The Impact of the COVID-19 Pandemic on Research at Penn State

University Senate Standing Committee on Research, Scholarship, and Creative Activity

March 15, 2024

1 Introduction

In September of 2020, the Research, Scholarship, and Creative Activities (RSCA) Committee of the Penn State University Senate was charged with assessing the impact of the COVID-19 pandemic on research activities at the University. After some discussion, the committee elected to administer a survey to research-active members of the Penn State community. The first such survey was administered in December 2020 and January 2021; subsequent surveys were conducted during December 2021-January 2022, and during March-May 2023. This report briefly details the findings from those surveys.

The report's general conclusions are as follows:

- The COVID-19 pandemic had a substantial, long-lasting negative impact on the pursuit of research at Penn State. It is only recently that individuals' perceptions of their research productivity have begun to return to pre-pandemic levels.
- Those impacts were felt across campuses and units, by members of the research community at every rank, by indivuduals from all racial, gender, age, income, and family status categories.
- The influence of COVID-19 on Penn State researchers was most acutely felt through its impact on teaching and family responsibilities. Negative changes in research productivity due to reduced training opportunities have been among the most rapid to return to normal.
- Steps taken by Penn State to mitigate the pandemic's impact on research were not generally widely used, and then generally only among researchers in the natural, physical, and medical sciences.

The balance of this report highlights some of the findings in more detail. See the appendix for details about the survey instruments.

2 General Impact

Given the widespread disruptions caused by the COVID-19 pandemic, it is unsurprising that members of Penn State's research community felt their research was disrupted by it. Beginning in fall of 2020, the RSCA Committee conducted a series of three annual surveys of all research-active individuals at all Penn State campuses and colleges. Our central phenomenon of interest was researchers' self-assessment of their own research productivity, evaluated on a 0 (lowest possible score) to 100 (highest possible score) scale.

Figure 2.1 shows kernel density plots of the distribution of values on that research productivity self-assessment for the periods from March 1 to October 31, 2019 (prior to the onset of the COVID-19 pandemic), and again for the same period in 2020 (during the pandemic). Both the median and mean scores decline from 2019 to 2020 (the latter from 73.5 to 46.4), and the distribution of scores also reflects widespread declines in scholars' evaluations of their research output.

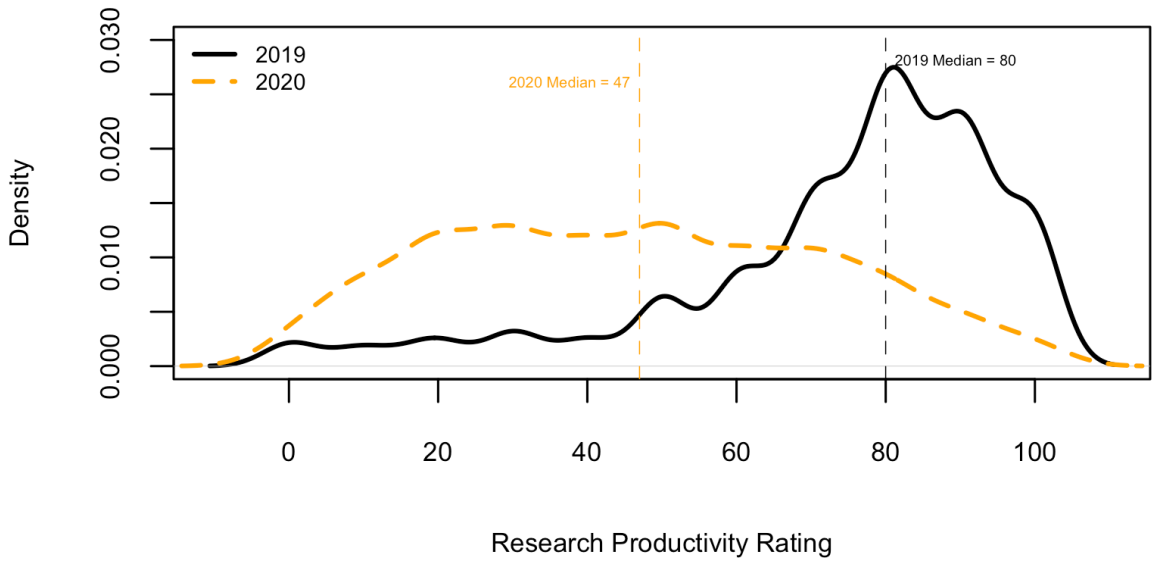

Figure 2.1: Research Productivity Ratings: 2019-2020 (from 2020-21 Survey)

Figure 2.2 illustrates the same distributions for researchers' retroactively self-assessed productivity scores, this time during the March 1 - October 31 periods in 2019, 2020, and 2021 (reflected by the black, orange, and blue lines, respectively). Once again, we observe a significant drop-off in self-assessed productivity between 2019 and 2020; that is then followed by a (somewhat smaller) increase in those scores (from a 2020 median of 45.5 to a 2021 median of 60).

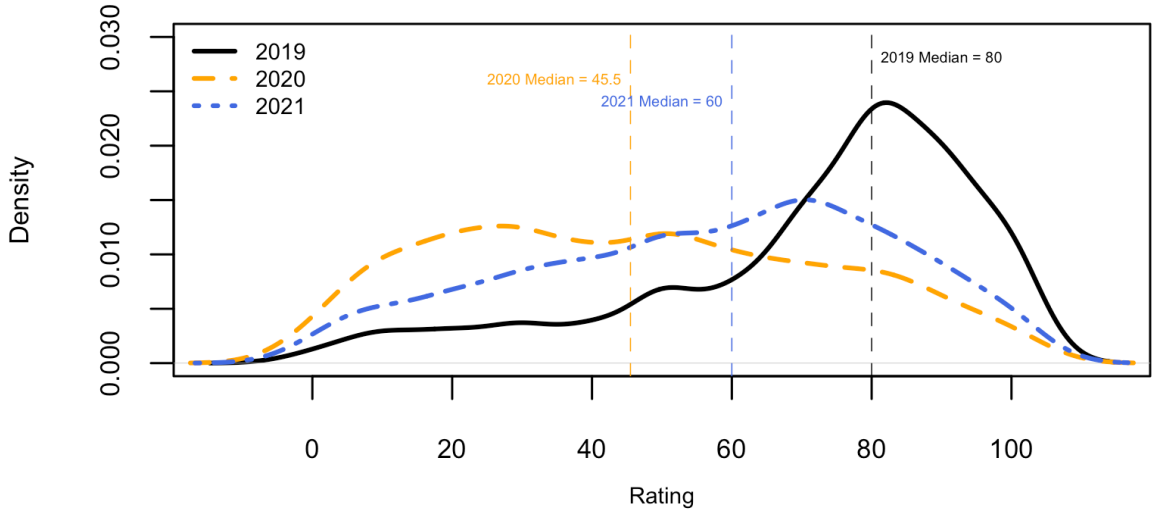

Figure 2.2: Research Productivity Ratings: 2019-2021 (from 2021-22 Survey)

Figure 2.3 plots the same distributions as assessed on the 2023 survey. There, researchers were asked to retroactively assess their annual productivity for 2019-2022. The medians and distributions of the reported scores for 2019-2021 are largely similar to those in the previous surveys. By 2022, we can see that researchers' evaluations of their research output had returned nearly to 2019 levels, although small differences remained between 2019 values and those for 2022. At least in the aggregate, self-reported research productivity at Penn State in 2022 was largely similar to that in (pre-pandemic) 2019.

