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Impacts of the COVID-19 Pandemic on Women and Early Career Archaeologists

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Abstract: The COVID-19 pandemic has had far-reaching impacts in all segments of life worldwide. While a variety of surveys have assessed the impacts of the pandemic in other fields, few studies have focused on understanding the short- and long-term impacts of the pandemic for archaeology. To assess these trends, we asked survey respondents ($n = 570$) if they experienced job loss and to rate the percentage of change in their economic situation, workload, teaching or research activities, and personal responsibilities. Results show alarming trends, with nearly half of those who experienced job loss being under the age of 35 and women and early career archaeologists suffering major economic losses. Impacts to workload, teaching activities, and research activities were also felt across these groups. Substantial increases in personal responsibilities (childcare, eldercare, caring for sick family members) were also identified, especially for women with children under 18 years of age. While structural inequalities have already been identified across different sectors of archaeology, the results of this survey suggest the most vulnerable populations are those most heavily affected. We recommend a variety of strategies for employers, professional organizations, funding agencies, and publishers to consider in mitigating the consequences of COVID-19, especially for women and early career scholars.

Keywords: archaeology; gender; career stage; COVID-19

1. Introduction

In early 2020, SARS-CoV-2, the virus that causes the novel 2019 coronavirus (COVID-19), began to spread in the United States, causing alarm in the public health sectors. By mid-March 2020, the World Health Organization had declared COVID-19 a global pandemic [1] and many non-essential professions instituted work-from-home mandates. In the ensuing weeks and months, services that had previously been vital for working parents, such as childcare facilities, were closed. The coronavirus pandemic has had worldwide impacts, affecting all professions and age groups through lockdowns and health precautions. Although these measures are necessary for public safety, expanding research suggests that certain segments of society have been more heavily impacted by the pandemic's disruptions, including parents of young children, disproportionately affecting women's careers [2–4]. In addition, precariously employed professionals (often early in their career) who rely on short-term contracts or soft money, have been subject to cuts or cancelled opportunities [5]. Black, Indigenous, and People of Color (BIPOC) scholars and other under-represented groups have shouldered burdens of structural inequalities [6] that anecdotal reports suggest have been exacerbated within economic and professional arenas by the pandemic [7].

While the consequences of the coronavirus pandemic are beginning to be explored in other fields [8–12], the short- and long-term impacts in archaeology are currently unknown. Archaeology is a diverse professional field, consisting of individuals employed at universities, Cultural Resource Management (CRM) firms, museums, government institutions, non-profit organizations, and a multitude of other archaeology-related businesses. For much of the profession, including in academic and CRM sectors, fieldwork constitutes important avenues for collecting data necessary to complete research projects. At the beginning of the pandemic, universities shifted classes online, causing increased work demands for learning new software and modifying course materials and content. In a preliminary study on the impacts in CRM in the first months of the pandemic, Douglass and Herr [13] reported that some CRM firms paused fieldwork until the initial safety risks were better understood. Many companies instituted safety protocols to minimize potential exposures related to team-based fieldwork, such as minimizing shared equipment and maintaining physical distance [13] (pp. 23–24).

A report by the American Alliance of Museums [14] shows significant economic insecurity faced by museums, with visitor numbers down significantly since the pandemic began. A survey of museum professionals by Kieffer [15] indicated wide-spread economic insecurity driven by the closure of museums, with only 68% of staff maintaining their jobs after temporary museum closures. Many staff worked from home, developing new ways for the public to access their collections through digital programming [16]. Access to collections was impacted by whether museum archives and collections remained open, with cleaning and other precautions limiting researchers' ability to handle archaeological materials.

Further impacts in the field of archaeology can be identified in the availability of jobs in the 2020–2021 calendar year, with university job listings showing fewer available permanent jobs since before the pandemic began [17]. These trends had negative ramifications for early career archaeologists who were scheduled to enter an already devastated workforce in the 2020 to 2021 calendar years. Similar impacts of the pandemic have been identified for other professions. In Economics, some of the largest repercussions are on early career researchers [8]. In Ecology and Evolutionary Biology, women reported being most unhappy with work-life balance caused by pandemic disruptions to childcare availability [9]. Despite the obvious effects on women and early career researchers, other studies have emphasized the long-term impacts on older adults, particularly through the creation of workforce bottlenecks with the delay in time to retirement preventing jobs opening up to new grad-

uates [18]. Overall submissions to academic journals show declines in submissions by female authors [19,20]. Submissions across pre-print websites (e.g., bioRxiv) also show that women were submitting at a lower rate in the first two months of the pandemic than other groups [21]. The pandemic's impacts will continue for years to come in both higher education and other professional fields. Some have even suggested that the pandemic has prompted a workplace transformation that is likely to have some permanency as employers identify more work from home opportunities.

Continuing research suggests that BIPOC communities are disproportionately impacted by the COVID-19 pandemic [22]. Despite these impacts, few studies to date have measured the direct impacts of the coronavirus pandemic on all professional archaeologists. Given the anecdotal evidence that has appeared online and in social media, the impacts of the pandemic are likely to shape the field of archaeology long-term.

2. Materials and Methods

2.1. Research Design

To identify the short-term impacts of the coronavirus pandemic in the field of archaeology, and to aid in the mitigation of long-term effects on our most vulnerable populations, we set up an online survey. The questions within the survey were grouped into several different thematic areas, to collect demographic data and to assess the impacts of the pandemic in various areas of professional archaeologists' life from March 2020 to June 2021. Therefore, our overall research questions were established to probe these themes in-depth:

Research Question 1: Have certain demographic sub-groups within the field of archaeology been more heavily impacted by the pandemic than others?

Objectives:

- (1) Identify sub-groups within the field of archaeology that have been disproportionately impacted by the pandemic.
 - a. Collect demographic data on age
 - b. Collect demographic data on gender (self-identified)
 - c. Collect demographic data on ethnic heritage (self-identified)
 - d. Collect demographic data on number of children under 18 in the household
 - e. Collect demographic data on the sector of archaeology in which each respondent works.

Research Question 2: What have the economic, professional, and personal impacts of the pandemic been in the field of archaeology?

Objectives:

- (1) Identify the economic, professional, and personal impacts of the pandemic in the field of archaeology.
 - a. Using a 0–10 scale, the respondents were asked about the percent change in:
 - i. Economic well-being
 1. Targeted follow-up questions inquire on what factors contributed most to economic change.
 - ii. Workload amount
 1. Targeted follow-up questions inquire on what factors contributed most to changes in workload.
 - iii. Research and/or teaching activities
 1. Targeted follow-up questions inquire on what factors contributed most to changes in research and teaching activities.
 - iv. Personal responsibilities
 1. Targeted follow-up questions inquire on what factors contributed most to changes in personal responsibilities.

Our first research question focused on collecting anonymous demographic data to identify whether certain groups have disproportionately been impacted by the coronavirus pandemic. This section collected important data on age, gender, ethnicity, number of children, and area of employment that will be vital to understanding which segments of the archaeological community have been most significantly impacted. For the second research question, we posed questions that focused on each area that archaeologists might be seen to have been impacted: economic situation, workload, research, teaching, and personal responsibilities. Here, we used a 0 to 10 scale set up to describe changes in overall activity, with 0 representing -100% (decrease), 5 representing no change (0%), and 10 representing $+100\%$ (increase). We infer that each numeric value on that scale represents a 20% change in the specified activity. We used these values to calculate an average amount of change in each area of inquiry.

2.2. Sample

In order to reach as many archaeologists as possible, a two-stage process was created to solicit responses to the public survey. In the first stage, we posted the survey to online social media outlets (e.g., Facebook, Twitter). This resulted in approximately half ($n = 225$) of the responses to the survey. We found that the demographics from the social media campaign cross-cut gender and sector of employment within archaeology. To reach archaeologists who might not engage in online social media platforms, we launched an email campaign to target the main employment sectors within archaeology (academia, museums, CRM) in the United States. Web searches identified email addresses for archaeologists working in each sector, with searches identifying 2–3 employers in each state for each employment industry. While this is not meant to be an all-encompassing sample, it provides a cross-section of respondents working in differing areas of archaeological professions. It is anticipated that those individuals listed on company/institutional websites are likely well-established within archaeology (e.g., tenured or tenure-track faculty, senior CRM archaeologists, museum curators, etc.). Therefore, we also searched to identify graduate students from the same universities, who we anticipate to be the next generation of museum staff, CRM managers, and/or university faculty. In order to target the most vulnerable populations, we also identified adjunct faculty at the same institutions. For cases where the institutional websites did not list the focus of the individual's work, additional web searches were used to identify those adjunct faculty members with connections to the field of archaeology. We acknowledge that contingent or part-time employees working in CRM or at museums may have been missed if they were not listed on company websites. This second-phase of the sampling strategy resulted in 345 additional responses to the survey. A relatively small proportion of responses from archaeologists working outside of the United States offers anecdotal evidence of the worldwide impacts in archaeology.

