

CONSENSUS STUDY REPORT

# THE IMPACT OF COVID-19 ON THE CAREERS OF WOMEN IN ACADEMIC SCIENCES, ENGINEERING, AND MEDICINE



# OUTLINE

## About the Report

### Before the COVID-19 Pandemic

- Highlights from the report
- Major findings 1-3

### Impacts of the COVID-19 Pandemic during 2020

- Highlights from the report
- Major findings 4-12

## Research Questions

## Beyond 2020

## Spring 2020 changed in how nearly everyone conducted their personal and professional lives

For academic STEMM, the disruptions caused by the COVID-19 pandemic included:

- delayed experiments in individual laboratories
- cancelled global scientific conferences
- shifted teaching and networking structures
- altered publication rates
- blurred the boundaries between work and nonwork

While adaptations allowed people to stay connected, the evidence available at the end of 2020 suggested that **the disruptions caused by the COVID-19 pandemic endangered the engagement, experience, and retention of women in academic STEMM.**

# STATEMENT OF TASK

The committee was charged to:

- Undertake a **fast-track study** focused on early indicators of the potential impact of the COVID-19 pandemic on the careers of women in academic science, engineering, and medicine (STEMM)
- Commission research papers **to identify and analyze disruptions experienced by women** in STEMM academic careers during the early stages of the COVID-19 pandemic.
- Hold a **public workshop and conduct its own analyses** on the ways in which COVID-19 is amplifying the disruptions encountered by women in STEMM academic careers
- Issue a consensus report with **findings that reflect what has been learned through its work as well as recommendations for further study and investigation.**

# COMMITTEE + SPONSORS

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# REPORT STRUCTURE

Summary

Introduction

October 2020 Women in STEMM Faculty Survey  
on Work-Life Effects of the COVID-19 Pandemic

Academic  
Productivity and  
Institutional  
Responses

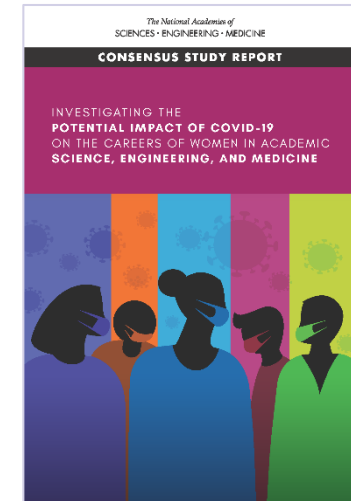
Work-Life  
Boundaries and  
Gendered  
Divisions of  
Labor

Collaborations,  
Networks, and  
the Role of  
Professional  
Organizations

Academic  
Leadership and  
Decision-Making

Mental Health  
and Well-being

Major Findings and Research  
Questions





# INTERSECTIONALITY & EQUITY

## **Intersectionality:**

A lens for understanding how social identities, especially for marginalized groups, relate to systems of authority and power. Race and ethnicity, sexual orientation, gender identity, age, and disability status, among many other factors, can amplify or alter the effects of the COVID-19 pandemic for a given person.

This report investigated, understood, and presented the topics explored through an equity lens.

# Other Significant Factors

The committee considered several contextual elements that interacted extensively with the COVID-19 pandemic, including the effects of:

- Anti-Black racism
- The persistence of structural injustices in U.S. society
- The economic recession triggered by the COVID-19 pandemic
- The increase in technology-mediated interactions
- Increasing frequency and severity of natural disasters

# BEFORE THE COVID-19 PANDEMIC

Advances in knowledge and practice in academic STEM **demand and benefit from a diversity of perspectives**, including people who represent different genders, ethnicities, and ancestries.

Women, however, remain **underrepresented in STEM**, with both societal and institutional inequities contributing both to this persistent underrepresentation and to the disproportionate burdens many women face in academic STEM fields.

# BEFORE THE COVID-19 PANDEMIC

Women in academic STEM are more likely to:

- Have a lower salary regardless of professional ranking in STEM
- Be a single parent or a primary caregiver
- Report experiencing greater work-related stress and discrimination in the workplace or their community

**Caregiving responsibilities often fall on the shoulders of women** and cut across career timeline and rank (e.g., graduate student, postdoctoral scholar, non-tenure track and other contingent faculty, tenure track), institution type, and scientific discipline.

