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Title

Managing research throughout COVID-19: Lived experiences of supramolecular chemists[†]

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[†] The Supporting Information includes a full discussion of women in academia, ethics and funding, the qualitative research approach, autoethnographic research, details of the survey, details of the reflective meetings, details of the collaborative autoethnography, the analysis and SI references

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Abstract

The international Women In Supramolecular Chemistry network believe taking an *area-specific* approach effectively supports equality, diversity and inclusion. Science lacks diversity, and this is intersectional. Here, we share effects of COVID-19, triangulating findings from an online survey, a collaborative autoethnography, and reflective group research meetings. We found research leaders took responsibility for teams' mental health and wellbeing at cost to their own. Community and peers helped ameliorate this. Qualitative research *with* the community offers insights into challenges, and supports individuals.

Main paper

A history of structural and systemic barriers to retention and progression, combined with a culture of microaggressions and discrimination, has resulted in an under-representation of women in

science.[1‡] Despite initiatives aimed at increasing the numbers of women, and near gender-parity at undergraduate and postgraduate degree levels, women remain under-represented at the most senior levels of academia.[2] Women in academia in any discipline face multiple barriers,[3] and for those in STEM these are exacerbated.[4] In this article, we focus on women as a marginalised group within supramolecular chemistry,[5] and we recognise that many of the barriers faced by these individuals are also experienced by other marginalised genders, and those with caring responsibilities.[§] We include a further discussion on the barriers faced by women in academia in section S1.† Marginalisation due to any protected characteristic such as gender, race, religion, sexuality or disability is intersectional,[6] meaning that barriers experienced compound.[**]

Within chemistry and other disciplines in science, part of developing as an independent researcher is becoming a Principal Investigator (PI) and running a successful research group. Differences in leadership style and workplace culture along with the differing demands placed on those who are marginalised (e.g. an expectation to perform EDI (Equality Diversity and Inclusion) roles, act as a formal or informal mentor, and taking on additional administrative or pastoral duties) may impact on an individual's career progression. The COVID-19 pandemic placed additional burdens and work on the higher education sector, academics, and research staff. Whilst at the time of writing the pandemic is not over, there are already general indicators that these burdens were borne disproportionately between men and women. Women's publication rates were affected to a greater degree than their male counterparts.[7] What then, are the impacts of COVID-19 on an already marginalised group?

Here, we move beyond numbers to explore the lived experiences of those working in supramolecular chemistry, and highlight experiences of being part of or managing an academic

[‡] We use 'women' to include trans women, and 'marginalised genders' to also include non-binary people and trans men.

[§] Please see section S1† for a full discussion on the barriers faced by women in academia.

[**] It should be noted that caring responsibilities are not a protected characteristic and thus it is particularly difficult to address caring-related discrimination, as there is no specific legal framework in the way there is for other types of discrimination.

research group in 'unprecedented times'. In order to achieve this, we took a novel approach to triangulate data from three qualitative sources: (1) an online survey of the community asking questions about experiences through COVID-19; (2) an international on-going collaborative autoethnography study with women research group leaders; and (3) the results of reflective group workshops/meetings held with two research groups in the UK and US with women PIs. We have intentionally used creative and reflective research approaches within an Embodied Inquiry[8] that centres the emotional, lived experiences of participants. In a process of reflexive thematic analysis,[9] themes were identified from transcripts of the collaborative autoethnography meetings by the authors. These themes represented 'hot spots' or points of interest that resonated with the research team and warranted further analysis. The transcripts of the reflective group meetings were then analysed with respect to the identified themes, before triangulation with data from the wider supramolecular community from the online survey responses. The aim of the analytic process was not to produce generalisable results, but to evoke responses that resonated with individual, lived experiences of the phenomena under investigation.[10††]

Participants

Online Survey

The online survey was open to respondents of all genders and all career types, within and directly supporting the international supramolecular chemistry community, in December 2020 and closed in May 2021, collecting 105 responses. Respondents were asked to identify their ethnicity/nationality, and included white, Indian, South American, Latino, Turk, Italian, British-Cypriot, European, Asian, Chinese, German and Hispanic. One respondent identified as LGBT+, and one as neurodivergent (Figure 2).

