The Reciprocity Team: Development of an Interprofessional Research Collaboration

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The purpose of this article is to articulate and provide detail about an interprofessional research collaboration at a public university in a rural area of western United States. This interprofessional research collaboration was organized to explore infant and maternal reciprocity. As a part of the organization and process portion of the collaborative effort, the authors identify the unique attributes of their collaboration. Additionally, barriers to collaborative research are presented, with opportunities and recommendations made to support existing and future interprofessional collaborative efforts for basic science scholars, clinicians, and educators in health-related professions. J Allied Health 2017; 46(2):e43–e49.

COMPLEX RESEARCH QUESTIONS require complex, often multi-pronged approaches across scientific disciplines. Thus, much research in basic and applied science has begun shifting from a single-laboratory model to one of multiple laboratories and principal investigators forging an interdisciplinary collaboration to investigate novel and significant empirical questions. Support for multidisciplinary research requires funding, infrastructure, and policy-makers to provide the necessary resources for these important endeavors.

Research collaborations have been defined as a form of interaction among creators of knowledge, allowing for effective communication and exchange; sharing of their skills, competencies, and resources; and working as a group to collect, analyze, and disseminate results from data. Research indicates that collaborations increase scientific productivity, which has attracted notice from national research policy makers, professional organizations, and academic institutions. The National Academies describe interprofessional research as occurring when “researchers in different disciplines . . . meet at the interfaces and frontiers of those disciplines and even . . . cross frontiers to form new disciplines.”

Literature examining inter/intraprofessional research collaboration has focused on productivity at research centers, universities partnered with industry (e.g., business, engineering, development), and collaboration among university research centers. Bozeman and Corley found that researchers who pursue a “mentor” collaboration strategy are likely to be tenured, to collaborate with women, and to have a favorable view about industry and research on industrial applications. Regarding the number of reported collaborators, those who have larger grants have more collaborators.

Van Rignsover and Hessels investigated interprofessional research collaborations and found that women participated more often than their male counterparts, and that researchers with more years of experience tended to have both intra- (within discipline) and interprofessional (between disciplines) collaborations. Researchers within larger organizations tended to participate more in interprofessional collaborations, while intraprofessional collaborations contributed to greater career development. Further, Abramo, D’Angelo, and Di Costa articulated that research collaboration is among those factors recognized as exerting one of the most significant influences on the performance of individual faculty, scholars, and institutions, in terms of both overall effectiveness, expanding scholarship, and predicting productivity. As a result, this framework for progressing research has become a foundation in academic policies at national and international levels. Adams and colleagues noted that scientific productivity increases as the collaborative team becomes larger,
as a direct result of greater division of labor within larger research groups. Collaboration with clinical researchers/partners also adds diversity to interprofessional teams and supports the development of junior faculty, encourages growing clinicians into academia, increases interest and willingness to take part in the research process, and reduces bias towards research.12

There is a gap in the literature highlighting the development and maintenance of interprofessional collaborations among health professionals. Therefore, the purpose of this article is to describe the origins and development of an interprofessional research team engaging in a multidisciplinary collaboration at a rural university, among faculty with varying levels of research expertise, from different disciplines, and with different research foci. Additionally, we provide recommendations to other clinicians, faculty, researchers, and administrators regarding strategies that may create and/or enhance research collaborative efforts among researchers and institutions with diverse resources, opportunities, and barriers.

Development of the Reciprocity Team

The interprofessional team at Idaho State University consists of researchers and clinicians from five different health-related professions, or basic sciences: Clinical Psychology, Experimental Psychology, Occupational Therapy, Physical Therapy, and Speech-Language Pathology. This team is referred to as the “Reciprocity Team,” given that we investigate predictors, mechanisms, and developmental outcomes of reciprocal interactions between infants and their maternal caregivers longitudinally during the early postnatal period. To do this, we examine mutual responsiveness, or synchrony, which defines the joint dyadic component of social interactions10 among infants and caregivers in the domains of social-emotional, cognitive, motor, play, sensory, language, and communication. Given the diversity of the members of the Reciprocity Team, in terms of research focus and career level, professional goals for the collaboration vary (Table 1). However, each team member indicated increased opportunities for interprofessional collaboration, grantsmanship, scholarly writing, and productivity as an individual professional goal.

