FEDERAL POLICIES AND PRACTICES TO SUPPORT STEM RESEARCHERS WITH CAREGIVING RESPONSIBLITIES

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Abbreviations and Acronyms

AHRQ	Agency for Healthcare Research and Quality
CFR	Code of Federal Regulations
CLB	career-life balance
CoSTEM	Committee on STEM
DEIA	diversity, equity, inclusion, and accessiblity
DOE	Department of Energy
ESI	early-stage investigator
FY	fiscal year
IMLS	Institute of Museum and Library Services
IWGIS	Interagency Working Group on Inclusion in STEM
NASA	National Aeronautics and Space Administration
NCE	no-cost extension
NIH	National Institutes of Health
NRSA	National Research Service Award
NSF	National Science Foundation
NSTC	National Science and Technology Council
OSTP	Office of Science and Technology Policy
PHS	Public Health Service Act
PI	principal investigator
RFI	Request for Information
STEM	science, technology, engineering, mathematics
USC	United States Code

Introduction

Supporting caregivers is a priority for the Biden-Harris Administration. This report recommends policies that provide flexibility for STEM researchers who have caregiving responsibilities. Enabling supportive and inclusive research environments is fundamental for a thriving science, technology, engineering, mathematics (STEM) workforce. STEM researchers who are also caregivers—meaning they have additional responsibilities to support children, elderly people, and people with medical conditions—are essential to and are not adequately supported in the STEM workforce.

As former First Lady Rosalynn Carter stated, "[…] there are only four kinds of people in this world- those who have been caregivers, those who are currently caregivers, those who will be caregivers, and those who will need caregivers."[1] In 2020, approximately 21% of Americans were caregivers.[2] The socioeconomic impact and the contributions of these individuals to society are underappreciated, including in STEM fields.

A diversity of experiences and perspectives enriches the science and technology ecosystem. Our nation must find ways to support and retain STEM researchers with caregiving responsibilities to meet our goals of a diverse and inclusive scientific workforce. President Biden has taken on a comprehensive set of executive actions by signing an executive order that included more than 50 directives to nearly every Cabinet-level agency to expand access to affordable, high-quality care, and provide support for care workers and family caregivers.[3] While federal agencies have taken on these Administration priorities and changes have been made at some federally funded academic institutions, in general, scientific environments have not prioritized caregivers. This lack of prioritization and the invisibility of caregiving demands and their impact on the individual's time and flexibility can contribute to inequities in opportunity and advancement for individuals with these responsibilities. Furthermore, caregiving responsibilities often contribute to the attrition of professionals from STEM, with some studies finding that 43% of women leave full-time STEM employment after their first child.[4,5] This is a tremendous loss of talent for the scientific research enterprise, given that caregivers are often particularly motivated, resourceful, and insightful. Their attrition and thwarted advancement contribute to the longstanding challenges to diversify the scientific workforce.

These challenges are compounded by a national child care crisis. Many caregivers have difficulties in both finding and affording adequate child care so that they are able to work. During the COVID-19 pandemic and the resulting shutdown of many dependent care facilities, caregivers were frequently left to solve the problem of simultaneous work and caregiving roles. This was a challenge in academic settings as well, and, in the aftermath, many institutions have been rethinking how to integrate work-life balance to better support Americans with caregiving roles. To address some of these issues, the Biden-Harris Administration called for investments to support high-quality, affordable child care,

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[1] Written Testimony of Former First Lady Rosalynn Carter Before the Senate Special Committee on Aging, 2011. https://www.cartercenter.org/news/editorials_speeches/rosalynn-carter-committee-on-aging-testimony.html

[2] American Association of Retired Persons and National Alliance for Caregiving. Caregiving in the United States 2020. https://doi.org/10.26419/ppi.00103.001

[3] https://www.whitehouse.gov/briefing-room/statements-releases/2023/04/18/fact-sheet-biden-harris-administration-announces-most-sweeping-set-of-executive-actions-to-improve-care-in-history/

[4] Barriers, Challenges, and Supports for Family Caregivers in Science, Engineering, and Medicine: Proceedings of Two Symposia. National Academies of Sciences, Engineering, and Medicine. https://doi.org/10.17226/27181

[5] Cech E, et al. The changing career trajectories of new parents in STEM. Proceedings of the National Academies of Science. https://www.doi.org/10.1073/pnas.1810862116

preschool, and long-term care in the fiscal year (FY) 2024 budget. Complementing those proposals, President Biden took immediate action to make care more affordable for American families, support family caregivers, and expand care options.[6]

While caregiving impacts nearly everyone, there is no denying that it has an outsized impact on women, who make up nearly two-thirds of family caregivers and drop out of the workforce at higher rates than men. When analyzing disparities in pay, women with caregiving responsibilities weighs heavily into understanding gender pay gaps.[7]

Data analyses on the STEM workforce show striking features:
- Postdoctoral scholars are more likely to be parents or be of childbearing age.[8,9]
- Almost half of all new mothers in STEM leave full-time STEM employment after becoming parents.[10]
- Adults who face dual parenting and informal, often unrecognized, caregiving roles for other family members (the "sandwich generation") carry a higher risk of anxiety, isolation, and depression.[11]

In academic settings, early-career researchers and postdoctoral scholars can be disproportionally affected since they may accept positions at institutions that are far from family support systems. Developing strategies to address these issues can be used to successfully retain workers, with particular emphasis on postdoctoral scholars who are in short supply and function as a critical population in the STEM workforce.[12,13,14]

These hardships are often further amplified for individuals from groups that are historically underrepresented in STEM. For instance, caregivers with intersecting identities (e.g., gender identity, ethnicity, race, disability status, etc.) and life experiences (e.g., first-generation students, individuals from low socioeconomic backgrounds, etc.) often face compounding challenges to their training and/or career growth and advancement. Historically, family leave policies have provided an insufficient level of support and have limited access to STEM research fields and careers compared to those with more resources and seniority.[15] Improving conditions for all caregivers in the STEM workforce, across career

