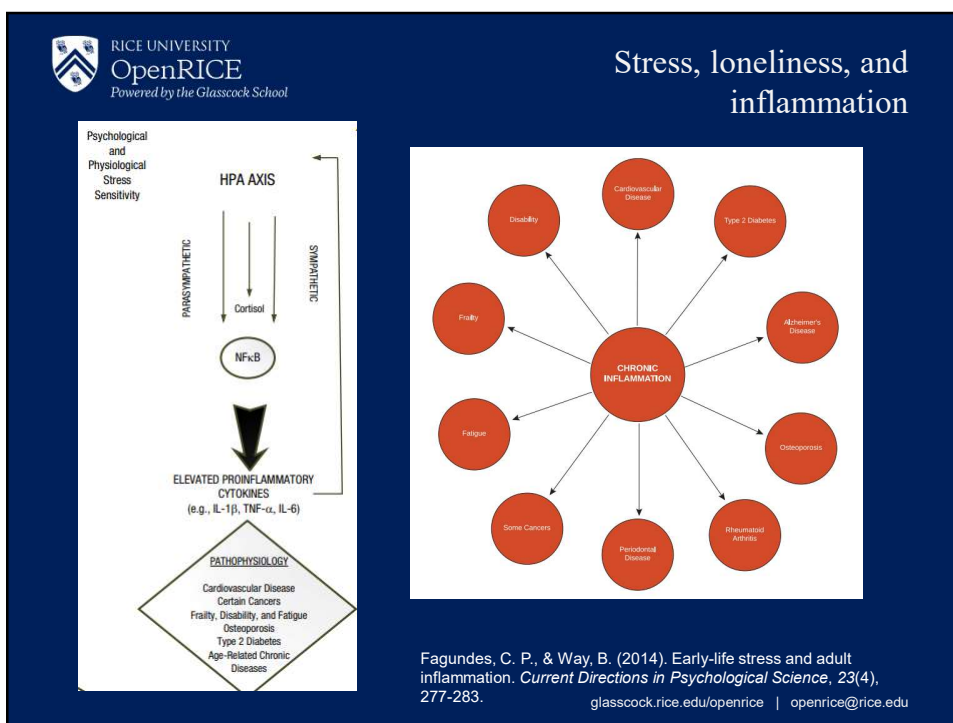
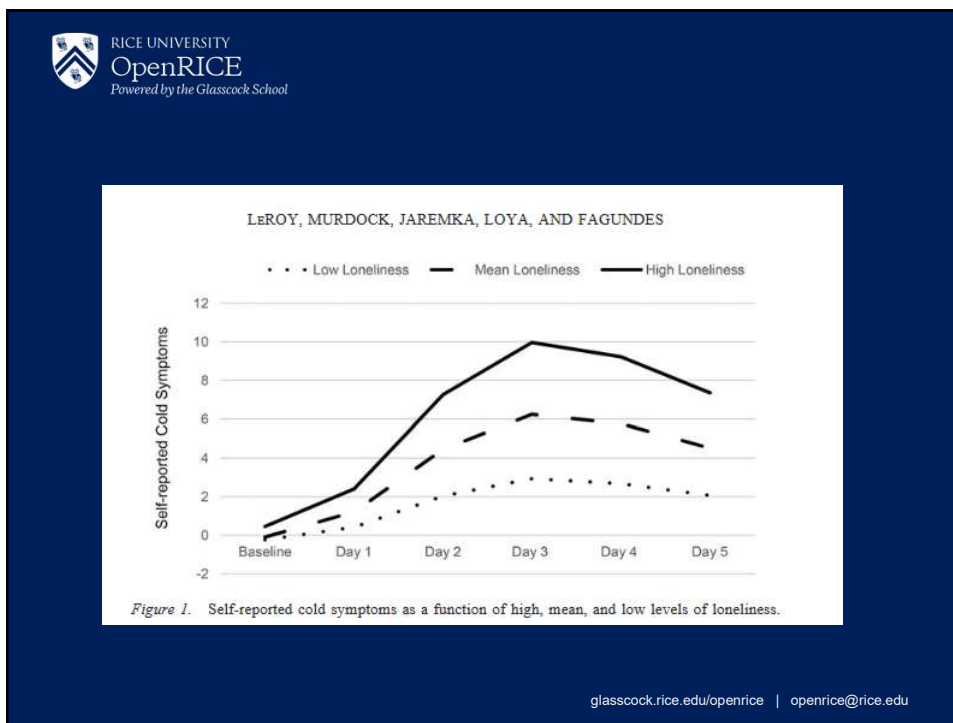
Exposed to  
cold virus

