

IMPACT OF COVID: MENTAL HEALTH AND WOMEN IN STEMM

C. Neill Epperson, MD

Robert Freedman Endowed Chair and Professor
Department of Psychiatry
Executive Director, Helen and Arthur E. Johnson
Depression Center |
University of Colorado School of Medicine

Elizabeth Harry, MD

Senior Director, Clinical Affairs,
University of Colorado Hospital
Associate Professor, Department of Medicine
University of Colorado School of Medicine

Judy Regensteiner, PhD

Director, Center for Women's Health Research
Professor, Department of Medicine
University of Colorado School of Medicine

Angeles Ribera, PhD

Professor and Chair
Department of Physiology and Biophysics
University of Colorado School of Medicine



Department of Psychiatry
SCHOOL OF MEDICINE
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

Disclosures

Sage Therapeutics
Asarina Pharma, Sweden





The Charge

**What do we know about
mental health among
women during COVID?**

Recommendations.

- Assessments
- Stress Physiology
- Access to healthcare
- Mental health
 - Depression
 - Anxiety
 - Post-traumatic stress
 - Sleep

APPROACH

PUBMED

COVID
STEMM
PANDEMIC

Engineering
Technology
Academics
Medicine

SEX
GENDER

Assessments
HPA-Axis/Stress
Depression
Anxiety
Sleep/Insomnia
Post-traumatic stress

GOOGLE

REPUTABLE SITES

CDC
AAMC
NEWS SOURCES

INSTITUTIONAL EXPERIENCE



Privilege is Accentuated

Senior investigators

- established reputation
- well funded
- have data
- have power, more likely to be male
- financial security

Extreme stress

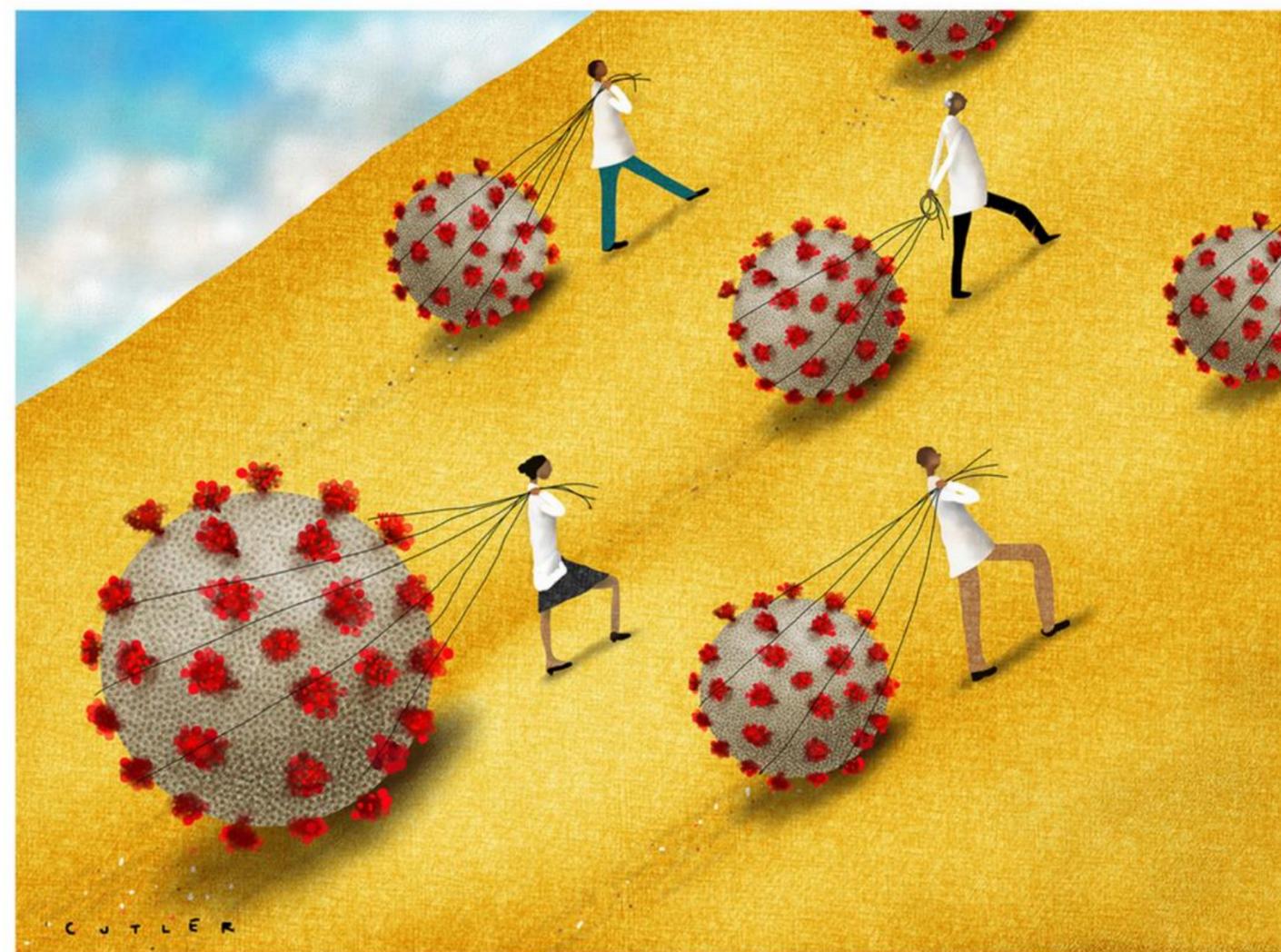
- unconscious bias in decision-making
- progressive initiatives can suffer