3. Results

Results from the survey are broken down below to describe large-scale trends across the field of archaeology. We describe the results in relation to: (1) Demographics; (2) Economic Impacts; (3) Workload Impacts; (4) Research Impacts; (5) Teaching Impacts; (6) Impacts on Personal Responsibilities; and (7) International Impacts.

3.1. Demographics

Of the 570 people who responded to the survey, 57% ($n = 325$) self-identified as women, 40% ($n = 226$) as men, 2% ($n = 11$) as gender fluid/agender/or a gender not listed in the survey options, and 1% ($n = 8$) preferred not to report their gender (Figure 1). The survey represents a bias towards women when compared to the SAA member needs surveys [23,24], which reported 49% for both men and women in 2015 and 48% for both men and women in 2020. Given the results of the survey, discussed later in this section, we believe that the greatest impacts from the pandemic were experienced by women, which made women more likely to respond to queries about its effects. Ethnic heritage is not a

straight-forward demographic issue, but we relied on respondents' self-identification in this area. While the majority (84%, $n = 481$) of respondents identified as White/Caucasian, historically under-represented groups in archaeology included those who identified as Hispanic (5%, $n = 31$), Native American (3%, $n = 17$), Black/African American (1%, $n = 7$), Asian (2%, $n = 13$), and Middle Eastern (0.4%, $n = 2$). The survey is notably biased towards white archaeologists, consistent with other recent surveys of the field that have reported that 83% of respondents are white [24]. Overall, these trends largely mirror the demographics of respondents to the SAA member needs surveys, suggesting that the demographics represent relatively accurate trends in the field. Employment across archaeology sectors varied, with the most frequent respondents working at universities (43%, $n = 247$), CRM (17%, $n = 97$), government (4%, $n = 21$), and museums (2%, $n = 13$). A relatively large portion of archaeologists (29%, $n = 163$), especially those working in museums, reported working in multiple sectors. This may include positions in other archaeology-related professions including commercial units, conservation organizations, consulting, K-12 education, heritage management, independent researchers, non-profit organizations, and research institutes. Thus, this survey likely best represents the experiences of white women archaeologists, especially those working in academia. Age groups were relatively evenly represented between the ages 25–34 (32%, $n = 184$) and 35–44 (30%, $n = 172$), followed by ages 45–54 (17%, $n = 96$), 55–65 (10%, $n = 59$), and smaller proportions of the oldest (65 + 6%, $n = 37$) and youngest age group (18–24, 4%, $n = 22$). Similar studies in other fields suggested that women with children under 18 years of age felt the burdens of the pandemic most profoundly. Thus, to assess this possibility, we also assessed the number of children in each household, finding most respondents had no children under 18 (69%, $n = 392$), followed in order by the number of children at one (14%, $n = 80$), two (14%, $n = 82$), and smaller percentages of archaeologists with three children or more (3%, $n = 15$). Geographic residence was also considered in order to identify regional impacts in archaeology. The majority of respondents live in the United States (86% $n = 491$), with smaller numbers of respondents from Canada (5%, $n = 27$), the UK (4%, $n = 22$), and the European Union (3%, $n = 16$). Although the results of this study largely document North American impacts in archaeology, respondents living in Australia and New Zealand, Central America, South America, and the Middle East offer valuable anecdotal evidence on worldwide trends.

3.2. Economic Impacts

To assess the economic impacts of the pandemic on archaeologists, we asked whether each respondent experienced job loss(es), asked respondents to assess the proportional economic improvement or losses on a sliding scale, and asked an open-ended question about what were the primary factors that contributed to economic impacts in their lives during the pandemic. Of the 13% of respondents who reported job loss(es), 76% were women, 23% were men, and 1% were gender fluid/agender/a gender not listed. A chi-square test (Supplemental Materials Table S1) was used to examine the relation between gender and job loss. The relation between these variables was significant, $X^2(2, N = 563) = 10.59$, $p = 0.005$. Women were more likely than men to have experienced job loss. Job losses were relatively evenly distributed across employment sectors in archaeology, although museums (14%), research institutes (10%), and non-profit organizations (5%) were disproportionately impacted by losses. Approximately 49% of those who lost jobs were between the ages of 18–35, suggesting that early career archaeologists were heavily impacted economically. A chi-square test (Supplemental Materials Table S2) was implemented to examine the relation between age and job loss. The relation between these variables was significant, $X^2(2, N = 570) = 10.31$, $p = 0.006$. Ethnicity was also explored to identify whether certain ethnic groups lost positions. We used a chi-square test (Supplemental Materials Table S3) and found that the relation between these variables was not significant, $X^2(1, N = 561) = 0.134$, $p = 0.715$.

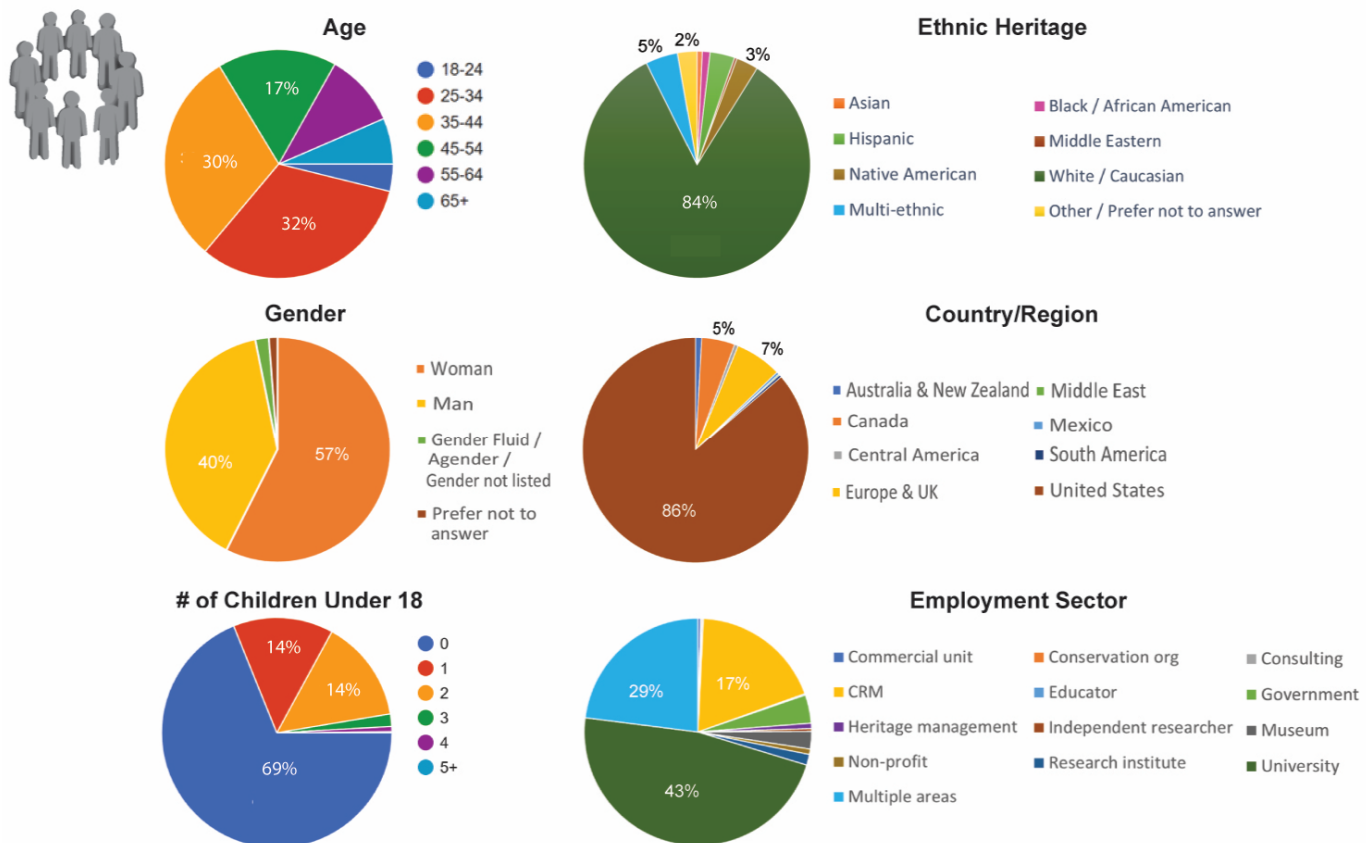


Figure 1. Demographic information of survey respondents, showing breakdown of: age; ethnic heritage; gender; country/region of residence, number of children under 18 years of age, and employment sector.

To understand the scale of economic impacts, and therefore highlight the demographic groups that felt the most economic effects of the pandemic, we asked respondents to rate the negative or positive percent change in their economic situation since the pandemic began. Each number on the scale (0 through 10) represented 20% change. The results (Figure 2) show that while over a third of respondents (36%) experienced no economic change, an almost equal percentage (35%) experienced some degree of economic improvement. Most who saw their economic lives improve reported savings on gas expenses and eating out, while some reported landing important contracts during this period, and a limited few reported getting a job resulting in a +100% improvement in their economic situation. Approximately 30% of respondents reported negative economic impacts, with the majority (22%) of those suffering between -20 to -40% impacts. Many of these more modest economic impacts were the result of fewer jobs available, per diems lost with cancelled CRM jobs, and impacts of travel restrictions.

