Mitigating losses: How science diplomacy can address the impact of COVID-19 on early career researchers

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Introduction

Despite the failures to tackle early coordinated responses at national and multinational levels¹, the global emergence of Coronavirus Disease 2019 (COVID-19) pandemic promoted unprecedented actions on the science-policy, science-communication, and science-diplomacy interfaces worldwide. With varying degrees of success, various actions within the realm of science diplomacy have accompanied the creation of knowledge related to COVID-19 through international collaboration^{2 3 4 5 6}. The COVID-19 pandemic brought the world to a standstill and also drew attention to the genuine need for science diplomacy^{7 8 9 10}. This pandemic highlighted the need of training opportunities in the interface of policy and diplomacy for researchers to be able to get grips on emerging health issues. Moreover, it is necessary to create specific platforms for experts to interact with decision-makers at the national and international levels, especially in the Global South. This crisis inevitably shifted the focus on scientific areas that directly address the pandemic response (epidemiology, public health, virology, immunology, pharmacology, human behavioral research, economics, among others). At the same time, some areas not related to the pandemic response have been slowed down due to inevitable physical and social restrictions that impacted certain aspects of the academic life. This does not only relate to daily access to the lab, scientific collections, or field sites, but also associates with furloughed employees and reduced funding to non-COVID-19-related research^{11 12 13 14}. Moreover, during the pandemic, women and (usually young) scientists with children have reduced their research efforts substantially, with future implications still difficult to quantify¹⁵. While some researchers might have harnessed telecommuting and lockdown periods to focus on data analysis and publication writing, gender bias still exists^{16 17}. The slight increase in publications with pre-acquired data may still be followed by an immediate future impacted by the lack of data acquisition during the pandemic. These issues may create long-term effects due to reduced capacity for generating pre-requisite data for securing new funding, termination of research, reduced networking opportunities, restrictions to international collaborations, collectively having a negative impact on other disciplines. While most established researchers may not be affected hardly by the above-mentioned effects, early career researchers (ECRs), represent a more vulnerable population¹⁸. ECRs usually refer to PhD students, postdoctoral fellows and scientists who have 10 years or less of experience after the doctoral degree, although there is some flexibility in this definition¹⁹. Due to their career stage, ECRs often face job precarity, lack of available opportunities, low funding, and

job insecurity ²⁰ (e.g., untenured positions and temporary contract employees). These problems are augmented by the COVID-19 pandemic and may be experienced more in countries with a developing scientific system. The impact could be higher for countries that are developing their research environment, are dependent on training their ECRs and conducting experiments abroad through international exchanges programs ²¹, which have been stopped due to the pandemic.

Given these unprecedented times, it has been observed that international scientific organizations, policy-makers, scientific communities, and private stakeholders have strengthened their collaborations in response to the pandemic ²². We, as ECRs, strongly believe that science diplomacy can make a difference in addressing the challenges (emanated or amplified by the current pandemic) that ECRs would face inside and outside academia. Here we present such challenges, and discuss how the Global Young Academy (GYA), an independent organization of early to mid-career researchers across all disciplines and countries, has provided a platform for ECRs to practice science diplomacy, science advice, and science communication. The former by serving as a bridge between ECRs and governments, the second by hearing the voices of young researchers when enacting policies, and the latter by informing societies about the benefits of scientific research. Motivated by the described examples, we recommend measures for scientists, funding agencies, and international organizations to foster international collaboration in these unparalleled times.

Effects of the COVID-19 pandemic on science and early career researchers

The COVID-19 pandemic has affected science globally at multiple levels and scales ²³. Scientific fields directly related to the pandemic response ²⁴ received special attention at the national, regional, and global levels in terms of funding priorities, continuity of in-person activities during movement restrictions, as well as public awareness about their relevance to the society. The urgency of the pandemic response prompted the creation of international collaborations (e.g., diagnosis, vaccines and therapeutics development, viral genome sequencing, and clinical trials) all supported with quick calls for special funding opportunities. Another collateral but unexpected effect of the pandemic are enhanced virtual interactions observed across disciplines. Conferences, workshops, and seminars that moved to digital formats often became more inclusive and enabled scientists to potentially reach broader