Another goal of the Reciprocity Team is to provide students with exposure to, and experience with an interprofessional collaboration. A number of students have been involved in the collaboration (Table 2), including participating in managing and securing data, behavioral coding of maternal-infant interactions, data analysis, project organization, disseminating results at symposia and conferences, and grant writing. Since collaborations are more common within research teams, the unique skills built as a result of these experiences may enhance student competitiveness for many graduate training opportunities, postdoctoral fellowships, and research positions.

The Reciprocity Team emerged from a conversation between two (interprofessional: clinical & experimental psychology) team members at a university research poster session at our home institution. Initial conversations lead to bringing in two additional researchers and clinicians from other disciplines (speech-language pathology & physical therapy), to enhance the breadth and depth of the research questions which could be asked given the additional expertise and resources. At that point, several meetings were conducted to refine research questions, approaches, and division of labor. An initial project was devised to take advantage of archival data. Participants came from a cohort of 16 parent-infant dyads, who participated in a longitudinal research study (at East Carolina University under the direction of Ramsdell-Hudock) from 7 to 18 months of infant age. The primary purpose for original data collection was to examine the development of infant/toddler vocalizations, and incorporate caregiver perspective into current knowledge bases about developmental norms. For our purposes, this data set provided the foundation to begin exploring reciprocity between infants and caregivers. It was quickly recognized that bringing in another researcher from an additional discipline (occupational therapy), and with unique clinical expertise, would further enhance the collaborative effort. We believe this interprofessional approach will ultimately enhance our research project and understanding of maternal-infant reciprocity.

As work began on re-analyzing the archival data set, the Reciprocity Team applied for and obtained a $46,000 internal seed grant supporting interdisciplinary research collaborations. The grant afforded opportunities to employ student research assistants, purchase materials and supplies, buy out of courses, reimburse travel for scholarly presentations, fund research participants to collect preliminary data, and host a Reciprocity Team in-house research symposium. To date there have been four presentations given and an additional two presentations accepted at the regional, national, or international level at psychology, psychobiology, developmental, occupational therapy, and speech-language pathology conferences, based on preliminary analyses. For the internal symposium, which commenced 1 year after the start of the collaboration, each team member and their research assistants presented preliminary findings from their coding of unique, developmentally-relevant behaviors at three infant ages (i.e., 8, 12, and 16 months). Symposium attendees were all of the members of the Reciprocity Team, including undergraduate and graduate research assistants, as well as interested department members, university administrators, and relevant community collaborators. The symposium
allowed the team to build upon previous discussions of more pragmatic concerns (e.g., operationalizing developmental variables of interest, discussing coding schemes and associated reliability, and grant purchasing) to integrate findings from across the multiple laboratories while including extended members of the team (i.e., research assistants).

As this collaboration has evolved, we continue to find more efficient ways of achieving our research and professional goals. This has been facilitated by monthly team meetings, centralization of resources (e.g., having a shared, cloud-based drive for presentations, documents, drafts, data figures, etc.), regular progress updates (i.e., the symposium and monthly meetings), and having a project coordinator (a doctoral student in experimental psychology) to help manage data sharing among labs.

**Our Research Focus at a Glance**

Reciprocity is the mutual engagement between infants and caregivers, involving bidirectional symmetry in actions and psychological states. Decades of research support robust reciprocal relationships between caregiver and infant behavior and outcomes. However, more research is needed to examine complex bidirectional associations between infant-caregiver engagements with regard to multiple interactive domains of infant behavior. Our group is attempting to fill this