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†† Details of the methodological approach, including discussion of our approach to using qualitative research and collaborative autoethnography, ethical approval and the methods used for data gathering and analysis are given in sections S2-8.†

In addition to recording demographic data, many of the questions were open, and respondents described their experiences through COVID-19, whether they had caring responsibilities. We had no responses we can specifically assign to those in administrative or technical roles, though they would have been impacted by COVID-19. However, these individuals may have identified themselves as 'other' (Table S5.1). Table S5.1 shows a breakdown of the intersection of career stage, gender, and caring responsibilities.

Collaborative Autoethnography

The 12 participants of the collaborative autoethnography (CA group) are all early-to-mid-career researchers in academia. They all identified as women. Three were based in the US, two in Germany, one in Italy, and six in the UK. Three members of this group identified as having a disability/chronic illness/neurodivergence. They have not disclosed or discussed sexuality. Eleven present white, one is Black. The collaborative autoethnography study was initiated in September 2020.

Reflective Group Meetings

The reflective group meetings began in January 2021 and are ongoing. Meetings are held every two weeks, and last one hour each time. 11 of the 14 participants identified as women. They had a diverse range of nationalities, including Indian, South African, Turkish, Lithuanian and Puerto Rican. Four identified as having a disability/chronic illness/neurodivergence. Thirteen were postgraduate students, one was a post-doctoral research associate.

Findings

The themes that we share here relate to the lived experiences of being in/running research teams in relation to: the challenges of managing a teams' mental health during lockdown; returning to labs with split teams and rotas due to social distancing requirements; and logistics of projects. In addition, we address the emotional impact of managing teams, mitigating damage, and the positive effect of taking time to reflect and connect with others.

Mental Health and Isolation

The COVID-19 pandemic and lockdown had a negative impact on many people's mental health and unsurprisingly, this was reflected in the participants of the collaborative autoethnography, as they shared concerns relating to the effects of this on their group members:

> *"My group are so disconnected. We're doing Zoom meetings but the sessions are not so helpful"*
>
> *"I had a new international student start and I'm so worried that they aren't able to connect with anyone"*
>
> *"They're just fragmented and I don't know what to do to make it better"*

The research group students echoed the impact of COVID-19, describing the effect on themselves. These are displayed in Figure 1.

Many of the survey respondents also discussed the negative impact of COVID-19 on their mental health:

> *"The Covid-19 is the bad phase in my life" (Post-doc, female)*
>
> *"Working from home was a real struggle and has had hugely negative impacts on my mental health" (PhD student, female)*
>
> *"During the March April lockdown I got properly depressed for the first time in my life" (Independent Researcher, male)*

However, some without caring responsibilities shared that they were able to look after their mental health better than before:

> *"But it also meant that i was able to look after my mental health a little better, having half of the day to do some healthy activities and spend time on myself" (Master's student, female)*
>
> *"I was able to make proper meals during the day and looked after myself better." (PhD student, female)*

The majority of survey respondents reported that COVID-19 had an impact on their productivity, reflecting the experiences of the research and CA groups.

> *"My productivity and efficiency are through the floor, but it is what it is"*
>
> *(Independent Researcher, male)*

Not all saw COVID-19 as a negative, see Figure 3.

Another female PhD student agreed: *"It worked out well for me because I had all the data from the lab so I could write a publication easily from home."*

From the online survey, the biggest indicator for having a tough time through lockdown was not gender or career stage, but whether an individual had caring responsibilities. It is worth noting however that although in our survey the gender spilt of independent researcher respondents was 22:17 women & non-binary people: men, the proportion of women and non-binary people with caring responsibilities was just 55% compared to 65% of male independent researchers. These trends are indicative of issues chemistry has retaining women post-phd[1] but do not reflect data on caring responsibilities within academic populations[11] and wider society, where women disproportionately bear the labour of caring duties, particularly for young children who were not able to attend school during COVID-19.[12] It may also reflect participation bias, as it is possible that a male researcher with caring responsibilities might be more sensitive to impacts of COVID-19 on researchers than the average and therefore more likely to respond to the survey (Please see section S1† for a discussion on mothering in academia). We should also note that although our survey respondents were wholly from academia (though the survey was open to all), we acknowledge that administrative and technical staff contributing to the goals of academic PIs would have been impacted too, and their voices are even less visible than those we share here.