→

•Replicated  
virus  
•Clinical  
symptoms

Age, gender, weight, ethnicity, season, smoking, alcohol, diet  
exercise, sleep not related to stress and illness

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**PSYCHOSOCIAL AND BIOLOGICAL PHENOTYPES**

Factors include: No Previous Illnesses, Positive Childhood Environments, CNS (PNS and Endocrine System), LPS, Proinflammatory Cytokines, Comorbid Illnesses, and Childhood Adversity. These lead to health and behavior changes.

**INDIVIDUALS INFECTED WITH SARS-COV-2**

**IMMUNE RESPONSE**  
Immune cells recognize the coronavirus, and the innate immune system is activated. In turn, a proinflammatory response is mounted by monocytes and macrophages. Eventually, the adaptive immune system is activated, and anti-virus antibodies are produced, which can neutralize the virus and promote patient recovery. During this period in a disease time course, patients will typically exhibit symptoms like high fever, cough, fatigue, breathing problems (severe cases).

**CORONAVIRUS DISEASE OUTCOMES**

**PATIENT RECOVERS.**  
Proinflammatory response subsides as the virus is contained and the body heals and recovers. **RECOVERY**

**PATIENT EXPERIENCES CYTOKINE STORM.**  
Proinflammatory cytokine response persists. Patient is at heightened risk of morbidity and mortality. **CYTOKINE STORM**

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## Stress, loneliness, and inflammation

**a**

Time	Low Loneliness (TNF-α)	High Loneliness (TNF-α)
Before Stress	~68	~68
45 Min After Stress	~68	~68
2 Hr After Stress	~68	~72

**b**

Time	Low Loneliness (IL-6)	High Loneliness (IL-6)
Before Stress	~142	~142
45 Min After Stress	~135	~142
2 Hr After Stress	~140	~150

**c**

Time	Low Loneliness (IL-1β)	High Loneliness (IL-1β)
Before Stress	~64	~64
45 Min After Stress	~65	~71
2 Hr After Stress	~70	~78

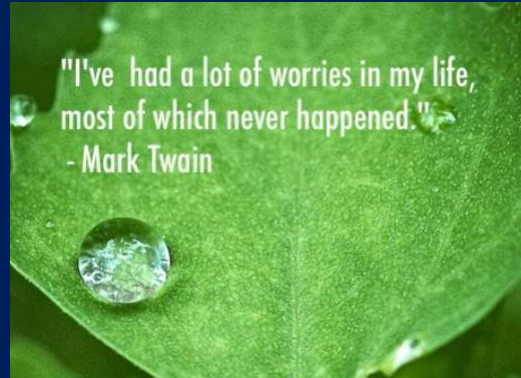
Jaremka, L. M., Fagundes, C. P., Peng, J., Bennett, J. M., Glaser, R., Malarkey, W. B., & Kiecolt-Glaser, J. K. (2013). Loneliness promotes inflammation during acute stress. *Psychological Science*, 24(7), 1089-1097.

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## Worry time

- Buffers
  - Rumination
  - Sleep problems
  - Feelings of helplessness



## Stay connected


- Buffers
  - Loneliness



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## Stay active as much as possible

- Buffers
  - Sedentary lifestyle's impact on depression



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## Try cognitive or “third wave” intervention techniques

