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Effective Self-Management for Early Career Researchers in the Natural and Life Sciences

Natalia Z. Bielczyk,[1,2,*] Ayaka Ando,[3,45] AmanPreet Badhwar,[4,5,45] Chiara Caldinelli,[6,45] Mengxia Gao,[7,45] Amelie Haugg,[8,9,45] Leanna M. Hernandez,[10,45] Kaori L. Ito,[11,45] Dan Kessler,[12,45] Dan Lurie,[13,45] Meena M. Makary,[14,15,16,45] Aki Nikolaidis,[17,45] Michele Veldsman,[18,19,45] Christopher Allen,[20] Adriana Bankston,[21] Katherine L. Bottenhorn,[22] Ricarda Braukmann,[23] Vince Calhoun,[24] Veronika Cheplygina,[25] Catarina Costa Boffino,[26] Ece Ercan,[27] Karolina Finc,[28] Heidi Foo,[29] Ali Khatibi,[30] Christian La,[31] David M.A. Mehler,[32] Sridar Narayanan,[33]

(Author list continued on next page)

[1]Stichting Solaris Onderzoek en Ontwikkeling, Veldstraat 48, 6533 CD Nijmegen, the Netherlands
[2]Welcome Solutions, Veldstraat 48, 6533 CD Nijmegen, the Netherlands
[3]Department of Child and Adolescent Psychiatry, Centre for Psychosocial Medicine, University of Heidelberg, Blumenstrasse 8, 69115 Heidelberg, Germany
[4]Centre de Recherche de l'Institut Universitaire de Gériatrie de Montréal (CRIUGM), 4545 Queen Mary Rd, Quebec H3W 1W6, Canada
[5]Université de Montréal, 2900 Edouard Montpetit Blvd, Montreal, Quebec H3T 1J4, Canada
[6]Trinity College Institute of Neuroscience, Trinity College Dublin, Dublin 2, Ireland
[7]The State Key Laboratory of Brain and Cognitive Sciences, The University of Hong Kong, The Hong Kong Jockey Club Building for Interdisciplinary Research, 5 Sassoon Road, Hong Kong
[8]Department of Psychiatry, Psychotherapy and Psychosomatics, University of Zurich, Lenggstrasse 31, 8032 Zurich, Switzerland
[9]Zurich Neuroscience Center, University of Zurich and Swiss Federal Institute of Technology Zurich, Winterthurerstrasse 190, 8057 Zurich, Switzerland
[10]Department of Psychiatry and Biobehavioral Sciences, University of California, Los Angeles, 660 Charles E. Young Drive South, Los Angeles, CA 90095, USA
[11]Neural Plasticity and Neurorehabilitation Laboratory, University of Southern California, 2250 Alcazar Street, CSC 133, Los Angeles, CA 90089, USA
[12]Departments of Statistics and Psychiatry, University of Michigan, Ann Arbor, MI 48109, USA
[13]Department of Psychology, University of California, Berkeley, Berkeley, CA 94702, USA
[14]Systems and Biomedical Engineering Department, Faculty of Engineering, Cairo University, Giza 12613, Egypt
[15]Athinoula A. Martinos Center for Biomedical Imaging, Department of Radiology, Massachusetts General Hospital, Harvard Medical School, Charlestown, MA 02129, USA
[16]Department of Psychiatry, Yale University School of Medicine, 300 George St, New Haven, CT 06519, USA
[17]Center for the Developing Brain, Child Mind Institute, 101 E 56th St, New York, NY 10022, USA
[18]Department of Experimental Psychology, University of Oxford, Woodstock Rd, Oxford OX2 6GG, UK
[19]The Florey Institute of Neuroscience and Mental Health, University of Melbourne, 30 Royal Parade, Parkville VIC 3052, Melbourne, Australia

(Affiliations continued on next page)

Early career researchers (ECRs) are faced with a range of competing pressures in academia, making self-management key to building a successful career. The Organization for Human Brain Mapping undertook a group effort to gather helpful advice for ECRs in self-management.

Introduction

Many PhD candidates dream of a research career. This constitutes a rewarding journey in the pursuit of new knowledge, often with meaningful contributions to society. It also represents a largely self-directed career with a high workload but also with great flexibility in time management, similar to owning a business.