audiences. International academic mobility and scientific exchange are commonly threatened by limited travel budget and visa-related issues ²⁵, then virtual meetings addressed inclusiveness concerns, especially for ECRs from low and middle-income countries. Nevertheless, the lack of in-person interactions may not allow sufficient networking opportunities for the initiation of collaborations, or career opportunities for ECRs, specially outside their countries, often a scientific training step for ECRs from developing countries ^{26 27} ²⁸. The positive and negative effects of virtual engagement have been discussed, including inequities in technology access and personal issues associated with telecommuting ²⁹.

Closures of laboratories, quarantines in many countries, and concomitant travel restrictions stalled progress in research other than COVID-19-related, reasons for many scientists to not attend conferences planned before the pandemic was declared, reducing chances for engaging with other researchers. Additionally, researchers in general need to secure funding, which usually depends on the progress of ongoing research. The issues inherent to the pandemic contingency may not provide the conditions to advance research for securing future funding. This has a higher effect on ECRs whose salaries generally depend directly on their grants or fellowships ^{30 31}. This scenario could be improved if researchers create new partnerships, especially between countries with different management of the COVID-19 contingency, or that are at different stages of the pandemic. Thus, research tasks could be shared and complemented if performed in different locations or sharing facilities where the contingency allows in-person work, as part of a collaboration with researchers where research is stalled, allowing for continuity.

The issues affecting ECRs working in disciplines not directly related to the pandemic response, also worsened the plight of some subgroups, particularly postdoctoral researchers and those finishing their PhDs, impacting career plans, expiration of fellowships, and wellbeing ^{32 33 34 35}. Due to the reduction in research funding, there could be an effect on employment and contract-research workers, a common scenario for ECRs, making them prone to job insecurity. ECRs undergo years of extensive training and undoubtedly, they represent one of the most highly skilled workforces as they continue advancing their careers. The insecurities of scientific careers may discourage postdoctoral researchers and up-coming generations of science graduates from adopting scientific research as a lifelong career or even dropping scientific careers both in academic and private sectors. This may disproportionately affect women, underrepresented groups, and science-lagging countries ^{36 37}. Furthermore, these

issues would also impact higher education as ECRs have a relevant role in teaching/education, especially at the undergraduate level and the formation of new researchers. Science diplomacy and international organizations could help design international exchange and engagement programs to support ECRs continue their research in the current and post-pandemic times.

An academy of early career researchers as science diplomacy actors

The GYA is a worldwide organization of early and mid-career scientists from different fields of knowledge. It empowers young researchers to lead international, interdisciplinary, and intergenerational dialogues to create an impact on science and society. GYA has served as a supportive institution promoting the foundation of novel National Young Academies (NYAs) worldwide ³⁸. In doing so, members of these academies have engaged in debates that served to modulate the pace of diplomatic efforts of their countries from a scientific realm. NYAs have promoted science advice at the national level and science diplomacy and scientific collaboration at the regional level and worldwide, many times with GYA participation ³⁹.

The World Health Organization declared COVID-19 a pandemic on March 11, 2020. To support the pandemic response, on March 26, the GYA released the statement “Beyond Boundaries: A global message from young scientists on COVID-19”, with recommendations to strengthen international partnerships, as well as to formulate harmonized international scientific policies toward the mitigation of the pandemic effects ⁴⁰. On the axis Science in Diplomacy, as part of the G7 group of academies, GYA is able to integrate the voices of ECRs with the advocacy of diplomatic groups; as seen with the release of the statement “The critical need for international cooperation during Covid-19 pandemic joint statement of Academies of Sciences and Medicine” ⁴¹. Also, in 2020, the group of G20 Science Academies (S20), created the statement on “Foresight: Science for Navigating Critical Transitions,” ⁴² with participation of GYA members. This communique directly reported to policy-makers and/or governments of G20 countries.