In the wake of COVID-19, academia needs new solutions to ensure gender equity

Jessica L. Malisch^{a,1} , Breanna N. Harris^b, Shanen M. Sherrer^c, Kristy A. Lewis^d, Stephanie L. Shepherd^e, Pumtiwitt C. McCarthy^f, Jessica L. Spott^g, Elizabeth P. Karam^h, Naima Moustaid-Moussa^{ij}, Jessica McCrory Calarco^k, Latha Ramalingam^{ij}, Amelia E. Talley^l, Jaclyn E. Cañas-Carrell^{m,n}, Karin Ardon-Dryer^o , Dana A. Weiser^p, Ximena E. Bernal^{q,r}, and Jennifer Deitloff^s

The coronavirus disease 2019 (COVID-19) pandemic has upended almost every facet of academia (1). Almost overnight the system faced a sudden transition

to remote teaching and learning, changes in grading systems, and the loss of access to research resources. Additionally, shifts in household labor, childcare,



Many women academics will likely bear a greater burden during the coronavirus disease 2019 (COVID-19) pandemic. Academia needs to enact solutions to retain and promote women faculty who already face disparities regarding merit, tenure, and promotion. Image credit: Dave Cutler (artist).

R. Yu, Stress potentiates decision biases: A stress induced deliberation-to-intuition (SIDI) model. *Neurobiol. Stress* 3, 83–95 (2016).

M. Goulden, M. A. Mason, K. Frasnch, Keeping women in the science pipeline. *Ann. Am. Acad. Pol. Soc. Sci.* 638, 141–162 (2011).

Caregiving

Heavier Burden for Early
Career Scientists



Nicola Byrum: COVID-19 and the Research Community: The Challenges of Lockdown for Early-Career Researchers, Institute of Psychiatry, Psychology and Neurosciences, Kings College London

WOMEN are disadvantaged..

- Be early in their career (1,2)
- Less likely to be in higher paid subspecialties in medicine (3)
- More likely to be in a contract job, lose their job or experience decreased paid hours (4)
- Have a lower salary regardless of professional ranking (3)
- Be a single parent or a primary caregiver (5-7)
- Have experienced discrimination in the workplace or their community (8-10)

(1) Woitowich et al., 2020;

(2) Benya et al., 2018,

(3) Raj et al., 2019

(4)Gewin, 2020

(5) Calisi, 2018

(6) Jolly et al., 2014

(7) Yavorsky et al., 2015

(8) Lu et al., 2020

(9) Jagsi et al., 2016

(10) Garcia et al., 2020



Assessment





Burnout

- Maslach Burnout Inventory – Human Services Survey for Medical Personnel (MBI-HSS MP),
- Oldenburg Burnout Inventory,
- the Single Item Burnout Measure embedded in the Mini-Z, and the
- Copenhagen Burnout Inventory
- **Stanford Professional Fulfillment Index and**
- **the Wellbeing Index**

("Valid and Reliable Survey Instruments to Measure Burnout, Well-Being, and Other Work-Related Dimensions - National Academy of Medicine," n.d.)

Burnout Facts



Reaction to excessive, chronic stress

- State of emotional, mental and physical exhaustion
- Decreased interest and motivation
- Reduction in accomplishments

Women in STEMM report

- greater emotional exhaustion,
- greater cynicism, and
- lower academic efficiency in environments described as 'chilly' and unwelcoming to women (1)



Burnout Facts

Female Physicians

- Report greater burnout,
- particularly among the <40 yr (1).
- Those with more childcare responsibility are more likely to ask for a career change, particularly those in procedural fields (2).
- Higher task load is associated with greater burnout (3).

(1) Jensen & Deemer, 2019 (2) Lyu et al., 2019

(3) Harry et al. 2020

STRESS PHYSIOLOGY



STRESS of COVID



- **In Healthcare (1)**

- Occupational hazards,
- National versus locally scaled responses,
- Process inefficiencies and
- Financial instability.

- **For Researchers (2)**

- Delays in clearance for conducting research due to COVID-19 are leading to researchers experiencing increased burnout,
- Sleep disturbance,
- Poor appetite,
- Increased interpersonal problems, and
- Decreased motivation

- **For Academics (3)**

- racial injustices, and
- geopolitical unrest are affecting academic faculty in multiple domains professionally and personally

