Ten simple rules for a successful remote postdoc

Postdoctoral positions are temporary full-time positions typically taken between completion of a PhD and the start of a permanent position. Postdocs are expected to move for short-term positions which can often be problematic for early-career researchers, especially those from under-represented groups in STEM. However, the proliferation of computational research has changed how scientists can conduct science, opening the door to postdoctoral work being conducted remotely. Research activities primarily involving quantitative analysis, modeling, writing, and data collection can take place anywhere and therefore can all be conducted on a remote or semi-remote basis. We offer 10 simple rules for overcoming challenges and leveraging the unique opportunities presented by remote postdoc positions, derived from our experiences as either remote postdocs or the PIs who have mentored them. We believe that not only will these suggestions increase the desirability of remote postdoc positions whenever they are feasible, but that they also contain good practices for facilitating better communication both within labs more generally and in other long-distance collaborations.

1   Ten simple rules for a successful remote postdoc

2   Kevin R. Burgio[1,2,¶,*], Caitlin McDonough MacKenzie[3,4¶], Stephanie B. Borrelle[4,5&], S.K. Morgan
3   Ernest[6,7,8&], Jacquelyn L. Gill[3,9&], Kurt E. Ingeman[4,10&], Amy Teffer[4,11&], and Ethan P.
4   White[6,7,8&]
5
6   [1] Education Department, Cary Institute for Ecosystem Studies, Millbrook, New York, United
7   States of America
8
9   [2] Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs,
10   Connecticut, United States of America
11
12   [3] Climate Change Institute, University of Maine, Orono, Maine, United States of America
13
14   [4] David H. Smith Conservation Research Program, Society for Conservation Biology, Washington,
15   DC, United States of America
16
17   [5] Department of Ecology and Evolutionary Biology, University of Toronto, St. George, Ontario,
18   Canada
19
20   [6] Department of Wildlife Ecology and Conservation, University of Florida, Gainesville, Florida,
21   United States of America
22
23   [7] Informatics Institute, University of Florida, Gainesville, Florida, United States of America
24
25   [8] Biodiversity Institute, University of Florida, Gainesville, Florida, United States of America
26
27   [9] School of Biology and Ecology, University of Maine, Orono, Maine, United States of America
28
29   [10] Department of Ecology, Evolution, and Marine Biology, University of California Santa
30   Barbara, Santa Barbara, California, United States of America
31
32   [11] Department of Forest and Conservation Sciences, University of British Columbia, Vancouver,
33   British Columbia, Canada
34
35   * Corresponding author
36   Email: kevin.burgio@gmail.com
37   ¶ These authors contributed equally to this work
38   & These authors contributed equally to this work
39

40   **Introduction**

41

42   Postdoctoral positions are temporary full-time research positions typically taken between

43   completion of a PhD and the start of a permanent position. This period is a key career stage for

44   early-career scientists during which postdoctoral researchers (postdocs) provide critical support

45   to research for many labs. These positions almost universally require postdocs to be physically

46   located in the lab where they are employed. Requiring postdocs to be present where lab resources

47   and personnel are located is logical when research primarily requires specific place-based

48   resources (i.e., field or lab work), or when real-time communication between remote

49   collaborators is difficult. The current expectation that postdocs move for short-term positions

50   (typically 1-3 years) poses a substantial burden for early-career researchers, in particular for

51   under-represented groups in STEM like first-generation PhDs and women.

52   Short-term moves cost time and money, with long-distance moves often costing the

53   equivalent of several months' salary for a postdoc. Relocations also separate people from their

54   support networks, and can force researchers with families to choose between living separately for

55   an extended period or sacrificing career opportunities for partners and support opportunities for

56   children. These burdens are often magnified for researchers from under-represented groups [1];

57   for example, first-generation students are less likely to have access to financial resources for

58   moving and counteracting the loss of their support network. Married women in faculty positions

59   are more likely to have a spouse who works full time than married men in equivalent positions

60   and face increased challenges (both real and assumed) in moving for short-term positions [2-3].

61   Thus, the burden of relocating for short-term postdocs further compounds existing biases that

62   members of these groups face when applying for postdoc positions [4] and contributes to the loss

63   of under-represented scientists from academia [1].

64   The proliferation of computational research has changed how scientists can conduct

65   science, opening the door to postdoctoral work being conducted remotely [5]. Research activities

66   primarily involving quantitative analysis, modeling, writing, and even some data collection can

67   take place anywhere and therefore can all be conducted on a remote or semi-remote basis. In

68   addition, advances in technology, such as video conferencing and other collaboration platforms,

69   mean that the differences between remote work and in-person interactions are rapidly decreasing.

70   However, traditional mindsets of both postdocs and principal investigators (PIs), as well as

71   perceived or existing logistical constraints, can present barriers to making remote postdocs more

72   mainstream.