# MAJOR FINDINGS

Established Research and Experiences from Previous Events

**1. Women's Representation in STEMM:** Leading up to the COVID-19 pandemic, the representation of women has slowly increased in STEMM fields, but with caveats to these limited steps of progress.

# MAJOR FINDINGS

## Established Research and Experiences from Previous Events

**2. Confluence of Social Stressors:** Social crises and COVID-19 pandemic-related disruptions to workload and schedules, added to formerly routine job functions and health risks, have the potential to exacerbate mental health conditions like insomnia, depression, anxiety and post-traumatic stress. All of these conditions occur more frequently among women than men.\*\*

# MAJOR FINDINGS

## Established Research and Experiences from Previous Events

**3. Intersectionality and Equity:** Structural racism is an omnipresent stressor for Women of Color, who already feel particularly isolated in many fields and disciplines. Attempts to ensure equity for all women may not necessarily create equity for women across various identities if targeted interventions designed to promote gender equity do not account for the racial and ethnic heterogeneity of women in STEMM.



# IMPACT OF THE COVID-19 PANDEMIC

The COVID-19 pandemic has negatively affected

the productivity,

boundary setting and boundary control,

networking and community building, and

mental well-being

of women in academic STEM.

# IMPACT OF THE COVID-19 PANDEMIC

Coupled with the **physical isolation** stipulated by public health responses to the COVID-19 pandemic, women in academic STEMM have been **isolated within their fields, networks, and communities.**

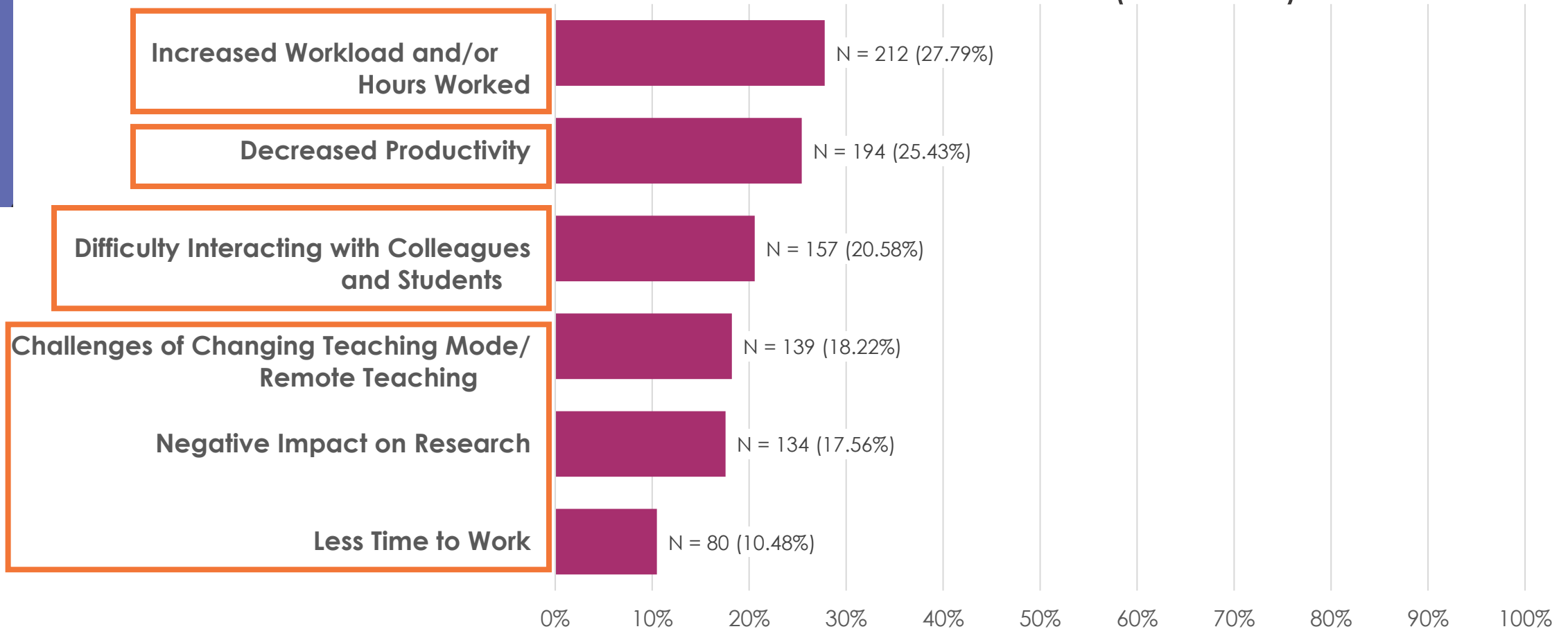
# IMPACT OF THE COVID-19 PANDEMIC

Women's shares of first authorships, last authorships, and general representation per author group have **decreased** during the COVID-19 pandemic.