> *"Working from home a lot, nightmare looking after a small child and trying to get work done whilst sharing childcare. Essentially getting about 3 hours a day of work done for many*

months, and trying to not let anyone down. Very difficult. Also no home office so that was fun." (Independent Researcher, male)

"This has been utterly exhausting. One of my senior colleagues without caring responsibilities actually said out loud during a staff zoom call that they'd "rather enjoyed the opportunity to focus on papers and grants, and they'd got a lot done." (While I am pleased for them, I was not alone in feeling like it was a tone-deaf[‡‡] comment, that sadly presages the onset of several years of division between those who were able to boost their careers as a result of the pandemic and those who were not." (Independent Researcher, male, caring responsibilities)

Return to labs

Many research labs were shut completely for extended periods of time during the COVID-19 pandemic, before a phased return was initiated, governed by necessary social distancing measures. The ways these returns and social distancing were managed varied from lab to lab, with some options including split days, one week on one week off, and three days on four days off. Reducing lab capacity had impacts on group dynamics, with rota systems that split individual lab groups being the most problematic for the CA group. Reducing time in the lab also impacted on the kinds of experimental work that could be completed. The CA group reflected:

"My group are divided"

"It's been a challenging process. I have a challenging line manager who tells me 'you just have to prioritise'"

"I had them all working on a review paper, now they need to get back to experimental work, and I had to pivot projects and come up with stuff that will work in the rota they have and the time they have."

[‡‡]We should note that quotes have been included verbatim, and we recognise that the phrase 'tone-deaf' is ableist language.[20]

From our reflective group meetings, the UK research group students were not split, as they shared a space with another research group and had a morning/afternoon rota. They spoke about the changed work conditions:

> *"We've been in shifts in the lab, split with another group, so we haven't been split. We're lucky" (PhD student, female)*
>
> *"We've had to change what we do – we can't run all day experiments any more we're only in 1-5" (Masters student, female)*
>
> *"I got lots done – worked on data in the morning then went into the lab after lunch" (PhD student, female)*

The survey respondents agreed that split group working and reduced time in the lab was challenging, particularly when communication with supervisors and PIs was not clear. There was a lot of anxiety over the return to labs, particularly from female PhD students.

> *"It has been immensely emotionally draining in returning. It requires additional effort each day to focus on work whilst the numbers are/were rising so steadily." (PhD student, female)*
>
> *"Finding return to labs hard, difficult to use the shared equipment safely without feeling stressed. I feel pressure to make up for lost time so the return to labs has been very busy." (PhD student, female)*
>
> *"Return to the labs wasn't too bad but struggled to do most work efficiently because of rotas in place." (PhD student, female)*
>
> *"Our supervisor chose who got to go back and only informed those individuals at the last minute, leaving everyone else wondering if they are to stay at home or just haven't received his email yet. Post docs got to go back first and didn't take the time to talk to the rest of the group" (PhD student, female)*

For research leaders, they echoed the CA group's experiences:

> *"I have a nursery age child and not childcare or any family near by so I basically couldn't do my job, which was increasingly more difficult with managing PhD students who couldn't go*

into lab… Returning to labs has made dealing with PhD students a bit better, less reliant on me to tell them what to do. But they continually pester me asking when the rota will change (we have split the group in half and are doing week in and then week out). This isn't helped when other labs are in 100% of the time due to them having larger labs or smaller groups. Head of school says there is no more space, seems unlikely, just poorly organised space… We have been told to prioritise teaching from up high, but also from college we are asking where all the grants are, where are the papers since we've had all this extra time..." (Independent Researcher, female)

As this quote makes clear, the emotional impact on research leaders carrying the burden of their research groups as well as the pandemic was huge.