73   Remote postdoc positions are not without their challenges, despite the increasing ease

74   and benefits of working remotely. One important role of a postdoc may be to help mentor

75   graduate and undergraduate students within a research lab, which is an important professional

76   development opportunity. New faculty may prefer a postdoc that can help them set up a lab

77   space by assisting with ordering equipment and developing research protocols. It may seem

78   challenging for a PI to gauge the progress of a postdoc who isn't in the same building; indeed,

79   some mentoring styles may be better suited to regular face-to-face interactions. While remote

80   postdocs may lack the potential for the organic exchange of ideas after seminars, chance

81   encounters in the hallway, and collegial coffee breaks that can build a community of

82   collaborators beyond a PI's lab. Yet with intentional planning and foresight, many of these

83   obstacles can be overcome.

84   Here, we offer 10 simple rules for overcoming challenges and leveraging the unique

85   opportunities presented by remote postdoc positions (Fig 1). We derived these guidelines from

86   our experiences as either remote postdocs or the PIs who have mentored them. For rules where

87   different advice is appropriate for PIs and postdocs, we have divided the rule into sections for

88   each group. We believe that not only will these suggestions increase the desirability of remote

89   postdoc positions whenever they are feasible, but that they also contain good practices for

90   facilitating better communication both within labs more generally and in other long-distance

91   collaborations.

92

93   **<u>Rule 1: Recognize the benefits of remote postdocs.</u>**

94   *PIs*

95   Opening postdoc positions to include remote work naturally expands the applicant pool,

96   attracting more applicants with diverse skills and interests, and increasing the chances of finding

97   the perfect person for the position. Incorporating remote lab members provides the opportunity

98   for the whole lab to engage in and improve their remote collaboration skills, which are essential

99   for collaborations with researchers from other institutions and non-academic partners.

100   Experience working with researchers outside of one's home network may lead to more

101   demographically diverse collaborations—helping to eliminate barriers to diversity and inclusion

102   in the scientific community. Finally, remote postdocs often bring an outside perspective to a lab

103   through their associations with research and researchers occurring in other locations. This

104   outside perspective allows the remote postdoc to serve as a conduit of ideas between

105   geographically isolated institutions, which may foster new collaborations or add value to existing

106   projects with analytical approaches or tools that may not be available at the home institution.

107   *Postdocs*

108   From the postdoc perspective, recognizing the advantages of a remote position can aid in making

109   a case to a skeptical PI and, more importantly, allows the postdoc to make the most of working

110   remotely. Working remotely fosters the development of independent skills required for success

111   in both academic and non-academic careers (e.g., organization, time management, balancing

112   multiple projects, advocacy, networking). Postdocs interested in working outside academia can

113   further leverage the built-in flexibility of remote positions to foster collaborations with local

114   NGOs, agencies, and private sector entities.

115   The ability to schedule activities according to your preferred working style can pay

116   dividends for postdoc productivity and quality of work. Remote postdocs have a unique

117   opportunity to schedule hours (or even days) to unplug from email and messaging to focus on

118   writing, coding, and other tasks that require deep concentration and creativity [6]. While it can

119   prove challenging and uncomfortable for an on-site researcher to go "off the grid" for an

120   extended period, remote postdocs can readily build such blocks into an efficient work schedule.

121

122   **Rule 2: Prepare for success.**

123   *PIs*

124   If you're considering hiring a remote postdoc, open and transparent communication throughout

125   the process is key to a successful experience. You can explicitly mention that you will consider

126   remote candidates in the job advertisement. During interviews, you should lead the discussion of

127   the terms of remote work and provide their expectations for the candidate's time on campus.

128   Expectations (e.g., communication norms, requirements for fieldwork or mentoring), and

129   limitations (e.g., availability of travel funds) should be communicated early on the process. If

130   you and a potential postdoc are writing a proposal together (e.g., grant or fellowship), devote

131   some time to talking openly about the costs and benefits of remote postdoc work and budget in

132   travel and housing costs if possible.

133   Just as you would with an on-site postdoc, it's important to come up with a clear set of

134   guidelines for regular check-ins and team meetings. These early investments in communication

135   and mentorship will also ultimately improve relationships across an entire lab group by centering

136   transparency and structured collaborations.

137   ***Postdocs***

138   Postdocs looking for remote postdoctoral positions should be proactive in approaching potential

139   PIs and negotiating the terms of their remote work. Reach out to potential PIs; even if they do

140   not have an explicitly remote postdoc position advertised, they may be open to the idea for a

141   current project or potential proposal. In either case, knowing the benefits of remote postdocs (see

142   Rule 1) and preparing a body of evidence of your independent work will improve your chances

143   of convincing a PI that you will be a successful remote postdoc. Self-directed fieldwork, a record

144   of original research proposals, managing undergraduate assistants, and previous project

145   management experience all offer evidence of the ability to work independently.