With variations by discipline, **women published fewer papers and received fewer citations** of their work since between March 2020 and December 2020

# IMPACT OF THE COVID-19 PANDEMIC

The Impact of COVID-19 on the Work Effectiveness of  
Academic Science Women in STEMM (N = 763)



# IMPACT OF THE COVID-19 PANDEMIC

For women in STEMM with caregiving responsibilities, many had **significantly less time in the day to network and engage in collaborations** because of increased non-work tasks.

To cope with additional caregiving demands, **women are reducing their work hours.**

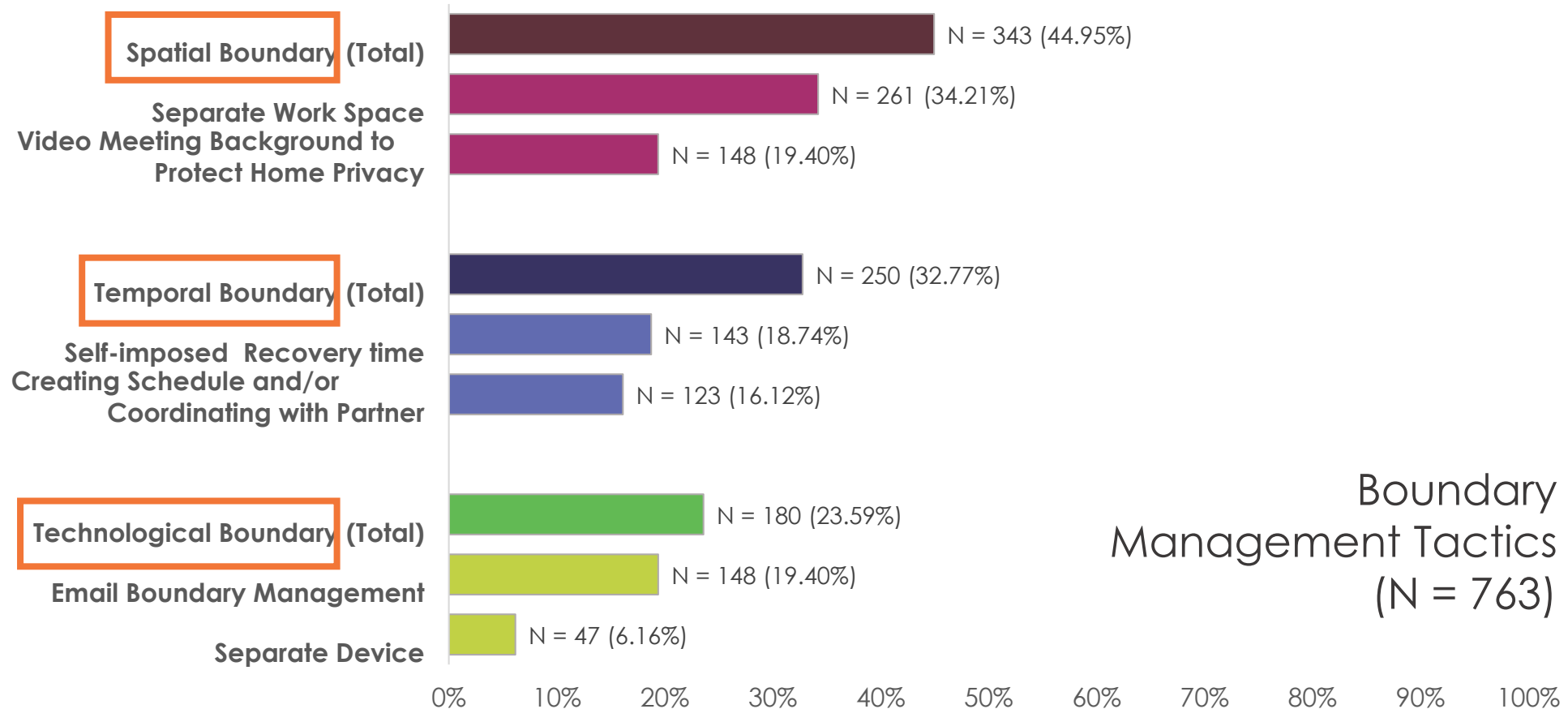
# IMPACT OF THE COVID-19 PANDEMIC

Alterations to healthy boundaries between the multiple roles women assume (e.g., as caregivers and professionals) and increased isolation may:

- Negatively impact productivity
- Harm the recruitment, retention, and persistence of women in STEMM
- Affect mental well-being

# IMPACT OF THE COVID-19 PANDEMIC

Several different **boundary management tactics** were used by women in academic STEM during 2020.





# IMPACT OF THE COVID-19 PANDEMIC

**Tenure clock extensions** were widely implemented to address faculty productivity challenges.

Some approaches academics leaders used to make decisions, govern, and be accountable were more gender inclusive and considered **the long-term implications**.

Budget cuts greatly affected contingent and non-tenured faculty members

Funders modified policies to **allow researchers greater flexibility**.

# IMPACT OF THE COVID-19 PANDEMIC

Professional conferences adapted quickly to virtual platforms, **allowing global participation, and often increasing access** by removing travel-related barriers that can affect women more than men given their caregiving responsibilities.

# MAJOR FINDINGS

## Impacts of the COVID-19 Pandemic during 2020

### 4. Academic Productivity:

- While some research indicates consistency in publications authored by women in specific STEMM disciplines, like earth and space sciences, during 2020, several preliminary measures of productivity suggests that COVID-19 disruptions have disproportionately affected women compared to men.
- Reduced productivity may be compounded by differences in the ways research is conducted, such as whether field research or face-to-face engagement with human subjects is required.

# MAJOR FINDINGS

## Impacts of the COVID-19 Pandemic during 2020

### **5. Institutional Responses:**

- Many administrative decisions regarding institutional supports made during 2020, such as work-from-home provisions and extensions on evaluations or deliverables, are likely to exacerbate underlying gender-based inequalities in academic advancement.