<table>
<thead>
<tr>
<th>Project Role</th>
<th>Discipline</th>
<th>Degree Level</th>
<th>Research Experience (yrs)</th>
<th>Previous Funding Sources</th>
<th>Area of Focus</th>
<th>Goals of Interprofessional Research Collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary investigator</strong></td>
<td>Clinical psychology; behavioral neuroscience, developmental psychology</td>
<td>Clinical/research doctorate and research post-doctorate</td>
<td>12</td>
<td>Yes, Internal and external grants.</td>
<td>Perinatal psychobiology, infant neurobehavioral development, maternal-infant interactions, and behavioral health.</td>
<td>To enhance research productivity and fundability, assist in producing collaborative grants, manuscripts, and presentations, and benefit from mentorship from more senior faculty.</td>
</tr>
<tr>
<td><strong>Co-primary investigator</strong></td>
<td>Experimental psychology; behavioral neuroscience, developmental psychology</td>
<td>Research postdoctorate</td>
<td>20</td>
<td>Yes, Internal and external grants.</td>
<td>Postural and locomotor development, maternal-infant (physical) interactions, sensorimotor development, and neurobehavioral plasticity.</td>
<td>To broaden research program, work collaboratively with colleagues in other disciplines to gain a more comprehensive understanding of neurobehavioral development, collaborate on grants and scholarship, provide interdisciplinary training opportunities for students, and collaborate with junior colleagues and help make them more competitive for external funding.</td>
</tr>
<tr>
<td><strong>Co-primary investigator</strong></td>
<td>Speech-language pathology</td>
<td>Research doctorate</td>
<td>13</td>
<td>Yes, Internal grants.</td>
<td>Infant vocal development, phonetics, phonology, and the scholarship of teaching and learning.</td>
<td>To learn from others and provide insight when appropriate, expand my own line of research through collaboration, obtain grant funding, add to the knowledge base about infant development, and gain insight from researchers in other disciplines.</td>
</tr>
<tr>
<td><strong>Co-primary investigator</strong></td>
<td>Occupational therapy</td>
<td>Clinical doctorate and research doctorate</td>
<td>2</td>
<td>None</td>
<td>Co-occupation, play participation, motor development, sensory processing and sensory interventions, and the scholarship of teaching and learning.</td>
<td>To gain interprofessional research experience, learn about grant procurement, collaborate on national presentations and publications, and gain experience with analysis and coding of infant/maternal behaviors.</td>
</tr>
<tr>
<td><strong>Consultant</strong></td>
<td>Physical therapy/ experimental psychology</td>
<td>Clinical doctorate, MS, PhD in progress</td>
<td>24</td>
<td>Yes, National Science Foundation</td>
<td>Neuroplasticity, motor behavior and rehabilitation interventions.</td>
<td>To gain interprofessional research experience, and participate in developing research methods that integrate the findings from multiple research labs to answer a research question.</td>
</tr>
<tr>
<td><strong>Research coordinator/ graduate student</strong></td>
<td>Experimental psychology</td>
<td>Bachelor’s research MS/PhD in progress</td>
<td>7</td>
<td>Yes, Internal and external student grants</td>
<td>Motor development, sensory feedback and experience.</td>
<td>To gain additional research experience, work closely with investigators from multiple fields, and gain experience working on a large collaborative grant/study.</td>
</tr>
</tbody>
</table>
Several concepts are key to collaborations, including sharing, partnership, interdependency, power, and process. Through collaborations, sharing can be seen in the division of labor, decision making, philosophy, values, data, perspective, and planning and intervention. Partnerships suggest a constructive nature, collegiality, openness, honesty, authenticity, and common goals to the collaborative relationship. Interdependency implies a mutually beneficial dependency across members of a collaboration. The concept of power may be better described as an empowerment of the individuals working together through this interactive process, surpassing individual limitations by embarking upon a collaboration. And finally, the collaboration process often constantly evolves through negotiation and compromise among participants.

Beyond these concepts, several unique aspects of collaboration can be highlighted with the Reciprocity Team. First, there are five different disciplines involved in the project, several of which are relatively new to interdisciplinary research collaborations. Second, the collaboration between researchers and clinicians across different disciplines adds to the expansive viewpoint explored. Third, the diverse group supports a comprehensive approach focused on developing methodology, and the application of those methods, to discover and address a significant public health problem (i.e., under-diagnosis and undertreatment of developmental difficulties). Fourth, the number of undergraduate and graduate research training opportunities within each of the disciplines, as well as in interdisciplinary research, is extensive. Fifth, the facilitation of numerous opportunities for presentations, papers, and grants in different areas/domains enhances research productivity and dissemination of ideas/findings. Lastly, the five different disciplines working with the same data set, and extracting a high volume of differing information from it, puts forth a broad perspective related to results.