146   Also, remote postdocs should set expectations around on-campus and off-campus time

147   during the hiring process/negotiations. How often will you visit? Will you share the costs of

148   visits to campus? Are there temporary housing options that you can access? If you do not set

149   these terms early, the coordination and costs will default to you (the postdoc) and may limit your

150   ability to visit campus as often as you might like.

151   Lastly, be realistic about and discuss the challenges of working remotely. Unless a PI has

152   successfully mentored a remote postdoc previously, they will likely have negative perceptions or,

153   at minimum, concerns about the process. Explicitly address how you will overcome the inherent

154   obstacles to communicating, being a remote citizen of the lab, mentoring graduate students, and

155   learning new skills.

156

157   **Rule 3: Establish a communication plan**

158   *PIs*

159   The importance of communicating does not end with the hiring of a remote postdoc (Rule 2); it

160   continues for the duration of the postdoc position. Setting expectations and norms for

161   communication is a vital facet of all mentor-mentee relationships, but it is especially important

162   for you to establish these with remote postdocs early in the onboarding process. Remote

163   relationships need explicit and up-front terms. Do mentors and mentees prefer email, direct

164   messaging, phone calls, or video calls, and under what circumstances? Emails might be better for

165   working out complex ideas, giving participants time to reflect and compose their thoughts, as

166   well as providing a written archive of decisions. Alternately, video calls facilitate brainstorming,

167   quick updates, and data sharing, while allowing participants to receive and respond to visual

168   cues. Other applications and software may be more appropriate for both local and remote

169   students and postdocs (e.g. Slack). As with in-person meetings, it's important to establish and

170   follow an agenda on voice and video calls to allow all parties to plan accordingly and keep

171   conversations from getting sidelined. Plans, preferences, and schedules may change throughout a

172   postdoctoral position, so it's also important to revisit your initial plan at set intervals, perhaps as

173   part of a semi-annual review. Some flexibility in approaches and a willingness to compromise,

174   try new things, or go outside of your comfort zone can help maintain strong communication with

175   your postdoc.

176   *Postdocs*

177   Actively engage with your PI to create a communication plan that works for both of you,

178   schedule regular meetings (frequent or otherwise), and adhere to them (see Fig 2 for real-world

179   example). The effort to cultivate a mentoring relationship remotely will likely help you to

180   understand better and improve your own communication and help you reflect on what kind of

181   feedback and direction is most useful to you. As you would with any new adviser, it is critical to

182   discuss mentoring styles; if the frequent direction from a hands-on adviser does not suit you,

183   being remote will not eliminate the conflict in approaches. When creating a communication plan,

184   carefully consider the differences among remote communication tools. While messaging

185   platforms offer an efficient and streamlined mode for sharing information, terse messages do not

186   carry the non-verbal information of a video chat and can be easily misconstrued. Check in often

187   to make sure your communication set-up continues to work for both parties, and adjust

188   accordingly.

189   Postdocs should also plan out how to communicate with other members of their lab.

190   Email lists can help to keep a remote postdoc in the loop but also increase the volume of

191   irrelevant information (i.e., about local events). It is especially critical to consider team

192   communication when leading a project remotely, where emails from team members can quickly

193   become overwhelming. Collaboration software (e.g., Slack) can allow for project- and task-

194   specific channels offer efficiency in organizing and filtering information, and may be a better

195   choice for remote projects.

196

197   **Rule 4: Invest in and use video conferencing.**

198   *PIs*

199   Video conferencing is an increasingly effective way to replace in-person meetings, and there are

200   dozens of available platforms, including free and subscription-based tools, many supported by

201   your university. Being able to see rather than only hear those you are interacting with allows for

202   more subtle communication, to read body language, and improves the establishment of rapport.

203   Video conferencing can be used to replace some in-person (one-on-one) meetings, and video

204   attendance should be supported for all group, lab, and project meetings (see Fig 2 for real-world

205   example). Lab processes should be developed to provide full value to video participants like

206   remote postdocs. For example, when local participants present slides during meetings, they

207   should share their slides by screen sharing through the video conferencing software rather than

208   pointing a camera at the screen. Shared screens or presentation views can allow your lab to

209   conduct practice talks, trouble-shooting code in real-time, share data, or live-collaborate on

210   papers.

211   While good video conferencing can be a great way to interact, bad video conferencing

212   can be frustrating due to poor sound, poor video, and other technological issues. Therefore, it is

213   important for both you and the postdoc to have access to good video conferencing setups, so

214   check that your remote postdoc is well-equipped. Invest in a video conferencing system for your

215   lab (good systems are surprisingly affordable) or find and schedule rooms at your university that

216   are equipped for remote participation. Become familiar with university resources for

217   teleconferencing, including license agreements for video conference software packages (you

218   might have free access as an employee and not know it). Wired internet access is often more

219   stable than a wireless connection, particularly in remote locations.