The most heavily impacted populations, those who experienced between -60% and -100% declines in their economic situation, were women (85.7%), mostly from the United States, followed by a smaller percentage (10%) of men and people identifying as gender fluid/agender/gender not listed (5%). These results are profound and show the major impacts of job losses were experienced by women, particularly women at earlier stages of their careers between 25–44 years of age. One respondent described, “The impacts on job prospects for early career folks is devastating and there is little in the way of support for those not still in school. Many of us are seriously considering leaving the field out of economic necessity.” Under-represented ethnic groups reported a greater percentage of job losses (21%), compared to their demographic representation in the survey. Employment sector trends show that economic losses among non-university archaeologists also show greater representation in the results, with the highest impacts on individuals employed in the consultant (5%), government (10%), and museum (14%) sectors. A new report from the

American Alliance of Museums (2021) suggests that operating incomes fell by an average of -40% , resulting in staff decreases of -29% on average [14]. These patterns were borne out in the survey data. The majority of archaeologists that reported high economic impacts were those who lost jobs due to budgetary cuts and travel restrictions.

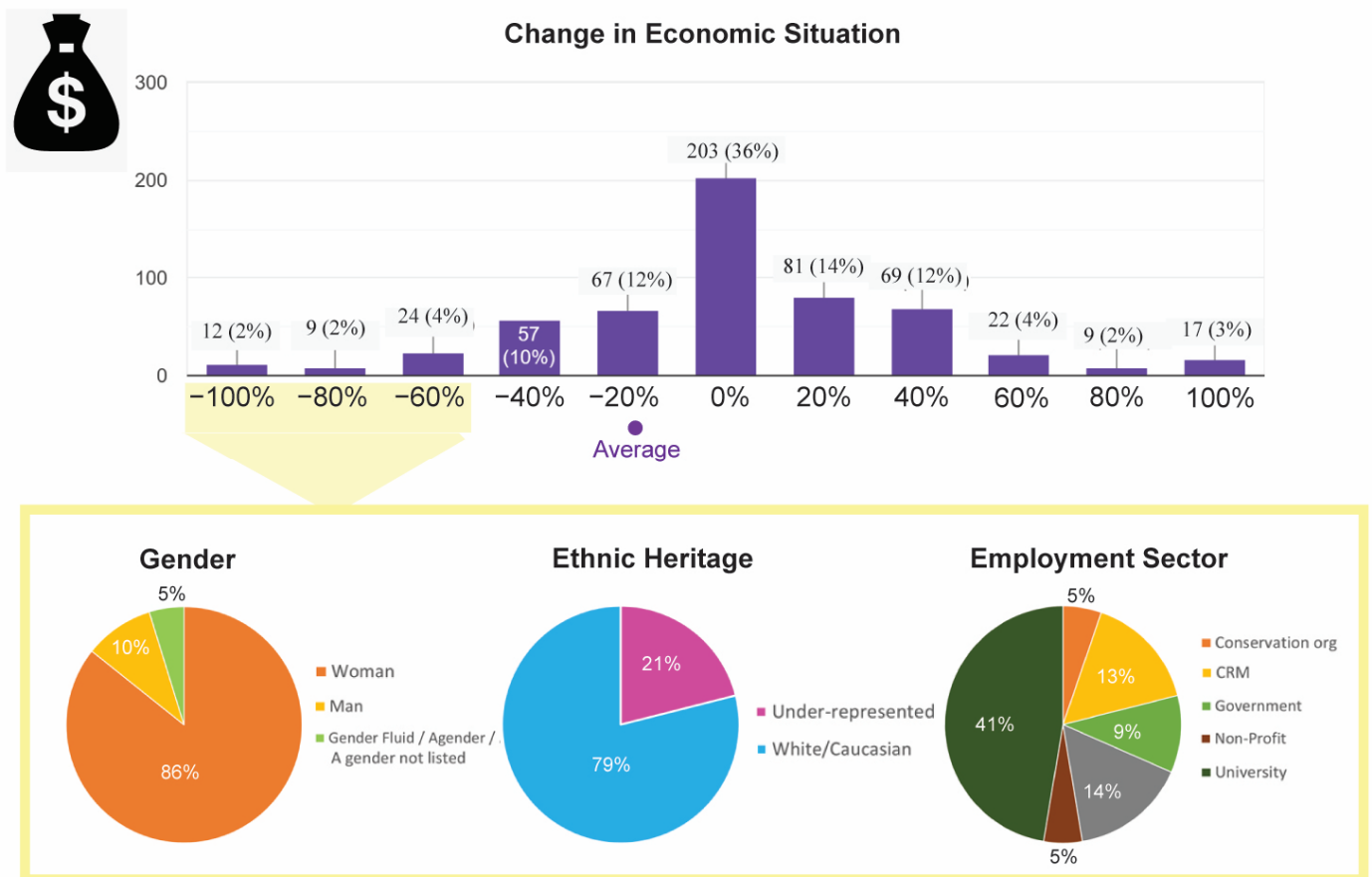


Figure 2. Scale of economic impacts of the pandemic on archaeologists, showing a breakdown of demographic groups (by gender, ethnic heritage, and employment sector).

3.3. Workload Impacts

To gauge the impacts on workload during the pandemic, we asked respondents to assess the proportional increase or decrease in workload since the pandemic began on a sliding scale, and asked an open-ended question about what were the primary factors that contributed to workload changes in their lives.

The results show that women’s workload disproportionately increased (62%) when compared with other groups. Respondents reported just over a 20% increase in workload on average (Figure 3). The most pronounced workload increases show relatively even proportions (compared with survey demographics) across ethnic communities, suggesting that all respondents falling into the highest workload impacts groups were subject to increases. Archaeologists employed by universities were more likely to be in the highest workload impact group (53%), followed by those working in CRM (24%), government (10%), and Museums (9%). Respondents in the highest impact scales reported that the transition of work to online formats contributed to the greatest workload demands (hybrid format requiring revamping assignments for online use while also teaching in-person and digitally), with increases in Zoom meetings, often unrecognized commitments dealing with emotional impacts on students or co-workers, learning new skills, and/or additional service or administrative work to help co-workers with children. Budgetary constraints or frozen job searches contributed to fewer employees, which respondents also describe

as contributing to higher workloads. Archaeologists working at museums report that the closure of many institutions meant a strong push to develop virtual content, also leading to increased work. Some archaeologists working in the CRM sector reported increased development and infrastructure during the pandemic, which when coupled with other pandemic restrictions contributed to more work spread across fewer employees. Some individuals whose spouses lost jobs reported needing to work additional jobs to make ends meet.

