Pivoting in Context

Using the Forging Alliances in Interdisciplinary Rehabilitation Research Model to Collaborate During COVID-19

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Abstract: With the onset of the COVID-19 pandemic, researchers have been faced with challenges in maintaining interdisciplinary research collaborations. The purpose of this article is to apply and expand a previously introduced model to sustaining new interdisciplinary research collaborations: Forging Alliances in Interdisciplinary Rehabilitation Research (FAIRR). FAIRR is a logic model that can be used as a guide to create interdisciplinary rehabilitation research teams. In this article, the authors propose expanding FAIRR by including strategies for sustaining interdisciplinary rehabilitation research collaborations: modifying inputs (resources needed to assemble a team and to conduct research activities), shifting activities (steps taken to move the interdisciplinary collaboration forward), and examining what impacts the fit between inputs and activities. Two examples are used to highlight the application of the FAIRR model to interdisciplinary collaborations during COVID-19.

Key Words: Research Collaborations, COVID-19, Interdisciplinary Research

Current practices in rehabilitation research require interdisciplinary collaborations to tackle large questions. Many collaborations like these originate from in-person, informal conversations at conferences or think-tank like summits. The COVID-19 pandemic has thwarted in-person participation in large research conferences, limiting the opportunity for collaborations to emerge from informal interactions. However, in situations where collaborations are in their early stages, virtual conferencing platforms (e.g., Zoom) have facilitated the continuation of interdisciplinary partnerships that began before COVID-19.

The purpose of this article is to apply and expand a model previously introduced to sustaining new interdisciplinary research collaborations: Forging Alliances in Interdisciplinary Rehabilitation Research (FAIRR). The use of technology to facilitate ongoing collaboration and its potential use in new partnerships is explored. Two examples will be used to highlight the application of the FAIRR model to interdisciplinary collaborations during COVID-19.

FAIRR MODEL: INPUTS

The FAIRR logic model includes inputs, activities, outputs, outcomes, and impacts. Because of the focus on developing relatively new collaborations, in this article, there will be a discussion of the inputs (Fig. 1A), activities (Fig. 1B), and factors that contribute to the fit between the two (Fig. 1C). Inputs are defined as the resources that are required to assemble a team and to conduct research activities: funding, environment, and specific partners.

Funding

Interdisciplinary collaborations help to build research capacity in rehabilitation research. Early collaborations are often supported by small funding sources (e.g., pilot grant funding from foundations or internal sources) or by including a collaborator as a coinvestigator (Co-I) on a large grant (e.g., Co-I on an NIH R01 or center grant). In the best of circumstances, executing projects on the grant requires a great deal of coordination. In the presence of COVID-19, the need to coordinate and execute funded projects takes on a whole new meaning. A funded project may provide an essential organizational structure to a research team; however, the structure needed to manage a team working remotely may be different. This is particularly relevant for studies that require human subject participation; carrying out the studies in-person as proposed may not be possible. The team may consider pivoting by redefining how they will address the overall study aims or reimagining the proposed projects. Redefining studies not only ensures delivering on grant productivity but also sets the foundation for future grants. This allows the team to establish a history of collaboration via publishing and generates ideas to use as a spring board for future funding.

Environment

With existing grant funding, a strong interdisciplinary team has been assembled and the roles and responsibilities of each member have already been defined. However, in the COVID-19 climate, if the team decides to pivot and redefine the research, too might roles and responsibilities for team members. The interdisciplinary environment among collaborators may shift to an entirely virtual format. Communication among team members will be important and should be based on preferences for style of communications, particularly for those who prefer to meet in person, but cannot do so. Although video conferencing has been the style of choice for many during COVID-19, constant video
meetings can lead to fatigue (e.g., Zoom fatigue).\textsuperscript{15,16} Instead, interspersing video conferences with phone calls and email messages may facilitate efficient, productive meetings. Drafting meeting agendas and establishing action items before ending meetings can also lead to efficiency. Determining which person is responsible for carrying out action items is also important to determine before ending meetings. In addition, having one team member responsible for note-taking during meetings and distributing the notes after meetings will allow all team members, whether or not they were able to attend, to remain fully informed and prepared for the following meeting. Recent papers suggest that virtual modes of communication could support research during COVID-19\textsuperscript{17} and highlight benefits and drawbacks of virtual communication.\textsuperscript{18} Below, specific suggestions for leveraging virtual communication to facilitate research collaborations are discussed.