# MAJOR FINDINGS

## Impacts of the COVID-19 Pandemic during 2020

### 6. Institutional Responses:

- Organizational-level approaches may be needed to address challenges that have emerged as a result of the COVID-19 pandemic in 2020, as well as those challenges that may have existed before the pandemic but are now more visible and amplified.
- Reliance on individual coping strategies may be insufficient.

# MAJOR FINDINGS

## Impacts of the COVID-19 Pandemic during 2020

### **7. Work-Life Boundaries and Gendered Divisions of Labor:**

- Preliminary evidence from 2020 suggests women in academic STEMM are experiencing
  - increased workload
  - decreased productivity
  - changes in interactions,
  - difficulties from remote work

caused by the COVID-19 pandemic and associated disruptions

- These are particularly salient for women who are parents or caregivers

# MAJOR FINDINGS

## Impacts of the COVID-19 Pandemic during 2020

### 8. Collaborations:

- During the COVID-19 pandemic, technology has allowed for the continuation of information exchange and many collaborations.
- In some cases technology has facilitated the increased participation of women and underrepresented groups.
- Preliminary indicators also show gendered impacts on science and scientific collaborations during 2020.



# MAJOR FINDINGS

## Impacts of the COVID-19 Pandemic during 2020

### 9. Networking and Professional Societies

During the COVID-19 pandemic in 2020, some professional societies adapted to the needs of members as well as to broader interests of individuals engaged in the disciplines they serve.

Transitioning conferences to virtual platforms:

#### Positive outcomes

- Lower attendance costs
- More open access to content

#### Negative outcomes

- Over-flexibility
- Opportunities for bias in virtual environments

# MAJOR FINDINGS

## Impacts of the COVID-19 Pandemic during 2020

### **10. Academic Leadership and Decision-Making:**

- During the COVID-19 pandemic in 2020, many of the decision-making processes, including financial decisions like lay-offs and furloughs that were quickly implemented contributed to unilateral decisions
- Fast decisions greatly affected contingent and non-tenured faculty members—positions that are more often occupied by women and People of Color.
- In 2020, these financial decisions already had negative, short-term effects and may portend long-term consequences.