(1) Sasangohar et al., 2020

(2) Sharma et al., 2020

(3) Gruber, 2020

Sex & Gender Differences in Stress

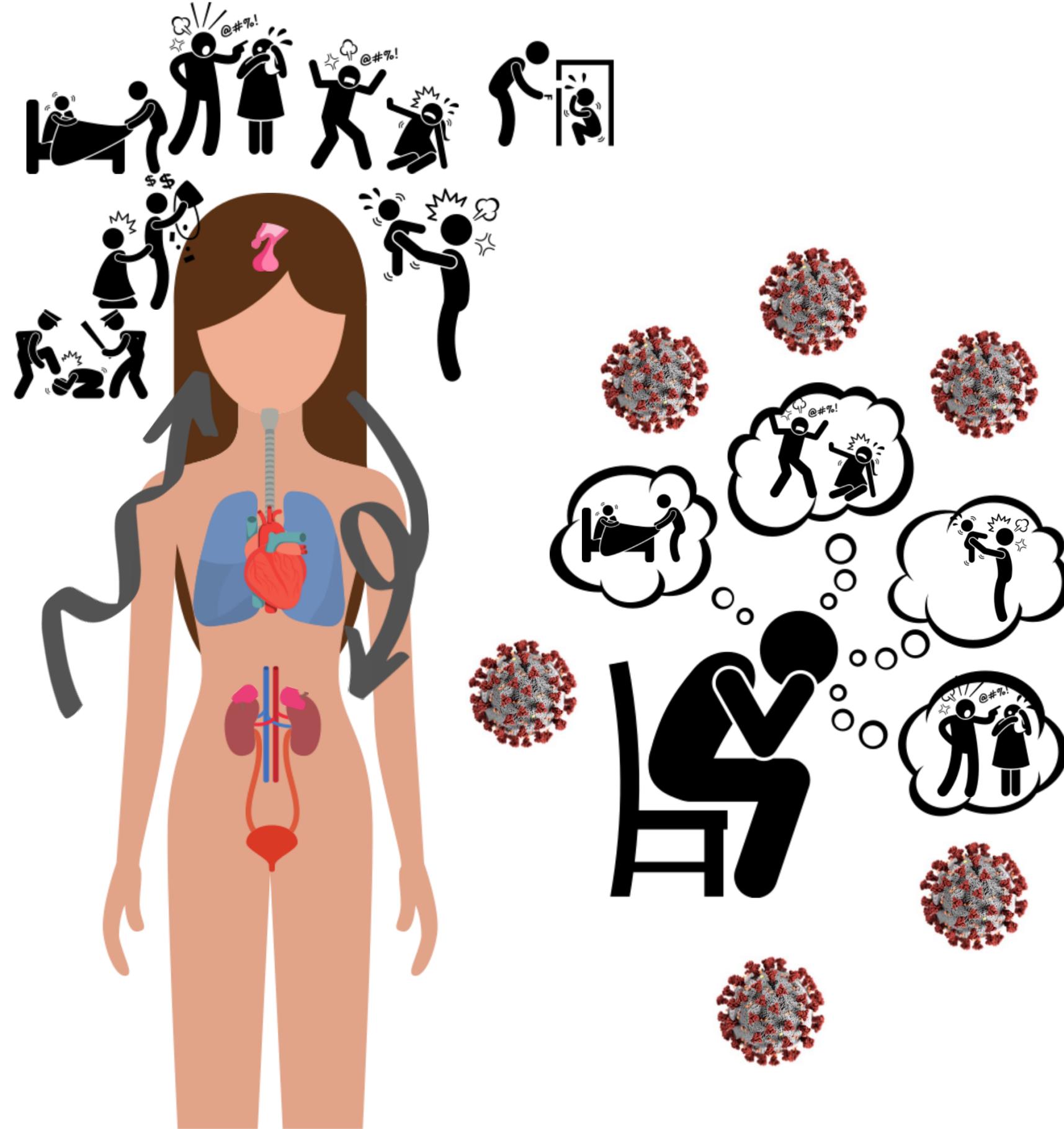


- **Women are more likely to be**
 - In primary care
 - Have greater patient contact, pressure to see patients quickly
 - Be at the bedside
- **Women exposed to stress are more likely to**
 - Have onset of post-traumatic stress
 - Worsening insomnia and other sleep problems
- **Glucocorticoid Responses**
- **Immune Responses**
- **Impact of previous adverse exposures**

(1) Sasangohar et al., 2020

(2) Sharma et al., 2020

(3) Gruber, 2020 E.