**Novel Technological Considerations**

Adapting collaborative workflows to the constraints of COVID-19 has necessitated new and varied technological tools. For some teams, this may have resulted in a steep learning curve as research activities were moved online. Numerous technologies have aided researchers in maintaining their productivity, and creative solutions to remote work have been supplemented by understanding different online tools and their features. Here, a brief overview of some tools that may help research teams collaborate easily and remain productive while working remotely is provided.

**Video Conferencing**

It is safe to say that video conferencing software has been one of the most widely used tools to help researchers collaborate by facilitating virtual face-to-face meetings during the COVID-19 pandemic (Table 1). Software programs have been critical to conduct meetings and collect data online. Research teams should make use of many of the lesser known features of these software as well (e.g., breakout rooms on Zoom). These functions may be ideal to facilitate discussions that function similarly to in-person meetings. Understanding the features of these tools and how they mesh with team preferences can vastly improve virtual collaborations.

**File Sharing and Storage**

Many research teams have needed to have joint access to files and materials. Many institutions use shared storage space...
on internal servers, which are accessed via virtual private networks. Other research groups have used online cloud services to manage shared access to files and data (Table 1). With each service having different pros/cons and data security considerations, research groups should thoroughly consider several options and choose the best for them.

Managing Concurrent Workflows

Virtual collaboration has promoted the use of concurrent workflow technologies. These technologies provide the ability for multiple people to edit work concurrently in real time. Another underused but highly powerful tool is version control systems. Version control systems allow a team to track modifications to files, smoothly integrate changes, manage conflicting versions, and work on new features while preserving past iterations and stable versions of a file (Table 1).

Analyzing Data in New and Creative Ways

Pivoting research has changed the data that can be collected, which in turn changes the methods used to analyze the data. Although many data workflows may be modified relatively easily, other workflows may require new and creative methods. In particular, rehabilitation research involving human movement may be particularly demanding without typical in-laboratory data collection. With the ability to record data via video, video coding software and software to quantify motion in videos may be invaluable for rehabilitation research (Table 1). Each has different features and interfaces, and thus, research teams should consider their choices carefully.

Organization and Scheduling

One tall order of remote work is keeping the whole team organized. A legion of online tools is available for groups to use. These include (but are certainly not limited to) apps for product management, scheduling, note taking, and brainstorming (Table 1). All free, these apps, and many more like them, can be used by teams to stay organized in their workflows, maintain accountability, and track project completion.

Remaining Socially Connected While Physically Separate

Similar to the loss of opportunity for casual collaboration development discussed in the introduction, the virtual environment risks losing all opportunity for casual or personal interaction during the work day. It is critical for the team to include time for checking in and personal sharing to maintain and develop relationships. Creative use of available technology has allowed teams to maintain some semblance of workplace camaraderie. Ideas for virtual games, icebreakers, team building activities, and coffee breaks abound and are accessible by a quick Internet search. Use of chat features can help keep a team connected, whereas unique virtual backgrounds or other creative ideas can bring levity to virtual meetings (Table 1).

Specific Partners

When research projects pivot, additional partners may be needed to execute projects successfully. Partners may need to be added with specific research or content expertise, particularly related to technology and remote teaching, virtual data collection, and project management. Also, virtual video conferencing is familiar to most researchers, but using such software to collect data may require more thought and action: reaching out to obtain institutional review board approval to record data collections, acquiring and sending data collection materials to participants, or partnering with individuals who can assemble interfaces on virtual platforms for data collections. These partners may be overlooked in other circumstances but could prove to be essential during COVID-19.

FAIRR MODEL: ACTIVITIES

Activities (Fig. 1B) are steps taken to move the interdisciplinary collaboration forward. In the presence of COVID-19,
the focus will be on hiring, study redesign and alternative data collection, and funding plans.

**Hiring**

Along with the grant principal investigators (PIs) and Co-Is, study staff and students may be involved in research projects. These staff and students are often in the early stages of their research careers and are obtaining research training in the form of an apprenticeship. Training on data collection techniques, recruitment, data entry and processing, and analyses are hands-on processes. With the onset of COVID-19, training and mentoring take on a different form. PIs and Co-Is must determine how to redistribute and allocate work to ensure that staff and students’ time is accounted for. For example, training and mentoring staff and students virtually may involve PIs and Co-Is guiding them during virtual data collections using a video conference platform. PIs and Co-Is may also lack experience with virtual platforms and require the expertise of others (e.g., project coordinator) to pivot to using a virtual format.

