2020

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 STEMM **demand and benefit from a diversity of perspectives**, including people who represent different genders, ethnicities, and ancestries.

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

BEFORE THE COVID-19 PANDEMIC

Women in academic STEMM are more likely to:

- Have a lower salary regardless of professional ranking in STEMM
- 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.

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.

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REPORT

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 |

12 Major Findings

31 Research Questions

Established Research and Experiences from Previous Events

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.

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.**

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.

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**This finding is primarily based on research on cisgender women and men.

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.**

IMPACT OF THE COVID-19 PANDEMIC

Factors such as **social isolation, caregiving, and job insecurity**, all more common among women during previous pandemics, have been associated with greater mental health concerns.
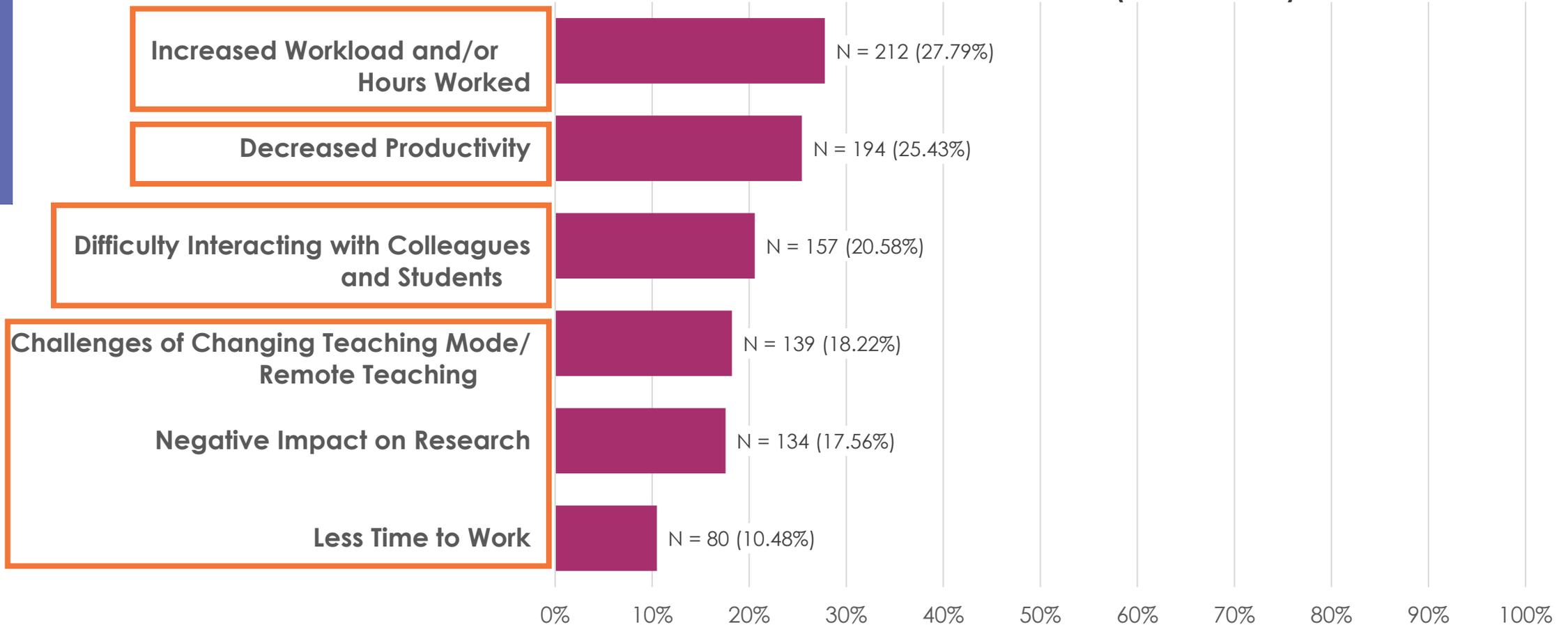
IMPACT OF THE COVID-19 PANDEMIC

Discrimination and marginalization have long been recognized as stressors and contributing factors to poor mental health.