Stress & HPA-A

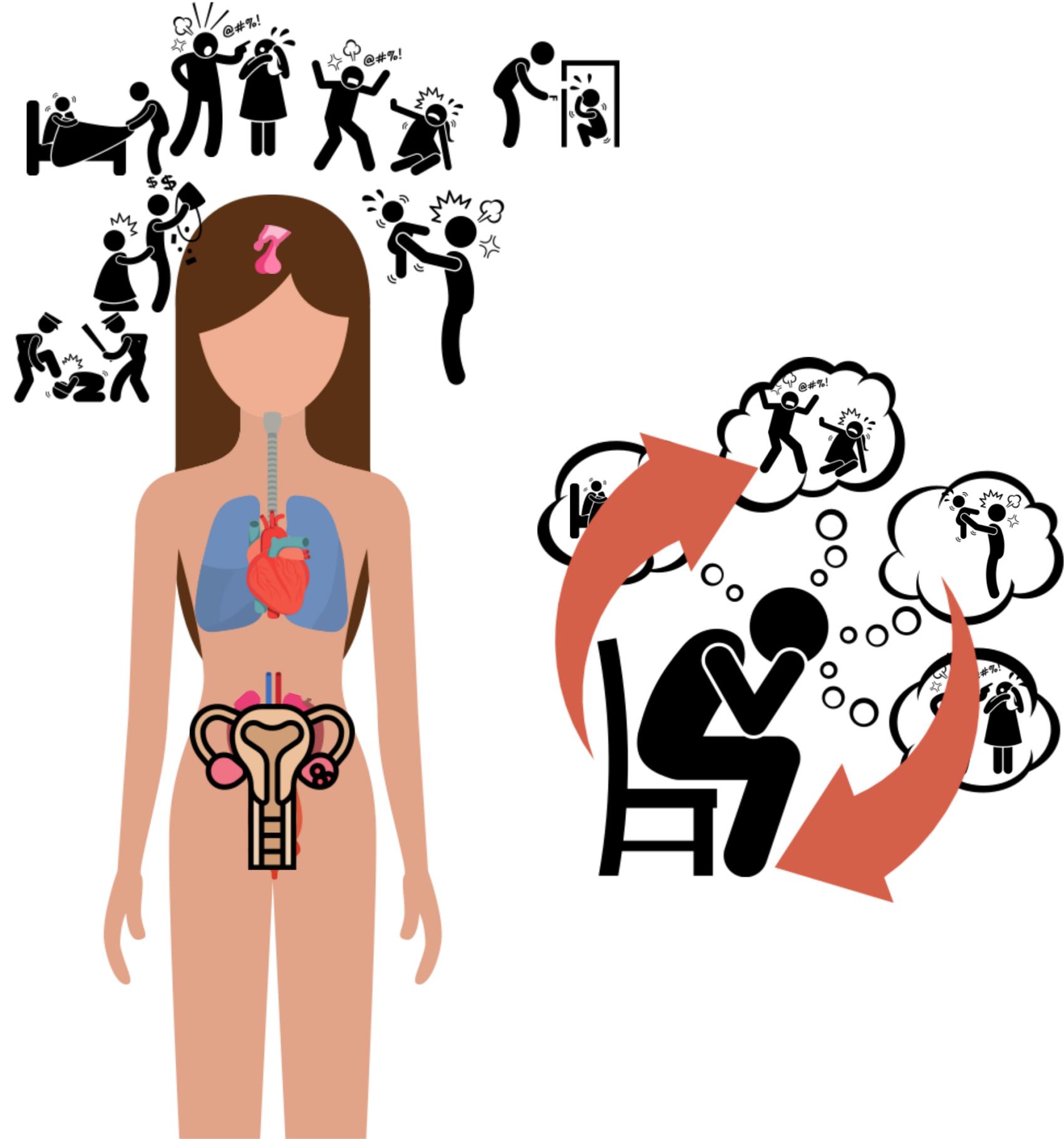
DYSREGULATION

Dampening or accentuation of glucocorticoids

Varies with current mental health state

Type and timing of stress/trauma

- Developmental Stage
- Acute vs Chronic
- Predictable vs Unpredictable
- Frequency



Stress, Hormones & The Brain

MULTIPLE NEUROTRANSMITTER EFFECTS

Estradiol & Serotonin

Incr. Expression of tryptophan hydroxylase (TPH)
Dcr. MAO activity, leaving serotonin the synapse
Inc. 5-HT_{2A} receptor density, more binding sites!

Testosterone

Progesterone

Allopregnanolone

!



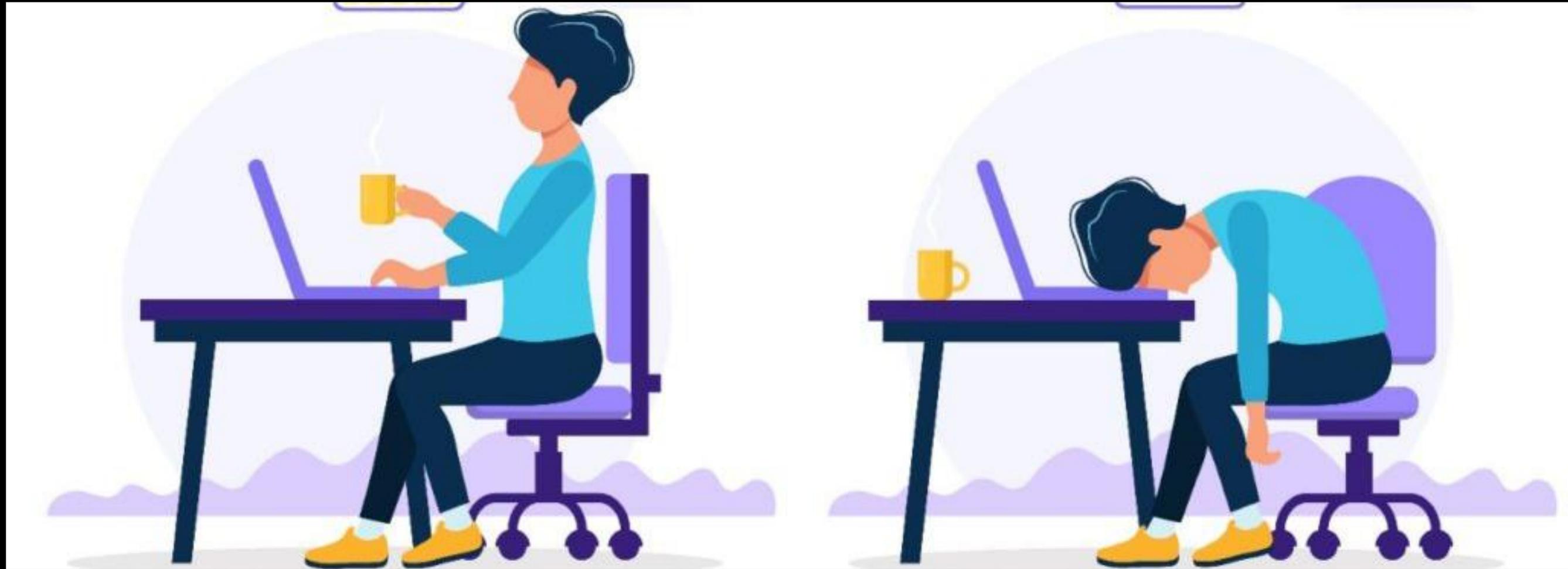
~ 75% of front-line work force are women = greater overall infection risk for women in this STEMM field.