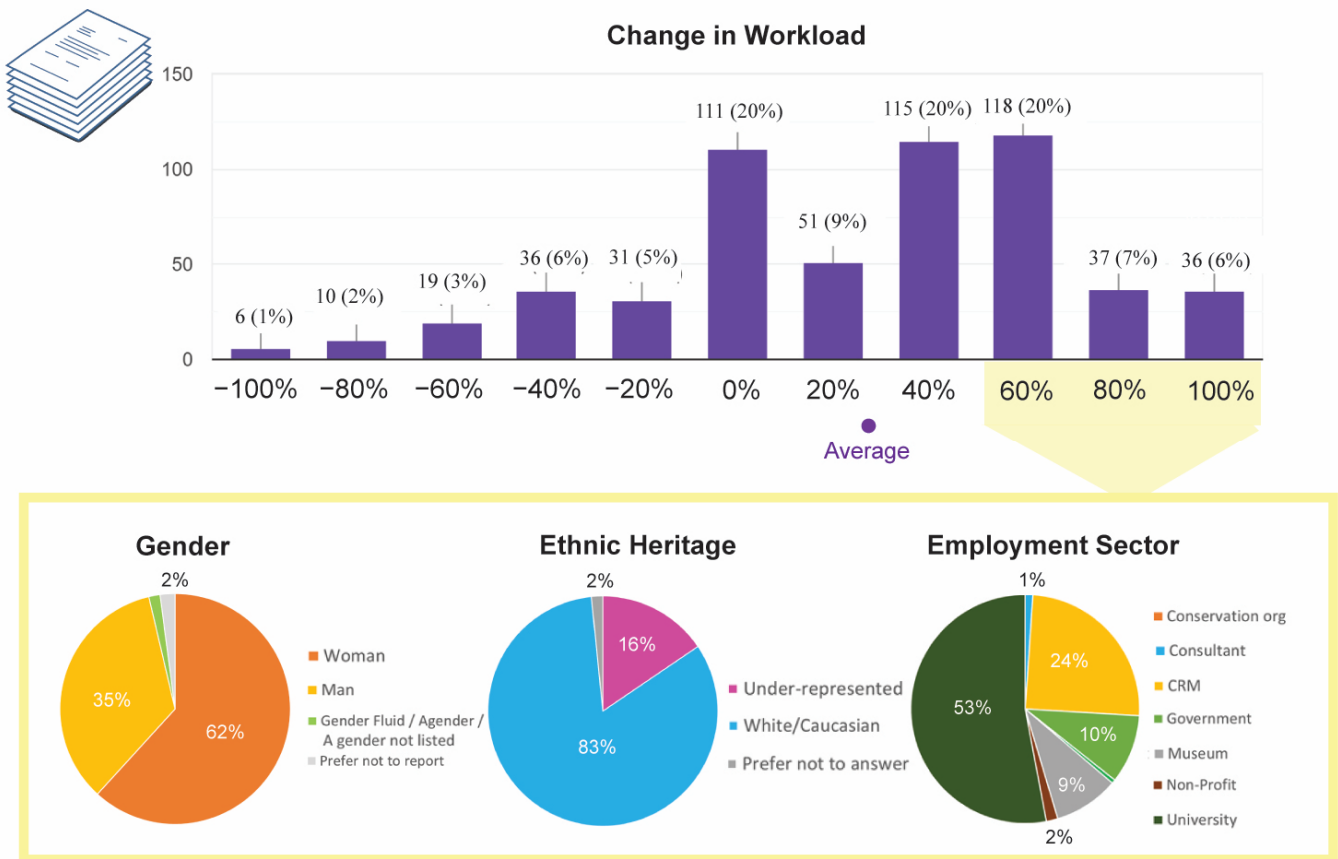


Figure 3. Scale of impacts on workload during the pandemic, showing a breakdown of demographic groups (by gender, ethnic heritage, and employment sector).

3.4. Research Impacts

Assessing the impacts on research during the pandemic, respondents were asked to rate the proportional increase or decrease in their research activities on a sliding scale (if applicable) since the pandemic began. In addition, an open-ended question was asked about the primary factors that contributed to research changes overall. On average, respondents reported approximately -40% decrease in research activities (Figure 4).

Results show little gendered impacts on research activities, as the proportions of individuals in the most highly impacted groups mirror the demographic breakdown of gender in the survey. Early career archaeologists described major setbacks, possibly ending their prospects for careers in archaeology. An early-career woman employed as an adjunct faculty at a university described major impacts:

“I feel like I am still expected to produce research and publish even though I can’t get to the field and I am overwhelmed with the transition to online learning. I feel like my career is at a standstill and that I am going to be left behind when it all evens out. I also understand that budget cuts mean that I likely won’t get a TT [tenure-track] position anytime in the next few years. It’s disheartening. Even though I love what I do, I feel like I

am doing it all for nothing- It's like I don't have anything realistic to work towards. I am considering leaving the field altogether."

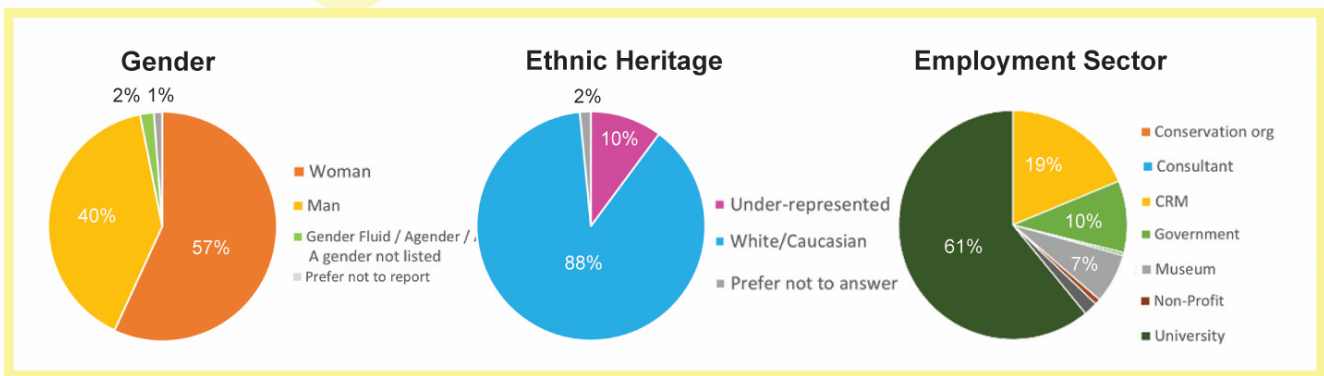
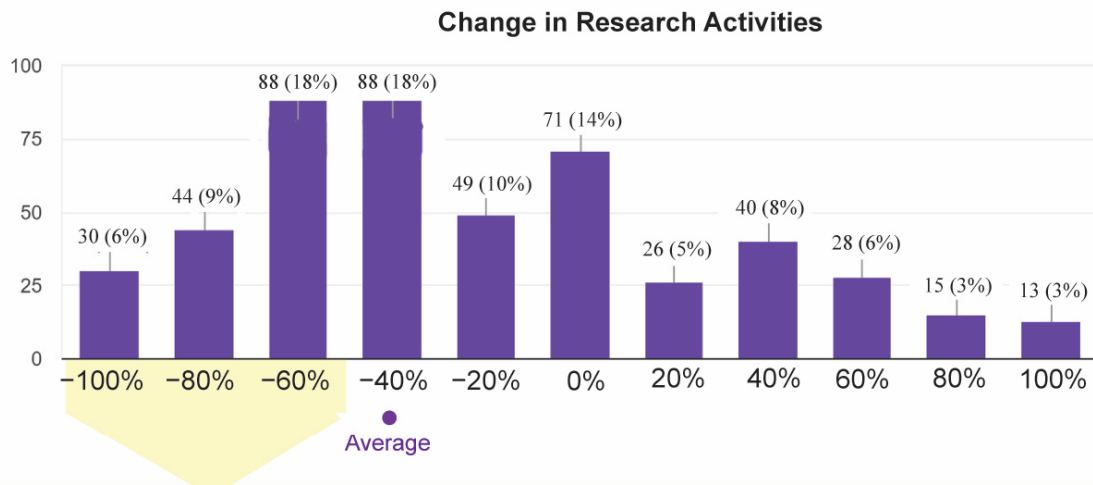


Figure 4. Scale of impacts on research impacts during the pandemic, showing a breakdown of demographic groups (by gender, ethnic heritage, and employment sector).

Under-represented ethnic groups showed lower levels of research impacts than the overall group. However, given their economic impacts and job loss(es), this may limit the usefulness of research activity as a metric.

University employees show the most profound impacts in the heaviest research impact groups ranging between -60% to -100% reduced research activities for 63% of respondents. CRM employees also reported a high degree of negative impact on their research potential/time, at 18%. Respondents reported several factors contributing to declines in research activities. Archaeologists employed by universities and CRM companies reported the closure of laboratory facilities greatly impacted their ability to conduct research. Those in CRM also reported that funding had been placed on hold, limiting the start of some projects. Those in museums reported that archives were closed and travel largely restricted, impacting research in this sector. Those respondents who reported increased research activities described how lost jobs or other cancelled opportunities contributed to increased ability to write, to analyze collections, or complete other research activities that could be done from home or online.

3.5. Teaching Impacts

Teaching impacts during the pandemic were assessed by asking respondents to rate the proportional increase or decrease in their teaching activities (if applicable) since the pandemic began on a sliding scale. This question was complemented with an open-ended question about what were the primary factors that contributed to changes in teaching activ-

ities overall. Respondents reported an approximately 20% increase in teaching activities on average (Figure 5).