Potential Challenges to the Collaborative Process

The very same concepts that can be unique to supporting flourishing collaborations listed above (e.g., sharing and partnership), can compound the success of a collaboration. Establishing a new collaboration between five disciplines has provided many opportunities, but also some challenges. The collaborators experience differences in discipline-specific vocabulary, research methods, and interpretation of data. The language used to describe items of interest often need to be discussed and explained by individual team members. At times terminology may be unclear, as when different terms are used by different disciplines to refer to the same construct. Through frequent, open discussion, the Reciprocity Team has been able to resolve and select terminology that seems most suitable for the project aims. These discussions add depth of understanding to the different disciplines participating on the team and the value of interprofessional perspectives. Selection of variables and research design also has been a challenge for the team. Again, frequent discussion and use of examples has provided opportunities to ensure that the different research labs converge on these important research elements. The willingness of some labs to recode data when the team learned a better method was beneficial to the collaborative process. Labs have used different coding software, however, the outcomes will be shared across labs. Due to the sheer volume of data

<table>
<thead>
<tr>
<th>Discipline</th>
<th>No. of Students</th>
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<tbody>
<tr>
<td></td>
<td>Graduate</td>
</tr>
<tr>
<td>Clinical psychology</td>
<td>3</td>
</tr>
<tr>
<td>Experimental psychology</td>
<td>2</td>
</tr>
<tr>
<td>Speech-language pathology</td>
<td>5</td>
</tr>
<tr>
<td>Occupational therapy</td>
<td>8</td>
</tr>
<tr>
<td>Physical therapy</td>
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collected, the Reciprocity Team is still seeking the best forms of data analysis to answer questions of interest.

**Opportunities for Long-Term Efforts**

The collaboration has been very enriching for all of the team members, to understand what other disciplines emphasize and how they approach answering their research questions. By developing a better understanding of these different disciplines through this process of working together, it is apparent that the team appreciates that each member brings useful and unique experiences, perspectives, skills, and expertise to the project. It is intended that the group continue to work together on the Reciprocity Project, but that the team members may also develop new side projects together, as a result of recognizing the unique contributions we make to approaching research problems. For example, one side project may address simultaneous data analysis using varying behavioral coding schemes that may be highly specific from a basic science standpoint versus that of a functional (therapeutic) standpoint with clinical implications. After two years of the team working together, numerous direct and indirect outcomes are a result of the collaborative tasks, efforts, and relationships (Figure 1). Specific growth is noted in the area of scholarly artifacts, student training, community partnerships, and service opportunities within the institution.

The team has aspirations to expand collaborations and procedures to clinical partners within the institution as well as in the community, with a focus on using new procedures for early identification and diagnosis of developmental delays and conditions.

**Recommendations**

**Developing Interprofessional Research Teams**

It has been documented that researchers who embody the following practices typically experience increased research productivity: researchers who have a quality doctoral education; find and use research mentors, and link with colleagues who have similar research interests; learn to take risks and accept criticism; prioritize and manage workloads; and learn about the systems that support research within specific academic environments. Conversely, junior faculty who consider, or who do terminate research careers as junior faculty, typically do so as a result of lower confidence in one’s research skills, reduced overall job satisfaction, and higher perceptions of burnout due to workload/workload distribution. Some health care professionals (e.g., occupational therapists), compared to others (e.g., nursing, psychology, physical therapy), are also less likely to engage, or collaborate in research due to low confidence or anxiety. Stoykov and colleagues recommended...
that in order to support junior researchers, faculty, administration, and institutions should emphasize development of interprofessional teams, implement mentoring (such as traditional mentorship, sponsorship, and coaching), cultivate leadership skills in present and future program/departmental leaders, and train junior faculty to be resilient. It is our contention that interprofessional collaborative teams may create opportunities that mentor junior faculty, facilitate increased productivity, and assist faculty in meeting their research related goals.