STEMM mothers face additional COVID-19 stressors.

Prenatal care, delivery and infant needs present financial challenges and stress (Ahlers-Schmidt et al., 2020). Concerns about infection during pregnancy not only create stress but lead to avoidance of medical services but also worries about how delivery will occur (Preis et al., 2020a, 2020b) (Berthelot et al., 2020). As increased maternal stress negatively impacts the progression of pregnancy, all mothers merit care that reassures that disease exposure and delivery complications are minimal.

PUBLISH OR PERISH



The pandemic has already led to a decrease in the papers published by women as well as fewer citations of women-authored publications (Amano-Patino et al., 2020; Gabster et al., 2020) (Andersen et al., 2020).

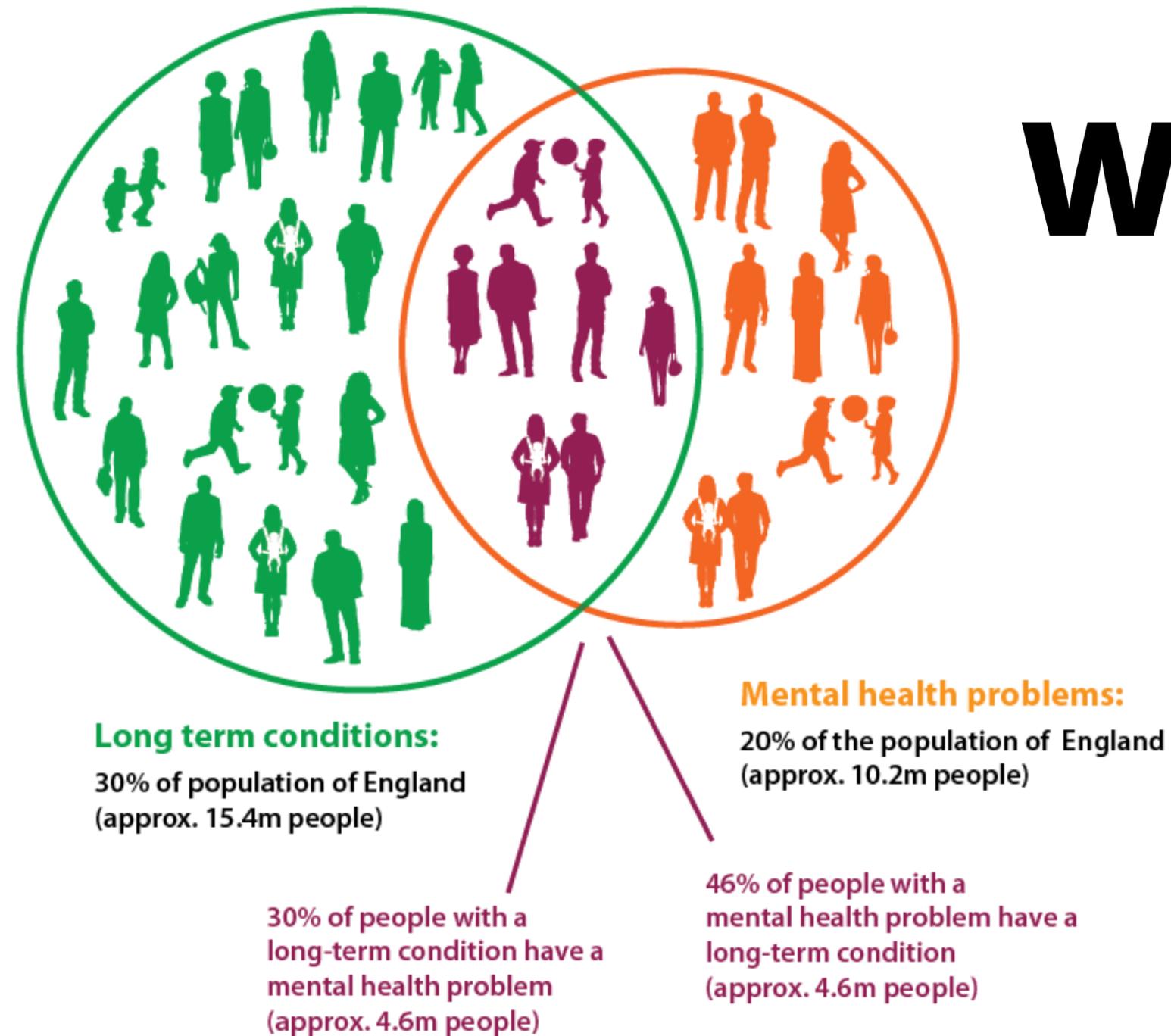
HEALTHCARE ACCESS & COMORBIDITY





Camacho-Rivera et al (2020) utilized data from a sample of U.S. adults (52% female) from the COVID-19 Impact Survey. Significant differences in the prevalence of overweight or obesity were observed between men and women (28% compared with 36%, respectively, $p=0.01$).