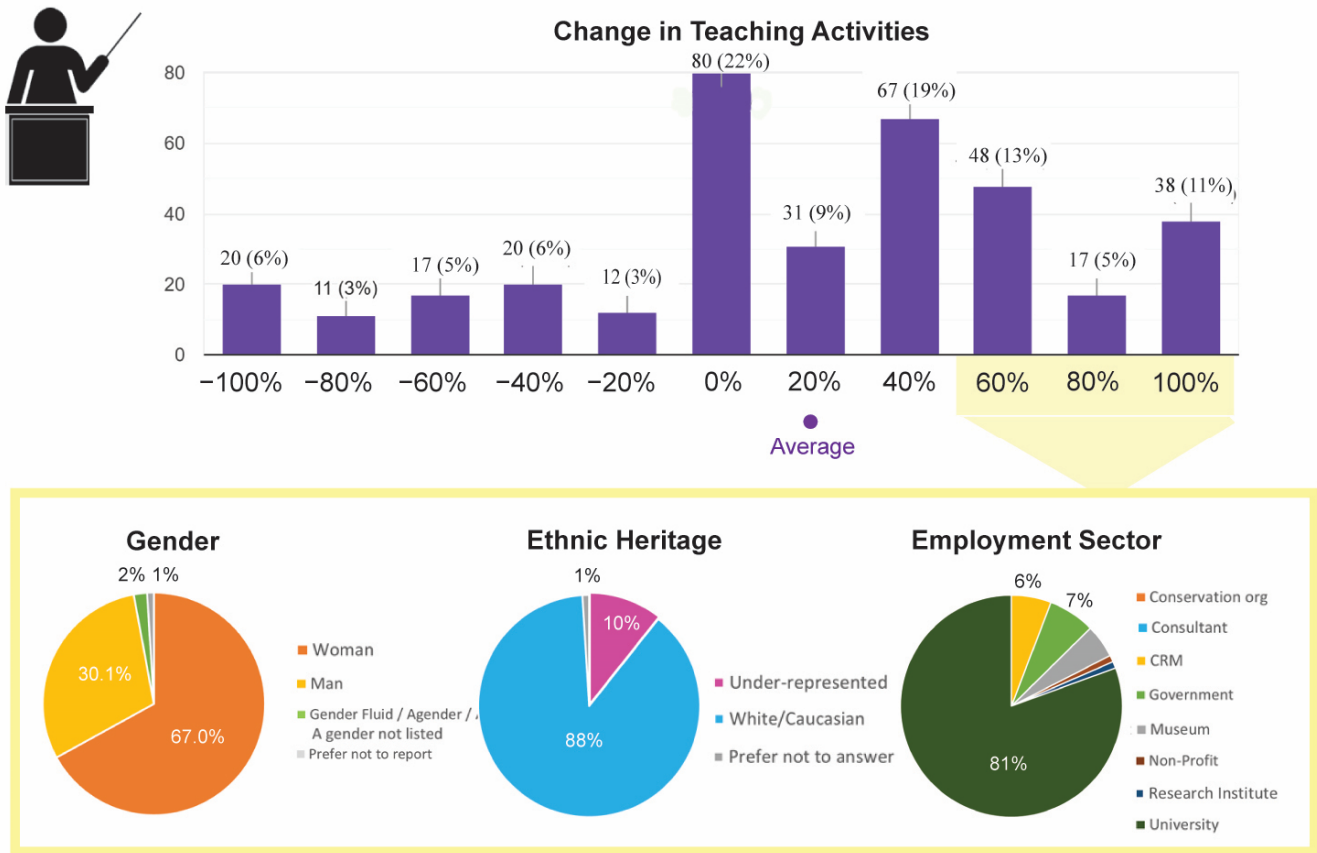


Figure 5. Scale of impacts on teaching activities during the pandemic, showing a breakdown of demographic groups (by gender, ethnic heritage, and employment sector).

The results show that, in the most heavily impacted group, women’s teaching activities were disproportionately increased (67%) compared to other groups. This may be linked to more women being employed in teaching positions. Archaeologists from under-represented heritage groups actually showed fewer impacts on teaching activities, but this may reflect historical biases in recruiting faculty and students from these communities in university programs. Given the focus of the question, naturally, archaeologists employed by universities were much more likely to be impacted by increased teaching obligations (81%), although archaeologists employed in other sectors, including CRM (6%) and government (7%), were also impacted by increased teaching demands.

Respondents reported several differing factors that contributed to increased teaching loads. The most important factor as identified with increased workloads was that the shift to online teaching required an extensive amount of time investment beyond typical course preparation. In particular, reformulating assignments for the virtual atmosphere, coupled with converting lectures and other course content online, took a considerable amount of time and investment. Several respondents described how much of this work was unpaid and required larger amounts of time to meet the new expectations of students. Learning new software also contributed a large amount of time, for both teachers and students, as both struggled to learn how to record videos, grade virtually, and assess learning goals. The adaptation of teaching in different formats simultaneously, for in-person and virtual classes, also accounted for large increases in time for teaching activities. Economic impacts on universities also contributed to hiring freezes and some university faculty had to teach overloads to fulfill all major courses.

3.6. Personal Responsibilities Impacts

Changes in personal responsibilities were assessed by asking respondents to rate the proportional increase or decrease in their childcare, eldercare, or other personal responsibilities (if applicable) on a sliding scale. This question was complemented with an open-ended question about what were the primary factors that contributed to changes in personal responsibilities overall. All respondents reported just over 1% increase on average (Figure 6). This value increases to over 30% when we isolate respondents with children under 18 years of age in their household.

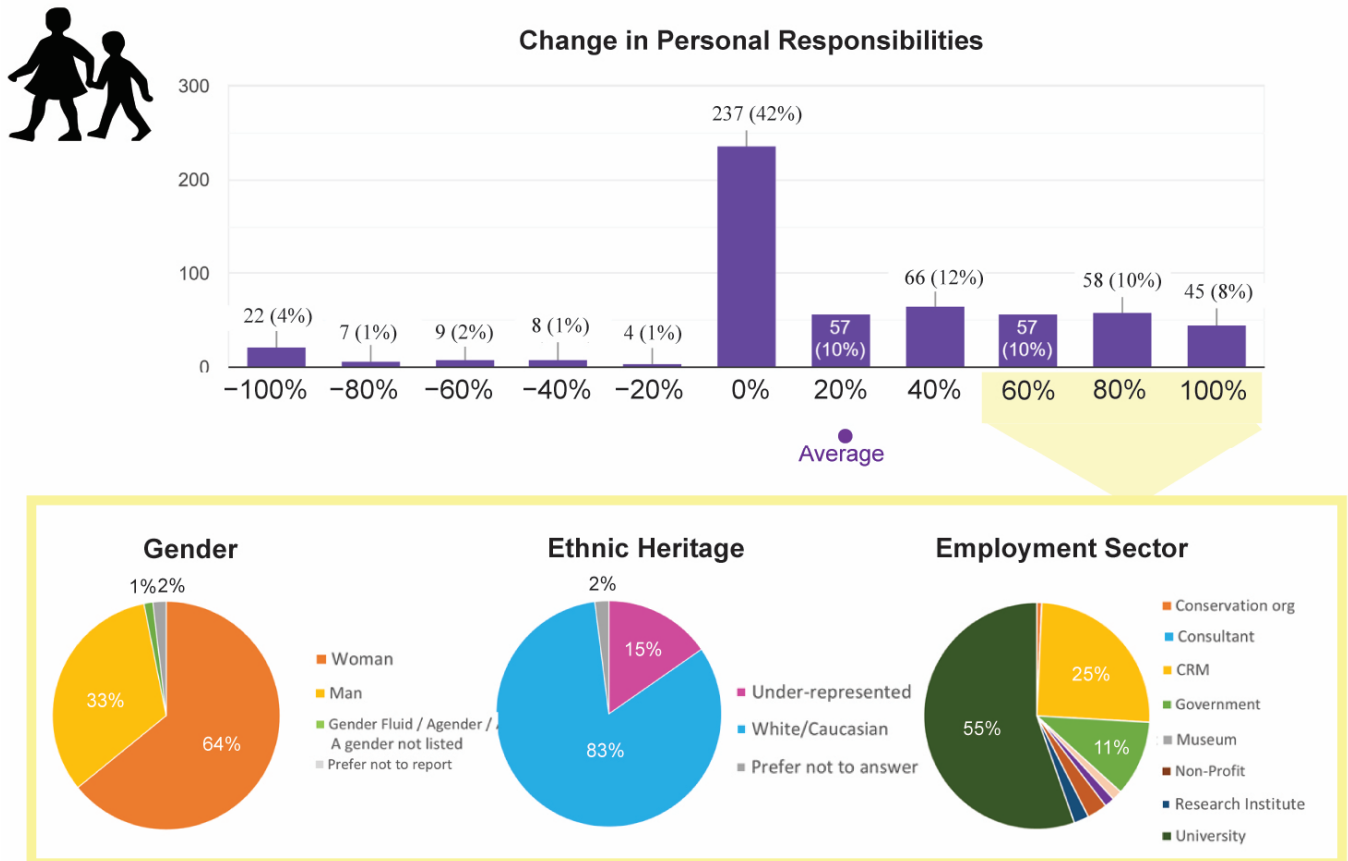


Figure 6. Scale of impacts on personal responsibilities during the pandemic, showing a breakdown of demographic groups (by gender, ethnic heritage, and employment sector).

As the most heavily impacted group of archaeologists, women had more increased personal responsibilities (64%) than other groups. Compared with survey demographics across ethnic heritage groups, results in the most heavily impacted group suggest that all groups were equally affected by greatly increased personal responsibilities. Similarly, employment sectors were also relatively the same as survey demographics, suggesting that the employment sector played little role in major increases in personal responsibilities.

Respondents reporting 60%+ higher personal responsibilities described having one child on average in their household, with many of the archaeologists with children reporting homeschooling as the biggest contributor to their personal responsibilities during the pandemic. Many parents reported closed childcare facilities, in addition to home schooling, on top of increasing work obligations. Some archaeologists reported family members becoming ill, requiring care that sometimes extended for long intervals of time. Other respondents described increased eldercare responsibilities, which were exacerbated by COVID-19 protocols for healthcare professionals and other care providers. In some cases where grandparents were providing childcare, families were separated by distance, travel, or health restrictions and parents lost the ability for family to step in for childcare

help. In other instances, some families coped by forming multi-generational households, with grandparents taking more prominent roles in childcare and schooling. However, this only accounted for 3% of respondents. Mental health of respondents (and/or their family members) also suffered during the pandemic, requiring more emphasis on activities and help to alleviate those impacts.