**Study Redesign and Alternative Data Collection**

The need to redesign or reimagine funded grant projects was introduced in the “INPUT” section under “FUNDING.” Three strategies may be effective in redesigning funded studies in ways that address the overall study aims: conducting virtual data collections, analyzing preexisting data, and writing systematic reviews. During COVID-19, in-person data collections involving human subjects have mostly been impossible because of safety concerns. One strategy to navigate the impossibility of in-person data collections is to conduct virtual video data collections. Video provides the opportunity to view the participant and to visually assess his or her responses. One specific advantage of conducting virtual video data collections includes the chance to view and assess participants’ abilities in their natural environments. If the session is recorded, responses can later be video coded using software (see the “ANALYZING DATA IN NEW AND CREATIVE WAYS” section). It may also be possible to acquire information over the phone from participants using questionnaires or formal assessments or to convert questionnaires to online formats using tools (Table 2). The interdisciplinary team may need to redesign how they plan to quantify the constructs they plan to measure (e.g., assessing balance via video). However, virtual data collection can offer a method for measuring the constructs of interest (e.g., OpenSim, Tracker).

A second strategy to continue productivity on projects involves using preexisting data to reimagine how to address study aims. Collaborators may have preexisting data that can be used to answer interdisciplinary questions. Because researchers with different areas of expertise have unique perspectives, they may draw information out of data that others do not see; a developmental psychologist’s video data may spark ideas about quantifying motor function when viewed by a rehabilitation researcher. As with any secondary data analyses, because the original data and studies were often not created with the reimagined hypotheses in mind, caution should be taken in the interpretation and generalizability of the findings (Table 2).

A third strategy involves conducting a review, whether it be as general as a scoping review or as rigorous as a systematic review. Planning and writing reviews provide the team with an opportunity to reassess their overarching question in light of the current literature; where do their respective fields stand on the issues that they set out to test? Publishing a review is also another opportunity for the team to establish a publication history with one another and to demonstrate their shared knowledge of each other’s perspectives (Table 2).

**Funding Plans**

Suggestions provided in the previous sections of “activities” can all serve as a starting point for future funding via pilot data and published coauthored manuscripts. Redesigning and reimagining studies may also generate ideas for future funding opportunities that the team has not originally considered.

**FAIRR MODEL: FIT**

Inputs and activities are not separate entities; they are intertwined. It is not possible to conceive of inputs without activities, and the activities themselves can lead to new inputs.

### TABLE 2. Study redesign and alternative data collection

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<thead>
<tr>
<th>Strategies</th>
<th>Software/Tools/Method</th>
<th>Advantages</th>
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<tbody>
<tr>
<td>Conducting virtual video data</td>
<td>Telephone questionnaires</td>
<td>Visually assess responses</td>
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<tr>
<td>collections</td>
<td>- Telephone Interview for Cognitive Status</td>
<td>Assess in natural environment</td>
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<td></td>
<td>- Online questionnaire</td>
<td>Video code recorded responses</td>
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<td></td>
<td>- Google forms</td>
<td>Can be directly uploaded into statistical software</td>
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<td></td>
<td>- Survey Monkey</td>
<td>to perform analyses</td>
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<td></td>
<td>- Qualtrics</td>
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<tr>
<td>Using preexisting data</td>
<td>Preexisting data</td>
<td>Pinpoint unique interdisciplinary perspectives</td>
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<td></td>
<td>- SPSS</td>
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<td>- Microsoft Excel</td>
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<td></td>
<td>- Matlab</td>
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<tr>
<td>Conducting a review</td>
<td>Scoping review</td>
<td>Reassess overarching question</td>
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<tr>
<td></td>
<td>- Narrative review</td>
<td>Establish team’s publication history</td>
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<td></td>
<td>- Systematic review</td>
<td>Demonstrate shared knowledge of interdisciplinary</td>
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The authors propose that the relationship between inputs and activities is mediated by fit: professional, scientific, and personal fit for each person on the interdisciplinary team (Fig. 1C).