The overlap between long-term conditions and mental health problems



Women's Health

Autoimmune disorders

Migraines

GI conditions

Metabolic disorders

Stress-related Mental Illness

Hospitalizations were **6** times higher
and deaths **12** times higher for COVID-19 patients
with reported underlying conditions*

MOST FREQUENTLY REPORTED UNDERLYING CONDITIONS

CARDIOVASCULAR
DISEASE



DIABETES



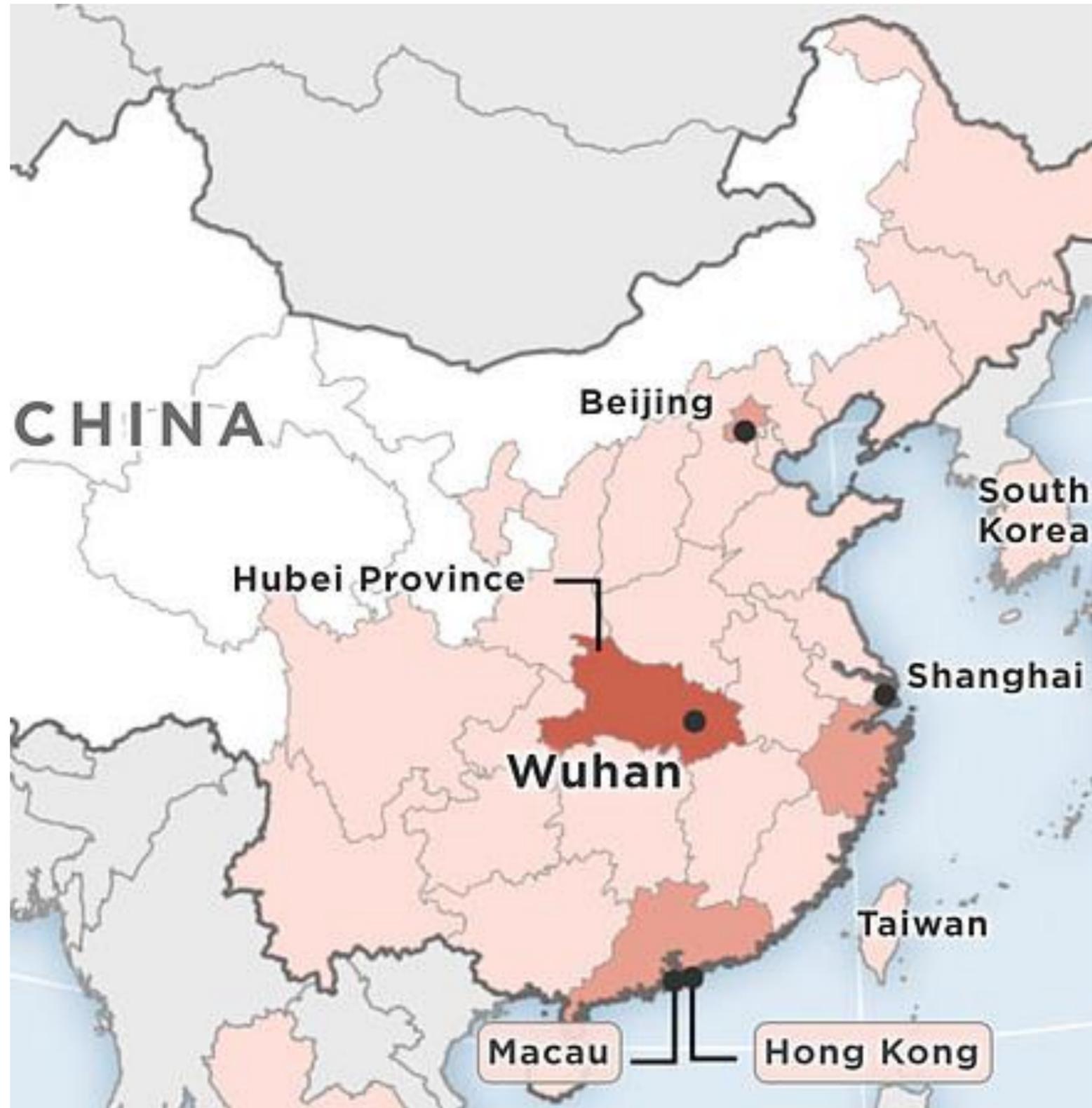
CHRONIC LUNG
DISEASE



*compared to those with no reported underlying health conditions



BRAIN HEALTH



Earliest Reports:

OVERALL psychological problems (depression, anxiety, insomnia) were reported by

- 60% of physicians,
- 51% of medical residents,
- 62% of nurses,
- 58% of technicians, and
- 62% of public health professionals.

Being a frontline (exposed to COVID-19 infected patients) healthcare worker (HCW) and female was associated with greatest risk for both anxiety and depression (Que et al., 2020).



Meta Analyses and Systematic Reviews:

**SHIFT WORKERS
NURSES
FEMALES**



SPAIN (Herro-San Martin et al., 2020)

- March-April 2020
- HCWs =Doctors (58%), nurses (26%), nurses' aides (10%), porters (4%) and cleaning staff (2%)
- HCWs (41 males, 59 females) reported a higher prevalence (57% vs 34%, $p=0.004$) of new onset or worsening of insomnia compared to non-healthcare workers (NHCW; 29 males, 41 females).