[6] https://www.whitehouse.gov/briefing-room/statements-releases/2023/04/18/fact-sheet-biden-harris-administration-announces-most-sweeping-set-of-executive-actions-to-improve-care-in-history/

[7] Buffington C, et al. STEM Training and Early Career Outcomes of Female and Male Graduate Students: Evidence from UMETRICS Data Linked to the 2010 Census. American Economic Review. https://www.doi.org/10.1257/aer.p20161124

[8] Powell K. The parenting penalties faced by scientist mothers. Nature. https://doi.org/10.1038/d41586-021-01993-x

[9] McConnell S, et al. Research: United States National Postdoc Survey results and the interaction of gender, career choice and mentor impact. eLife. https://doi.org/10.7554/eLife.40189

[10] Cech E, et al. The changing career trajectories of new parents in STEM. Proceedings of the National Academies of Science. https://www.doi.org/10.1073/pnas.1810862116

[11] Lianlian L, et al. A national profile of sandwich generation caregivers providing care to both older adults and children. Journal of the American Geriatrics Society. https://doi.org/10.1111/jgs.18138

[12] Langin K. As professors struggle to recruit postdocs, calls for structural change in academia intensify. Science. https://doi.org/10.1126/science.caredit.add4693

[13] Woolston C. Lab leaders wrestle with paucity of postdocs. Nature. https://doi.org/10.1038/d41586-022-02781-x

[14] Ysseldyk R, et al. A Leak in the Academic Pipeline: Identity and Health Among Postdoctoral Women. Frontiers in Psychology. https://doi.org/10.3389/fpsyg.2019.01297

[15] Barriers, Challenges, and Supports for Family Caregivers in Science, Engineering, and Medicine: Proceedings of Two Symposia. National Academies of Sciences, Engineering, and Medicine. https://doi.org/10.17226/27181

stages, life circumstances, and needed support, could be a powerful way to recruit and retain STEM talent.

Existing Federal Policies and Practices

The National Science and Technology Council (NSTC) Committee on STEM (CoSTEM) and its Interagency Working Group for Inclusion in STEM (IWGIS) created this report to provide best practices for those who support or look to support caregivers in STEM research environments. This report and its recommendations are responsive to the requirements in Sec. 10501 of the CHIPS and Science Act of 2022 (Pub.L. 117-167).

These practices should be considered by principal investigators (PIs) and their trainees on federally funded research awards and by federal agencies that provide research funding. For the purposes of this document, the word "trainee" is broadly defined as any individual who is formally receiving training in a research setting. This includes undergraduate students, graduate students, and postdoctoral scholars, including international students and scholars. Caregivers include all individuals with caregiving responsibilities. Caregiving can include care for a newborn or newly adopted child and/or care for an immediate family member who has a disability or a serious health condition.

The enclosed practices and guidance consider, to the maximum extent possible, how agencies can provide:
- Flexibility in timing for the initiation of approved research awards;
- No-cost extensions of such research awards;
- Award supplements, as appropriate, to research awards to sustain research activities conducted under such awards; and
- Any other appropriate accommodations at the discretion of agency directors.

A. Flexibility in Timing for the Initiation of Research Grant Awards

In the current federal research funding landscape, there is limited flexibility in award initiation. Some agencies allow expenditures to be charged before the award start date. For example, the National Science Foundation (NSF), the National Institutes of Health (NIH), and the National Aeronautics and Space Administration (NASA) allow grant recipients to incur pre-award costs up to 90 calendar days prior to the award start date if the advance funding is necessary for the effective and economical conduct of the project.[16,17,18] In general, an award start date is specified in the notice of award and, for some agencies, the award start date cannot be changed after an award is made.[19]

The NIH Ruth L. Kirschstein National Research Service Awards (NRSA) Fellowships allow flexibility in timing for the initiation of approved research. Fellowship applicants are notified by NIH of the agency's

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[16] National Science Foundation, Proposal & Award Policies & Procedures Guide (NSF 23-1). https://new.nsf.gov/policies/pappg/23-1/ch-6-nsf-awards#6D3c

[17] National Institutes of Health, NIH Grants Policy Statement 7.9.1 Selected Items of Cost. https://grants.nih.gov/grants/policy/nihgps/html5/section_7/7.9_allowability_of_costs_activities.htm#:~:text=Pre%2DAward%20(Pre%2DAgreement)%20Costs

[18] National Aeronautics and Space Administration, Grant and Cooperative Agreement Manual. https://www.nasa.gov/wp-content/uploads/2023/09/grant-and-cooperative-agreement-manual-oct.-2022-0.pdf?emrc=89df2b

[19] National Science Foundation, Proposal & Award Policies & Procedures Guide (NSF 23-1). https://new.nsf.gov/policies/pappg/23-1/ch-6-nsf-awards#6D3c

intention to make an award and given the opportunity to confirm plans for the start of fellowship support.[20] This affords award recipients flexibility in initiation of the award, generally for up to 6 months after the federal award date.

B. No‑cost Extensions

The period of performance is the period of time during which the grantee is expected to complete the grant activities. The flexibility in timing after the conclusion of the original award period is known as a no-cost extension (NCE). NCEs are guided by uniform federal regulations[21] with each agency having varying implementation processes. NASA allows grantee institutions to initiate a one-time NCE of up to 12 months for most instances where additional time is required to complete the original scope of work. The institution must notify its grant officer in writing of the supporting reasons and revised period of performance at least 10 calendar days before the end of the original award period. Similarly, NSF grantees can request a one-time NCE using the same process, and additional no-cost extensions may be approved by NSF should the project meet certain criteria.[22]

NIH permits grantees to extend the final budget period of a previously approved project period once for up to 12 months, without additional NIH funds and without prior approval.[23]

C. Award Supplements

Several federal agencies offer varying types of administrative supplements to research awards. Supplements may be used to address family leave, child care, family health care coverage, and other benefits. Supplements can also be used to mitigate caregiver travel issues for research or conference attendance, and support continuity of research after a caregiver takes leave.