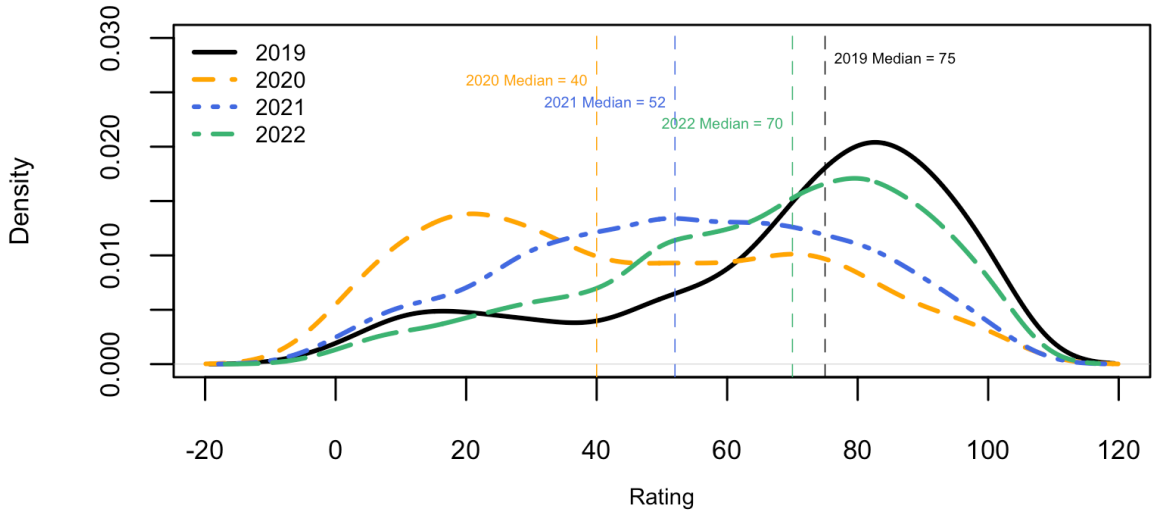

Figure 2.3: Research Productivity Ratings: 2019-2022 (from 2023 Survey)

In each of the three surveys, researchers were also asked ``(T)o what extent is research…part of your professional responsibilities at Penn State?" Possible responses were:

- Research is my *sole or primary* professional responsibility at Penn State.
- Research is a *very important* part of my professional responsibilities at Penn State.
- Research is *co-equal* with several other of my professional responsibilities at Penn State.
- Research is a *small part* of my professional responsibilities at Penn State.
- Research is *not among my professional responsibilities* at Penn State.

Figure 2.4 plots the mean research productivity score across each of the three surveys and four years. The black line represents averages from the 2020-21 survey, and reflects averages for 2019 and 2020. The orange lines are from the 2021-22 survey, and include averages for 2019, 2020, and 2021. Finally, the blue lines are from the 2023 survey, and include all four years of assessments. In the first panel, we plot the averages for all respondents in each survey; each subsequent panel disaggregates those averages by respondents' responses to the *Research Importance* question.

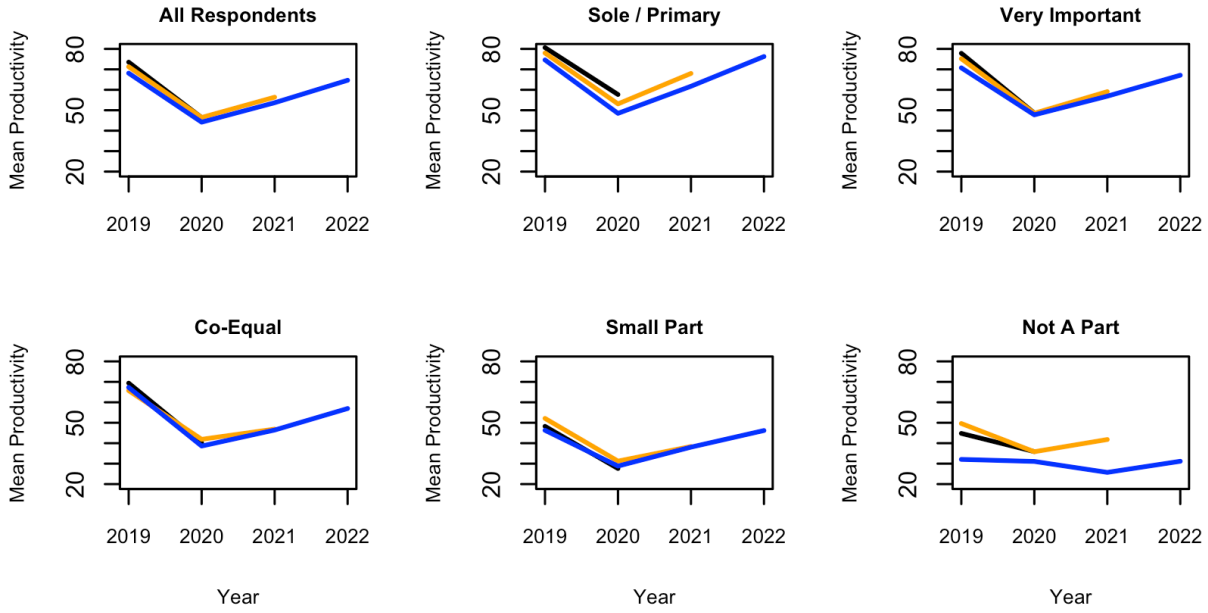

Figure 2.4: Mean Research Productivity Ratings, by Research Importance (All Surveys)

The plots in Figure 2.4 make clear several dynamics. First, research productivity declined uniformly between 2019 and 2020, and then rose again almost as uniformly between 2020 and 2021, and again between 2021 and 2022. As one would expect, respondents' baseline levels of self-assessed productivity varied across the five groups, with the highest average scores among those for whom research was either their sole or a very important responsibility. In addition, the magnitude of the declines between 2019 and 2020 were roughly proportional to those baselines, withthe largest absolute declines occurring among individuals for whom research was either *very important* or *co-equal* with other professional responsibilities.

3 Differential Impact

The aggregate patterns of research output in Section 2 likely mask important variation across different individuals in the University community. An important task of the RSCA committee is to examine whether the effects of the COVID-19 pandemic on research output varies significantly between different groups of scholars. Accordingly, we considered eight different sets of classifications for researchers at Penn State: *unit*, *rank*, *age*, *gender*, *race/ethnicity*, *sexual orientation*, *income*, and *family status*. In both descriptive and causal terms, each of these factors might be linked to differences in the observed impact of COVID-19 on individuals' research.