# MAJOR FINDINGS

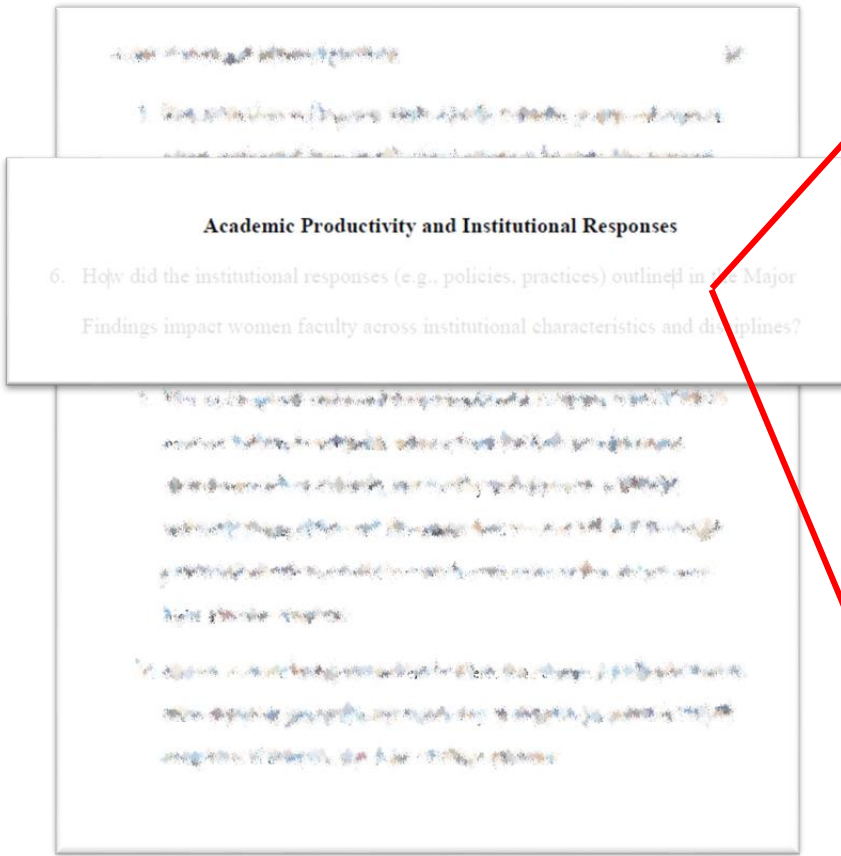
## Impacts of the COVID-19 Pandemic during 2020

### 11. and 12. Mental Health and Well-being:

- Social support, which is particularly important during stressful situations, is jeopardized by the physical isolation and restricted social interactions that have been imposed during the COVID-19 pandemic. For women who are already isolated within their specific fields or disciplines, additional social isolation may be an important contributor to added stress.
- For women in the health professions, major risk factors during the COVID-19 pandemic in 2020 included unpredictability in clinical work, evolving clinical and leadership roles, the psychological demands of unremitting and stressful work, and heightened health risks to family and self.

# RESEARCH QUESTIONS

## Academic Productivity and Institutional Responses



- What adaptations did women use during the transition to online and hybrid teaching modes? How did these techniques and adaptations vary as a function of career stage and institutional characteristics?
- What are examples of institutional changes implemented in response to the COVID-19 pandemic that have the potential to reduce systemic barriers to participation and advancement that have historically been faced by academic women in STEMM, specifically Women of Color and other marginalized women in STEMM?

# RESEARCH QUESTIONS

## Work-Life Boundaries and Gendered Divisions of Labor

- How do different social identities (e.g., racial; socioeconomic status; cultural; ethnic; sexually gender diverse; immigration status; parents of young children and other caregivers; women without partners) influence the management of work-nonwork boundaries?
- How might insights gained about work-life boundaries during the COVID-19 pandemic inform how institutions develop and implement supportive resources (e.g., reductions in workload, on-site childcare, flexible working options)?