Supplements for Family Leave, Child Care, Family Health Care Coverage, and Other Benefits

Many federal agencies allow for grant funds to be used for traditional employee benefits such as paid time off and health insurance. However, this often depends on whether the grantee institution has established benefits policies in place for similarly situated employees. For example, NASA allows grant funds to be used for employees on the grant with dependent care responsibilities but only if the institution has pre-existing policies regarding these benefits. NIH NRSA fellowship awards and NIH institutional research training grants allow for training-related expenses and provide allowances for family health care expenses (e.g., health insurance premiums) at the discretion of the institution.[24] Other federal agencies offer supplements to cover child care expenses for PIs, trainees, or both. For example, AmeriCorps provides child care subsidies for active AmeriCorps program participants.[25] The subsidy depends on household income and the number of children, and payments are made directly to

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[20] National Institutes of Health, NIH Grants Policy Statement 11.2.8 Initiation of Support.
https://grants.nih.gov/grants/policy/nihgps/HTML5/section_11/11.2.8_initiation_of_support.htm

[21] 2 CFR 200.308(e)(2). https://www.ecfr.gov/current/title-2/part-200/subpart-D#p-200.308(e)(2)

[22] National Science Foundation, Proposal & Award Policies & Procedures Guide (NSF 23-1).
https://new.nsf.gov/policies/pappg/23-1/ch-6-nsf-awards#6D3c

[23] National Institutes of Health, NIH Grants Policy Statement 8.1.1 NIH Standard Terms of Award.
https://grants.nih.gov/grants/policy/nihgps/HTML5/section_8/8.1.1_nih_standard_terms_of_award.htm#NIH

[24] The NIH Grants Policy Statement (NIHGPS) makes available, in a single document, the policy requirements that serve as the terms and conditions of NIH grant awards. By accepting an award, recipients agree to comply with the requirements in the NIH Grants Policy Statement except where the notice of award states otherwise. See, NIHGPS 11.3.8.4 Training Related Expenses https://grants.nih.gov/grants/policy/nihgps/HTML5/section_11/11.3.8_allowable_and_unallowable_costs.htm

[25] AmeriCorps Child Care Program. https://americorpschildcare.com/index.cfm?tab1

qualified child care providers. NIH and the Agency for Healthcare Research and Quality (AHRQ) provide child care supplements to NRSA fellows and trainees at an amount of $2,500 per year regardless of the number of children or the household income.[26,27,28]

The NIH NRSA supplement is unique in that it explicitly allows funds to be used for dependent care. Section 487 of the Public Health Service (PHS) Act, as amended (42 U.S.C. 288(b)(5)) provides for "stipends, tuition, fees, and allowances (including travel and subsistence expenses and dependency allowances), adjusted periodically to reflect increases in the cost of living, for the recipients of the awards as the Secretary may deem necessary."

NRSA regulations reflected in 2 CFR Part 200, Subpart E and 45 CFR Part 75, Subpart E and the NIH Grants Policy Statement[29] govern the expenditure of all training grant funds. Prior to 2006, health insurance was also included in the NRSA tuition. In 2005, NIH held a town hall on NRSA Tuition Support,[30] and one of the recommendations was that the funds for tuition and health insurance be separated. In 2006, health insurance was separated from tuition and became an allowable expense[31] under training-related expenses and institutional allowances for awards beginning in FY 2007. In 2000, the National Academy of Sciences report "Addressing the Nation's Changing Needs for Biomedical and Behavioral Scientists"[32] included conversations on how to adjust policies to facilitate the recruitment of women and individuals from disadvantaged backgrounds as required by Section 487 of the Public Health Service Act. Recently, NIH began to allow costs associated with family health insurance. Beginning with NRSA awards made from FY 2000 funds, family health insurance became an allowable cost for trainees who have families and are eligible for family health insurance coverage at the awardee or sponsoring institution.

Travel Award Supplements for Caregivers in STEM

Federal agencies provide various award supplements to support researcher travel to conferences or to perform field work. NSF, NASA, and the Institute of Museum and Library Services (IMLS) allow for temporary dependent-care costs beyond regular dependent care costs that are a direct result of travel to conferences.[33,34] Additional clarity is needed if and how this is applicable for grants.[35,36] Federal

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[26] National Institutes of Health. NOT-OD-21-177. https://grants.nih.gov/grants/guide/notice-files/NOT-OD-21-177.html

[27] Agency for Healthcare Research and Quality. NOT-HS-22-013. https://grants.nih.gov/grants/guide/notice-files/NOT-HS-22-013.html

[28] NRSA child care funds are allowable through 42 USC 288(b)(5)) and through 42 CFR 66.107

[29] National Institutes of Health. NIH Grants Policy Statement. https://grants.nih.gov/policy/nihgps/index.htm

[30] National Institutes of Health. NIH Town Hall Meeting on NRSA Tuition Support. https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fgrants.nih.gov%2Ftraining%2FNRSA_Town_Hall_Mtg_Summary.doc&wdOrigin=BROWSELINK

[31] National Institutes of Health. NOT-OD-06-093. https://grants.nih.gov/grants/guide/notice-files/NOT-OD-06-093.html

[32] National Academy of Sciences. Addressing the Nation's Changing Needs for Biomedical and Behavioral Scientists. https://nap.nationalacademies.org/catalog/9827/addressing-the-nations-changing-needs-for-biomedical-and-behavioral-scientists