SPAIN (Romero-Blanco et al., 2020)

- During “lockdown”
- Nursing students
- Female gender, living with family, use of alcohol

Italy (Romero-Blanco et al., 2020)

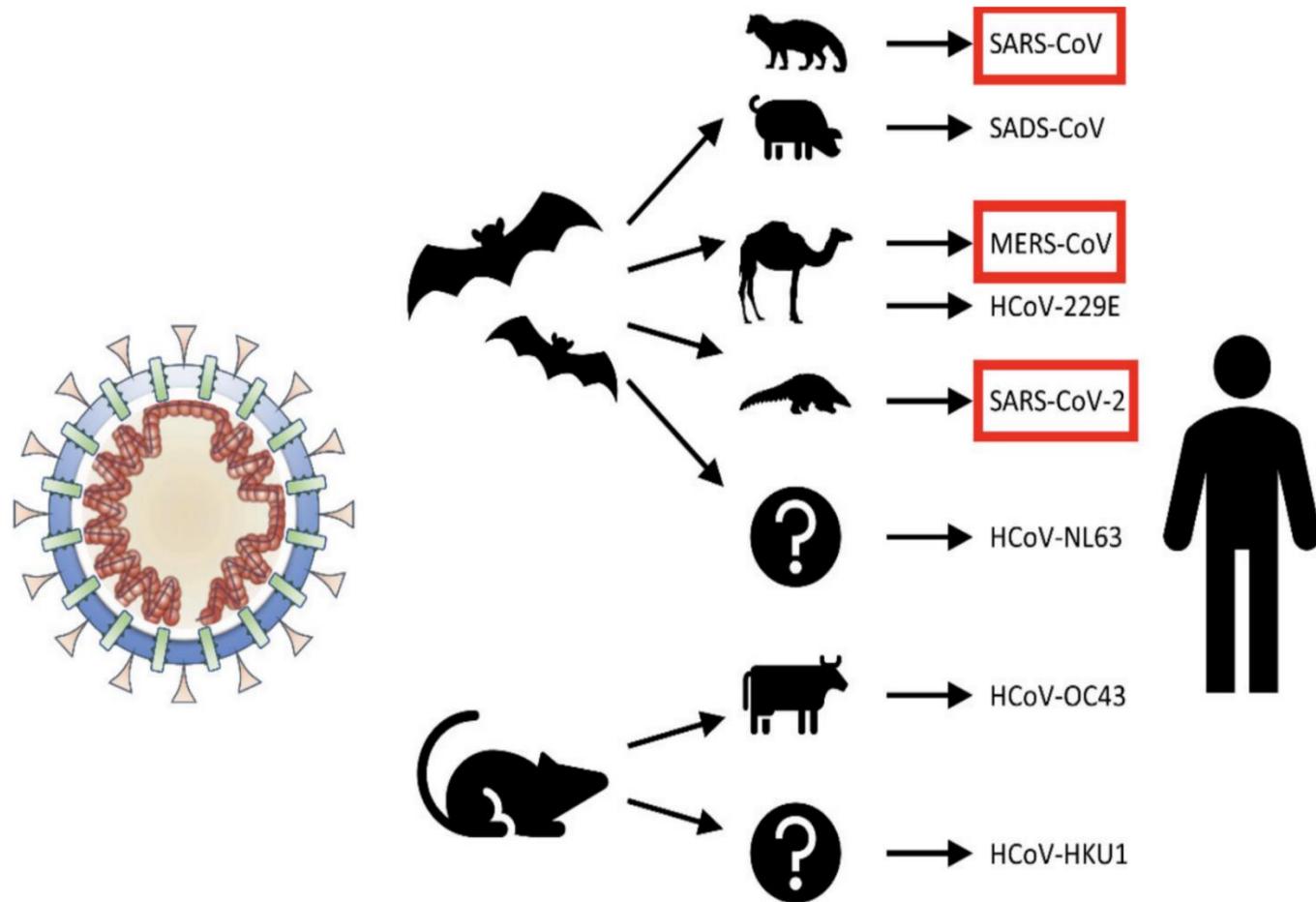
- During “lockdown” March 10 to May 3, 2020
- University students
- 73% reported clinically meaningful sleep difficulties after the lockdown compared to 55% prior (using validated ratings).
- Female gender, living with family, use of alcohol



RACISM, DISCRIMINATION, AND HISTORICAL TRAUMA

- Perceived stress of racism is associated with worse sleep and biological markers of imbalance between parasympathetic and sympathetic tone (Bell et al., 2017, 2019).
- Historical trauma and low social support associated with greater post-traumatic stress among American Indians (Ginty et al., 2020)
- LGBTQ+ students are going to home to families who do know or approve of their identity (45.6%; Gonzales et al., 2020)

SARS, MERS, COVID-19



Risk Factors for Post-traumatic Stress Symptoms

- 1) Unpredictability in one's daily caseload,
- 2) Having to manage patient and family expectations in unexpected critical cases/situations.
- 3) Rapid increases in critically ill patients
- 4) Greater decision-making burden
- 5) High daily fatalities
- 6) Constant updating of hospital procedures related to care of patients
- 7) Being a survivor of one of the previous infectious outbreaks

A woman with dark, curly hair is shown from the chest up, wearing a white collared shirt. She has a thoughtful expression, resting her chin on her hand and looking upwards and to the right. The background is a light, textured wall covered with various hand-drawn question marks in black ink. Some question marks are solid, while others are outlined or have a dotted trail. The text "What do we do?" is centered over her face in a white, sans-serif font.