However, finding success in today's scientific environment places competing demands on early career researchers (ECRs). We define ECRs as individuals pursuing academic research at the sub-tenure level, regardless of years of experience. At a time when reproducibility is of great concern in science, expectations for research skills in ECRs grow even higher (Poldrack, 2019): they are asked

to avoid performing underpowered studies, to replicate their studies, and to maintain high standards of methodological rigor (Poldrack, 2019). Although these developments improve the reliability of scientific findings, they might also negatively affect career-advancing metrics particularly important for ECRs, such as publication count and journal impact factor (a.k.a. prestige; Allen and Mehler,

Russell A. Poldrack,[34] Pradeep Reddy Raamana,[35] Taylor Salo,[22] Claire Godard-Sebillotte,[36] Lucina Q. Uddin,[37] Davide Valeriani,[38] Sofie L. Valk,[39,40] Courtney C. Walton,[41] Phillip G.D. Ward,[42] Julio A. Yanes,[43] and Xinqi Zhou,[44] and OHBM Student and Postdoc Special Interest Group

[20]Cardiff University Brain Research Imaging Centre, School of Psychology, Maindy Road, CUBRIC, Cardiff CF24 4HQ, UK

[21]Future of Research, 82 Wendell Avenue, STE 100, Pittsfield, MA 01201, USA

[22]Department of Psychology, Florida International University, 8th Street, DM 256 Miami, FL 33199, USA

[23]Utrecht, the Netherlands

[24]Tri-institutional Center for Translational Research in Neuroimaging and Data Science (TReNDS), Georgia State University, Georgia Institute of Technology, Emory University, 55 Park Pl, 18th Floor, Atlanta, GA 30303, USA

[25]Department of Biomedical Engineering, Eindhoven University of Technology, Postbus 513, 5600 MB Eindhoven, the Netherlands

[26]Institute of Psychiatry & Department of Radiology, Hospital das Clinicas da Faculdade de Medicina da Universidade de São Paulo, Rua Dr. Ovídio Pires de Campos, 785 – Cerqueira César – CEP: 01060-970 São Paulo, Brazil

[27]C.J. Gorter Center for High Field MRI, Department of Radiology, Leiden University Medical Center, C3Q, PO Box 9600, 2300 RC Leiden, the Netherlands

[28]Centre for Modern Interdisciplinary Technologies, Nicolaus Copernicus University in Toruń, Wileńska 4, 87-100 Toruń, Poland

[29]Department of Psychiatry, University of New South Wales, Centre for Healthy Brain Ageing (CHeBA) School of Psychiatry Level 1, AGSM (G27) Gate 11, Botany Street UNSW NSW 2052, Sydney, Australia

[30]School of Sport, Exercise and Rehabilitation Sciences, College of Life and Environmental Sciences, Centre of Precision Rehabilitation for Spinal Pain (CPR Spine), University of Birmingham, Edgbaston, Birmingham B15 2TT, UK

[31]Department of Neurology and Neurological Sciences, Stanford University, 780 Welch Road, Palo Alto, CA 94304, USA

[32]Department of Psychiatry and Psychotherapy, University of Münster, Albert-Schweitzer-Campus 1, Gebäude A9, 48149 Münster, Germany

[33]Montreal Neurological Institute, McGill University, 3801 University Street, Montreal H3A 2B4, Canada

[34]Department of Psychology, Stanford University, Jordan Hall, Building 420, Stanford, CA 94305, USA

[35]Rotman Research Institute, Baycrest Health Sciences, 3560 Bathurst St., Toronto, ON, Canada

[36]Department of Family Medicine, McGill University, 5858, Chemin de la Côte-des-Neiges, Montreal, Quebec H3S 1Z1, Canada

[37]Department of Psychology, University of Miami, Coral Gables, FL, USA

[38]Department of Otolaryngology, Head & Neck Surgery, Massachusetts Eye and Ear, Harvard Medical School, 243 Charles St, Boston, MA 02114, USA

[39]Brain and Behaviour (INM-7), Wilhelm-Johnen Strasse, 52425 Juelich, Germany

[40]Otto Hahn group Cognitive Neurogenetics, Max Planck Institute for Human Cognitive and Brain Science, Juelich, Germany

[41]School of Psychology, University of Queensland, Sir Fred Schonell Dr, St Lucia QLD 4072, Brisbane, Australia