[33] National Science Foundation, Proposal & Award Policies & Procedures Guide (NSF 23-1). Dependent Care Travel Costs - II.D.2.f(iv)(a). https://new.nsf.gov/policies/pappg/23-1/ch-2-proposal-preparation#2D2fiva

[34] National Aeronautics and Space Administration. Frequently Asked Questions. https://www.nasa.gov/general/grants-policy-and-compliance-team/#hds-sidebar-nav-16

[35] National Aeronautics and Space Administration. Grants and Cooperative Agreement Manual. https://www.nasa.gov/wp-content/uploads/2023/09/grant-and-cooperative-agreement-manual-oct.-2022-0.pdf

[36] Institute of Museum and Library Services. General Terms and Conditions for IMLS Discretionary Grant and Cooperative Agreement Awards. https://www.imls.gov/grants/manage-your-grant/grant-administration

regulations do state that federal funds may be allocated to the identification, but not the provision, of locally available dependent care resources.[37]

Types of Supplements Supporting Continuity of Research for Caregivers in STEM

Some agencies provide award supplements to ensure continuity of research, such as providing funding for a technician to continue working on a research project while the supported investigator is on leave due to caregiving responsibilities. NIH provides administrative supplements to career development award recipients and to first-time independent research project award recipients who experience critical life events, including childbirth, adoption, or caring for an ailing family member, to sustain their research projects while they are on leave.[38,39] Flexible use of funds is encouraged and can include salaries for additional scientific staff, payments for computational services, and payments for supplies and equipment.[40,41] The Department of Energy (DOE) supports supplemental proposals to support temporary personnel to continue research productivity while project personnel are on extended leave in accordance with the recipient institution's policies, whether for family, parental, military, or other extended leave.[42]

Research Supplements to Promote Reentry into Health-Related Research Careers

The NIH Research Supplements to Promote Reentry into Health-Related Research Careers supports mentored research training opportunities for individuals who have interrupted their research careers for family responsibilities or other qualifying circumstances.[43,44] Doctoral degree holders who have experienced a career pause of at least six months and no more than eight years are eligible to apply. Career interruptions may include a complete or partial hiatus from active paid research activities. The supplements are designed to enhance existing skills and knowledge to prepare candidates to apply for individual or independent research support.

D. Other Discretionary Accommodations

Extension of Award Eligibility and Career Stage Status

Federal agencies offer extension of award eligibility and career stage status due to interruptions including for caregiving and other family responsibilities.

- **Early-Stage Investigator (ESI) Extensions:** NIH considers requests for extensions of early-stage investigator (ESI) status (individuals who completed their terminal degree within the past 10 years) from researchers with lapses in research or research training or have experienced periods of less

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[37] 2 CFR 200.432 https://www.ecfr.gov/current/title-2/section-200.432

[38] National Institutes of Health. NOT-OD-23-031. https://grants.nih.gov/grants/guide/notice-files/NOT-OD-23-031.html

[39] National Institutes of Health. NOT-OD-23-032. https://grants.nih.gov/grants/guide/notice-files/NOT-OD-23-032.html

[40] National Institutes of Health. NOT-OD-23-031. https://grants.nih.gov/grants/guide/notice-files/NOT-OD-23-031.html

[41] National Institutes of Health. NOT-OD-23-032. https://grants.nih.gov/grants/guide/notice-files/NOT-OD-23-032.html

[42] US Department of Energy. Guide to Financial Assistance. https://www.energy.gov/sites/default/files/2021-09/Guide%20to%20Financial%20Assistance-%20October%202021.pdf

[43] National Institutes of Health. Research Supplements to Promote Reentry and Reintegration into Health-Related Research Careers. https://orwh.od.nih.gov/career-development-education/research-supplements-promote-reentry-and-reintegration-health-related

[44] National Institutes of Health. NOT-OD-21-134. https://grants.nih.gov/grants/guide/notice-files/NOT-OD-21-134.html

than full-time effort.[45] Requests to extend ESI status can include medical concerns, disability, family care responsibilities, natural disasters, and active-duty military service. Requests for extensions are reviewed by a committee composed of senior NIH extramural review and program staff. Determinations are made on a case-by-case basis.[46] However, because close to 50% of the ESI extension requests are related to childbirth, NIH will approve an ESI extension of one year for childbirth within the ESI period.

- **NIH K99/R00 Award Extensions**: NIH Pathway to Independence Award (K99/R00) is a program that focuses on helping outstanding postdoctoral researchers complete mentored training and transition to independent, tenure-track or equivalent faculty positions. NIH will approve a one-year extension for childbirth within the four-year K99 award period. NIH considers requests for various reasons, including medical concerns, disability, family care, extended periods of clinical training, natural disasters, and active-duty military service. Requests are reviewed on a case-by-case basis.[47]

Revised Biosketch Guidelines for Explanation of Reduced Scientific Productivity

By including factors that impede advancement in the caregiver's personal statement, peer reviewers and others have a more complete picture on which to base their assessment of qualifications and productivity relevant to the proposed role on the project. The biosketch within NIH grant and fellowship applications is used to convey information about the qualifications, productivity, and the role of the personnel involved in the proposed project. NIH expanded its biosketch guidelines to allow investigators to explain reasons for breaks in activity, such as caregiving.[48]

E. Support for Caregivers in Federally Funded Training and Fellowship Programs

Individual fellowships and institutional-level training programs enhance and strengthen the national STEM workforce. These programs promote and support the pool of trained scientists at the predoctoral and postdoctoral levels. Federal agencies provide support for caregivers in various federally funded fellowship and training programs. Examples include:

- As detailed above, the Ruth L. Kirschstein National Research Service Awards (NRSA) provide stipends to NRSA trainees and fellows for family care leave for up to 60 calendar days of parental leave per year for adoption or the birth of a child.[49] Trainees can request $2,500 per budget period to defray child care costs as part of new applications, continuation applications, or as an administrative supplement request.[50] Additionally, both self-only and family health insurance qualify as NIH training-related expenses or institutional allowances for select trainees.[51]

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[45] National Institutes of Health. NOT-OD-19-125. https://grants.nih.gov/grants/guide/notice-files/NOT-OD-19-125.html

[46] National Institutes of Health. NOT-OD-18-235. https://grants.nih.gov/grants/guide/notice-files/NOT-OD-18-235.html

[47] National Institutes of Health. NOT-OD-20-011. https://grants.nih.gov/grants/guide/notice-files/NOT-OD-20-011.html

[48] National Institutes of Health. NOT-OD-11-045. https://grants.nih.gov/grants/guide/notice-files/NOT-OD-11-045.html

[49] National Institutes of Health. NIH Grants Policy Statement 11.3.16.1 Leave
https://grants.nih.gov/grants/policy/nihgps/HTML5/section_11/11.3.16_other_terms_and_conditions.htm

[50] National Institutes of Health. NIH Grants Policy Statement 11.2.9.7 Childcare Costs
https://grants.nih.gov/grants/policy/nihgps/HTML5/section_11/11.2.9_allowable_and_unallowable_costs.htm

[51] National Institutes of Health. NIH Grants Policy Statement 11.2.9.4 Institutional Allowance
https://grants.nih.gov/grants/policy/nihgps/HTML5/section_11/11.2.9_allowable_and_unallowable_costs.htm

- While NIH NRSA fellows are required to pursue training full time, under certain circumstances, fellows may submit a written request for less than full-time training. Written requests for part-time training are considered on a case-by-case basis and must be approved in advance of each budget period. The circumstances requiring part-time training might include medical conditions, disability, or personal or family situations such as child or elder care.[52]

- Other examples of trainee support include NASA's Hubble Fellowship program and the NSF Ocean Sciences Postdoctoral Fellowships, both of which are exploring expanding benefits for postdoctoral fellows by requiring institutions to consider postdoctoral fellows as employees and provide postdoctoral fellows with equivalent benefits.[53,54] Additionally, as mentioned above, some federal agencies allow temporary dependent-care costs beyond regular dependent care that are the direct result of travel to conferences.[55]

- NSF offers Career-Life Balance (CLB) supplemental funding to support additional personnel to sustain research while a postdoctoral fellow is on family leave, including for necessary dependent care.[56] CLB supplemental funds can provide up to six months of salary support or stipend for a maximum of $30,000 in direct costs of salary compensation or stipend provided the duration of support does not exceed the duration of the family leave.

Federal agencies continue to explore opportunities to better support federally funded trainees. For example, between February and April 2023, NIH's Working Group on Re-envisioning NIH-Supported Postdoctoral Training hosted public listening sessions and posted a Request for Information (RFI) to identify possible solutions to address the recent decline in the number of postdoctoral trainees.[57] Of note, the responses to the RFI included comments supporting improved work-life balance, compensation, and benefits, including child and dependent care.[58]

Cited Barriers Impacting Caregivers and Potential Practices for Supporting Caregivers

The term "caregiver burden" is traditionally used in the context of psychological and financial costs to the family of an individual with a chronic illness. The term can be applied to STEM students and professionals with caregiver duties, including childbearing; caring for children, especially children with special needs and/or health challenges; caring for aging relatives; hospice caregiving; or caring for relatives suffering a health issue.[59] This burden is compounded for caregivers with intersecting identities (e.g., gender identity, ethnicity, race, disability status, etc.) and life experiences (e.g., first

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[52] National Institutes of Health. NIH Grants Policy Statement 11.2.7 Full-Time and Part-Time Training https://grants.nih.gov/grants/policy/nihgps/HTML5/section_11/11.2.7_full-time_and_part-time_training.htm

[53] 2 CFR 200.431. https://www.ecfr.gov/current/title-2/section-200.431

[54] National Aeronautics and Space Administration. Balancing Your Research with Your Life https://science.nasa.gov/researchers/work-life-balance/

[55] 2 CFR 200.475. https://www.ecfr.gov/current/title-2/section-200.475

[56] National Science Foundation, Proposal & Award Policies & Procedures Guide (NSF 23-1), Career Life Balance (CLB) Supplemental Funding Requests (II.F.8). https://new.nsf.gov/policies/pappg/23-1/ch-2-proposal-preparation#2F8

[57] National Institutes of Health, Advisory Committee to the Director (ACD) Working Group on Re-envisioning NIH-Supported Postdoctoral Training. https://acd.od.nih.gov/working-groups/postdocs.html

[58] National Institutes of Health, Advisory Committee to the Director (ACD) Postdoc Working Group Listening Session: International Postdoc Concerns (video). https://videocast.nih.gov/watch=49408

[59] Grad J, et al. Mental illness and the family. Lancet. https://doi.org/10.1016/S0140-6736(63)91339-4

generation students, individuals from low socioeconomic backgrounds, etc.). Caregivers in STEM fields experience physical and emotional demands that negatively impact work, careers, self-esteem, overall health, and productivity.[60] Barriers to career advancement for parents in STEM fields include high levels of maternity bias (a form of gender bias), workplace exclusion, fewer professional development opportunities, stigmatization of using parental leave, lack of support, and professional isolation.[61,62] Described above are several practices currently employed by federal agencies to support federally funded researchers with caregiving responsibilities. Additionally, studies in scientific literature described other barriers to and potential practices for creating systemic and significant change for STEM learners and workers with caregiving responsibilities are also noted below

A. Knowledge of the Opportunities that Give Caregivers Flexibility

A significant but easily remediated problem is that guidance and resources pertaining to flexible caregiving policies are not easily accessible.[63,64] Often, these documents are neither easy to find nor easy to understand, but they can be made more accessible.