Emotional impact

The emotional impact of the pandemic was also a frequent topic of conversation within the CA group:

"I am very distracted and anxious. Lacking in motivation and finding it hard to build a head of steam"

"Someone died of COVID whilst lecturing in South America – is HE [Higher Education] worth dying for?"

The survey results showed that proportionally more women than men talked about the emotional impact of COVID-19, while students spoke about the importance of their team and not being able to see peers or socialise:

"I wasn't able to get to know my team as well as i might have if we were able to socialise more." (Masters student, female)

"With it came a lack of communication that pushed me into anxiety and despair." (PhD student, female)

The CA group meetings became a safe space to share and process emotions during the COVID-19 pandemic. The participants were able to be honest, and as a result felt less isolated and helpless:

"I have so much anger and I don't know why. I'm frustrated I don't have clean data. I can't sleep. I have so much anxiety"

"It's week 4 of home-schooling and the wheels are falling off. I needed to sleep and was looking at paper drafts instead"

"I'm just fire-fighting the whole time. There's so much pressure"

One research group from the UK reflective group meetings were aware of the load their PI faced:

"I worry about [redacted] she's under so much pressure" (PhD student, female)

"She's very hands on with the team. It's quite a special group" (Post-doc, female)

The research leaders responding from the survey also spoke about the impact of COVID-19 and the emotional load (Figure 4).

"I feel that my research team and I responded to the challenges that covid posed to us with resilience and agility, the main impact to myself was that amount of my personal and emotional resource was needed to support others and ensure the productivity of my team was maintained. This has left me drained and exhausted." (Independent Researcher, female)

"I worked from home. Its arguably the hardest thing I've ever done. I have 2 kids (age 8 and 12) and they are somewhat autonomous, but it was still difficult. I worried about everything...especially the well-being of my group, and of course our productivity which effectively fell to zero." (Independent Researcher, male)

"The most negative effects for my research, besides the huge amount of extra work for me that covid has necessitated to sort out Dept & university matters, is not seeing individual members of my group in person, other than by zoom, for more than a year. Without face-to-face interaction one cannot really understand how everything is going, personally and professionally, for everyone and on particular projects." (Independent Researcher, male)

This emotional load of responsibility for ones' research group, unrecognised in workload allocation models and literature, contributed to the feelings of firefighting and burnout seen in the CA group and the independent researchers responding to the survey.

Discussion and Conclusion

The CA group found the space to reflect, process, and share with a community of supportive peers. The meetings, rather than being another burden on their time, became points of connection and support. The importance of community for women in science is widely recognised.[13,14] Given the pre-COVID-19 context of the lack of diversity within chemistry,[15] it is little surprise that women, as they are often the main care givers within the home, have been impacted more by the COVID-19 pandemic.[16] Our survey demonstrated that it was caring responsibilities rather than gender[17] that correlated with less positive experiences, and this could be extrapolated to include the duty of care that many independent researchers felt towards their research groups. It must be noted that our survey sample had a higher proportion of women respondents (65%) than would be representative of the supramolecular or chemistry communities.[15]

The importance of community (or lack thereof through lockdown and social isolation) was another important factor contributing to personal experiences. Communities and networks are vital for those who are marginalised.[3,14] Our previous work demonstrated the value of reflexive and creative approaches to help build communities and networks,[5] allowing members to identify and disseminate their experiences to better understand the impact of marginalisation. The ongoing work with the CA and research groups supporting their reflective and reflexive processes[18] has been valued by all participants for the opportunity to share, connect, and feel less alone. Similarly, feedback from the mentoring circles organised through WISC has emphasised the positive impact of regular and supportive meetings with peers.