[42]The Turner Institute for Brain and Mental Health, School of Psychological Sciences, Monash University, 770 Blackburn Rd, Monash University, 3800, Melbourne, Australia

[43]Department of Psychology, Auburn University, 226 Thach Hall, Auburn, AL 36849, USA

[44]School of Life Science and Technology, University of Electronic Science and Technology of China, No. 2006, Xiyuan Ave, West Hi-Tech Zone, Chengdu, Sichuan, P.R. China

[45]These authors contributed equally

*Correspondence: natalia.bielczyk@gmail.com

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2019). Trying to self-navigate under such pressure can be overwhelming, especially given extenuating circumstances that appear during a research career.

This article was created by the Organization for Human Brain Mapping (OHBM) Student and Postdoc Special Interest Group (SP-SIG) and collaborators at different career stages, from Masters students to full professors. Through our own experiences, we found that self-navigating in academia to be particularly daunting and counterintuitive. Access to career guidance varies greatly from institution to institution and even lab to lab; thus, we have compiled information that we find is both useful for self-navigating in academia and broadly applicable. Although our recommendations are largely drawn from personal experience, relevant research studies are cited where

possible. A summary of the introduced tools and strategies is given in Supplemental Information.

Take Charge of Your Own Career Development
Follow Your Curiosity and Build Expertise
Curiosity is the primary driver of scientific discovery. However, passion for research might only come with experience built over time; many successful scientists fall in love with what they do only after achieving some level of expertise in the field.

Develop Clear Long-Term Goals
Citing Jim Rohn, "If you don't design your own life plan, chances are you'll fall into someone else's plan." Developing a clear vision and planning small steps toward the ultimate goals is necessary to steer

your career. This will also help view small failures and setbacks as lessons and growth opportunities. Usually, only the clearly defined, measurable, and time-bound goals are achieved (Raia, 1965; Figure 1Ai). Moreover, following Yerkes-Dodson law (Figure 1Aii), putting too much pressure on goals can lead to elevated stress, which can result in a cascade of errors, procrastination, and suboptimal performance.