B. Ensure Those Who Support Caregivers are Aware of and Share Caregiver Flexibilities

Institutional leadership and grant management staff of federal grant recipient institutions should receive training on applicable caregiving policies. Researchers supported by federal grants should be made aware of their institution's caregiving policies and of the caregiving policy flexibilities made available in the grant.[65] Similarly, institutions should improve mentorship on work-life balance and encourage peer mentoring to create a strong and supportive network for STEM caregivers.[66]

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[60] Lerner D. Organizational Policies Supporting Caregivers in STEMM: Examining Academic Medicine. https://www.nationalacademies.org/documents/embed/link/LF2255DA3DD1C41C0A42D3BEF0989ACAECE3053A6A9B/file/D2FB679680B2CF9B031683971DC08C95B6D88B945B72?noSaveAs=1

[61] Global movement demands action to support mothers in science. American Association for the Advancement of Science. https://www.eurekalert.org/news-releases/976560

[62] Mothers in Science. https://www.mothersinscience.com/action-plan-funding-agencies#:~:text=This%20action%20plan%20outlines%20a,3)%20promote%20inclusion%20of%20caregivers

[63] Shauman K, et al. Barriers to Career Flexibility in Academic Medicine: A Qualitative Analysis of Reasons for the Underutilization of Family-Friendly Policies, and Implications for Institutional Change and Department Chair Leadership. Academic Medicine. https://doi.org/10.1097/ACM.0000000000001877

[64] McKinley R. Scientists who are caregivers need more support. ASBMB Today. https://www.asbmb.org/asbmb-today/policy/011923/caregivers-need-more-support

[65] Shauman K, et al. Barriers to Career Flexibility in Academic Medicine: A Qualitative Analysis of Reasons for the Underutilization of Family-Friendly Policies, and Implications for Institutional Change and Department Chair Leadership. Academic Medicine. https://doi.org/10.1097/ACM.0000000000001877

[66] University of California San Francisco. Women's Advancement and Recognition in Medicine. https://zsfg.ucsf.edu/warm-hearts

C. Normalize Caregiving Flexibilities and Accommodations within STEM Working Environments

The institutionalization of practices that reduce the stigma of seeking help due to caregiving responsibilities is key to shifting attitudes in the scientific community.[67,68,69,70,71,72,73] For example, providing 12 weeks of fully paid child care leave for new parents, lactation rooms, protected time for pumping, and increased access to child care services and emergency backup child care should be socialized and promoted as basic expectations.

D. Flexibilities and Organizational Support to be a STEM Researcher and a Caregiver

Flexible work hours, reduction of administrative burden (particularly for PIs), and timing of awards play a major role in the advancement and retention of STEM professionals with caregiver responsibilities.[74,75] Organizations employing caregivers could provide career-stage/track-tailored and more extensive parental leave and flexible caregiver policies, and expectations should allow STEM students, trainees, and professionals to have more control over their schedule to manage caregiving responsibilities while remaining engaged in the workforce.[76,77] For example, according to NSF, the pivot to flexible virtual panels has helped remove a barrier to participation enabling more researchers to participate in merit review, particularly those with child care and/or elder care responsibilities.[78] Organizations should re-examine the impact of routine time-consuming tasks and administrative burdens that prevent productivity and increase staff burn-out.[79] Responses to caregiver issues in STEM must be multifaceted. Concerns in a laboratory environment may be different than those in a fieldwork environment and

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[67] Jones R, et al. The Most Valuable Resource Is Time: Insights From a Novel National Program to Improve Retention of Physician-Scientists With Caregiving Responsibilities. Academic Medicine. https://doi.org/10.1097/ACM.0000000000002903

[68] Szczygiel L, et al. Insights from an Intervention to Support Early Career Faculty with Extraprofessional Caregiving Responsibilities. Women's Health Reports. https://doi.org/10.1089/whr.2021.0018

[69] Shauman K, et al. Barriers to Career Flexibility in Academic Medicine: A Qualitative Analysis of Reasons for the Underutilization of Family-Friendly Policies, and Implications for Institutional Change and Department Chair Leadership. Academic Medicine. https://doi.org/10.1097/ACM.0000000000001877

[70] Cech E, et al. The changing career trajectories of new parents in STEM. Proceedings of the National Academies of Science. https://www.doi.org/10.1073/pnas.1810862116

[71] Jones R, et al. From Stigma to Validation: A Qualitative Assessment of a Novel National Program to Improve Retention of Physician-Scientists with Caregiving Responsibilities. Journal of Women's Health. https://doi.org/10.1089/jwh.2019.7999

[72] Jones R, et al. The Most Valuable Resource Is Time: Insights from a Novel National Program to Improve Retention of Physician-Scientists With Caregiving Responsibilities. Academic Medicine. https://doi.org/10.1097/ACM.0000000000002903

[73] Cech E. Consequences of Flexibility Stigma Among Academic Scientists and Engineers. Work and Occupations. https://doi.org/10.1177/0730888413515497

[74] Shauman K, et al. https://doi.org/10.1097/ACM.0000000000001877

[75] Cardel M, et al. Turning Chutes into Ladders for Women Faculty: A Review and Roadmap for Equity in Academia. Journal of Women's Health. https://doi.org/10.1089/jwh.2019.8027

[76] Jones R, et al. https://doi.org/10.1097/ACM.0000000000002903

[77] Szczygiel L, et al. https://doi.org/10.1089/whr.2021.0018

[78] National Science Foundation. Memorandum on OIG Report No. 22-6-003, Remote Versus In-Person Merit Review Panels. https://oig.nsf.gov/sites/default/files/reports/2022-01/22-6-003-Merit-Review-Remote-v-Person-Panels.pdf

[79] Shauman K, et al.. https://doi.org/10.1097/ACM.0000000000001877

organizations need to adjust appropriately. More than anything, caregivers need flexibility and as STEM researchers, this can include flexibility in the timing and availability of research funding awards.[80],[81]

Actions to Understand and Assess Opportunities for Change

Federal agencies continue to work towards the goal of offering resources and flexibility to awardees who have caregiver responsibilities, including child care, elder care and care for people with serious medical conditions. The following actions have the potential for positive benefits that would allow for more caregivers to thrive in the STEM workforce.