The initial months of the pandemic highlighted the need of inclusive science communication that helps inform and show the population about the need of science diplomacy and science advice to tackle solutions to the pandemic. The webinar “COVID-19 in

Latin America, perspectives from young scientists” in May 2020, brought together six GYA scientists to provide 132 attendees from 20 countries with reliable and accurate information on the pandemic ⁴³.

The transition to online interactions created more inclusive settings by eliminating travel-associated logistics and monetary factors as limitations. Often, travel expenses for in-person meetings of academies may not be allocated from research grants or fellowships as they are considered service, hindering participation. The first GYA e-AGM and e-conference (June 2020), combined real-time interactive and asynchronous events, and discussions with pre-recorded presentations. This was the year with the highest attendance, despite encompassing attendees challenged by the differences in time zones. But the digital divide, which existed before the pandemic, has surfaced more than ever now that most events are virtual. One aspect is suboptimal or lack of suitable technology in some regions -a major challenge for synchronic engagement. A practical measure to enable equal opportunities for synchronous interactions is to subsidize internet access for participants in a specific event as fees might be prohibitory in some countries ⁴⁴. The e-events offered new, experimental ways of engagement for GYA members, representatives of NYAs, renowned scientists, professionals in science policy, along with key partner organizations ⁴⁵.

Another aspect of the digital divide is the paywall to access scientific literature and publication fees, which may be aggravated by reduced funding ⁴⁶. In fact, it might be worse during the pandemic in institutions with no remote access to their digital library during closures. Interestingly, most of COVID-19-related research has been made open access, evidencing the urgency to advocate for open access for all other disciplines, a trend that must be promoted and expanded. The GYA advocates for open science through partnering with UNESCO and other key stakeholders in a wide range of initiatives ⁴⁷.

The GYA and NYAs work together to increase scientific collaborations in different regions and suggest solutions from ECRs to address globally important issues. The global meeting of NYAs, the largest gathering ⁴⁸ of young academies so far (and first-ever online) organized by GYA in September 2020, represented a global platform for establishing further collaborations and exchange of best practices. From a science diplomacy perspective, it allowed exchanging ideas between ECRs with different decision-making capabilities within academic, private, and governmental sectors. This meeting served for gathering Latin

American and Caribbean fellows involved in the writing of a current assessment on the situation of early- and mid-career scholars in this region ⁴⁹. A recent GYA-funded report presented a regional assessment on future research perspectives of ECRs from South East Asia ⁵⁰. Some major trends were reported: limited intraregional scientific collaboration and mobility, disparities in scientific practices between countries, and lack of proper availability of resources for scientific research.

The GYA's North-South interdisciplinary grants ⁵¹ and the Young Scientist Ambassador Program (YSAP) ⁵² are two concrete examples of sustained opportunities that are the direct outcome of interactions created as part of the membership to GYA. These annual projects create deliverables that enable further joint projects ⁵³. The nature of these programs is to connect researchers across countries that do not traditionally engage through science. A key inclusive factor, since cultural or regional conditions may represent biases that forbid researchers from establishing novel partnerships. These collaborations may also involve outreach programs and interactions with stakeholders (e.g., media, policy-makers), increasing the impact and fostering science diplomacy through scientific collaboration ⁵⁴. In 2020, the bilateral YSAP missions were modified to a virtual format, time will determine if their impact is similar to the in-person format ⁵⁵. The North-South grant aims to foster global collaboration within the GYA. For 2020/21, it was awarded to members from six countries, who aim to collect, and analyze the artwork of life during the COVID-19 pandemic across the world in relation to the measured intensity of the pandemic ⁵⁶.

To suggest tailored solutions, further effects of the pandemic on ECRs must be assessed. Members of the GYA Women in Science working group compiled experiences amongst members, women scientists from different countries, as they tried to navigate their work and motherhood. They shared pieces of advice and motivation in the article "GYA Women in Science stay and work from home: How might we make COVID-19 lockdown work for us?" ⁵⁷. This exploratory perspective was applied to other projects, like the inclusion of COVID-19-related questions in different surveys, such as the impact of the pandemic in women in science's work, or on ECRs from a specific region through the Global State of Young Scientists in Latin America and the Caribbean study (GLoSYS LAC). To understand the role of science and ECRs in the current pandemic, other GYA surveys about trust in medical science or young scientists' perception on science advice were updated as well. The results of these

studies will be presented to policy-makers and are expected to be used to improve the environment in which ECRs develop their missions.