**Facilitating Interprofessional Collaborations**

Below are additional recommendations related to the development and enhancement of interprofessional research teams per members of our collaboration. The recommendations are provided for individual researchers and collaborative research teams; they expand upon those provided by others.\(^4\)\(^-\)\(^6\),\(^12\),\(^17\) However, it is our contention that strategies to foster interprofessional collaborative teams can also be enabled and supported through institutional structures and opportunities.

**Researchers/Research Teams.** As a member of a research team, there are several things which can be helpful to keep in mind. First of all, taking part in a research collaboration will require changing roles. This can be facilitated by being open-minded and flexible to different approaches, research questions, methods, data analysis techniques, presentation, and manuscript opportunities. This is a key part of any collaboration, but especially one based around research. Along the same thread, it will be important to be constructive, respectful, and willing to accept that your influence or approach may not always be the team’s top priority. Instead, it is helpful to appreciate and effectively use each team member’s relative strengths to maximize the group’s productivity. For example, select a team leader who has excellent organizational and time-management skills. Time investment and funding, to name a few, will not always be equal across team members, nor should they be. To include all team members, a successful collaboration poses questions or problems that lend themselves to multiple perspectives and funding opportunities, such as social- or health-related problems. However, sometimes for one grant application or paper it may make more sense to highlight one aspect of a project over another, to make the submission more competitive. Despite fluctuating demands on time as different focus areas present themselves, collaboration does not mean an excuse for social loafing. Sometimes it can be more work as you learn how to cooperate, blend your results together, and write with other members of the research teams. It is important to be willing to put in the effort.

In organizing, successful collaborators will generate a timeline or plan of action that everyone can follow in working toward joint achievement of goals, and progressing with professional activities between meetings. Team members should also have regular contact with each other to foster the collaboration and ensure that everyone has a common understanding of research goals, procedures, and anticipated outcomes. During meetings, it will be beneficial to keep minutes, notes, and lists to reference at a later time. Further, the group will benefit from providing each collaborator access to project resources (e.g., team presentations, data, drafts, etc.). Think about your goals and contributions within a collaboration and choose your collaborators based on what you would like to achieve and contribute. Collaborations should be maximally mutually beneficial. This can be partially accomplished through addressing misinterpretations, miscommunications, and disagreements promptly as they may quickly ruin a complex collaboration with many contributors.

**Institutions.** Institutions can help foster collaborations by supporting interdisciplinary and interprofessional on-campus activities on a regular basis. For example, university programs (graduate college, office of research) and departments can sponsor interdisciplinary events such as research forums, symposia, and invited colloquia from presenters external to the university or department. Scholarly artifacts that are shared at the college or university level as a part of research could be valued or incentivized as scholarly activity and/or service, as these settings are likely where collaborations can begin. Additionally, external reinforcing for attendance could be developed, such as counting participation as service to support tenure, etc. University leadership (including department chairs and deans) can try to facilitate interactions among faculty from associated disciplines, especially for junior faculty. For example, in recommending university service opportunities to junior faculty, they can prioritize opportunities and appointments that have the potential to lead to worthwhile interprofessional activities and collaborations. Furthermore, administrators should appraise themselves of the research interests and goals of tenure-track faculty in order to advocate for and respond to potential opportunities of collaboration.

Institutions can also provide funding opportunities for faculty and students that will help to support progress of interprofessional research collaborations. For faculty, these opportunities should be available at every career stage (junior and senior), to support the consistent development of interdisciplinary research programs. Moreover, priority could be placed upon funding submissions that utilize interprofessional collaborations over other submissions. All institutional units (e.g., departments, colleges, schools) can value scholarly artifacts (e.g., presentations and publications) in associated-discipline outlets for their faculty and students. For example, units should not discount a publi-
Interprofessional research collaborations are encouraged by academic institutions, funding sources, and brokers of research dissemination. Such collaborations have increased productivity needed to gain funding with the generation of scholarly artifacts (e.g., presentations, publications, patents, etc.). In light of the opportunities, many research collaborative efforts face diverse barriers that can impede developing or maintaining progress and project dissemination. Yet, many of the barriers experienced in collaborations create unique prospects that may transform professional trajectories for researchers and their colleagues.

Conclusions

References