220

221   ***Postdocs***

222   As the remote postdoc, you should have a good camera and microphone and private

223   space from which to participate in remote meetings. Work with your PI to determine how these

224   up-front but crucial costs could be shared. If you are occupying lab or desk space at a local

225   university, ask your host if you can gain access to video conference software packages or video

226   conferencing rooms. Just as important as good hardware is using video conferencing software

227   that makes connecting easy and provides good smooth connections. Familiarize yourself with the

228   ins and outs of teleconferencing software, as it is your responsibility as well as the PIs to

229   troubleshoot any issues; taking the lead when technology inevitably fails will demonstrate

230   competence and courtesy.

231

232   **Rule 5: Normalize remote interactions & cultivate digital spaces for the entire lab.**

233   *PIs and Postdocs*

234   Digital collaboration on writing, coding, and discussion is increasingly central to productive

235   collaborations. While these approaches are essential to remote collaboration, they are also

236   incredibly useful for local collaboration. Even within the same institution, people may have

237   different work schedules, things that prevent them from coming into the lab, or frequent travel

238   requirements that limit in-person interactions. Digital spaces allow lab members to interact

239   seamlessly regardless of whether they are remote or local. For example, this manuscript was

240   written entirely through a remote collaboration using email, Slack, and Google Drive.

241   Integrating digital spaces into the everyday lab practices also reduces the differences

242   between local and remote members and lowers the barriers for interaction. Because digital

243   collaboration tools like Google Docs (for manuscript writing), Git/Github (for code writing and

244   project management), and Slack (for intra-group conversations about lab activities) store

245   activities and conversations as they happen, they allow people to see issues that others are

246   struggling with, learn from conversations that happened earlier, and engage and make them a

247   core part of your lab environment.

248   It is vital that remote interactions are normalized throughout the lab, not just for the

249   remote postdoc. Electronic lab or research notebooks, wikis, project management software, and

250   cloud storage also improve institutional memory, create an archive of activities, help with project

251   management, and ensure long-term, secure data storage, and thus provide many advantages even

252   in addition to supporting remote work. Remote participation in meetings can be useful for local

253   participants as well, allowing for work to continue when traveling, working from home, feeling

254   ill, transportation issues, childcare constraints, etc. (see Fig 2 for real-world example). You can

255   support this culture by normalizing remote meeting attendance for the lab in general, which

256   fosters an environment of inclusion and support and makes the remote postdoc seem like less of

257   an outlier.

258

259   **Rule 6: Treat remote postdocs like full members of the lab.**

260   *PIs*

261   While there may be constraints or differences in your mentoring approach with a remote postdoc,

262   don't think of them as separate from the rest of the lab. Treat them the same way you would an

263   on-site postdoc, with individualized mentoring plans, regular communication, and involvement

264   in lab activities. Some things may be different, but for the most part, you can replace in-person

265   activities with digital interactions and video conferencing. Remember to include your remote

266   postdoc when you share opportunities, celebrate accomplishments, and plan lab activities, just as

267   you would with your local lab participants. Get used to thinking of them as part of the lab,

268   because they are! In so doing, you will model good collaborative behavior for the other members

269   of your lab, and normalize remote interactions that will be increasingly prevalent as students and

270   trainees progress in their careers.

271   ***Postdocs***

272   In the absence of opportunistic interactions, it's important to be an active member of your lab

273   and work to develop remote mentorship opportunities. Think of your roles and responsibilities in

274   the way as if you were local. Read manuscripts, chapter drafts, or code for your labmates (see

275   Fig 2 for real-world example). There are many ways to be a mentor, and you do not need in-

276   person interactions with graduate students and undergrads in the lab to offer collaboration,

277   support, and advice. By using the tools suggested above, leading a project that involves other

278   members of the lab is a useful and productive way to integrate yourself, mentor graduate

279   students, and provide more opportunities to connect with lab members. Other ways to be a full

280   member of the lab is to actively part in day-to-day lab duties that are possible to do remotely,

281   which can include planning lab celebrations, organizing lab meetings, and taking part in journal

282   clubs.