A. Understanding the Vulnerability of Research Grant-Funded Trainees

As detailed in the section above, there are multiple federal programs through which trainees access funds to participate in research. Trainees who are not eligible for fellowships are often funded by the grants awarded to a PI. As a result, not all trainees receive the same benefits based on the source of their funding. For these individuals, agency policies often leave the coverage of benefits, such as child care and family health care coverage, up to the grantee institution which may or may not extend these benefits to the trainees. Additionally, for postdoctoral trainees at institutions that do not consider them employees, benefits coverage often depends on the possibility of applying research award funds towards the cost of the benefits. Some research funding programs do not allow funds to be used by trainees to cover specific benefits, such as health care costs for dependents, leaving those individuals to make difficult financial decisions and potentially leading them to leave their positions. This is particularly problematic for trainees who do not have other sources of income or benefit coverage.

B. Assessing Caregiver Needs and Considerations for Evaluation

Studies to better and explicitly understand the supports caregivers need, including funding gap analyses and/or needs assessments, would support the development of additional policies and practices to support recipients of federal research funding. This should include evaluations that contribute to understanding barriers facing caregivers based on existing supports and their effectiveness.

C. Tracking of Flexibilities and/or Program Usage to Understand Benefits and Unintended Consequences

Tracking of the usage and implementation of caregiving support is still nascent. Further work must be done to track who is using and benefiting from current support structures to identify what policies work best, for whom, and under what circumstances. For example, collecting data, including demographic data that can be disaggregated by gender, race and ethnicity, disability status, geographic location, and socioeconomic indicators, which may also include employment status, occupation, educational attainment, parental education, and income is important to understand how to improve approaches and systems, and how to avoid unintended consequences. Information on access to caregiver flexibilities is needed and the results should be disseminated publicly to support further evidence-based improvements by stakeholders who mentor, hire, and/or fund research trainees in the STEM workforce.

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[80] Shauman K, et al. https://doi.org/10.1097/ACM.0000000000001877

[81] Cech E, et al. https://www.doi.org/10.1073/pnas.1810862116

D. Communication of Caregiver Supports and Implementation of Organization–Wide Policies

Unclear and variable communication of existing policies is a challenge for caregivers and poses barriers to the use of available caregiver support. Caregiver flexibilities or accommodations for caregivers are not always widely and broadly advertised in policy guides or on agency websites. Likewise, when flexibilities or accommodations are offered on a "case-by-case" basis or when responses vary "based on the request," this leaves caregivers without clarity or certainty, often at a time of high vulnerability or during a time of crisis. This often requires PIs and or their trainees to follow-up with agency staff to determine options and eligibility. For new PIs, early career researchers, and/or trainees, this may present itself as a barrier to access. Case-by-case considerations also make it difficult for program managers to track or identify examples, ranges, and/or trends of what is allowable. It also makes caregivers vulnerable to experience biases. Access to support is often dependent on a variety of factors including leadership, the caregiver's supervisor(s), the funding program, and the discretion of a funder's program manager. In some cases, support depends on the budget cycle and the timing of the request. Given that funds are not set aside for caregivers and their needs, if the timing of the request coincides with a deficit or surplus in program budget, different individuals might receive different responses for similar or identical requests.

E. Focus on Organizational and Systems Change that Limit and Prevent Systemic Barriers

Currently, a cohesive approach to supporting individuals with caregiving responsibilities does not exist. The current approach often relies on individual caregivers must self-advocate for flexibilities and benefits. Although the needs of each individual are unique, there are common challenges that could be considered universal. Self-advocacy and outreach are often assumed to be part of the process of obtaining flexibility in leave, timing of award, or funds for dependent care. Although flexibility at the individual level is necessary, inequities naturally arise as those with cultural understanding, more experience, status, or resources know how to navigate this complex system. An individual whose parents are or were faculty is more likely to understand how to navigate an academic or research institution. Additionally, a graduate student who has access to other streams of income—such as financial stability provided by family—may be more likely to have the support needed to advocate for their needs and to wait for their request to be addressed, than a graduate student without the same financial means or familial resources, or who has sole caregiving responsibilities. A foreign-born graduate student or postdoctoral scholar may have less familiarity with these resources than domestic-born counterparts. Consideration of the organizational and systemic barriers faced by caregivers is an essential part of understanding and using best practices, developing more universal approaches to support caregivers at federally funded research institutions, and for developing more and or new policies and practices over time.

Recommendations

Based on the review of existing policies; recommendations from the literature; survey of the federal landscape, which included data collected by the Interagency Working Group for Inclusion in STEM; review of federal research agencies' policy guidelines; and interviews with agency program managers and policy offices, the following recommendations are provided below. As federal agencies maintain or develop and implement policies and practices for their research awards, PIs, or trainees, the following recommendations aim to inform actions supporting STEM researchers with caregiving responsibilities.

R1. Information on Available Caregiving Flexibilities for Grants should be Readily Available and Publicly Accessible

- Federal agencies should ensure that information on available flexibilities is readily available and accessible.
- Agencies should review their policies and the allowable use of flexible caregiving policies to ensure clarity as to when flexibilities may be used (particularly during a funding/award cycle).
- Additionally, agencies should create clear and straightforward processes for supporting individuals and institutions to receive clarifying information whenever uncertainties arise.
- Agencies should have or establish a reporting mechanism for supported individuals to disclose any suspicions they have that their institution is not supporting their request for caregiver flexibilities within grant limits, without fear of retribution.