3.7. International Impacts

While the majority of respondents came from the United States, we identified similar trends worldwide in the consequences of the pandemic. All regions reported economic impacts, closures, and increased demands of childcare and caring for sick family members. Trends in Canada and Mexico largely mirrored those identified as economic, workload, and personal impacts in the United States. All respondents from Central America came from Belize where major financial impacts on the tourism industry, which constitutes a major source of the country's gross domestic product (GDP). The revenue generated from heritage tourism provides a large portion of the necessary funds that are used to pay staff salaries, fund research, and maintain national archaeological reserves. The almost overnight closure of the global tourism industry has had far reaching effects on the non-academic heritage fields and employment opportunities. Offices closed and some individuals received pay cuts as high as 50% to accommodate budgetary shortfalls. Respondents from South America (primarily from Chile and Peru) described how fieldwork was postponed, with impacts on jobs causing unemployment in the field. In Europe and the United Kingdom, major shifts can be identified in funding for archaeological research and jobs. UK redundancies meant that archaeologists lost jobs and world-renowned departments (such as Sheffield and Chester) are scheduled to close, as the universities have claimed low student enrollment and budgetary shortfalls over the recent past. In continental Europe, some archaeologists report being denied funding extensions, and lab work and sample collection has been indefinitely delayed, greatly limiting the completion of projects. In Australia and New Zealand, universities faced impacts on international students as borders closed and some faculty and staff experienced pay cuts to deal with budgetary shortfalls. In the United States and New Zealand, a development boom contributed to increased work in the CRM fields from COVID-related infrastructure and other legislation.

4. Discussion

Some important trends regarding the current consequences and future effects of the coronavirus pandemic on archaeology can be identified from the results of this survey. First, both in the United States and worldwide, archaeologists experienced major economic, professional, and personal impacts due to the loss of jobs and funding, travel restrictions, and increased responsibilities of childcare and homeschooling coupled with care with sick family members. Women and early-career archaeologists were disproportionately impacted by lost jobs and resulting severe economic losses. Women with children were also identified as suffering the greatest impacts on their time, as childcare obligations increased exponentially coupled with increased workload due to moving courses or content online.

Despite these trends, the experiences of archaeologists working in different archaeology-related professions varied. Archaeologists employed by universities reported the highest rates of increased workload obligations, ranging from learning new online software to delivering courses in dual face-to-face and online formats. At museums, closures meant layoffs and for those who did not lose jobs, staff sometimes shifted their focus to developing interactive online content for visitors, often at great time investment. Closures at museums and university restrictions on travel also contributed major impacts in the completion of research projects, as graduate students and other researchers struggled to do archival, collections, or fieldwork research.

Experiences of archaeologists working in CRM-related fields were mixed. Some respondents reported the fieldwork and lab work elements of their jobs being greatly affected, particularly in relation to travel closures and new COVID social distancing

restrictions. Other CRM firms (particularly in the United States and New Zealand) seem to have taken advantage of a boom in new development, reporting that they landed new contracts despite pandemic restrictions. Yet other CRM archaeologists reported impacts in funding given governmental delays and bureaucracy. In this paper we aimed to identify the groups that experienced the most profound impacts, whether economic, professional, or personal.

Based on these results, we offer several recommendations to employers, funding agencies, and professional organizations for helping to mitigate those most heavily impacted by the pandemic. First, across many of the survey questions, women were identified as being most strongly impacted across their lives. This is not unexpected, as studies show gendered pay-gaps and major differences in promotion and career advancement for women prior to the pandemic [25,26] and continuing throughout [27]. In academia, only one-fifth of professors and one-third of those in the highest salary brackets are women [7] (p. 12). Taking time away from careers to have and raise children accounted for many of these disparities. During the pandemic in the UK, some estimates suggest that women spent two-thirds more time on childcare activities than men, and up to 78% more if there were children under 5 in the household [28]. In the United States, Collins et al. [29] found that from February to April 2020 that mothers of young children reduced their work by 4 to 5 times more than fathers. In this survey, women were identified as being disproportionately impacted across many of the metrics, particularly as experiencing economic impacts. For women who did not experience job loss, major increases in workload, and especially personal responsibilities, were experienced. Women with children were particularly impacted by heightened childcare and family care obligations as childcare and schools closed, commitments that were made nearly impossible with increased workloads.

We recommend various strategies to mitigate negative impacts of the pandemic on women (Table 1). Do Mar Pereira [30] argues that the recognition of reproductive and caregiving labor is central to supporting women (and parents broadly) through the pandemic and subsequent years. One way this can be done is by adding childbirth and care (as well as elder care) to CVs or resumes; however, employers and professional organizations need to reinforce these practices by recognizing these efforts. Women with children have borne significant impacts to their professional careers prior to and throughout the pandemic, and systemic change is needed to support the hiring and promotion of women in all sectors of archaeology. The availability and affordability of childcare is essential to these efforts and employers and professional organizations need to prioritize (and subsidize) its availability [31]. In addition, instituting more flexible options for parents to continue to work from home will allow individuals the ability to do their work in more family-friendly ways. Funding agencies should also recognize the systemic issues that women face and implement new policies that allow for funds to be available to bring dependents and partners/caregivers with them to the field.

Second, several studies [7] (p. 1233) and [32] describe major impacts from the pandemic on precarious BIPOC scholars, who were more likely than their counterparts to experience negative impacts during the pandemic. Although the results of ethnicity in this study was hampered by small sample size, other studies have emphasized the issues that historically under-represented groups have faced within archaeology and other fields. Some initiatives have helped to mitigate these impacts. Financial support, from the ground-up, has been developed through microgrants offered through the Black Trowel Collective, a mutual aid initiative allowing archaeologists in need to request assistance for a variety of financial needs (e.g., textbooks, travel, rent, groceries, childcare) as well as mentorship opportunities. If employers, professional organizations, or individuals want to reach those groups most in need from the impacts of the pandemic, we recommend reaching out to organizations such as the Black Trowel Collective, as well as the Society for Black Archaeologists and the Indigenous Archaeology Collective, to donate financially or to offer institutional support to the organizations. Employers and professional organizations

should also develop fellowships and other funds to mitigate the economic impacts of the pandemic on impacted populations.

Table 1. Recommendations for the most heavily impacted target groups from the survey, including suggestions for mitigation strategies that can reduce long-term impacts.

Mitigation Strategy
<p>Women with children and other caregiving roles</p> <ul style="list-style-type: none"> - Offer subsidized childcare and/or elder care options at workplaces and at professional meetings. - Funding agencies should include the ability to include costs for child or elder care that includes the ability to bring dependents and partner/caregiver to research locale.
<p>Historically under-represented archaeologists</p> <ul style="list-style-type: none"> - Recognize the emotional and psychological toll that BIPOC archaeologists have faced with existing structural inequalities. - Do not overburden BIPOC individuals with service work focused on diversity. However, if these individuals take on these roles, they should be compensated for their time economically (monetarily and/or course reductions) and have those roles documented for tenure and/or promotion. - Fully funded programs and positions that provide career building opportunities or remove barriers for entering the archaeological and museum fields are needed for historically underrepresented archaeologists. Including, but not limited to, funded field schools, waivers for fees associated with professional conferences, and paid museum internships. - Recognize the disproportionate impact of the pandemic and its effects on BIPOC communities and actively seek to create infrastructure that supports BIPOC scholars and mitigates the specific issues that BIPOC archaeologists face. - Support professional organizations that foster professionalization opportunities for historically underrepresented groups (e.g., The Society for Black Archaeologists, Indigenous Archaeology Collective).
<p>Early career professionals</p> <ul style="list-style-type: none"> - Provide emergency funding to support graduate students, contingent employees, and other early-career archaeologists whose careers have been sidetracked by the pandemic. - Provide funding to cover extensions of graduate student graduation timelines. - Be flexible about ‘years of service’ requirements when hiring early career professionals, recognizing that projects were shut down and time in the field was lost

Other recommended strategies for offsetting negative impacts on historically under-represented groups include recognizing the emotional and psychological impacts of systemic racism, recently highlighted in the impacts of the Black Lives Matter campaign [33,34] and violence against Asian-Americans. The emotional taxation on BIPOC scholars should be recognized [35] and the structural inequalities that these groups face should be officially recognized by employers and professional organizations. By officially recognizing the disproportionate impact of the pandemic and its effects on BIPOC archaeologists, institutions should actively seek to create infrastructure that supports BIPOC individuals and mitigates the specific issues that these populations face. In addition, being cognizant of diversity-related service demands is necessary, given that these can overburden individuals and take time away from activities needed for promotion. If individuals take on these roles, their time should be compensated (either monetarily or through incentives such as course releases). Finally, we recommend that institutions and organizations offer fully funded programs or positions that provide career building opportunities or remove barriers for entering archaeology or museum studies for historically underrepresented archaeologists. These would include, but not be limited to, funded field schools, waivers for fees associated with professional conferences, and paid museum internships.