Manage Your Time
Long-term goals can also help you say "no" by choosing tasks that provide delayed gratification over instant but insignificant rewards. Saying "no" is difficult but necessary. Most researchers fall into the trap of temporal discounting, where future time commitments matter less at the time of agreement. One strategy to overcome this issue is to imagine that
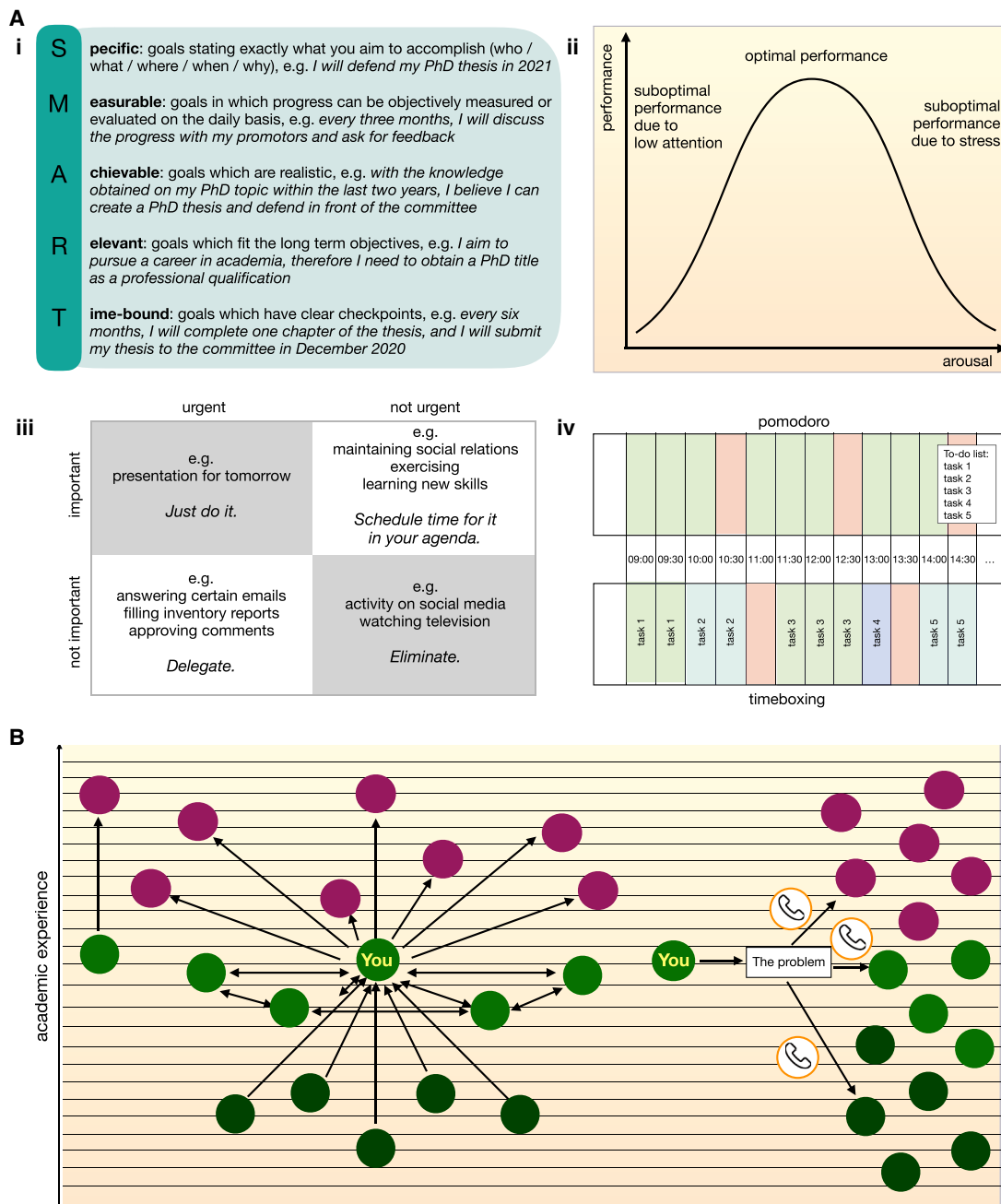
Figure 1. Principles of Effective Goal Setting and Time Management and Modern Models of Mentoring
(A) Principles of effective goal setting and time management. (i) The S.M.A.R.T. approach for setting goals (Raia, 1965) with examples. (ii) The Yerkes-Dodson law. There is an optimal level of arousal above which performance decreases due to high stress level. (iii) The Eisenhower chart. The key to long term success is to manage important, but not urgent, tasks. (iv) The "pomodoro" technique and "timeboxing" for planning work time. In the pomodoro technique, tasks are kept in lists and working time is pre-divided into periods of deep work (green) interleaved with breaks (red). In the timeboxing, every task is assigned with a precise time slot.
(B) Models of mentoring. Left: the traditional, hierarchical view. Middle: modern, multilayered model. The mentee becomes the center of their own mentoring network, with multiple mentors at different career stages (magenta), other ECRs at a similar career stage (peer coaching, light green), and more junior mentees (dark green). Right: "lifeline" (or "advisory board") model: a network of mentors at different career stages serving as an advisory board.

the task is due tomorrow—would you still say "yes" on such a tight deadline?

According to Dwight D. Eisenhower, activities can be divided along two dimen-sions: important/not important and ur-gent/not urgent (Figure 1Aiii). Although important/urgent tasks are prioritized, proper management of important/non-ur-gent tasks (related to your long-term pro-fessional development, health, building bonds, etc.) are the real key to success. Furthermore, following Parkinson's law,

the more time you allocate to a given task, the more time the task will take. Practice delegating tasks that you do not need to do by yourself and consider implementing productivity strategies, such as the "pomodoro" (free applications available, e.g., Time Out and Stretchly) or the "timeboxing" technique (Figure 1Aiv).

Take Care of Yourself
Exercise
Exercising 2 to 3 times a week reduces the chances of depression, anger, stress, and anxiety disorders. For example, walk or bike between home and work or perform simple yoga stretches during the day. Group exercise sessions are also effective in controlling stress and improving mood.

Discover Your Optimal Work Style
When are you the most productive or most creative during the day? What is your preferred sleep schedule? What type of diet makes you feel the most energized? What makes you procrastinate? Knowing your optimal work style can help you achieve work-life balance.