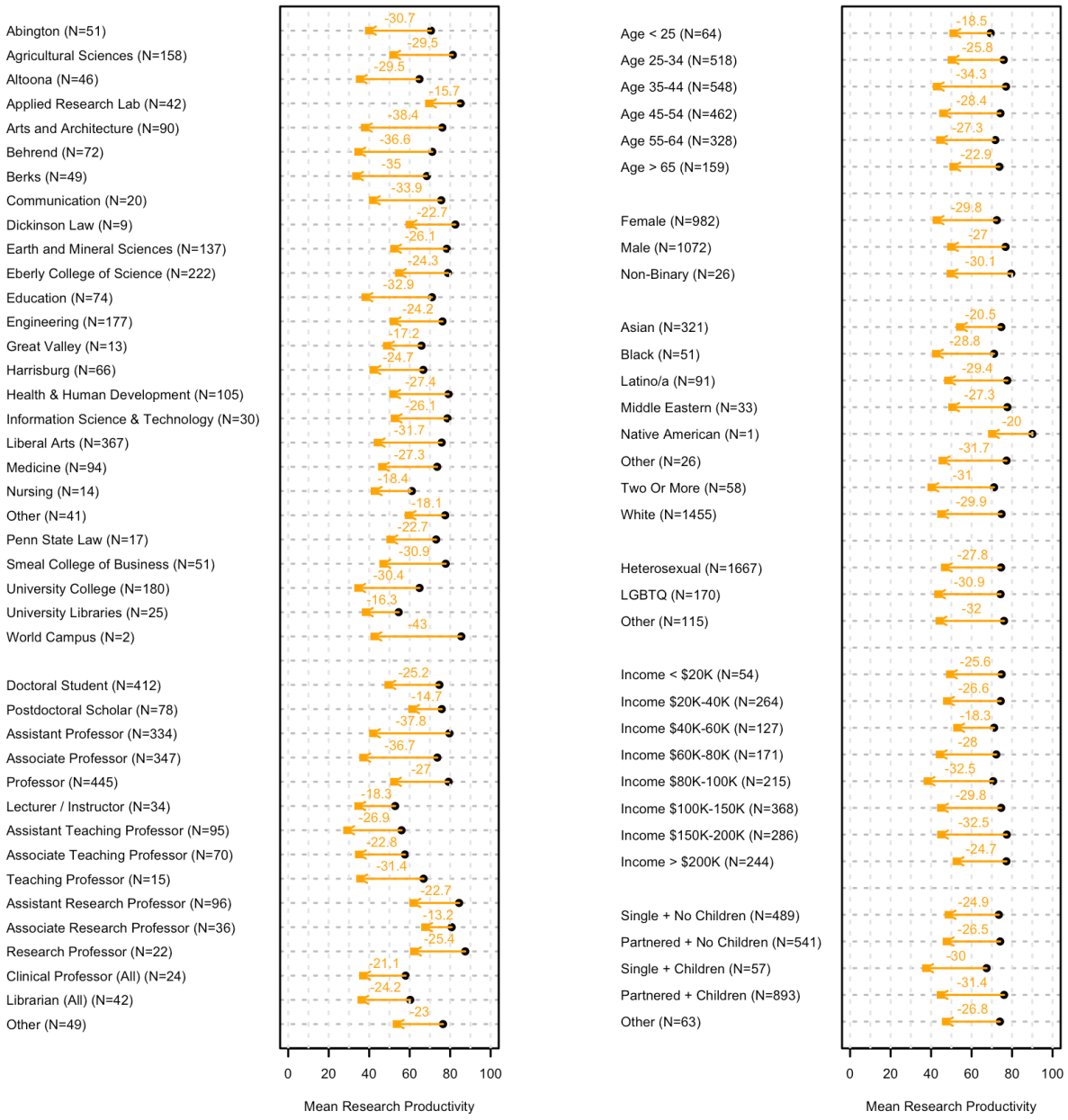

Figure 3.1: Mean Productivity Ratings by Grouping: 2019 and 2020 (2020-21 Survey)

Figure 3.1 plots the mean research productivity scores during 2019 and 2020 for each of the groups defined by our eight factors. We adopt our typologies from Penn State's Office of Planning, Assessment, and Institutional Research (OPAIR), specifically from their university-wide *Climate Survey*, conducted in 2020. The black circles represent groupwise averages on the 0-100 scale for 2019; the orange squares are averages for the same group for 2020. Numbers in orange reflect the change in averages from 2019 to 2020; *N*s reflect numbers of respondents from the 2020-21 survey in each grouping.

Among different Penn State units, the largest declines in average research productivity were seen in the Colleges of Arts and Architecture and Communication, and at the Behrend and Berks

campuses; the smallest were in the Applied Research Lab (ARL), Penn State - Great Valley, and in the University Libraries. Across roles and ranks, the largest reported declines were among tenure-line assistant and associate professors, and the smallest among lecturers and associate research professors.

Turning to demographics, the largest average reported research declines occurred in the middle age categories (35-44 and 45-54), with the smallest observed among those under 25. Productivity declines were somewhat larger for female and non-binary individuals than for males. Across different ethnic groups, the highest declines were among those identifying as *Other* and *Two or More Races*, while the lowest declines were among Asian respondents.[1] Productivity declines were generally lower among self-identified heterosexual respondents than those identifying as LGBTQ or other, while substantial variation was seen across respondents by income levels. In the latter case, the observed patterns did not vary monotonically with income; instead, no appreciable pattern could be discerned across the groups.

Finally, both single and partnered individuals with children living at home showed larger average declines in research productivity than either such group without children (or the residual / *Other* category). This is also perhaps unsurprising; the pandemic's impact was especially severe for individuals with small children, and the disruptions to schools and child care facilities caused by COVID-19 may explain part of this observed variation.

Figure 3.2 differs from Figure 3.1, in that it plots the *changes* in average productivity scores from 2019-2020 (black circles), and also from 2020-2021 (orange rectangles), as reflected in data from the second survey administered in 2021-22. In this plot, values greater than zero imply year-on-year declines in research output, while positive values (to the right of the vertical line at zero) indicate *increases* in research productivity. A signature trait of this plot is that, with the exception of a few very small (*N=1*) subgroups, *all* the 2019-2020 changes were negative, while nearly all the 2020-2021 changes were positive. Because these scores are from the 2021-2022 survey, they have slightly different values than in Figure 3.1.

Also of note in Figure 3.2 is the relative magnitude of the changes. With rare exceptions, the magnitude of the decline in research productivity in 2019-2020 was greater – and in some cases, significantly greater – than the magnitude of the increase in 2020-21. While the sizes of the 2019-2020 declines are largely similar to those in Figure 3.1, we observe important differences across different groupings in the extent to which researchers' research trajectories "recovered" during 2022. While some groupings (e.g., sexual orientation) saw relatively little differences by category, others reflect much greater variation. For example, younger researchers appear to "bounce back" more rapidly than older ones, with positive changes in 2021-2022 being an almost perfectly monotonically-declining function of age. We see similar large variations by income category, and across different ranks and roles within the university community.

[1] The small number of Native American respondents makes generalizing to that group difficult.