Capacity building for global partnerships is crucial all the time, but even more necessary in these times that science needs collaborative young leaders with science communication, advice and diplomacy skills. The Science Leadership Programs (SLPs) implemented by GYA in Africa and Asia, are tools that could be adapted for current specific needs and be expanded to other regions. Additionally, a specific space to harness science diplomacy skills of ECRs in South Asia was developed as a virtual workshop ⁵⁸.

Recommendations to support early career researchers affected by the pandemic

A global perspective on the issues emerging from the COVID-19 pandemic contingency and impact on ECRs have been presented. There is a need to develop strategies to boost scientific diplomacy to solve these challenges. Relevant GYA activities have been introduced, constituting experiences on how international associations can foster partnerships to enable science diplomacy to act proactively. Similarly, the support of the recommendations listed below might be useful and considered as intersectional issues that can be developed in future science diplomacy engagements. Based on this, relevant recommendations are proposed and can be extrapolated in other settings, for scientists and policy-makers to employ science diplomacy tools to address and overcome these urgent issues.

Challenge	Recommendation	Goal	Measures of success	Science diplomacy component
Reduced visibility and networking opportunities for ECRs	For young researchers: Connect digitally with other researchers, regionally and globally. Membership to a relevant organization to facilitate asynchronous interactions with a wide array of colleagues	New opportunities for partnerships to increase collaborations and competitiveness, fostering technical exchange and scientific excellence	Research output (publications, briefings, etc.) metrics, funding adjudication, broader impact of research	Promotion of intergovernmental associations for fostering mobility of researchers between countries
	For international societies, academies, and organizations: Establish/enhance mentoring programs (at the intergenerational and international levels)	Facilitate the transfer of experience and create bridges of mentoring and collaborations	Acquisition of leadership skills, case by case on novel professional development opportunities and new collaborations	Furthering the circulation of scientific experiences at multinational levels, with focus in less developed countries
	International societies, academies, and organizations: create capacity building opportunities to empower leadership	Access to a highly skilled scientific workforce to work together in the interphases of policy and diplomacy with regional or global perspective	Increased visibility and representation of ECRs in science advice and diplomacy	Facilitate tailored programs for creating coherent policies to avoid brain drain and loss, and stimulate innovation by young researchers
Reduction of international collaborations, especially for science-lagging or ODA recipient countries	Funding agencies: enhance or create funding that allows the creation of new collaborative projects, including pilots and, exploratory studies opened to applicants from all professional stages. Encourage the inclusion of science-lagging countries in international consortiums. Flexibility in timelines and extension supplements for active projects	Connect countries through science by creating global fellowships for ECRs to establish new collaborations and continue their research, or gather preliminary data to secure future funding	Research output (publications, briefings, etc.) metrics, funding acquisition, successful continuity of ongoing projects. broader impact of research	Implement collaborative scientific schemes with national, regional, and transnational stakeholders to promote scientific exchange

Augmented impact on science-lagging or ODA-recipient countries' ECRs	International societies, academies, and organizations: organize activities that foster a collaborative and inclusive environment for ECRs, allowing equal engagement and direct interaction (by considering technology access and country representation)	Empower new collaborations in an inclusive manner, especially considering interactions between the global North/South and by fostering South/South interconnections	Research output (publications, briefings, etc.) metrics, funding acquisition, representation metrics per country/region	Promote regional and transnational funding programs to stimulate hands-on cooperation between scientists
Understanding impact of COVID-19 on ECRs	International societies, academies, and organizations: consider subsidizing internet access to members and create small funding programs	Increase virtual engagement	Metrics on participation and demographics, assessment of newly created programs for ECR development	Fostering multinational investment allocation in projects directed by young researchers
Reduction of funding impacting professional networking activities	Conference, workshop, webinar, and event organizers: hold events when possible free of charge or with low/differential cost to science-lagging countries; open the event for all sectors (academia, industry, business, policy); learn from best practices	Support open science for all; increase sectors engagement; support science-policy and science-stakeholders discourse	Metrics on participation and demographics	Promote (a) scientific mobility to international and intraregional loci; and (b) scientific regular virtual meetings between scientists and other stakeholders (this kind of meetings is a pandemic response/practice that likely will remain in the future)
Reduction in scientific funding	International societies, academies, and organizations: advocate with governments and institutions to present the importance of other fields of science despite the international emergency we are facing and aim to influence public budget decisions	Mitigate effect on future funding and influence decision-making on current funding calls.	Changes in budget allocation, incorporation of new actors in the funding landscape, such as NGOs and philanthropic groups	Engaging in regional legislations (a) to ensure common minimum GDPs amounts for funding science and reduce regional scientific budgetary differences and gaps, and (b) to promote private investment in science allied with academia