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

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

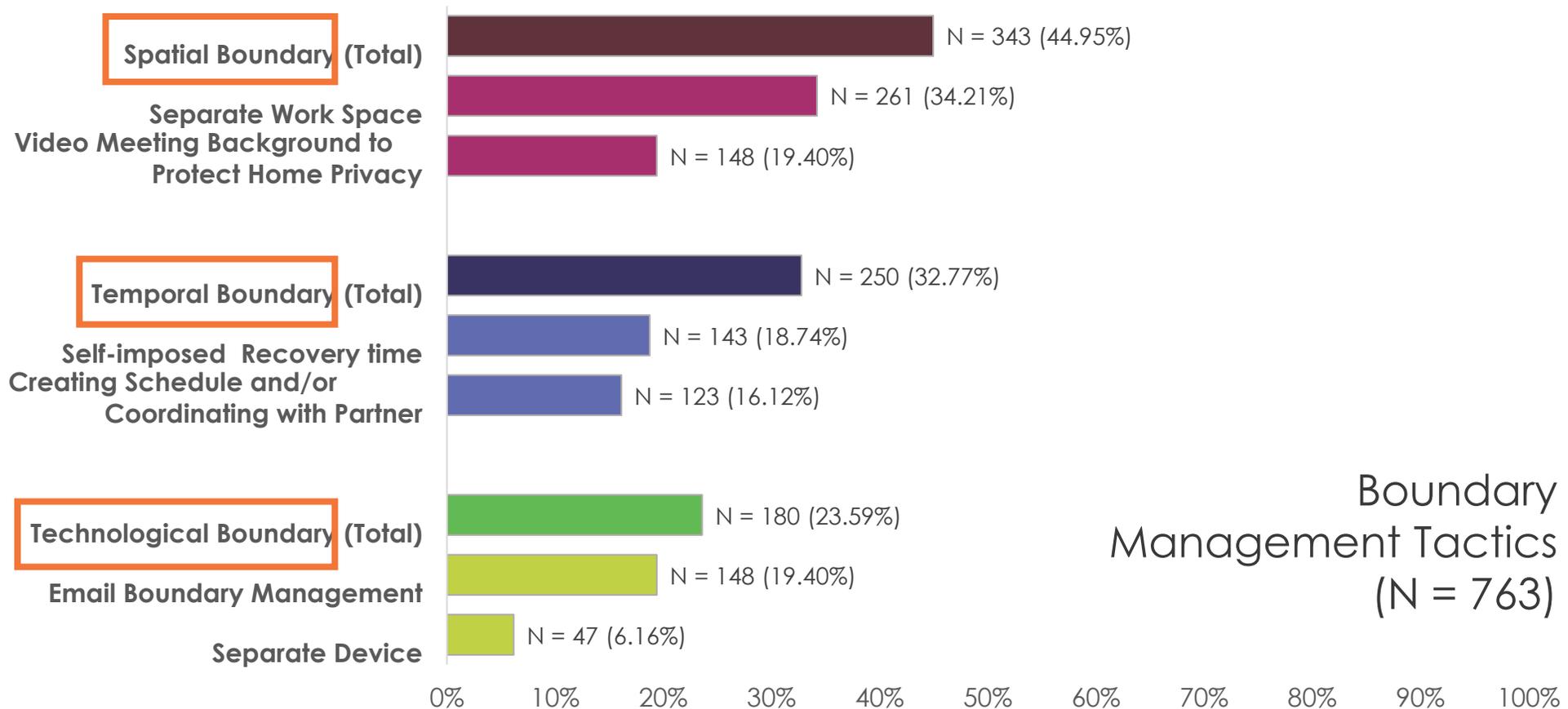| Category	Value
Increased Workload and/or Hours Worked	N = 212 (27.79%)
Decreased Productivity	N = 194 (25.43%)
Difficulty Interacting with Colleagues and Students	N = 157 (20.58%)
Challenges of Changing Teaching Mode/ Remote Teaching	N = 139 (18.22%)
Negative Impact on Research	N = 134 (17.56%)
Less Time to Work	N = 80 (10.48%)

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

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

Spatial Boundary (Total) — N = 343 (44.95%)
Separate Work Space — N = 261 (34.21%)
Video Meeting Background to Protect Home Privacy — N = 148 (19.40%)

Temporal Boundary (Total) — N = 250 (32.77%)
Self-imposed Recovery time — N = 143 (18.74%)
Creating Schedule and/or Coordinating with Partner — N = 123 (16.12%)

Technological Boundary (Total) — N = 180 (23.59%)
Email Boundary Management — N = 148 (19.40%)
Separate Device — N = 47 (6.16%)

Boundary Management Tactics (N = 763)

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

REPORT

| 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 |

Understanding the Impacts

Exploring the Opportunities

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Academic Productivity

Several preliminary measures of productivity suggests that **COVID-19 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

Questions to Consider: What are the short- and long-term effects of the COVID-19 pandemic on the career trajectories, job stability, and leadership roles of women, particularly of Black women and other Women of Color?

Institutional Responses

Some institutional supports employed during 2020, such as work-from-home provisions and extensions on evaluations or deliverables, may **exacerbate underlying gender-based inequalities** in academic advancement.

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

Questions to Consider: What are the short- and long-term effects of faculty evaluation practices and extension policies implemented during the COVID-19 pandemic?

How might positive institutional responses be leveraged to create a more resilient and responsive higher education ecosystem?

Gendered Divisions of Labor

There are **early indications that women – and especially women of color** – have seen **loss of work-life boundaries, reduced productivity, reduced hours because of caregiving and educating-at-home responsibilities; stress-induced insomnia, anxiety, depression, and other effects** of the pandemic – and that **these effects have been more pronounced for women**.

Questions to consider: How have COVID-19 pandemic-related disruptions affected progress toward reducing the gender gap in academic STEMM labor-force participation?

How can institutions account for the unique challenges of women faculty with parenthood and caregiving responsibilities when developing effective and equitable policies, practices, or programs?

Collaborations and Networking

Technology has allowed for **the continuation of information exchange and many collaborations** and in some cases has facilitated the increased participation of women and underrepresented groups. Preliminary indicators also show gendered impacts on science and scientific collaborations during 2020.

Questions to consider: How will the increase in virtual conferences specifically affect women's advancement and career trajectories? How will it affect women's collaborations?

How has the shift away from attending conferences and in-person networking changed longer-term mentoring and sponsoring relationships?

Academic Leadership and Decision-Making

Many decisions made in 2020, including financial ones like lay-offs and furloughs, were **quickly implemented and greatly affected contingent and non-tenured faculty members**. Some approaches academies leaders used to make decisions, govern, and be accountable were more gender inclusive and considered **the long-term implications**.

Questions to consider: What specific aspects of different leadership models translated to more effective strategies to advance women in STEMM, particularly during 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?

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**.

Questions to Consider: What is the impact of the COVID-19 pandemic and institutional responses on the mental health and well-being of members of the academic STEMM workforce as a function of gender, race, and career stage?

How might insights gained about mental health during the COVID-19 pandemic be used to inform preparedness for future disruptions?

REPORT

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.

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

Understanding the Impacts

Exploring the Opportunities

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.

Thank you

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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