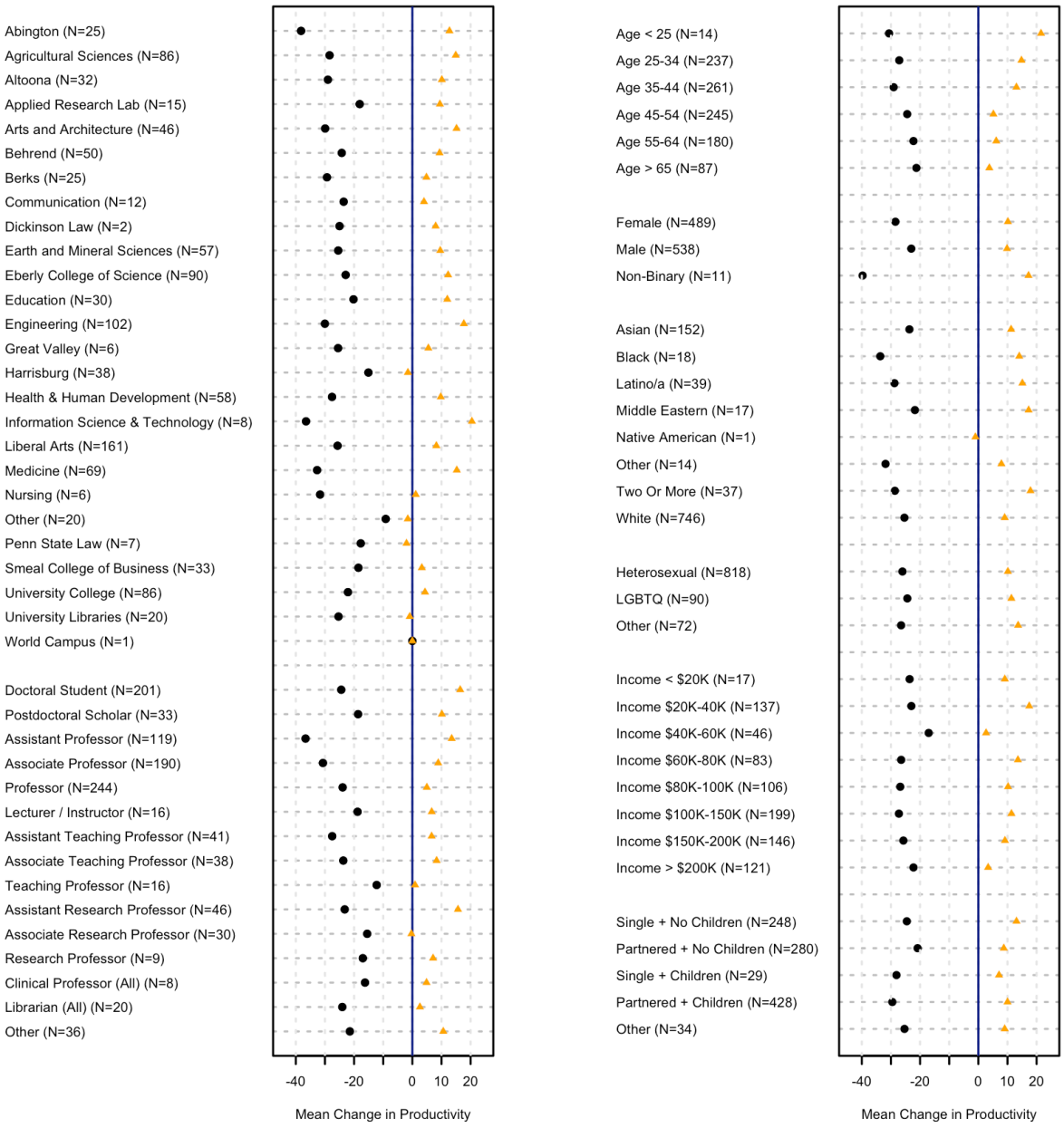

Figure 3.2: Mean Change in Productivity Ratings: 2019-2020 and 2020-2021 (2021-22 survey). Black circles are 2019-20 changes; orange triangles are 2020-21 changes,

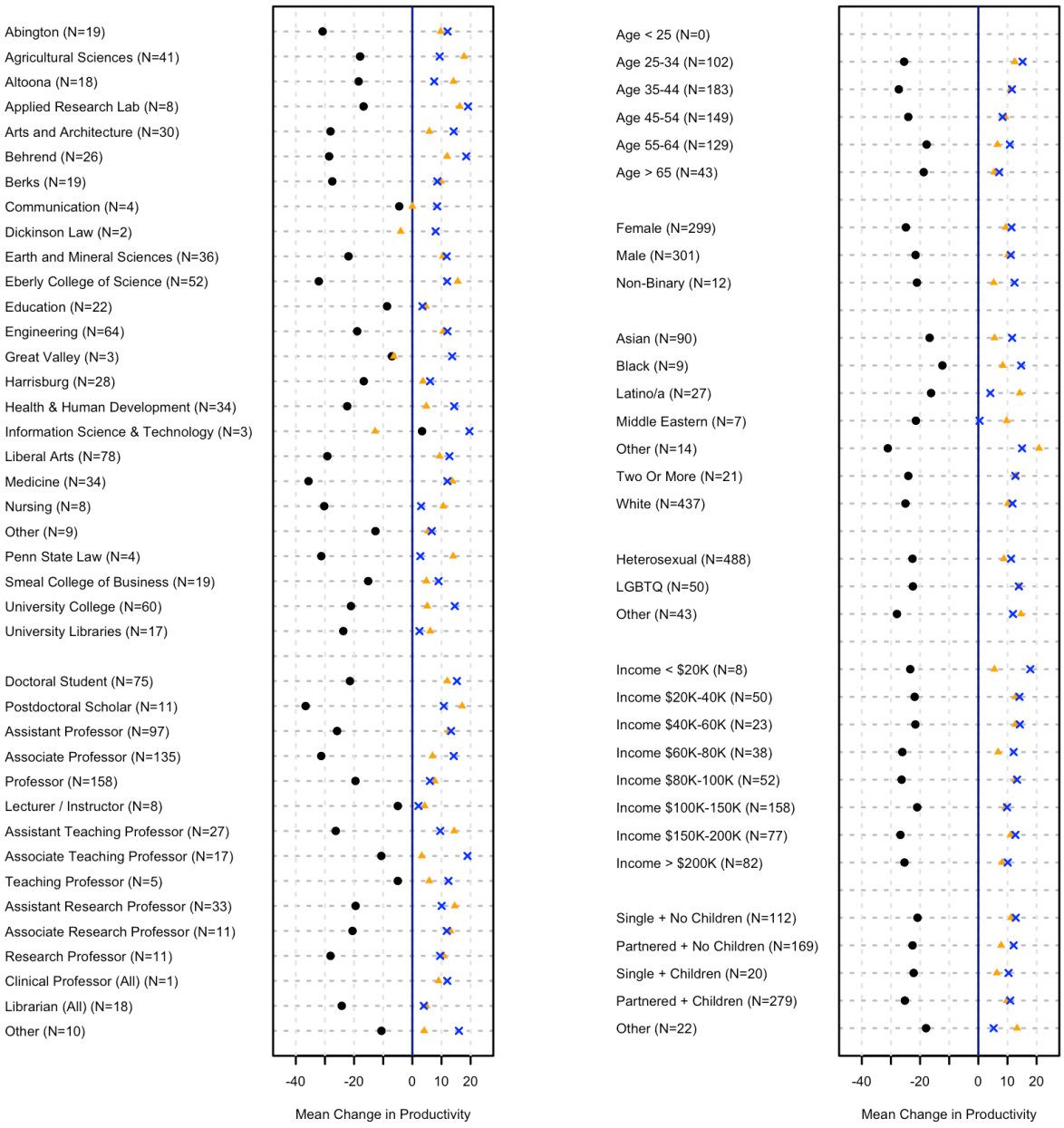

Figure 3.3: Mean Change in Productivity Ratings: 2019-2020, 2020-2021, and 2021-22 (2023 Survey). Black circles are 2019-20 changes; orange triangles are 2020-21 changes; blue Xs are 2021-22 changes.

Figure 3.3 is similar to Figure 3.2, but reflects data from the four-year retrospective survey administered in 2023. Accordingly, it adds a third set of symbols (blue crosses) that indicate the average change in research productivity score for individuals in that grouping from 2021 to 2022.[2] Once again, those scores are uniformly positive, but typically smaller in magnitude than

[2] Note here that, because members of the research community are not typically under roughly 22 years of age, the 2023 survey records no one under age 25 as having valid answers to questions

the declines from 2019-2020. In addition, we once again observe significant heterogeneity in the extent of researchers' 2021-22 "recovery" across different professional and demographic groupings.

4 Reasons and Mechanisms

In addition to professional and demographic questions, the first two of the three surveys also asked respondents who reported declines in productivity to "indicate what you believe to be the reason(s) for that decrease." Those reasons included:

- Increased *personal / health challenges* due to COVID-19.
- Increased *family-related responsibilities* due to COVID-19.
- Reduced ability to engage in *research-related travel* due to COVID-19.
- Reductions in *research-related resources / budgets* due to COVID-19.
- Increased time / effort spent on *teaching* due to COVID-19.
- Increased time / effort spent on *administrative and other duties* due to COVID-19.
- Decreased ability to receive effective *research-related training* due to COVID-19.
- *Other* factors related to COVID-19.
- Other factors *not related* to COVID-19.

Respondents were instructed to mark all that applied to them. These questions were included on the 2020-2021 and 2021-2022 surveys; they were excluded from the 2023 survey.[3]

Figure 4.1 presents the average change in research productivity between 2019 and 2020 for all 2020-21 survey respondents indicating each of the nine reasons for a productivity decline. It is interesting to note that the most frequently reported mechanisms by which COVID impacted research were *Reduced Travel* (*N*=1057) and *Increased Teaching Effort* (*N*=1052). In terms of impact, the largest (i.e., most negative) average changes in productivity were observed among individuals citing *Family Responsibilities* and / or *Reduced Resources* as reasons for their declines. Those reporting *Personal / Health Challenges* and *Other COVID-Related Factors* were also likely to have greater declines in research productivity, while *Decreased Training Opportunities* and *Non-COVID-Related Factors* were among the factors associated with smaller declines.

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regarding their research productivity in 2019. Accordingly, we omit those individuals from this figure.

[3] Note that individuals whose research productivity *increased* between 2019 and 2020 were also asked to choose from a more abbreviated set of possible explanatory factors for that increase. The number of such individuals in each survey was relatively small; there were 313 such individuals in the 2020-2021 survey, 236 in the 2021-2022 survey, and 157 in the 2023 survey. We omit those individuals from the discussion in this section.