283

284   **Rule 7: A little in-person interaction goes a long way; maximize it by being creative.**

285   ***PIs***

286   One to two in-person, on-campus interactions a year can provide a lot of value to you and your

287   postdoc. You can also minimize opportunity costs by inviting your remote postdoc to give a

288   department seminar, nominate them to speak at an on-campus symposium, or ask them to serve

289   on a committee that meets only a few times during the semester or can handle remote work (e.g.,

290   honors thesis committees). With some foresight, you can leverage these opportunities to

subsidize a campus visit and then strategically schedule lab meetings, social activities, and

networking opportunities during your remote postdoc's visit. Search through the calendars for

on-campus groups and adjacent departments to identify seminars, lunches, and meetings that

may add value to your postdoc's visit, even if they are "off the beaten path." Will there be a

Story Collider show or a reading in town by a popular science communicator? Is your campus

women in STEM group hosting a workshop for allies? Does the college town bakery have fresh

doughnuts at the local farmer's market on certain mornings? Facilitating a visit for a remote

postdoc and helping them fill their schedule with a mix of academic, social, and networking

opportunities can bring the entire lab closer together and sharpen your skills for inviting and

hosting campus visitors in the future, from senior researchers to faculty candidates. Creating an

atmosphere of fun and celebration around a remote postdoc's visit can also help bring the whole

lab closer together and promote collegiality. Another way to get more in-person time is to

organize lab meetups at conferences and workshops which may allow for an intensive time to

work together in person and build community within the lab.

Postdocs

Maximize the benefits of your time on campus. Do your best to create opportunities for

professional growth but don't underestimate the social aspect of visits to your institution (see Fig

2 for real-world example). Informal gatherings are as important as giving seminars and setting up

professional meetings. These opportunities, in addition to being fun and integrative, can help you

rest and recharge to take full advantage of a short visit. Make connections with your lab mates by

asking where the best coffee on campus is or when it is safe to run on the local trails. Eduroam

(global Wi-Fi roaming for academics) is another tool that makes it easy for postdocs to work

314   from different campuses and move seamlessly from one place to another. Also, brainstorm with

315   your PI about ways to bring them to you - it doesn't have to be a one-way street!

316

317   **Rule 8: Actively work to combat isolation.**

318   *PIs*

319   Distance can exacerbate feelings of loneliness or isolation that are rife in academia, and postdocs

320   may be especially vulnerable. Maintaining proximity to family and friend networks can reduce

321   the financial and personal toll of a postdoc position. For many, the postdoc stage is

322   contemporaneous with new challenges like starting a family, caring for aging parents, financial

323   instability, and the loss of strong social connections built during college or graduate school. As

324   members of an often-neglected career stage (i.e., many institutions don't have central postdoc

325   offices or support services), postdocs may feel isolated, which can be especially hard when

326   dealing with life transitions, imposter syndrome, or the stress and uncertainty of the job market.

327   Remote positions offer postdocs the choice to live where they are best supported. While the

328   quality of life benefits are worthwhile in their own right, reduced stress and time spent managing

329   logistics can also lead to better work [7].

330   By fostering an inclusive atmosphere even for remote lab members, you can set your

331   postdoc up for success. Encourage remote postdocs to be part of group projects that involve

332   regular interaction with other lab members. Many of our day-to-day interpersonal interactions

333   can be done remotely. For example, remote postdocs can lead lab meetings, participate in journal

334   clubs, offer "office hours," review the writing and coding of other lab members, serve on

335   committees, and even participate in social events (either calling into the event itself or helping in

336   the planning process). To make up for the lack of incidental "water cooler" interactions or

337   opportunistic group lunches, your remote postdoc may appreciate it if you replace spontaneous

338   interactions by sharing funny articles or interesting opportunities. You could also check in via

339   social media or a messaging application from time to time (following your established

340   communication norms, of course!). Finally, it may be beneficial to use your connections in the

341   academic community to identify a local host institution (desk space) for your remote postdoc.

342   ***Postdocs***

343   *Finding a second academic home.* Lacking the built-in interactions of an onsite position, remote

344   postdocs must actively cultivate their academic and social connections. One effective strategy is

345   for the remote postdoc to find a second (local) academic home. Joining a lab at a local

346   institution, even informally, provides a platform to talk about your work with a knowledgeable

347   audience, to receive feedback on writing or presentations, to discuss papers, and to practice

348   mentoring graduate students (but be wary of overcommitting!). For future PIs, the postdoc stage

349   is a chance to develop as a colleague and an adviser so interacting with scientists of all career

350   stages is critical practice. Depending on your relationship with the local institution, remote

351   postdocs may have access to a workspace, network, library, and recreational facilities (see Fig 2

352   for real-world example). Local institutions may also have seminar series' that are relevant to

353   your discipline, offering inspiration and the chance to cultivate relationships with potential

354   collaborators. If a group or organization doesn't exist, consider starting one!

355   *Make self-care a priority.* While not necessarily unique to remote postdocs, depression, anxiety,

356   and mental health issues are common among graduate students [8]. Given the potential for social

357   isolation, while working as a remote postdoc, this may exacerbate the mental health condition of

358   those who are already struggling. Therefore, it is vital to prioritize social support and self-care.

359   For postdocs that remain in a location where they have lived previously, take advantage of an

360   intact social support network. Even if your physical location is new or temporary, remote

361   postdocs should cultivate and maintain connections in their local community.