Seek Help
If your mood stays low for a prolonged period, you might benefit from therapy or counselling. Although seeking professional help was often stigmatized in the past, it is increasingly being appreciated. Treat your mind as you would your body: take good care of your mental health and go in for professional check-ups. Typically, academic institutions offer mental health services to their employees. Additionally, there are associations dedicated to this cause, e.g., Academic Mental Health Collective.

Join Communities
Research suggests that among doctoral students and academics aged 18 to 34, isolation was the biggest contributor to reported mental health problems (Shaw, 2014). There are highly inclusive online associations open to ECRs that focus on career and personal development, such as the community of eLife Ambassadors.

Discern Criticism
Although (self-)criticism is a part of the daily research routine, it is helpful to distinguish a critique of your work from criticism of you. Constructive criticism provides an opportunity for improvement. If criticism is destructive or personal, it is best not to react immediately but instead to take a step back and understand the true motives underlying the criticism.

Clarify Your Rights on Work-Family Balance
Either now or in the future, you will likely have caretaking responsibilities (children, partners, family members, etc.). In that case, ask a mentor or colleague you trust for support. Find out about your rights to statutory leave. Additionally, most employers have policies to grant additional leave and/or benefits above what is legally mandated: courses on work-family balance, a contract extension for caretakers, childcare support, and support groups for parents in research. You should also look for grants and fellowships that provide support for the continuation of your research during leave or upon return after a career break (check: "Scientist and parent" series at *eLife*).

Make sure that you and your Principal Investigator (PI) have similar expectations about work-life balance (e.g., consider options such as part-time employment) and have up-front discussions about your availability (or lack thereof) outside your normal work schedule.

Write a CV of Failures
Success rates for publishing in high impact journals and obtaining grants can be 10% or lower, making academia very competitive. It is easy to get a false impression of chronic underachievement in such conditions.

In 2010, Dr. Melanie Stefan proposed writing a "CV of failures," where only rejections and failures are documented (Stefan, 2010). Reading CVs of failures written by established researchers can be helpful, as it demonstrates that failure is an integral part of science and should not be taken personally (Cheplygina, 2018). Documenting rejections can also be beneficial as an index of productivity and source of self-motivation: once you create a CV of failures, every action will add to either your official CV or the "shadow CV."

Plan Out Your Projects
You might find that your research project has bottlenecks that can delay its completion. You can increase the chances of successful completion by careful planning and teamwork. Online scheduling tools, such as Slack or Trello, can help keep the team on track. If bottlenecks appear, you should ask yourself: "Can we decompose this problem into smaller and manageable chunks? Who is a useful contact to address each of these subproblems?" Communicate the bottlenecks clearly to your superiors as soon as they arrive. Be your own advocate—if you don't ask for what you need, no one will know you need it.

Furthermore, consider developing side projects if your main project is burdened with bottlenecks outside your control. Think about your research activities as an investment portfolio: it should be diversified enough that the failure of one project will not tank your entire career. When you present your idea for risk diversification to your supervisors, treat it like a business pitch: professional, worthwhile, and well thought out. Refer to Supplemental Information for comprehensive advice on minimizing risk in research projects.

Grow Your Network
Become the "Go-To" Person
Develop a core competence that will allow you to stand out in your research community and develop a personal brand around it. Your niche can be anything: from proficiency in using a particular experimental tool to talent in community management. You can promote your skill by offering to help (e.g., through Twitter). Good news spreads fast; your colleagues will remember your willingness to help and spread the word whenever they hear about someone searching for this particular expertise.

Join Twitter
Twitter allows you to disseminate your work, get first-hand information (e.g., open calls for travel grants), have a voice in your community, and ask for opinions (Cheplygina et al., 2020). It is also common for online collaborative projects to begin on Twitter, engaging you in interesting side projects (Tennant et al., 2019). Funding opportunities can also be found on Twitter (e.g., @nihfunding, @nihgrants, @nsf, @ibrosecretariat). However, Twitter should be used responsibly, as it can become time-consuming and addictive.

Build Online Visibility
Aim to gradually increase your visibility online. Keep your LinkedIn and Google Scholar profiles updated and linked to all your online outlets. You can also set up a

personal website—even if you do not have an established research portfolio yet, you can post a blog or updates on your career activities (e.g., CV and/or failure CV). You can also search for yourself on Google and review the search results. If you see records you don't want to be associated with, you can contact Google support to remove this information from search results or contact the administrators of the website that features unwanted content.