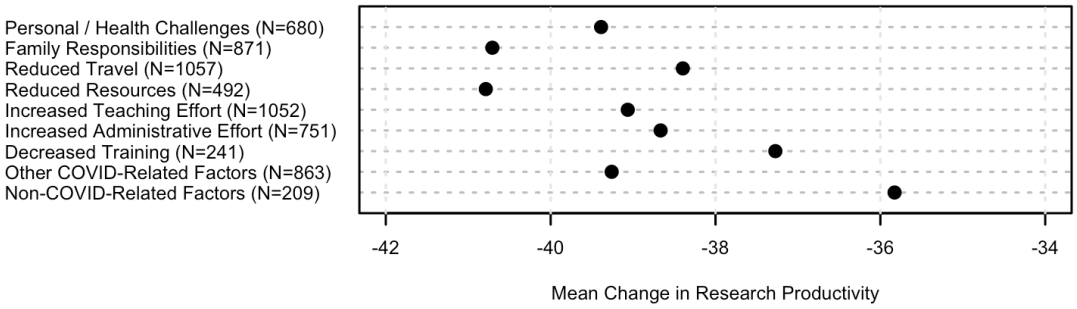

Figure 4.1: Mean Change in Productivity by Reason: 2019-2020 (2020-21 Survey)

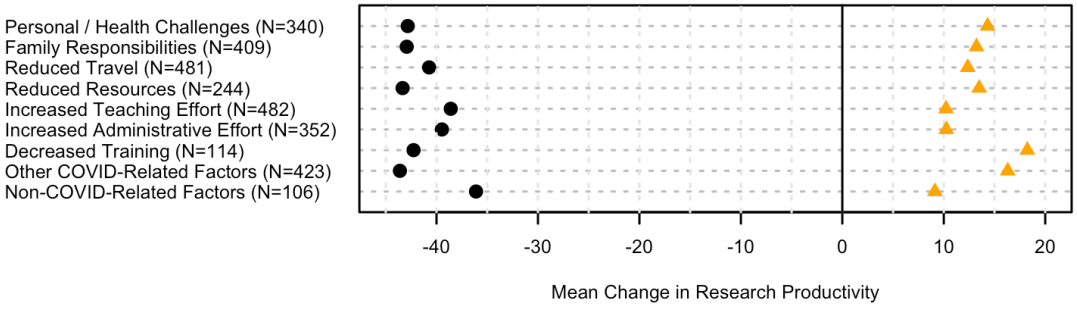

Figure 4.2: Mean Change in Productivity by Reason: 2019-2020 and 2020-21 (2021-22 Survey). Black circles indicate changes from 2019-2020; orange triangles are changes from 2020-2021.

Figure 4.2 is similar to Figure 4.1, this time drawing on the 2021-22 survey to plot changes across 2019-2020 and 2020-2021 by reported mechanism. Once again, the black circles reflect mean changes in research productivity between 2019 and 2020, while orange triangles are mean changes from 2020 to 2021. The former ar largely consistent with the values in Figure 4.1. Once again, *Reduced Travel* and *Increased Teaching Effort* were the most frequently reported

mechanisms by which COVID impacted research. Figure 4.2 also shows that the greatest "recovery" during 2020-2021 was among researchers for whom *Training* was key; individuals reporting *Other COVID-Related Factors* also saw relatively large positive changes to their research productivity in 2021. Note again that, because these questions were not asked on the 2023 survey, we cannot plot changes from 2021 to 2022 against these categories. However, we will return to these factors below, in section 6.

5 Penn State Resources

At the request of the Office of the Senior Vice President for Research (OSVPR), the three surveys also included questions designed to measure the extent of usage of certain steps Penn State took to mitigate the impact of COVID-19 on research activities. These questions asked respondents to indicate which (if any) of the following actions helped in that regard:

- The availability of internal seed grants.
- The Office of Sponsored Program (OSP)'s support in working with sponsors to allow non-working employees to temporarily continue charging to grants.
- OSP's support in obtaining no-cost extensions.
- Supplemental awards from sponsors.
- The availability of remote access to core research facilities, and upgraded with hardware and software to support remote research.
- The ability for undergraduate students and graduate students to continue working in labs and other facilities, albeit at a reduced level.
- Other measures that kept research moving forward (please specify).

Figure 5.1 plots the mean number of COVID mitigation resources (out of a possible seven) that faculty members in each listed units indicated they used during 2020.[4] More than half of all faculty (55.7 percent) did not use any such resources. Among those that did, the highest usage was among faculty in the natural, physical, and medical sciences, while the lowest rates of use were in the libraries, University College, and the law schools. Similar levels and patterns of utilization were found in the 2021-2022 and 2023 surveys; for example, the non-utilization rate in the 2021-2022 survey was 54.8 percent, and that in the 2023 survey was 56.3 percent. These utilization rates reflects the fact that these mechanisms were largely designed to assist researchers in the biological and physical sciences, and saw relatively little use outside of those fields.

[4] Data are drawn from the 2020-2021 survey. Note that no faculty at Dickinson Law utilized any of these mitigation actions.