Third, early-career archaeologists were heavily affected by both pre-and post-pandemic economic declines. Many respondents reported suffering financial and professional setbacks that have made it impossible to continue in archaeology. For example, one Hispanic woman (25–34 years of age) respondent working in multiple archaeology sectors described how: “I doubt I will ever be able to make it back to archeology. I was forced to take an archaeology adjacent position to pay the bills. After 10 years in the field, the lack of good health care for my family and access to affordable childcare means I am probably done.”

Similar sentiments were repeated by other early-career archaeologists who have lost jobs or seen their research prospects dissipate. Graduate students described substantial delays in their fieldwork or data collection, coupled with precarity in their standing in degree programs. They also described continuing pressure to progress despite the limitations imposed by the pandemic. In order to support early career archaeologists, employers and professional organizations must recognize the permanent impacts of the pandemic (and pre-pandemic economic situation) within academia, museums, and other archaeology-related professions and provide training in alt-ac career paths. Many early career archaeologists expressed concerns about additional funding cuts in their programs related to the pandemic, given that their research has delayed data collection and therefore graduation timelines. Graduate programs should make every effort to offer fully funded extensions, even if it means that the program reduces the number of incoming students in subsequent years. For those most heavily impacted early career archaeologists, professional organizations and employers should develop emergency funds available to support those individuals to help to retain early career individuals in the field of archaeology. Flexibility on 'years of service' requirements is recommended when hiring early career professionals, recognizing that projects were shut down and time in the field was lost. Finally, for those early career archaeologists on the tenure track, flexibility in research requirements is needed to account for delays and shutdowns in fieldwork, lab work, and archival locations. One solution to these issues is to modify the relative contributions of early career archaeologists' job requirements (e.g., teaching, service, research) to match the availability of those options, especially when research (fieldwork or lab work) was impossible during the pandemic.

Structural inequities have been noted across several vulnerable populations in academia since before the pandemic began [33,34,36–40]. BIPOC faculty are majorly under-represented in tenure-stream positions [31,38]. In addition, academic mothers are particularly prone to facing setbacks in promotion and/or tenure [41]. We echo Fulweiler and colleagues [31], who recommend several measures that can help alleviate the impacts of the pandemic and move towards mitigating long-term impacts at universities, including: (1) flexible timelines for promotion; (2) removing expiration dates on start-up funds; (3) requiring COVID-disruption statements that allow for individualized merit, tenure, and promotion guidelines; and (4) providing flexible funds to support the productivity of academic mothers, particularly BIPOC mothers. Mengwasser Shillington et al. [35] offer additional recommendations for universities, arguing that pausing the tenure clock for 1–2 years is insufficient and hurts the economic earning capabilities of women over the long-term. Instead, the development of individualized tenure evaluation plans are necessary to minimize long-term impacts. In addition, the author notes that workload adjustments, including reduced course loads and temporary financial support to make up research productivity, are necessary to mitigate long-term impacts on women and vulnerable populations. Aubrey et al. [9] recommend continuing online teaching support, relaxed expectations in granting and publication outputs, and pausing tenure clocks. Options for teaching hybrid/online courses to allow for flexibility would also help those most affected. Additional measures could include allowing for lectures, activities, and other teaching formats to be prerecorded or conducted asynchronously to allow for work to be completed while meeting the demands of caregiving.

Universities must grapple with long-term impacts not only within its faculty ranks, but also for graduate students who have had their research delayed and graduation timelines extended. As described previously, funding should be extended to affected graduate students to prolong their time to finish. Special funds also should target those whose jobs may have been lost or those who faced other negative economic impacts. Given the finding that early career archaeologists bore nearly half of all job losses, universities are prime locations to try to mitigate long-term impacts in this population. Here, we make recommendations for how this may be done (Table 2). Mentoring should take these issues into consideration, with advisors working alongside students to develop plans that best support retaining students within their programs. Additional efforts must also

be made to aid graduate students who have been majorly impacted by the pandemic, by offering full funding to cover extended graduation timelines, as well as emergency funds for those students most in need. Finally, university administrators should work to foster better communications with faculty and staff to ensure that decision-making is occurring at multiple levels within the university. This includes taking faculty opinions into consideration when setting health and safety measures within classrooms.

Table 2. Recommendations for institutions and organizations including suggestions for mitigation strategies that can reduce long-term impacts.

Mitigation Strategy
Employers—Universities
<ul style="list-style-type: none"> - Emergency funding to support graduate students and other impacted university faculty and staff. - Pause tenure clocks (faculty) and graduation timelines (graduate students). - Individualized tenure and promotion expectations tailored to needs of person and circumstances, based on COVID-19 disruption statements. - Relaxed expectations on publishing and grant submissions, not only for pandemic years but also for the years that follow. - Remove expiration dates on start-up funds. - Offer flexible supplementary funds for mothers, particularly BIPOC mothers, to facilitate research that has been impacted during the pandemic. - Consider gender and race/ethnicity structural inequalities in decisions for career advancements. - Mentoring that considers impacts of pandemic. - Development or expansion of university-sponsored childcare options. - Increase options for hybrid/online courses to allow for flexibility in teaching and demands on time. Lectures, activities, etc. that can be prerecorded or conducted asynchronously allow for work to be completed while meeting the demands of caregiving. - Foster communication between administration and faculty when making safety and health decisions for classrooms. - Flexible teaching design that included remote and in-person options.
Employers—CRM
<ul style="list-style-type: none"> - Mentoring that considers impacts of pandemic. - Create and maintain company values and practices specifically designed to support the contemporary working family. - Create a company culture that ensures women are in leadership roles. - Individualized promotion expectations tailored to needs of person and circumstances, based on COVID-19 disruption statements. - Purchasing of individual equipment so that employees do not have shared surfaces. - Greater opportunities for work-from-home if working on office-based projects. - Maintain yearly or bi-yearly staff allowance for home office equipment. - Maintain yearly or bi-yearly staff allowance for personal field equipment. - Offer a flex-time schedule option and telecommute schedule as standard operations procedure. - Additional funds to purchase PPE to protect fieldwork teams. - Contribute to retirement plans for staff even if they are not able to contribute. - Offer emergency contingency funds and/or micro-loan options for staff families impacted by COVID disruption. - Include short-term disability and family leave options for all staff. - Include COVID-19 best practice measures and protection plans in company handbooks and health and safety plans. - Offer insurance options to part-time staff and full-time 32-h staff that include company contribution. - Recruit women, marginalized community members, and historically under-represented groups for job openings. - Create paid internship opportunities for historically under-represented groups. - Target Woman Owned Small Business (WOSB), Minority Business Enterprise (MBE) companies, and other disadvantaged businesses as teaming partners as standard operating practice.
Employers—Museums
<ul style="list-style-type: none"> - Mentoring that considers impacts of pandemic. - Individualized promotion expectations tailored to needs of person and circumstances, based on COVID-19 disruption statements. - Increased communication and sharing of acquired grants to facilitate feelings of economic security. - Listening to and supporting ideas from all staff for innovative approaches to digital community outreach and engagement. - Recruit women and historically under-represented groups to serve on boards and other decision-making bodies. - Greater opportunities to work from home.

Table 2. Cont.

Mitigation Strategy
Professional Organizations
<ul style="list-style-type: none"> - Blend in-person and virtual meetings to accommodate variability in access to travel and ability to take time away from personal responsibilities. - Provide child/elder care during meetings and offer subsidies to early-career or economically disadvantaged individuals. - Recruit women and historically under-represented groups to serve on boards and other decision making bodies.
Funding Agencies
<ul style="list-style-type: none"> - Offer no cost extensions of projects delayed or negatively impacted by travel restrictions limiting fieldwork. - Allow for re-budgeting of projects when new COVID-related costs arise. - Offer supplemental funding for childcare or elder care costs and allow for costs for researchers to bring dependents and partner/caregiver to research locale. - Prioritize funding for underrepresented groups and early career researchers. - Consider gender and race/ethnicity structural inequalities and bias in decisions for funding and offer reviewers and panelists training opportunities. - Recruit women and historically under-represented groups to serve in decision-making roles of funding agencies.
Publishers
<ul style="list-style-type: none"> - Expedite submissions from women and historically under-represented groups. - Recruit women and BIPOC scholars to serve on editorial boards and in reviewer roles. - Offer publishing fee waivers or reductions for women, mothers, historically under-represented groups, and other groups negatively impacted by pandemic. - Offer free virtual workshops about successful publishing in journals.

Douglass and Herr's [13] survey showed the initial impacts of the coronavirus pandemic on archaeologists employed in the CRM sector. Many of those same themes were identified in this survey. Over the past year, CRM firms have relied upon governmental programs supporting employees, including the Payroll Protection Program (PPP). Some firms have benefitted from increases in government contracts, even if other sectors declined. Early career archaeologists employed within CRM could benefit from mentoring within CRM firms that take the pandemic impacts into account, especially in navigating ways to move up the ladder through promotion. Creating and maintaining company values and practices specifically designed to support the contemporary working family is essential for CRM firms to offset major setbacks. This includes creating a company culture that ensures women and minorities are in leadership roles.