362

363   **Rule 9: Develop adaptive problem-solving skills.**

364   *PIs*

365   There are clear benefits that come with having a remote postdoc in your lab, but there are also

366   real tradeoffs. Some of these tradeoffs can be managed by applying the rules we have described.

367   However, each situation is different, and novel challenges or obstacles are likely to arise for both

368   you and the postdoc. When hiring a remote postdoc, be prepared to be flexible in your thinking

369   and adaptive in how you deal with challenges and obstacles, or even exciting opportunities that

370   might arise. As a PI, your experience in navigating the hiccups that inevitably occur in the

371   process of conducting research is an important resource to draw on when an unexpected situation

372   arises. Maintaining an open and creative approach to managing the tradeoffs of having a remote

373   postdoc will likely lead to benefits in other aspects of your lab, career, and collaborations.

374   *Postdocs*

375   For a remote postdoc, being adaptive to novel obstacles starts with an open communication

376   channel, and we cannot emphasize communication enough—see Rules 2 and 3. Discuss

377   challenges with your PI as they emerge and *before* they become intractable. As an early career

378   researcher, it can be easy to fall in the trap of 'dealing with it' on your own when unexpected

379   situations arise, and your PI is busy, right? Remember: part of their job description is helping

380   you to navigate sticky situations during your postdoc. Second, be creative about overcoming

381   distance challenges. For example, CMM successfully mentored an undergraduate project and led

382   a journal reading group solely via remote interactions (Fig 2). Being creative about problem-

383   solving means that you don't have to replicate the standard postdoc position to gain many of the

384   same experiences. Finally, take advantage of existing academic relations or networks that can

385   provide creative opportunities to fill the distance between you and your remote lab community

386   (see Fig 2 for real-world example). With open communication and creativity, the postdoc and the

387   PI can develop dynamic problem-solving skills that will benefit both throughout their careers.

388

389   **Rule 10: Accept and own having / being a remote postdoc.**

390   *PIs*

391   Embracing remote work as a legitimate working model will require a shift in how we think about

392   postdoc research. In our experience, the perception that remote postdocs contribute less to their

393   labs is both common incorrect. We should actively confront this and other negative perceptions

394   to offer a new mindset for remote postdocs, their mentors, and the broader academic community.

395   First, we should challenge the idea that remote postdocs are inaccessible to, and isolated from,

396   their academic colleagues. As noted above, video conferencing and collaboration tools make

397   isolation from a home institution unnecessary, and physical presence at an alternative location

398   can actually *enhance* opportunities for connection with local academic resources. Second, while

399   remote postdocs can miss out on the kind of unplanned interactions that characterize on-site

400   presence, such interactions can be detrimental to concerted focus. Remote postdocs have

401   increased control over the volume and timing of external distractions and commitments, leading

402   to improved efficiency, creativity, and quality of work [6]. Third, the perceived inconvenience of

403   remote collaboration represents an opportunity to integrate emerging tools into the lab. For

404   example, KEI (a remote postdoc) is currently leading a lab project that is serving as a test case

405   for making GitHub the lab standard for collaborative coding. Deciding to have a remote postdoc

406   can be an active choice rather than a compromise–it can work to everyone's advantage in terms

407   of professional development and growth.

408   ***Postdocs***

409   It is important for remote postdocs themselves to recognize that they participate and contribute as

410   much as (and sometimes more than) local researchers. Furthermore, not being at the lab/office

411   can lead remote postdocs to feel like they are always "on the clock." In response, some may

412   compensate by working unreasonably long hours, making themselves constantly available, or

413   taking fewer breaks. One strategy for combating this tendency is to log your hours and use

414   work/time tracking applications to illuminate effort and progress. Communication once again

415   comes into play here; be explicit with your PI and collaborators about your schedule and

416   availability. With good planning, integration, confidence, and communication, fantastic science

417   and scientists can emerge from remote postdoc arrangements!

418

419   **<u>Conclusions</u>**

420   We have provided a set of guidelines for facilitating successful remote postdoctoral experiences

421   from both the PI and postdoc perspectives (Fig 1). The core of this advice is to "treat this person

422   as you would a coauthor/collaborator/co-PI from another institution" (e.g., [9]) and embed tools

423   that facilitate remote collaboration as a core component of how a lab operates. Because so much

424   modern collaboration happens virtually or involves relatively few in-person meetings (e.g.,

425   working groups), the skill sets needed to communicate and work this way already exist. We just

426   need to apply them to postdocs.