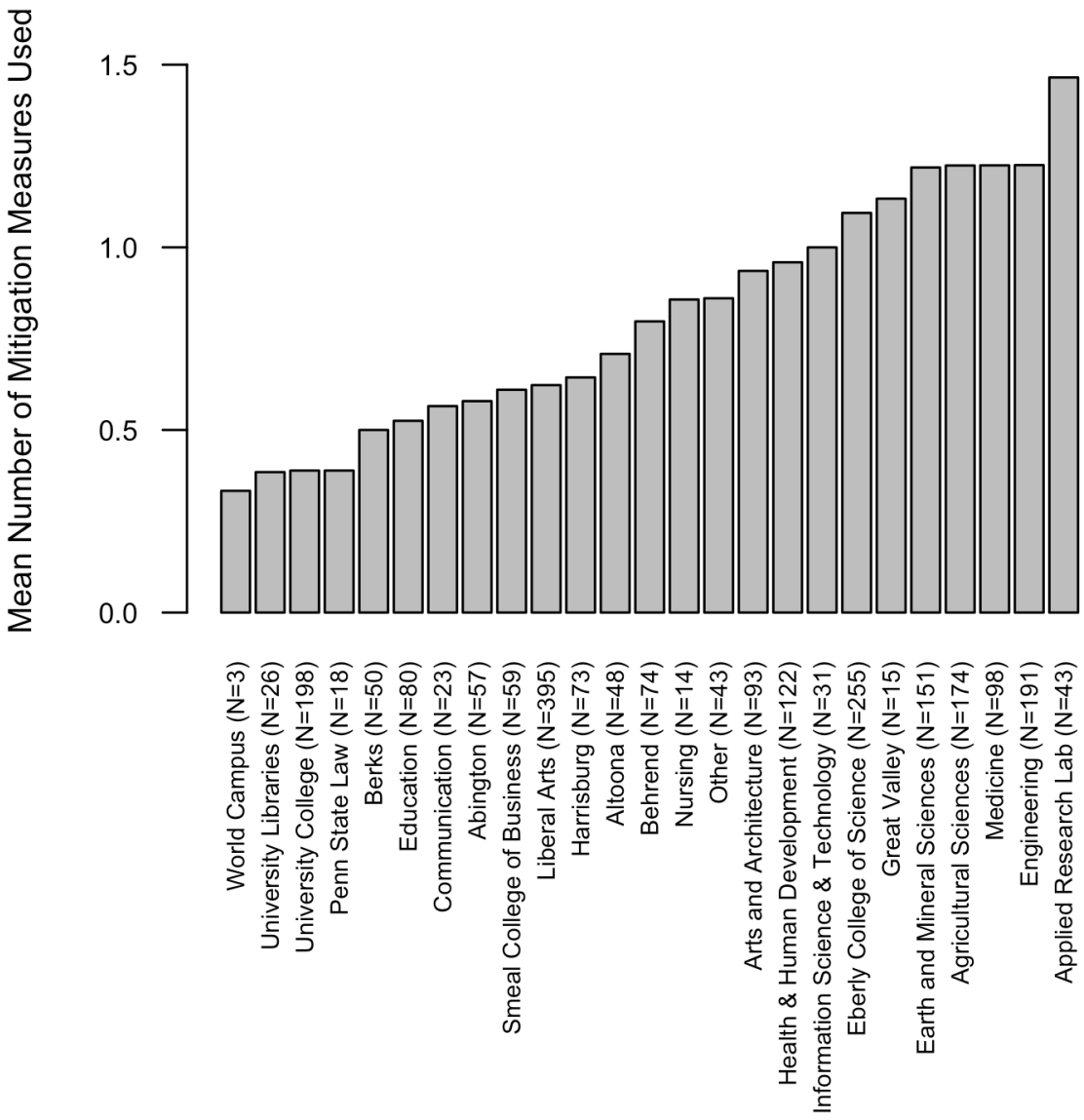

Figure 5.1: Mean Number of COVID Mitigation Resources Used, 2019-2020, by Unit (2020-2021 Survey) *N*s are total numbers of research personnel in that unit responding to these questions.

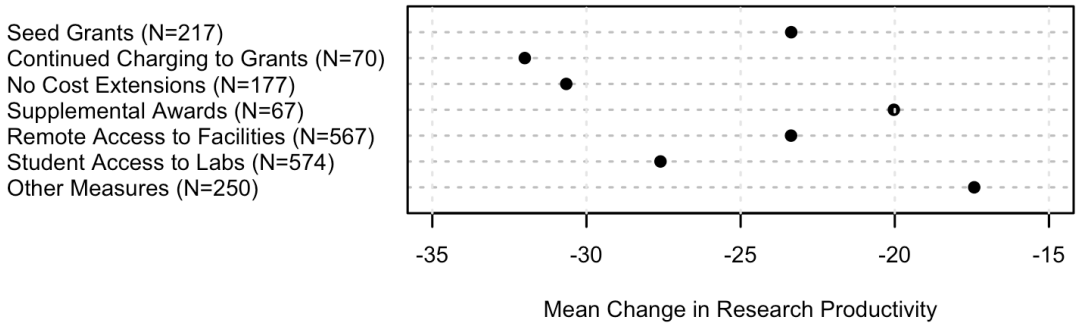

Figure 5.2: Mean Change in Productivity by Mitigation: 2019-2020 (2020-2021 Survey). *N*s are numbers of research personnel indicating they made use of that resource on that survey.

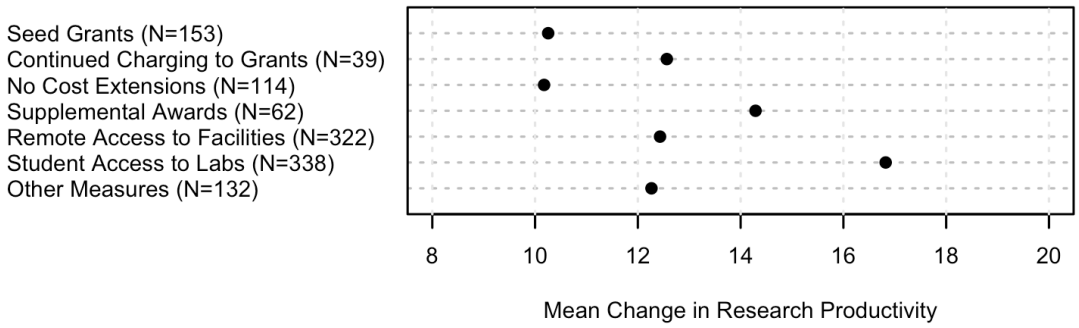

Figure 5.3: Mean Change in Productivity by Mitigation: 2020-2021 (2021-2022 Survey). Ns are numbers of research personnel indicating they made use of that resource on that survey.

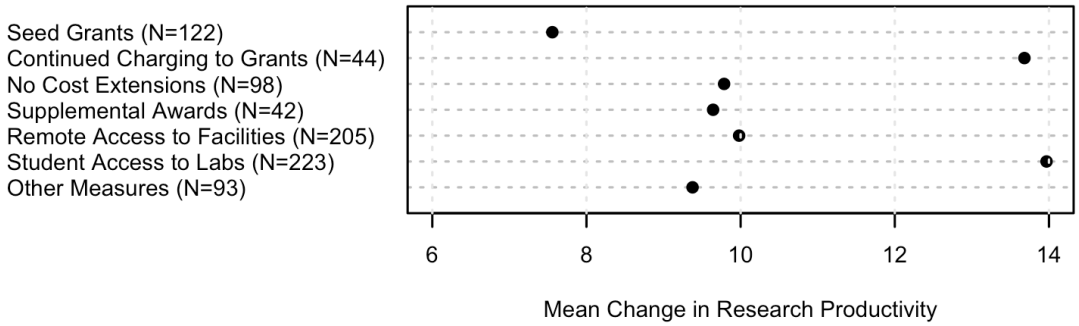

Figure 5.4: Mean Change in Productivity by Mitigation: 2021-2022 (2023 Survey). *N*s are numbers of research personnel indicating they made use of that resource on that survey.

Figures 5.2, 5.3, and 5.4 illustrate the average changes in self-reported research productivity for 2019-2020 (2020-2021 survey), 2020-2021 (2021-2022 survey), and 2021-2022 (2023 survey), respectively. Those plots reflect substantial diversity in the degree of research output lost and then regained, across groups of individuals who made use of the various resources Penn State made available to mitigate the effect of COVID on research. In addition, individual-level analyses show negligible associations between the number of mitigation resources used and the magnitude of researchers decline in research productivity; for example, in the 2020-2021 survey, the Pearson's correlation between the number of such measures used and the change in research productivity is 0.078.

6 Combined Analysis

A more complete consideration of the impact of COVID-19 on research at Penn State requires that we consider the range of factors that might shape that relationship – including researcher characteristics, mechanisms for impact, and potential mitigating influences – in a more holistic fashion. Figures 6.1 and 6.2 plot estimated coefficients from linear regression analyses of 2019-2020 and 2020-2021 changes to research productivity, as a function of the factors discussed in sections 3 through 5. Predictors are coded as factor (dummy) variables; coefficient estimates can be understood as conditional differences of means in the change in research productivity for survey respondents sharing that trait, as compared to those who did not.