The challenges that students, post-docs, and independent researchers faced in supramolecular chemistry are likely to echo those faced by academics and researchers across not only the many fields of chemistry, but other disciplines too. What is novel in our approach, is that findings

presented herein are data triangulated from three sources, together with the use of a community specific group to address these challenges. As such, rather than looking at the problems from the outside, we as a community are exploring these issues as a means to address them. There was a negative impact of rotas on the mental health, communication, and productivity of research groups. Having caring responsibilities was the largest factor for all participants regardless of age, career stage or gender. The emotional load of managing a research group through COVID-19 was an unexpected burden borne unevenly across the academic community, falling as it does predominantly on those in STEM who are more senior in their careers, and who are thus more likely to also shoulder additional senior management responsibilities. This last factor, largely unrecognised by universities, without doubt contributed to the decision made by some women survey respondents to leave academia during/as a result of the COVID-19 pandemic.

> *"I have a nursery age child and not childcare or any family near by so I basically couldn't do my job, which was increasingly more difficult with managing PhD students who couldn't go into lab… I told my line manager about my lack of ability to do my job, and he just told me to make a note of it for our PDRs, which have now been cancelled" (Independent Researcher, female)*
>
> *"Upon returning to lab, I had lost all motivation to work. This event contributed quite strongly to my decision to leave academia" (Other, female)*

If chemistry and science are to continue to tackle the EDI crisis, then it is imperative that the impact of COVID-19, particularly on those with caring responsibilities, lab groups, and who are from minorities where progression is limited, is ameliorated.

In a survey of 2888 mothers in academia, Kovarovic et al[16] identified many practices that did not help, and nine themes of practices that did from 2498 responses. These included:

1. Specific, genuine support from managers and/or peers
2. Increased flexible working opportunities
3. Additional leave options

4. ‘Different’ Fridays (that is implementation of a day with no meetings, or shorter work hours)
5. Equipment and skills needed to work from home
6. Teaching, marking or other workload relief
7. Financial benefits
8. Furlough
9. Making children and home life visible at all levels[16]

Whilst some of the general recommendations Kovaric et al give in their report would be beneficial to women and caregivers in supramolecular chemistry and other science disciplines, such as specific, genuine support, flexible working, workload relief, financial benefits and making children and home life visible, it is clear that the additional pressures of working within a lab, and running a lab and research group need additional responses from institutions and funders. There are a number of ways in which this could be achieved in chemistry where the overarching problem has been the loss of lab time which has varied due to the size of the lab, the number of researchers in a group, local rules on social distancing etc.. For example, Masters and PhD students can be supported by giving them extra time to complete their degree and providing post-docs with contract extensions however, these options are likely to have financial impactions on the individual/organisation that would also need support. It must also be acknowledged that this could just push the problem onto the next cohorts of students, reducing their funding and time. An alternative could be to accept less original research and more review papers for progression and promotion. For PIs, provision of no-cost extensions and enabling deliverable deadlines to be moved, and risk mitigation planning to happen as part of this process. However, we should also acknowledge that not every researcher would be affected to the same degree, and it is sensible to calibrate responses depending on: 1) the lost time for each individual researcher; 2) personal intersectional factors (caring responsibilities etc) and; 3) some additional time that acknowledges the widespread mental health and stress struggles faced by everyone.

It will be necessary to track whether the long-term impact of COVID-19 increases the attrition of women from chemistry and decreases the progression of minority groups.[1,15,19] **We suggest that a major tool in the arsenal used to address the lack of gender balance and diversity in science generally, and the impact of COVID-19 on those groups specifically, is establishing and growing networks of area-specific communities.** This allows space for individuals to reflect on and share their lived experiences so that they are less isolated and marginalised. We offer WISC as a blueprint or model of how this may be achieved in an area-specific field that can be replicated across disciplines, borders, and communities.

Figure 1 Research group members' reflections on the impact of COVID-19.

Figure 2 Demographics of respondents to online survey.

Figure 3 The silver linings of COVID-19.

Figure 4 The emotional load of research group leaders.

References

1 R.S.C., *Breaking the barriers: Women's retention and progression in the chemical sciences*, Royal Society of Chemistry, London, 2019.

2 S. Rosser, *The science glass ceiling: Academic women scientists and the struggle to succeed*, Routledge, New York, NY, 2004.