### Work-Life Boundaries and Gendered Divisions of Labor

11. How do different social identities (e.g., racial; socioeconomic status; cultural; ethnic; sexually gender diverse; immigration status; parents of young children and other caregivers; women without partners) influence the management of work-nonwork boundaries? How did this change during the COVID-19 pandemic?

# RESEARCH QUESTIONS

## Collaboration, Networking, and Professional Societies

- How will the increase in virtual conferences specifically affect women's advancement and career trajectories? How will it affect women's collaborations?

### Collaboration, Networking, and Professional Societies

15. What were the short- and long-term effects of the COVID-19 pandemic-prompted switch from in-person conferences to virtual conferences on conference culture and climate, especially for women in STEM?
16. How will the increase in virtual conferences specifically affect women's advancement and career trajectories? How will it affect women's collaborations?
17. How has the shift away from attending conferences and in-person networking changed longer-term mentoring and sponsoring relationships, particularly in terms of gender

- How can organizations that support, host, or facilitate online and virtual conferences and networking events: (1) ensure open and fair access to participants who face different funding and time constraints; (2) foster virtual connections between peers, mentors, and sponsors; and (3) maintain an inclusive environment to scientists of all backgrounds?



# RESEARCH QUESTIONS

## Academic Leadership and Decision-Making

- What specific interventions did colleges and universities initiate or prioritize to ensure that women were included in decision-making processes during responses to the COVID-19 pandemic?
- What are potential “top-down” structural changes in academia that can be implemented to mitigate the adverse effects of the COVID-19 pandemic or other disruptions?

### Academic Leadership and Decision Making

21. What specific interventions did colleges and universities initiate or prioritize to ensure that women were included in decision-making processes during responses to the COVID-19 pandemic?
22. How significant were equity-minded leadership, shared leadership, and crisis leadership styles at either mitigating or amplifying emerging and potential negative effects of the COVID-19 pandemic on women in colleges and universities that prioritized their inclusion?
23. What specific aspects of different leadership models translated to more effective strategies to advance women in STEM, particularly during the COVID-19 pandemic?
24. How can examples of intentional inclusion of women in decision-making processes during the COVID-19 pandemic be leveraged to develop the engagement of women as leaders at all levels of academic institutions?

# RESEARCH QUESTIONS

## Mental Health and Well-being

### Mental Health and Wellbeing

27. What is the impact of the COVID-19 pandemic and institutional responses on the mental health and wellbeing of members of the academic STEMM workforce as a function of gender, race, and career stage?
28. How are tools and diagnostic tests to measure aspects of wellbeing, including burnout and insomnia, used in academic settings? How does this change during times of increased stress, such as the COVID-19 pandemic?
29. How might insights gained about mental health during the COVID-19 pandemic be used to inform preparedness for future disruptions?
30. How can programs that focus on changes biomarkers of stress and mood dysregulation, such as levels of sleep, activity, and texting patterns, be developed and implemented to better engage women in addressing their mental health?
31. What are effective interventions to address the health of women academics in STEMM that specifically account for the effects of stress on women? What are effective interventions to mitigate the excessive levels of stress for Women of Color?

- What is the impact of the COVID-19 pandemic and institutional responses on the mental health and wellbeing of members of the academic STEMM workforce as a function of gender, race, and career stage?
- What are effective interventions to address the health of women academics in STEMM that specifically account for the effects of stress on women? What are effective interventions to mitigate the excessive levels of stress for Women of Color?



# BEYOND 2020

- Lessons that can be gleaned from the first several months of the COVID-19 pandemic **may be applicable to other large-scale disruptions** (e.g., climate-change-related events, severe economic recessions, or other novel infectious disease outbreaks) that will continue to be risks faced by the STEMM enterprise over time.
- Together, the findings and research questions can **help better prepare** higher education institutions to respond to disruptions and **explore opportunities** that support the full participation of women in the future.

# BEYOND 2020

**The future almost certainly holds additional, unforeseen disruptions** that will test the principles and resilience of institutions of higher education.

It also almost certainly requires the contributions of STEMM, which can be fully realized **only if the well-being of women in these fields does not significantly suffer** from the COVID-19 pandemic and other disruptions.

# CONTACT

## Project Page

<https://www.nas.edu/women-and-covid-19>

## Download the Report

<https://www.nap.edu/26061>

## The *Promising Practices* Report

<https://www.nap.edu/25585>

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