R2. Incorporate Training and Incentives for Federally Funded Research Institutions

- Agencies should develop and deploy training for institutions on the caregiver flexibilities afforded under grants.
- Agencies may also consider using available authorities (i.e., prize competitions) to incentivize and reward institutions, PIs, and supporting organizations for providing quality support to caregivers.

R3. Lead the Way for Broad Cultural and Institutional Change

To ameliorate the burden of relying on individual caregivers to shoulder the process of self-advocating for support, navigating complex systems, and handling cultural expectations alone,

- Agencies should target their efforts towards messaging, guidance, practices, and policies that socialize the notion that flexibilities and accommodations for caregivers are essential for inclusion, diversity, equity, and accessibility in the STEM workforce.

For example, such efforts should normalize seeking flexibility in the timing of research award initiation and aim to eliminate the stigma of seeking flexibility due to caregiving responsibilities.

R4. Incentivize Mentoring and Allowing for Caregiver Cohort Support to be Considered as a Practice for Mitigating Barriers for STEM Inclusion, Especially for Individuals from Underrepresented Groups

Literature from multiple fields has shown that one way to increase retention and achievement, particularly for underrepresented students, is to use a cohort model.[82,83,84] For example, one program found that the implementation of a caregiver cohort model encouraged institutional change and had the unintended benefit of destigmatizing and promoting more open conversations about caregiving and informal peer support.[85]

- Institutions should explore cohort models to provide support to caregivers. Institutions can either create new groups or leverage pre-existing cohort programs, such as those for individuals from groups underrepresented in STEM, to build institutional awareness and support for caregivers.

These cohorts should incorporate discussions about mentorship and work-life balance, community building, destigmatization of caregiving, and professional development. Additional or tailored programming may be needed for those underrepresented in STEM due to race, socioeconomic background, ethnicity, gender, sexual orientation, and/or disability status. The cohort model(s) should be explored with various groups, including graduate students, postdocs, and early- and mid-stage career individuals.

- At smaller institutions, or where admissions processes make creating cohorts difficult, facilitating sponsorship and mentoring—formal or informal—should be prioritized to increase the network of support for caregivers.
- For agencies that allow for or provide funding support for cohort models, programs should explore and confirm whether caregiver support would be considered as an allowable cohort model.

R5. Allow for Award Time/Funding Cycle Flexibility

- Agencies should implement policies that allow flexibility in the timing of awards, including standard policies that permit NCEs to be used for expected and unexpected caregiving responsibilities.
- Agencies should also consider allowing for flexibility in the timing of when funds are spent (i.e., not immediately after disbursement). While such flexibility may complicate reporting across fiscal years, this kind of adjustment is needed to facilitate the needed flexibilities for STEM researchers with caregiving responsibilities.

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[82] Jagsi R, et. al. Doris Duke Charitable Foundation Fund to Retain Clinical Scientists: innovating support for early-career family caregivers. Journal of Clinical Investigation. https://doi.org/10.1172/jci166075

[83] Kosinski-Collins M, et. al. The brandeis science posse: Building a cohort model program to retain underserved students in the sciences. American Chemical Society. https://doi.org/10.1021/bk-2017-1256.ch004

[84] Langhoff N, et. al. Development of a Cohort-Based Program to Strengthen Retention and Engagement of Underrepresented Community College Engineering and Computer Science Students. https://doi.org/10.18260/1-2--30320

[85] Szczygiel L, et al. Insights from an Intervention to Support Early Career Faculty with Extraprofessional Caregiving Responsibilities. Women's Health Reports. https://doi.org/10.1089/whr.2021.0018

- Agencies should allow flexibility on early career status definitions in a way that takes personal circumstances and caregiver leave into consideration. For example, agencies should exclude leave for caregiving from the calculation of qualifications for early career investigator awards.

R6. Provide Clear and Upfront Funding Flexibility to Account for Unexpected and Future Needs

- Agencies should consider framing award language to provide maximum flexibility in how to use funds allocated for caregiving. The notice of grant award could list examples of acceptable flexibilities and encourage early consultation with the granting agency on appropriate uses of funds.

R7. Provide Gap Funding for Care Providers

- Agencies should reconsider when NCEs and/or additional funding can be allowed. For example, agencies may be able to adopt policies to allow for paid family leave and/or hiring of extra staff to help with administrative burdens associated with the continuation of the research or the basic research activities when researchers need to assume caregiving roles.

Conclusion

Given the role of federal agencies in funding research institutions, their researchers, and training the next generation of researchers, agencies can guide policies and practices that benefit individuals in STEM with caregiving responsibilities. This report aims to capture and highlight existing federal policies and practices that support the needs of caregivers in STEM and identify potential approaches for agencies and institutions to consider in order to meet caregiver needs. The implementation of the recommendations has the potential to benefit federally funded STEM professionals as well as other trainees in research settings that could benefit from overall organizational and instructional change.

This report focuses on overlooked aspects of the supportive structures needed to be successful in STEM and highlights the opportunities that exist to ensure STEM researchers with caregiving responsibilities can fully contribute to the STEM workforce and to society. A lack of effective policies, practices, and guidance that support the broad spectrum of caregivers in STEM will only further contribute to an exodus from the STEM workforce, already stressed and exacerbated by the COVID-19 pandemic.

Sharing policies and practices across agencies would promote consistency across federal agencies, providing widespread benefits to caregivers. This report should be used as a springboard to increase coordination and collaboration across agencies, to support greater uniformity across government, and to support cross-agency data needs as they assess the impacts of the practices and policies that support caregivers in STEM.