427   Given recent transitions in how science is conducted and the technology supporting

428   remote interactions, there is an increasing number of situations in which postdocs can work

429   effectively without being physically located at their PI/advisor's university. This opens the

430   possibility of increasing numbers of remote postdocs, which could reduce the often substantial

431   burdens associated with moves for short-term positions. Like all innovations, the remote postdoc

432   model has advantages and disadvantages when compared with onsite presence, and it may have

433   more utility for some scenarios than others. There may also be circumstances that call for a

434   blended model that includes both onsite and remote periods of work, which can be negotiated

435   between the PI and postdoc, specific to the needs of the project goals and the constraints under

436   which the postdoc and PI operate. While there are some trade-offs to working remotely, with

437   some thought and creativity, many of these limitations can be overcome.

438   While implementing these guidelines will require some effort, the benefits of doing so

439   will extend far beyond the postdoc for which they are initially developed. Following these rules

440   and tailoring them to each lab's specific circumstances will improve the group's ability to

441   interact with colleagues at other institutions, improve communication among lab members

442   (including local ones), support the participation of introverted lab members, and provide

443   flexibility for lab members juggling multiple obligations. Indeed, many of these approaches

444   improve collaboration among lab members in general, allow parents to work around childcare

445   responsibilities, and support the participation of lab members with illnesses or disabilities that

446   make commuting to campus difficult [10]. PIs need to be aware of the potential challenges of

447   working with remote postdocs (compared to onsite postdocs), so they can actively engage in the

448   work necessary to support their success [7]. By making the necessary and often minor changes,

449   they will make their labs better for everyone. The time has come to view remote postdoc

450   research as part of a diversity of viable models.

451

452   **Acknowledgments**

458   **References**
459

460   1. Grogan KE. How the entire scientific community can confront gender bias in the
461   workplace. Nature Ecology and Evolution. 2019 Jan;3(1):3.
462

463   2. Jacobs JA. Presidential address: The faculty time divide. In Sociological Forum. 2004
464   Mar 1 (Vol. 19, No. 1, pp. 3-27). Kluwer Academic Publishers-Plenum Publishers.
465

466   3. Rivera LA. When two bodies are (not) a problem: Gender and relationship status
467   discrimination in academic hiring. American Sociological Review. 2017 Dec;82(6):1111-
468   38.
469

470   4. Eaton AA, Saunders JF, Jacobson RK, West K. How Gender and Race Stereotypes
471   Impact the Advancement of Scholars in STEM: Professors' Biased Evaluations of
472   Physics and Biology Post-Doctoral Candidates. Sex Roles. 2019:1-5.
473

474   5. Ríos-Saldaña CA, Delibes-Mateos M, Ferreira CC. Are fieldwork studies being relegated
475   to second place in conservation science?. Global Ecology and Conservation. 2018 Apr
476   1;14:e00389.
477

478   6. Mark G, Voida S, Cardello A. A pace not dictated by electrons: an empirical study of
479   work without email. In Proceedings of the SIGCHI conference on human factors in
480   computing systems. 2012 May 5 (pp. 555-564).
481

482   7. Waltman J, Sullivan B. Creating and supporting a flexible work-life environment for
483   faculty and staff. Effective Practices for Academic Leaders. 2007;2(2):1.
484

485   8. Levecque K, Anseel F, De Beuckelaer A, Van der Heyden J, Gisle L. Work organization
486   and mental health problems in PhD students. Research Policy. 2017 May 1;46(4):868-79.
487

488   9. Frassl MA, Hamilton DP, Denfeld BA, de Eyto E, Hampton SE, Keller PS. Ten simple
489   rules for collaboratively writing a multi-authored paper. PLoS Computational Biology
490   2018;14(11):e1006508.
491
492   10. Maestre FT. Ten simple rules towards healthier research labs. PLoS Computational
493   Biology. 2019 Apr 11;15(4):e1006914.
494
495
496
497   **Figures**
498