Post Preprints

Consider posting preprints of your article and encouraging the research community to comment before submission to peer-reviewed journals. Articles preceded by a preprint are usually better cited than original submissions (Serghiou and Ioannidis, 2018), and the amount of online attention highly correlates with the impact factor of the eventual accepted journal. There are also certain downsides to preprints, e.g., not gaining enough online attention might discourage high-impact journal publication. However, posting preprints promotes your commitment to open science, which will be rewarded in the long run.

Give More Presentations

It might be difficult and daunting to talk at a major conference at the beginning of your research career. Start by giving seminars at your own research institute and student conferences. You can also propose to be a guest online speaker in lab meetings to a junior professor you met at a conference. More talks bring more invitations, and practice makes perfect.

Join Hackathons

Hackathons are themed sprint-like events where participants conduct group research projects over a period of a few hours to a few days. Hackathons will allow you to develop: (1) leadership skills, by converting and delegating parts of your project into Hackathon projects or proposing small standalone projects; (2) research and networking skills, by joining other projects and building collaborations; and (3) writing skills, by authoring project proposals and brief proceedings publications. You may find a list of exemplary science-themed Hackathons in Supplemental Information.

Share Your Ideas with Others

Blogs are a great tool to share your ideas and opinions. To start, you can consider writing guest posts for established blogs in your field. For example, the OHBM Student and Postdoc SIG leads a blog dedicated to ECRs and is always open to featuring materials proposed by their readers.

You might also volunteer to review other researchers' manuscripts and grants. For example, you can join ECR-dedicated grant reviewing programs, e.g., Early Career Reviewer Programme at NIH.

Supporting Open Science by sharing your work as an open-source resource can also strengthen your research and networking skills. GitHub is a good place to start as it hosts code for many open-source tools and facilitates not only collaborations but also interactions with code developers. Sharing research tools and promoting them on Q&A, sites such as NeuroStars, can also increase networking opportunities and improve your work, as others might find issues or potential enhancements that were previously overlooked.

Mentoring Is Key

A common misunderstanding is that mentorship is just another aspect of day-to-day interactions with your supervisor (Figure 1B, left). Creating a *network* of mentors can be more beneficial for providing diverse advice in different situations (Figure 1B, middle). A "lifeline" model of mentoring (Figure 1B, right), where you develop a mentoring environment of multiple helpful researchers whom you can call as a lifeline, is also recommended.

There are online resources that can assist mentees and mentors in making the mentoring process run smoothly. For example, the Early Faculty Online Training program at Stanford University offers information for mentees and mentors to develop a mentorship skill-set useful for researchers at many career stages. There is also an open initiative to increase the diversity in the biomedical research workforce from the National Research Mentoring Network (NRMN).

Join or Create a Peer Coaching Program

Peer mentoring is a particular form of mentorship, in which mentors and mentees at similar career stages cooperate in pairs. In this scheme, mentors and mentees usually self-manage their relationship.

A recently popularized form of peer mentoring is a coaching group, which consists of researchers at similar career stages who support each other during a series of in-person meetings and are typically assisted by a trained facilitator. Peer coaching groups efficiently complement traditional mentoring. If there is no peer coaching group available at your institute, consider creating one with your fellow ECRs.

An alternative option is joining an online mentoring program. In such a program, mentees are paired with mentors who might be geographically distant. For example, the OHBM offers an International Online Mentoring Program (Bielczyk et al., 2019) in which mentors are coupled with mentees on the basis of years of experience in active research and mutual expectations. Other examples include programs from the Institute of Electrical and Electronics Engineers, where mentees can apply for a particular mentor or 1000 Girls, 1000 Futures dedicated to women in Science, Technology, Engineering, and Mathematics (STEM), which offers two hours of mentoring per month for a period of one year.

Conclusion

Although many of the authors of this manuscript work in neuroscience and psychology, we believe that the points discussed here apply for a broader ECR community. Although the demands of academia seem to be ever increasing, self-management of your career can increase your confidence and sense of control. There are also career options beyond academia, which might suit you better. In Supplemental Information, we give additional advice to researchers considering a career switch to industry, and we list exemplary professions in which academic experience is an asset. For more information about post-PhD career tracks, you can reach out to the Corresponding Author, Dr. Bielczyk (Bielczyk, 2019).

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