What do we do?

Protective Factors

Individual

- Use of humor and planning as coping strategies
- Presence of religious beliefs
- Altruistic acceptance of work-related risks

Carmassi et al., 2020





Protective Factors

Work

- Perception of being adequately trained to meet the needs of patients
- Working in structured units
- Perception of safety of the work environment

Carmassi et al., 2020

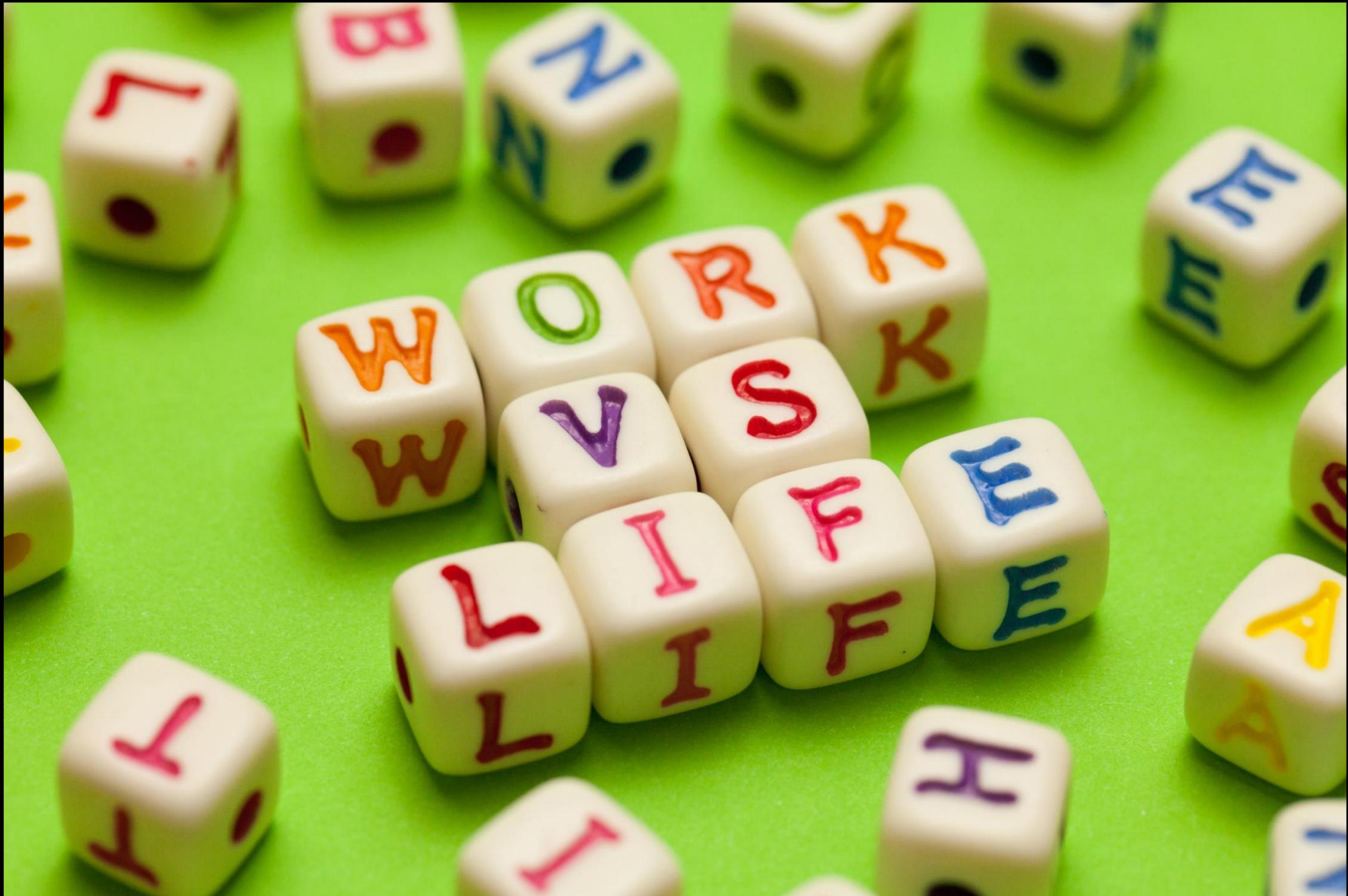
Protective Factors

Social

- Having support of family and friends
- Support from supervisors and colleagues
- Ability to talk to someone

Carmassi et al., 2020







BALANCE

Telehealth is
here to stay.



Leaders
are the
last to
seek help.



Focus on
sleep

Focus on
Sleep

Ensure
psychological
safety

Tools for
self-
monitoring

Listening
sessions

Faculty &
Staff
Outreach





Research

Sleep evaluations with objective and subjective measures.

Incentivize mental health evaluations

Benefit of supporting child and elder care at the institutional/organizational levels.

Consider intersectionality of race, gender identity, sexual orientation, ethnicity, profession, disability, reproductive and developmental stages, and overall health status

Focus on at-risk groups
Meet basic needs