3 S. Stiver Lie and V. O'Leary, *Storming the tower: Women in the academic world*, Kogan Page, Lomdon, 1990.

4 E. Monosson, *Motherhood, the elephant in the laboratory: Women scientists speak out*, Cornell University, Ithaca, NY, 2008.

5 C. Caltagirone, E. Draper, C. Haynes, M. Hardie, J. Hiscock, K. Jolliffe, M. Kieffer, A. McConnell and J. Leigh, An area specific, international community-led approach to understanding and addressing EDI issues within supramolecular chemistry, *Angew. Chemie Int. Ed.*, 2021, **60**, 11572–11579.

6 K. Crenshaw, *Demarginalizing the intersection of race and sex: A black feminist cririque of antidiscrimination doctrine, feminist theory, and antiracist politics*, University of Chicago Legal Forum, 139-67, 1989.

7 C. Flaherty, Inside Higher Education, https://www.insidehighered.com/news/2020/04/21/early-journal-submission-data-suggest-covid-19-tanking-womens-research-productivity, (accessed 10 November 2020).

8 J. Leigh and N. Brown, *Embodied Inquiry: Research methods*, Bloomsbury, London, 2021.

9 V. Braun and V. Clarke, Reflecting on reflexive thematic analysis, *Qual. Res. Sport. Exerc. Heal.*, 2019, **11**, 589.

10 V. Evans-Winters, *Black feminism in qualitative inquiry*, Routledge, Abingdon, 2019.

11 I. Dougall, M. Weick and M. Vasiljevic, *Inside UK Universities: Staff mental health and wellbeing during the coronavirus pandemic*, Durham, 2021.

12 J. Blanden, C. Crawford, L. Fumagalli and B. Rabe, *School closures and parents' mental health*, Essex, 2021.

13 E. Daniell, *Every other Thursday: Stories and strategies from successful women scientists*, Yale University Press, New Haven, 2006.

14 E. Yarrow, in *Women thriving in academia*, ed. M. Mahat, Emerald, Bingley, 2021, pp. 89–108.

15 R.S.C., *Diversity landscape of the chemical sciences*, Royal Society of Chemistry, London, 2018.

16 K. 'Fire' Kovarovic, M. Dixon, K. Hall and N. Westmarland, *The impact of Covid-19 on mothers working in UK Higher Education Institutions*, Durham, 2021.

17 B. Fisher and J. Tronto, in *Circles of care*, eds. E. Abel and M. Nelson, SUNY Press, Albany, NY, 1990, pp. 36–54.

18 A. Bleakley, From reflective practice to holisitic reflexivity, *Stud. High. Educ.*, 1999, **24**, 315–330.

19 CRAC, *Qualitative research on barriers to progression of disabled scientists*, London, 2020.

20 N. Brown and J. Leigh, *Ableism in academia: Theorising experiences of disabilities and chronic illnesses in higher education*, UCL Press, London, 2020.

Acknowledgements

As well as thanking all those who participated in our research, we would like to thank all the funders and supporters, (University of Kent; University College London; Università degli Studi di Cagliari; Christian-Albrechts-Universität zu Kiel, including funding from the Gender Equality budget; Royal Society of Chemistry: Inclusion and Diversity Fund; UKRI Future Leaders Fellowship, Grant Number: MR/T020415/1; Royal Society, Grant Number: APX\R1\201170; Scot Chem; Biochemical Society: Diversity in Science Grant; ChemPlusChem; Crystal Growth & Design; STREM Chemicals) the Board and Advisory Board members, and all the wider members who have participated in the clusters, the mentoring programme, attended events, and engaged with us on Twitter.

Author contributions.

Jennifer Leigh led data collection, analysis and writing

Jennifer Hiscock, contributed to data collection, analysis, and writing

Sarah Koops, contributed to data analysis

Anna McConnell, contributed to data collection

Cally Haynes, contributed to data collection

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Larissa von Krbek, contributed to data collection

Katrina Jolliffe, contributed to research design and writing

Michaele Hardie, contributed to research design

Competing interests.

The authors declare no competing interests.