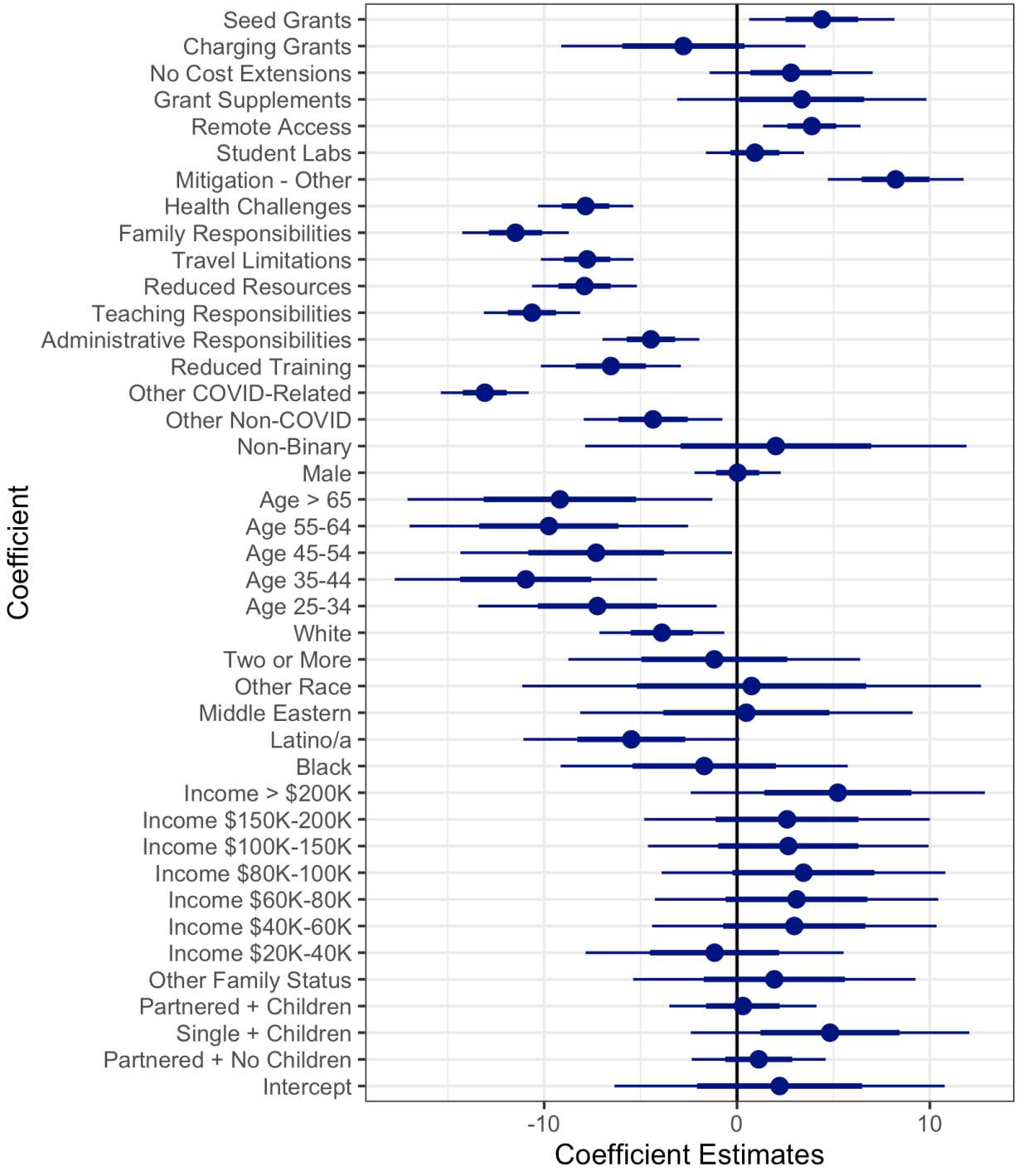

Figure 6.1: Correlates of Changes in Research Productivity, 2019-2020. Figure plots linear regression coefficient estimates with 50/95-percent confidence intervals. Data are drawn from the 2020-2021 survey.

The coefficients in Figure 6.1 show the marginal associations between various respondent characteristics and the expected change in research productivity between 2019 and 2020. Predictors are grouped by type, with mitigation resources used at the top of the figure, followed by the reasons each respondent gave for a research decline, and concluding with demographic variables.[5] Positive coefficients (that is, dots to the right of the vertical line at zero) denote characteristics associated with more positive / less negative changes in productivity; negative estimates correspond to factors associated with greater declines (or smaller increases) in productivity. Wide and narrow lines denote 50 and 95 percent two-tailed confidence intervals, respectively, for each estimate.

For the 2019-2020 period, the mitigation factors most strongly associated with smaller decreases in productivity include utilization of *Seed Grants*, *Remote Access* to research facilities, and *Other* mitigation resources.[6] Unsurprisingly, individuals reporting each of the various reasons for a research decline had, on average, bigger negative changes in their research productivity than those who did not report such reasons. The model also reveals the aforeseen pattern of differential impact across different age groups; at the margin, the youngest individuals in Penn State's research community (those age 25 and less) were the least negatively impacted by COVID-19, with generally larger (negative) age effects as one moves into higher categories. At the same time, the model reveals relatively few marginal differences across racial / ethnic, income, and gender categories.

The picture is somewhat different when we move to changes in productivity between 2020 and 2021. In those analyses – conducted using the 2021-22 survey data – the only mitigation resource substantially associated with productivity gains was the ability of students to conduct lab work. Similarly, the differences observed across "reasons" for COVID's impact largely disappear, as do relevant differences across age categories. The relative paucity of important predictors is reflected in the correspondingly smaller explanatory power of the second model ($R^2 = 0.172$, compared with 0.395 in the model in Figure 6.1).

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[5] For reasons of space, variables indicating rank and administrative unit were omitted from these analyses.

[6] A brief review of the open-ended responses associated with the "Other" resource category reveals that a commonly-mentioned resource was the availability of Zoom.

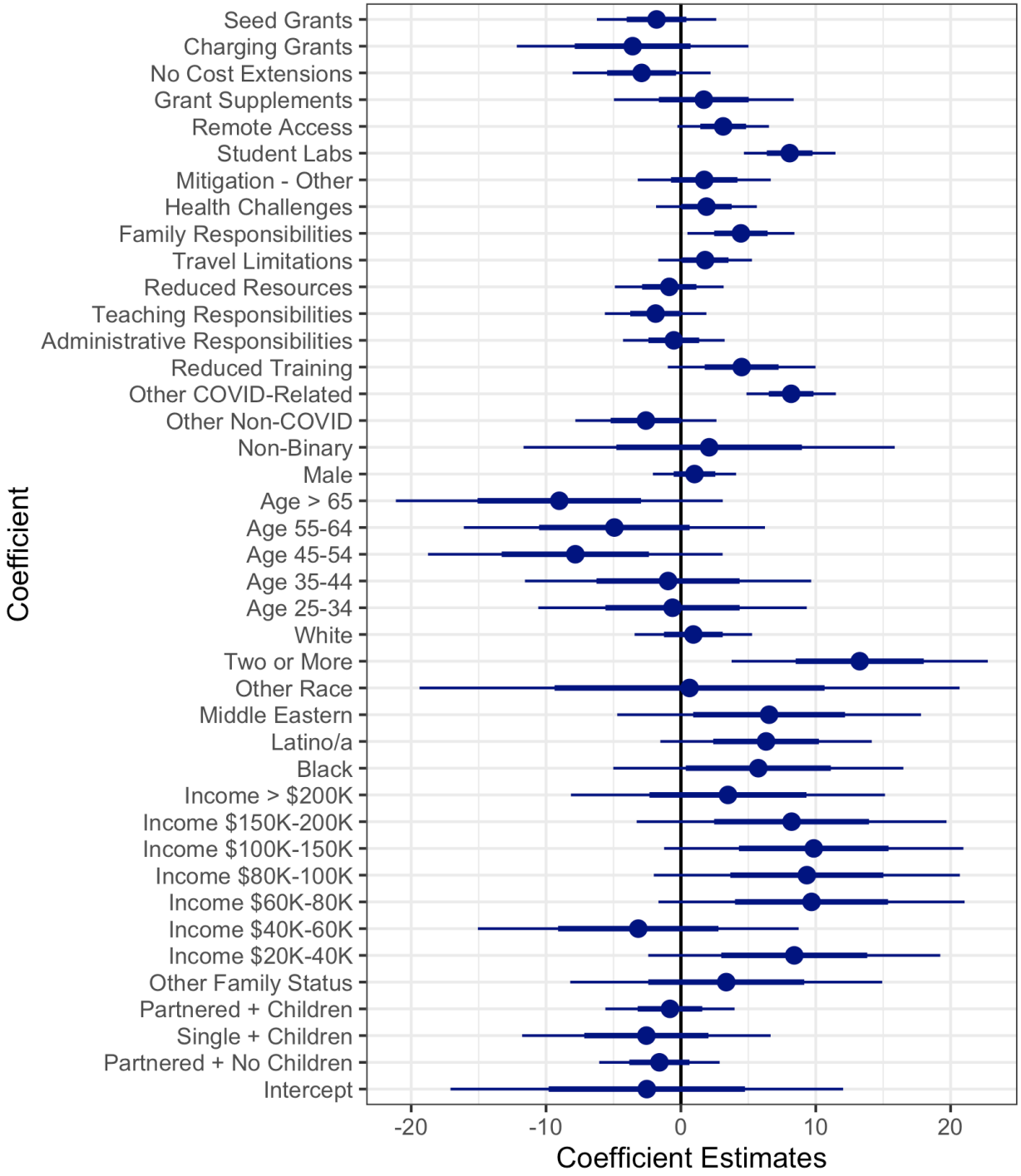

Figure 6.2: Correlates of Changes in Research Productivity, 2020-2021. Figure plots linear regression coefficient estimates with 50/95-percent confidence intervals. Data are drawn from the 2021-2022 survey.