**A** • Activating Event



**B** • Belief

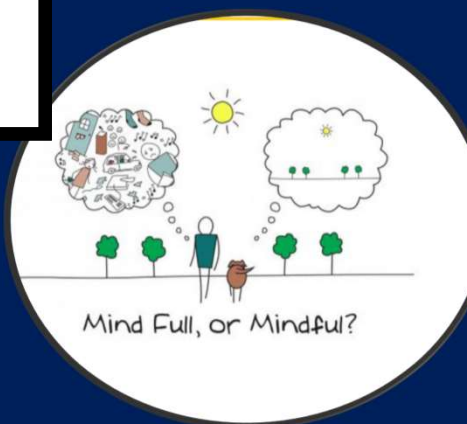
**C** • Consequences

<p><b>All or nothing thinking</b></p> <p>Sometimes called 'black and white thinking'</p> <p><i>If I'm not perfect I have failed</i></p> <p><i>Either I do it right or not at all</i></p>	<p><b>Over-generalizing</b></p> <p>Seeing a pattern based upon a single event, or being overly broad in the conclusions we draw</p> <p><i>"everything is always rubbish"</i></p> <p><i>"nothing good ever happens"</i></p>
<p><b>Mental filter</b></p> <p>Only paying attention to certain types of evidence</p> <p><i>Noticing our failures but not seeing our successes</i></p>	<p><b>Disqualifying the positive</b></p> <p>Discounting the good things that have happened or that you have done for some reason or another</p> <p><i>That doesn't count</i></p>
<p><b>Jumping to conclusions</b></p> <p>There are two key types of jumping to conclusions:</p> <ul style="list-style-type: none"> <li>• <b>Mind reading</b> (imagining we know what others are thinking)</li> <li>• <b>Fortune telling</b> (predicting the future)</li> </ul> <p><i>2 + 2 = 5</i></p>	<p><b>Magnification (catastrophizing) &amp; minimization</b></p> <p>Blowing things out of proportion (catastrophizing), or inappropriately thinking something to make it seem less important</p>
<p><b>Emotional reasoning</b></p> <p>Assuming that because we feel a certain way what we think must be true</p> <p><i>I feel embarrassed so I must be an idiot</i></p>	<p><b>should must</b></p> <p>Using critical words like 'should', 'must', or 'ought' can make us feel guilty, or like we have already failed</p> <p><i>If we apply 'shoulds' to other people the result is often frustration</i></p>
<p><b>Labelling</b></p> <p>Assigning labels to ourselves or other people</p> <p><i>I'm a loser</i></p> <p><i>I'm completely useless</i></p> <p><i>They're such an idiot</i></p>	<p><b>Personalization</b></p> <p>Blaming yourself or taking responsibility for something that wasn't completely your fault</p> <p><i>"this is my fault"</i></p> <p><i>Conversely, blaming other people for something that was your fault</i></p>

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## Try cognitive or “third wave” intervention techniques


<h3>Recognize</h3> <p>What is happening right now? Thought / Feeling / Memory</p> <p>What am I feeling in my body?</p>  <p>Name it</p>	<h3>Assess</h3> <p>Am I saying Yes or No to this? Sit and simply observe for 15 seconds</p> 	<h3>Investigate</h3> <p>What am I longing for? What is the function of this experience? Where is this experience trying to lead me? What is this experience trying to tell me?</p>
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## <http://bmed.rice.edu/>

**Biobehavioral Mechanisms Explaining Disparities Lab**  
BMEED LAB

Ongoing studies:

- Project Act – Recruiting individuals who are caring at home for a spouse diagnosed with Alzheimer’s Disease/related dementias & devote at least 4 hours daily of care for their spouse for at least the last 3 months
- Project Chroma- Recruiting individuals 70 years or older and/or individuals medically diagnosed with Mild Cognitive Impairment
- Project Heart – Recruiting individuals 55 years or older
- Writing During COVID-19 – Recruiting individuals who are currently living in the U.S., who can read & write in English, who are 60 years or older AND/OR have an underlying health

Email: Kristi L Parker [kristi.parker@rice.edu](mailto:kristi.parker@rice.edu) for more information

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T	Act	Project	Year	Sub #	Project Title	Contact PII Project Leader	Organization	FY	Admin IC	Funding IC
5	R01	HL127260	03		PROJECT HEART: BIOBEHAVIORAL EFFECTS ON CARDIOVASCULAR RISK FOR BEREAVED SPOUSES	FAGUNDES, CHRISTOPHER PAUL	RICE UNIVERSITY	2017	NHLBI	NHLBI
3	R01	HL127260	02S1		PROJECT HEART: BIOBEHAVIORAL EFFECTS ON CARDIOVASCULAR RISK FOR BEREAVED SPOUSES	FAGUNDES, CHRISTOPHER PAUL	RICE UNIVERSITY	2017	NHLBI	NHLBI