Table 1. Recommendations to create and/or maintain a scientific environment that can foster new international opportunities for ECRs to allow research continuity during and post-pandemic. The challenges identified in the first column, represent those originated or augmented by the COVID-19 pandemic. ODA: Official development assistance.

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Endnotes

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⁴⁷ This rapport includes workshops, consultations, and participation in high level dialogues. <https://en.unesco.org/news/global-young-academy-contributes-unescos-consultation-open-science>

⁴⁸ Almost 70 representatives from over 40 young academies gathered at this meeting.

⁴⁹ Such report is planned to be distributed to various stakeholders in this region with different degrees of decision-making competences. For the ASEAN region, a similar report has been already produced and distributed to different stakeholders See: J. Geffers, C. Beaudry, H-C. Yang, F. Huang, O. Phanraksa, M. Dominik, Y-C. Lin, M-C. Huang, S. Komai, K. Lorimer, W. Piyawattanametha, P. Saengchantr, H. Saleh, B. Tagg and Veerakumarasivam. (2017). Global State of Young Scientists (GloSYS) in ASEAN – Creativity and Innovation of Young Scientists in ASEAN. Global Young Academy. https://globalyoungacademy.net/wp-content/uploads/2017/01/GloSYS-in-ASEAN_webversion.pdf

⁵⁰ Ibidem.

⁵¹ <https://globalyoungacademy.net/activities/interdisciplinary-grant-2020-21-the-covid-19-pandemic-and-art/>

⁵² <https://globalyoungacademy.net/activities/young-scientist-ambassador-program/>

⁵³ Both programs (North-South grants and YSAP) have allowed to develop further projects, involving publications, graduate student co-supervision and organization of further events, such as conferences. <https://globalyoungacademy.net/activities/connecting-epigenetics-and-natural-resources/>, https://globalyoungacademy.net/wp-content/uploads/2017/09/YSAP_Mission-Report_-Ghada.pdf, https://globalyoungacademy.net/wp-content/uploads/2020/06/YSAP-Mission_-Morocco_Chile-2019.pdf

⁵⁴ For example, YSAP 2019 mission of climate change and SDGs between Chile and Morocco, included meetings with the respective embassies, outreach in universities, collaborative research and organization of conferences.

⁵⁵ As this is a recent program, anecdotal data support the contention that this endeavor set out networks that are currently, - and likely in the future - producing research outputs in the form of reports and peer-reviewed publications.

⁵⁶ <https://sites.google.com/view/19andart>

⁵⁷ <https://globalyoungacademy.net/wp-content/uploads/2020/05/GYA-WiS-Paper-May2020.pdf>
- This open-access booklet was introduced at the S20 Women in Science webinar (G20

Science Summit) in September 2020: <https://globalyoungacademy.net/gya-members-help-shape-the-g20-science-20-summit/>

⁵⁸ The Science Diplomacy in South Asia workshop had participants from 7/8 South Asian countries. Remarkably, not only in this event but in the organizing working group India and Pakistan are represented, stressing the need and willingness of science in/for diplomacy between countries with recent and current political tensions.

<https://globalyoungacademy.net/call-science-diplomacy-for-asia-workshop/>