7 Summary and Conclusions

In wrapping up, it is important at the outset to note some of the limitations of the analyses presented here. First and foremost, we underscore that, because these are survey data, concerns about the representativeness of the data upon which this report relies are worthy of consideration. While the sampling frame included all research-active individuals at every college and campus at the university, the potential for nonresponse bias remains. On the one hand, we have no particular reason to expect that to be of particular concern in this case; examination of the univariate marginals for the various demographic categories suggests that the individuals responding to the three surveys are largely similar to the overall populations at the university. On the other hand, it is possible that there are other, unmeasured characteristics on which the data here differ from the broader Penn State community.

A second limitation of the report is our exclusive focus on self-reported changes in a broadly-defined measure of research and creative activity. That choice was deliberate, and designed to allow for a conception of "research" that could reasonably cover the myriad activities falling under the purview of University Policy AC23. At the same time, such a measure necessarily masks important differences in what qualifies as "research": the work of a sculptor is necessarily different from that of a petroleum engineer, which differs in turn from that of a nurse, or a poet, or an entomologist. The common measure we use here elides those differences, in favor of comparability, but more in-depth examinations of COVID's impact would and should necessarily be more nuanced and specific.

Finally, in focusing on general patterns across groups of Penn State researchers, we risk essentializing COVID's impact in important – and potentially pernicious – ways. No large-*N*, primarily quantitative study can fully characterize the influence that the COVID-19 pandemic had on the work of the University. Unmeasured factors, intersectional dynamics, the changing landscape of the local, regional, and national responses to COVID, and a host of other factors come together to uniquely shape each researcher's circumstances. For that reason, our goal here is necessarily more modest: to learn something, ideally of value, about the pandemic's influence on the university's ability to undertake its core mission.

With all these caveats in mind, we can nonetheless derive some general conclusions. While the long-term impact of the COVID-19 pandemic remains to be felt, the data from our three surveys allows us to make a few general observations about its impact on research activities at Penn State. First and foremost, the onset and development of the pandemic represented a substantial disruption to research at Penn State, and one whose impact was effectively universal: From postdocs to senior faculty, across disciplines, campuses, and time, and in myriad ways, COVID made research and creative activities more difficult. The effects of the pandemic have also been relatively slow to recover; while researchers were able partially to "bounce back" as soon as the 2021-2022 academic year, Penn State's complete recovery from COVID-19 is still in progress.

At the same time, the apparently universal impact of the pandemic also masked substantial differences in its severity and longevity across different groups within the University. Of particular interest were the different mechanisms by which COVID impacted individuals' research activities, and the variation in the severity of those impacts across those mechanisms. Researchers for whom family, resource, and travel impacts of COVID-19 were greatest reported being the most negatively impacted by the pandemic, a finding that also withstood the inclusion

of multivariate controls (including those for age, gender, income, and family status). While we must be careful not to ascribe causal interpretations to those results – particularly in light of well-known biases associated with controlling for post-treatment factors – they are perhaps at least suggestive of the kinds of steps the University might consider for addressing differential research effects should it be faced with another pandemic in the future.

8 Acknowledgements

The RSCA Committee owes a debt of gratitude to numerous indivuduals and institutions for assisting in the creation of this report. Penn State's Office of Planning, Assessment, and Institutional Research was an invaluable partner in creating, distributing, and administering the three surveys. We especially thank the late Dr. Geoff Mamerow and Dr. Betty Harper for their assistance. Dr. Kathy Bieschke and Dr. Lora Weiss also provided valuable help in creating and promoting the surveys in the Penn State community. Former RSCA Committee chair Dr. Roger Egolf (Penn State - Lehigh Valley) and current chair Dr. Ira Saltz (Penn State - Shenango) lent exceptional support, expertise, and advice on creating the report, as did the current and past (2020-2023) members of the RSCA Committee.

9 Appendix: COVID Research Impact Surveys

Beginning in the fall of 2020, Professor Christopher Zorn (College of Liberal Arts) worked with Mr. Geoffrey Mamerow (Office of Planning, Assessment, and Institutional Research) to develop and field a 16-item survey to asses the impact of COVID-19 on research activity at Penn State. The survey was administered on-line, using the Qualtrics platform. The sampling pool was all research-active faculty, staff, and graduate students (including postdoctoral scholars) at all Penn State campuses. Zorn and Mamerow worked with Drs. Kathy Bieschke (Vice Provost for Faculty Affairs) and Lora Weiss (at the time, the Senior Vice President for Research) to obtain a list of all such individuals. Dr. Bieschke sent survey invitations to a total of 10924 members of the Penn State research community, and a reminder to fill out the survey appeared in Dr. Bieschke's biweekly "News for Faculty and Instructors: Penn State and COVID-19" emails beginning on December 11, 2020.

The survey asked individuals the extent to which research comprised an important part of their professional activities at Penn State. For purposes of the survey, respondents were instructed to define "research" to be those activities which fall under the category of "The Scholarship of Research and Creative Accomplishments" in University Policy AC23. These include:

> "…competence, usually demonstrated through publication, exhibition, performance, or presentation of scholarly papers, to carry out research or creative work of high quality and scholarly significance… evidence of thorough understanding of the field; maintenance of high levels of academic performance; recognized reputation in the subject matter field; evidence of continued professional growth and active contribution to professional organizations."

The survey then asked each respondent to score their research productivity between March 1 and October 31, 2019 on a scale ranging from 0 (lowest) to 100 (highest), and then to do the same thing for the period from March 1 to October 31, 2020. Depending on the respondent's answers to these question, they were then asked to indicate the reason(s) for the decline (or increase) in their research activity. The survey went on to ask respondents about their utilization of some of the resources that Penn State had made available to facilitate research during the COVID-19 pandemic, and then to ask a series of open-ended items in which respondents could offer additional comments on how COVID-19 had impacted their research, and suggestions for how Penn State could minimize the negative impact of the pandemic on research. Those questions were followed by a battery of demographic questions which concluded the survey.

Subsequent surveys were administered to the same sampling frame during December 2021 - January 2022, and again in March - May 2023. Those surveys once again asked respondents for retrospective assessments of their research productivity (on the same 0-100 scale), but extended the periods covered to March 1 - October 31, 2021 (in the 2021-22 survey) and to both that and March 1 - October 31, 2022 (in the 2023 survey). The 2021-22 survey also retained the questions regarding the reasons for changes in productivity, and those related to the use of resources meant to facilitate research; the 2023 survey retained the latter, but dropped the former. Each of the three surveys was conducted anonymously; this prevents us from tracking within-subject changes over time, but facilitated honesty in responses and enhanced differential privacy. All three survey instruments are available in their entirety in Adobe PDF format at **https://bit.ly/RSCA-COVID-Surveys**.

Table 9.1: Details of RSCA COVID-19 Surveys

Survey	Dates Administered	Total N
2020-21 Survey	12/9/2020 - 1/25/2021	3,056
2021-22 Survey	12/1/2021 - 1/15/2022	1,615
2023 Survey	3/30/2023 - 5/7/2023	1,078

Additional information in the surveys (not examined in this report) include researchers' responses to the surveys' open-ended questions regarding additional information about how COVID-19 impacted their research, and asking for suggests on how to minimize COVID-19's impact on research at Penn State. For additional information about the surveys or the data used in this report, please contact:

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