499
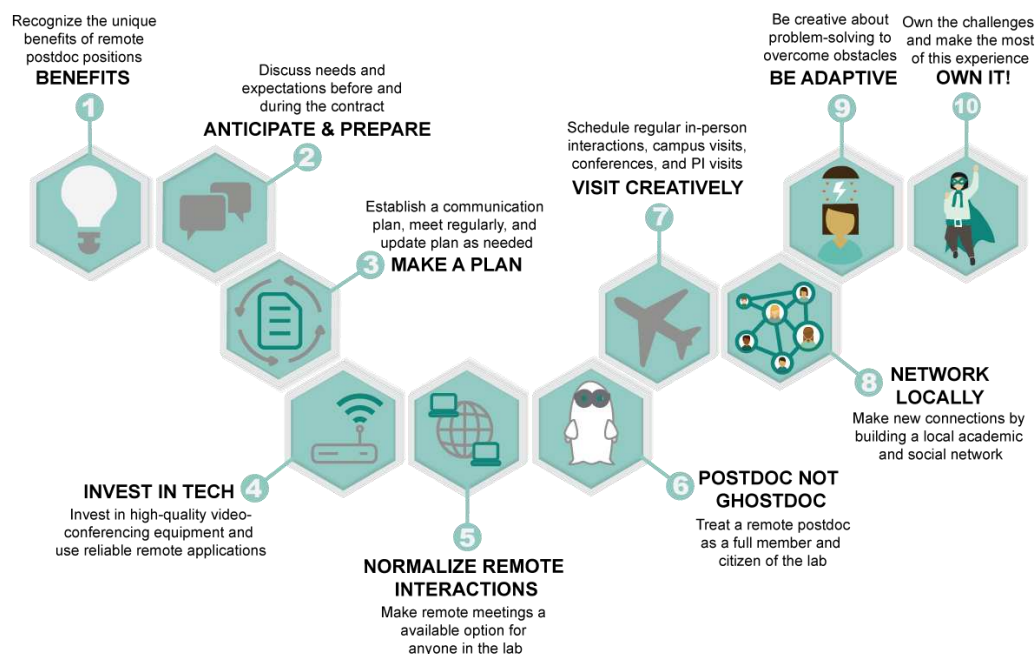
500   **Figure 1.** Summary of the ten simple rules in approximately chronological order from

501   advertising for a remote position to establishing a productive working environment and

502   maximizing remote opportunities.

503

504
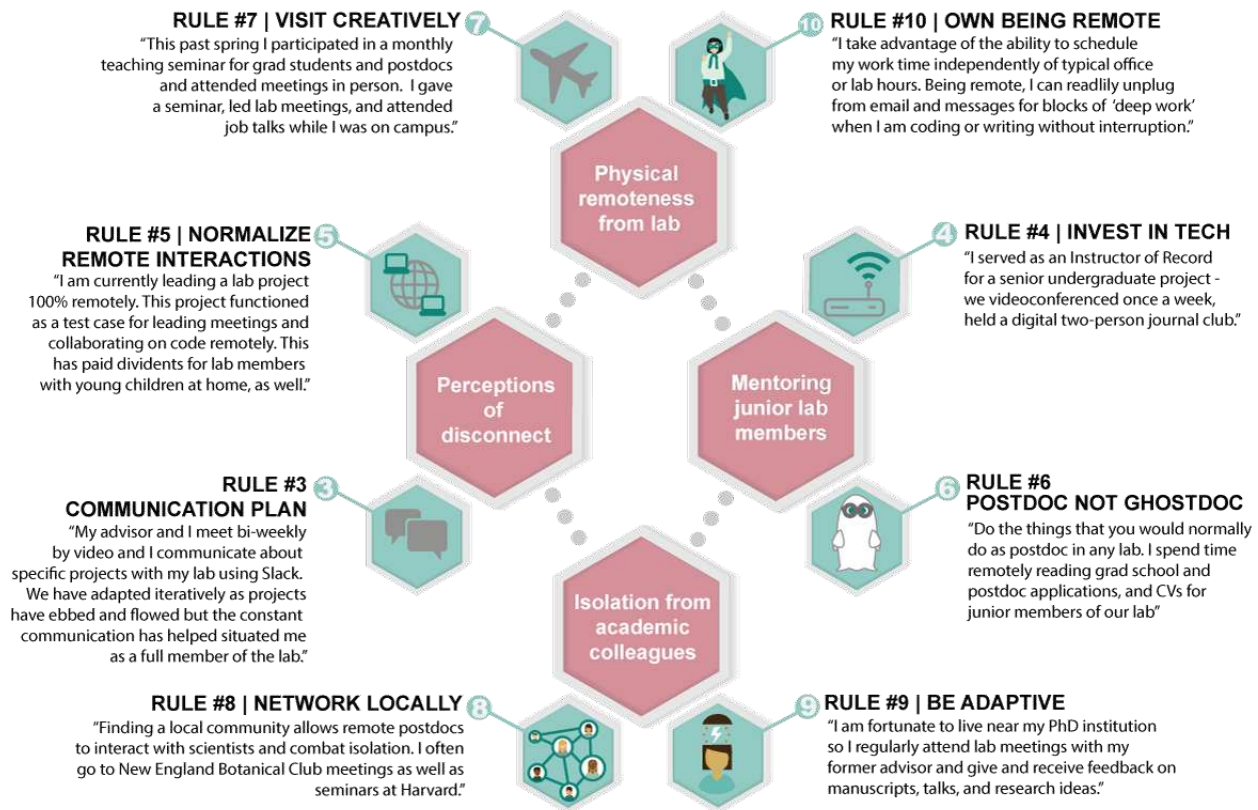
505
506
507 **Figure 2.** Simple rules for remote postdocs (green) applied to several common postdoc situations

508 (pink). Quotes are from authors with direct experience of the associated rule and situation.

509