Furthermore, CRM firms should continue to invest in safety measures even as the pandemic comes to a close, purchasing individual equipment and making COVID-related health checks an important component of daily team-based protocols. This could be enacted by maintaining a yearly or bi-yearly staff allowance for home office equipment and by maintaining yearly or bi-yearly staff allowances for personal field equipment. Recognizing the impacts of the pandemic on working parents, CRM firms can offer more flexibility in work arrangements, including a flex-time schedule option and telecommute schedule as standard operations procedure.

Offsetting the economic losses of CRM employees should also be a major goal. Strategies to do so include contributing to retirement plans for staff even if they are not able to contribute, offering emergency contingency funds and/or micro-loan options for staff families impacted by COVID disruption, as well as including short-term disability and family leave options for all staff. Offering insurance options to part-time staff and full-time 32-hr staff that include company contribution will also aid the most vulnerable archaeologists employed in CRM.

Targeting structural inequities is also vital for the CRM sector. This can be done by recruiting women, marginalized community members, and historically under-represented groups for job openings. Like in academia, more work must be done to deal with gender and racial inequities in CRM [42], particularly fostering more diversity by employers. The creation of paid internship opportunities for historically under-represented groups can

help, as can organizations supporting Woman Owned Small Business (WOSB), Minority Business Enterprise (MBE) companies, and other disadvantaged businesses as teaming partners as standard operating practice.

A variety of surveys [14,15,43] have assessed impacts of the coronavirus pandemic on museums, including this one, which showed economic losses as a result of the temporary closure of many museums. We recommend that employers institute a personalized mentorship program or encourage participation in existing programs for employees that recognizes the inequalities in outcomes across gender and ethnic/racial lines following the coronavirus pandemic. This includes mentorship opportunities that allow for promotion within institutions. An innovative online intern mentorship program through the Association of Historians of American Art was established during the pandemic, which gave interns at dozens of museums just this type of experience. The program augmented their institution's intern experience with professional guidance and education from individuals from other types of museums and from different departments from around the United States. Professional museum organizations also have mentorship programs within the organization, including the Council for Museum Anthropology, the American Alliance of Museums Curators Committee, and the RCS Mentoring Program (a joint collaboration between ARCS and the Collections Stewardship network). However mentoring programs do not exist for all fields in the museum sector and few exist for individuals mid-career.

Respondents in this survey, and another museum focused survey [15], indicated that greater communication is necessary to foster feelings of economic security within museum staff. Museums are losing staff through economic shortfalls, budget cuts, and voluntary resignations due to fiscal uncertainty. Thus, there has never been a more critical time for budget transparency and communication of budgetary conditions, particularly when new grants or other funds are acquired. This will help staff feel more secure in their jobs, and thus more willing to invest mentally and emotionally into the workload that they demand.

Furthermore, the rapid shift to online content by museum staff has shown that museum employees can develop innovative approaches to programming, digital exhibits, and educational outreach in short periods of time. Museum supervisors, directors, and board members should continue to foster new ideas from staff, seeking to develop new programs that can maintain an online presence, or blend the online and in-person visitor experiences. Decision making roles are generally not very diverse, so we recommend recruiting women and historically under-represented individuals to serve on museum boards and in managerial roles. Calls for change in museum employment are apparent on social media platforms, including *Change the Museum* on Instagram, a group that has over 49,000 followers that has called for greater diversity in the museum sector. Given women and minorities have been disproportionately affected by the pandemic [44], now is the time to heed this request.

Finally, offering museum staff greater opportunities to work from home would allow individuals with children greater flexibility to balance work-life commitments. This is critical given the high proportion of women in the museum sector (according to this survey 66% of those at least partly employed, or 69% of those fully employed by museums identified as women). These women are burdened with childcare and home duties that were noted pre-pandemic [45] and this burden has increased during the pandemic [46]. Museum internship mentors during the pandemic were able to find a variety of project-oriented tasks that could be done from home focused around digitized material from archives, collections database research, educational outreach development, and curatorial research. These tasks directly contributed to museums' mission statements indicating the ability for some aspects of museum jobs to be conducted remotely.

Professional organizations can play an important role in the recovery from the pandemic if appropriate initiatives are enacted. First, virtual conferences have shown the possibilities for opening conferences and other professional meetings to larger audiences for whom the costs of attending in-person may not be feasible. We recommend that as professional organizations plan their future meetings, they consider ways to blend tradi-

tional in-person meetings with delivering the same content digitally. Furthermore, parents are majorly impacted by in-person meetings in particular, especially at those that do not provide childcare options. We recommend that professional organizations work to institute childcare (and eldercare) options at all in-person meetings, and in particular, offer subsidies to low-income members. Finally, in order to foster the growth of archaeology as a profession for under-represented ethnic/racial groups, we recommend offering subsidies in annual dues and other fees. These initiatives will aid in opening up our field, and in the participation in annual meetings, to archaeologists who have been unable to attend meetings and gain important networking opportunities. Finally, the recruitment of women and historically under-represented individuals to serve on boards and other decision-making bodies will help to diversify professional organizations and the initiatives that they push forward.

The pandemic has had far-reaching impacts on traditional funding mechanisms within archaeology, particularly for researchers with children and archaeologists faced with job loss. Flexibility is recommended for currently funded researchers and we encourage funding program officers to offer no-cost extensions to allow for delays in fieldwork. In addition, we recommend the allowance of re-budgeting project costs when COVID-related expenses cause new setbacks in funded projects. Furthermore, we recommend that funding agencies consider systemic inequalities present in our field and enact new measures to mitigate those impacts on parents, historically under-represented ethnic groups, and early career researchers. Offering supplemental funds for childcare or eldercare is essential to allow caregivers to be able to participate in funded fieldwork. Allowing costs to bring dependents and a caregiver/partner would take the burden off parents of young children who traditionally struggle to conduct fieldwork because of both economic costs and logistical issues of bringing children to the field. Gender and racial/ethnic biases have been identified in funding decisions and removing these structural barriers is essential for a more equitable field. Offering training for reviewers and panelists would help in this area, as would prioritizing funding for early career and historically under-represented ethnic populations. Diversifying decision-making roles within funding agencies is also critical for moving our field ahead in the 21st century. Therefore, recruiting women and historically under-represented groups to serve in decision-making roles at funding agencies can help these efforts.

Publishers also play an important role in the maintenance of historical inequalities in archaeology. To mitigate pre-existing issues, as well as major declines in submission by women, we recommend several strategies that aim to re-orient publishing in archaeology. Our recommendations mirror those of Gamble et al. [38] and work to foster better diversity in publishing moving into the future. First, we recommend the expedition of submissions by women and historically under-represented groups; however, we recognize that those journals that rely on blind peer review may not be able to implement such a policy. However, if possible, by expediting those submissions, more women will get published in the near future and some of the losses experienced in publishing will be mitigated. Second, we advise the recruitment of women and BIPOC scholars to serve on editorial boards and in reviewer roles. Third, several publishers have recently held publishing workshops for early career scholars to learn how to publish their first article. We commend these efforts and recommend that journals that have not hosted such workshops begin to offer them. Finally, we advise that publishers offer publishing fee waivers or reductions for women and historically under-represented ethnic groups, in order to bring more equity in the articles that they publish. These measures, together, may help to turn around the very alarming statistics that have been recorded throughout the pandemic, efforts that must be corrected as soon as possible to retain the best and brightest in our field.

5. Conclusions

The coronavirus pandemic has had profound impacts in the field of archaeology. Results from this survey are troubling, showing major impacts on early career scholars and

women. Here we have targeted those most impacted populations, those who described the highest levels of economic losses, impacts on teaching or research, and in personal responsibilities. The results from the survey show that almost half of those who lost job(s) were under 35. Some of the comments of those affected individuals suggested that these losses have made the possibility of continuing to work in the archaeology sector impossible. If our field does nothing, it will see many of the best and brightest students and early career professionals shift employment to other sectors. Employers, professional organizations, and institutions must take immediate action to try to mitigate these impacts. In addition, women and historically under-represented ethnic groups showed major impacts in the survey. Even if they did not lose jobs, many were impacted negatively by economic losses, increased workloads, reduced options for research, and heightened personal responsibilities. The field of archaeology is already struggling to deal with the structural inequalities that have limited advancement of these groups within its ranks. New measures by employers, professional organizations, publishers, and funding agencies are needed to limit the long-term impacts of these vulnerable populations within the field of archaeology. Without some intervention, our profession is sure to be set back for decades to come. Only immediate action will work to prevent this outcome.

Supplementary Materials: The following are available online at <https://www.mdpi.com/article/10.3390/heritage4030093/s1>, Table S1: Contingency table for x2 analysis on gender and job loss; Table S2: Contingency table for x2 analysis on age group and job loss; Table S3: Contingency table for x2 analysis on ethnicity and job loss.

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