Professional/Scientific Fit

Pivoting research questions and reimagining studies can lead to fresh, innovative ideas that would not have been pursued without the need to adapt. However, pivoting is a risk because team members may feel that the new shift is outside of their professional scope. Even if the new direction fits into their scope, it may fall outside of the team member’s areas of interest. The ability to address questions and having an interest in doing so are equally important. Team members also need to consider whether the new direction still fits their career goals and places them on a trajectory that aligns with their career goals (e.g., Does the new direction result in shifting the team member’s role either to minimize or increase the content of the workload and responsibilities beyond the original expectations?).

Personal

COVID-19 has changed both professional/scientific and personal lives. Dining rooms have been converted into home offices and work is interspersed with childcare duties and home schooling. Team members must consider how negotiating and managing virtual work align with new personal schedules. It is also crucial that team members are mindful of one another’s new situations and external factors that might affect their capacity and availability.

Effects of Fit on Outputs, Outcomes, and Impacts

Although the current article focuses on inputs, activities, and the fit between the two, modifying these areas has downstream effects on the other components of the FAIRR model: outputs, outcomes, and impacts. Pivoting inputs and activities while assessing fit can facilitate ensuring deliverables such as dissemination of information stemming from the project (outputs), garnering funds and attracting new funders (outcomes), and creating new interdisciplinary collaboration opportunities (impacts). Keeping the effects of inputs, activities, and fit on outputs, outcomes, and impacts in mind serves to strengthen rehabilitation research capacity and productivity.

CASE APPLICATIONS OF INPUTS, ACTIVITIES, AND FIT

The FAIRR model can be used to focus on inputs, activities, and how fit connects the two in rehabilitation research, particularly during COVID-19. For example, Figure 2 shows inputs, activities, and fit in the context of a collaboration at the start of a large funded center grant project in the area of pediatrics. Thus, funding had been secured and the environment

![Figure 2](image-url)
and partners had established roles on the grant. The team was assembled and was in gear to begin collecting studies already outlined in the grant. All of the studies involved in-person visits with children living with autism spectrum disorder and their families (e.g., hands-on data collections to quantify motor movements with body worn sensors). With the onset of COVID-19, the inputs remained the same, but activities with regard to study design were altered. Specifically, the team used the first and second strategies described under “study redesign.” Virtual data collection protocols were devised and research questions based on existing data were created to achieve the overall grant aims.

Figure 3 shows an example of a large center grant collaboration nearing its end by addressing the final grant aim in the area of adult rehabilitation. In this case, both the inputs and activities were altered. Originally, this study involved in-person visits with individuals living with HIV (e.g., in-person data collections to administer assessments and tasks that quantify motor function). COVID-19 led to the creation of a hybrid data collection approach with safe, minimal contact in-person visits and virtual data collections in line current government health guidelines. Although the data were collected and analyzed, the expected time frame was extended owing to learning the approval process of developing a sound scientific method with institutional review board approval. The environment and partners also changed because of a switch in leadership; the lead PI stepped down and a different researcher who was previously uninvolved on the project assumed the lead role. Although the funding for completing the final aim did not change, the funding plan was modified. The original plan involved using pilot data from the final aim as part of a springboard for another large center grant. However, findings from the third aim and their implications were premature owing to halting in-person data collections when COVID-19 began and pivoting methods. Therefore, the rationale needed to support the next grant was not strong. In this circumstance, fit was also affected. With the addition of new leadership, there was a shift in the research questions that fell outside of the area of expertise and interest for one of the team members. Therefore, plans were pivoted to address the last aim of the present grant and to use those findings to apply for future funding farther down the road once the implications could be fleshed out. At that point, the fit will need to be assessed to determine the role of further collaboration.

LIMITATIONS

The authors acknowledge that there are limitations to their proposed application of the FAIRR model. First, logic models provide a useful structure for organizing collaborations. However, because logic models are linear, they could hinder pivoting...
by limiting flexibility, oversimplifying objectives, and overemphasizing control. Second, studies have examined the feasibility and efficacy of telehealth in health care. Studies examining the effectiveness of virtual vs. face-to-face communication on research collaborations are still limited.24-27 Thus, this is a much-needed area of future research, especially given the need to pivot to virtual modes of communication during COVID-19.

CONCLUSION

In sum, researchers need to pivot in the presence of COVID-19. The authors suggest that a portion of the FAIRR model can be used to successfully shift research inputs and activities while keeping fit in mind for all team members. Use of the model can help to reset present priorities and to set the stage for future research plans.

REFERENCES