



Published in final edited form as:

*Pedagogy Health Promot.* 2015 December 1; 1(4): 233–246. doi:10.1177/2373379915600174.

## Challenges and Benefits in Designing and Implementing a Team-Based Research Mentorship Experience in Translational Research

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### Abstract

**Background**—Translational research seeks to build bridges between research and practice to address public health issues efficiently and effectively. The purpose of this paper was to evaluate a newly formed Institute that provided graduate students and adolescent behavioral health community professionals with a translational research service-learning opportunity through the creation of a community-university mentoring partnership. Goals of the team-based research mentorship approach included: 1) providing students the skills for implementing translational research; 2) providing research opportunities for community agencies to enhance operations and to encourage ongoing research involvement; and 3) developing relationships between university faculty and community agency professionals for further research collaborations.

**Methods**—The Institute used the National Institute on Drug Abuse's Mentoring Mosaic to select a diverse group of Community and Academic Mentors. The research mentorship experience of the initial cohort was evaluated based upon the Research Mentorship Conceptual Framework and Self-Assessment Tool.

**Results**—As a direct result of the research mentorship, outcomes for the Academic and Community Mentors and Scholars (i.e., those seeking a graduate certificate) included improved working relationships/networking and research experience. Through experiential learning, Scholars also discovered career trajectory clarity, the need for community collaboration in research, opportunities for continuing professional development, a greater understanding of public health competencies and how they align with community-based research, and skill development in best practices for translational research.

**Conclusion**—The team mentoring approach is a form of pedagogy that holds promise to enhance translational research and community-based research efforts while developing public health competencies.

### Keywords

translational research; mentoring; continuing education

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## Background

### Need for Translation of Evidence-based Practices in Adolescent Behavioral Health

Translational research applies the accomplishments of research and science into practice-based settings. The actual translation of research knowledge to practical use has historically been difficult because it requires the inclusion and subsequent coordination of a range of constituencies (e.g., health policy) (Atkinson & Gold, 2001). The recent response to this core issue within translational research has been to include community-based stakeholders within the research (Callard, Rose, & Wykes, 2011; Michener et al., 2012; Rubin et al., 2012; Wallerstein & Duran, 2010; Westfall et al., 2013).

The gap between research and practice has been continually reported and investigated, and provides an explanation, in part, for delays in improvements in health care to address health disparities (Glasgow & Emmons, 2007; Kerner, Rimer, & Emmons, 2005; Lenfant, 2003). The failure to utilize evidence-based practices (EBP's) occurs across an array of community-based settings. Barriers to translational research are embedded in the dichotomous nature of research and practice, inclusive of their settings (Burton, 2013). The problem, then, of unmet need in adolescent substance abuse treatment is not attributed solely to a rise in the prevalence of drug abuse and co-occurring disorders of childhood, but is also a services delivery problem complicated by the lack of sufficient avenues for translation of EBPs into community settings (Burton, 2013). This challenge calls for an increase in communication between those who conduct research and those who use research to help inform practice so that the former group has a better understanding of potential implementation barriers and the latter group is better equipped to meet fidelity standards.

### Research Mentorship

The concept of *research mentorship* has not yet acquired a standard definition, nor has its scope and the roles of the individuals involved been clearly defined (Abedin et al., 2012). When discussing research mentorship, literature within the biological and social sciences fields largely include process-oriented suggestions (e.g., choosing mentors) and views on structural issues (Steiner, 2014). Some studies have conceptualized research mentorship around particular themes, including acquisition of research skills, academic productivity, and career development (Ragsdale, Vaughn, & Klein, 2014). Keyser and colleagues conceptualize research mentorship to be a process that is “effectively transmitting the values, standards, and practices of science from one generation of researchers to the next” (Keyser, Abedin, Schiltz, & Pincus, 2012, p. 1546). Building on the aforementioned themes, we have operationally defined research mentorship to be a partnership between an experienced mentor and a mentee, which seeks to provide unidirectional career guidance (i.e., assistance in navigating research career attainment) and bidirectional professional development. The latter includes the initiation and enhancement of research and networking skills, opportunities for presentation and publication experience, and guidance on research conceptualization, implementation, and problem solving.

## The Institute

In order to combat the aforementioned problem of a decrease in communication between those that conduct research and those who use research to inform practice, an Institute was formed that focused on research mentorship and translational research. The Institute at the University, funded by a federal research training grant, provides graduate students and community professionals from a variety of social, behavioral, and community health sciences fields the opportunity to participate in a translational research mentorship program focused on addressing adolescent behavioral health issues. The Institute was established by a federal grant in 2012 and is led by a multidisciplinary Executive Committee from the disciplines of Public Health and Behavioral and Community Sciences. The Institute offers a graduate certificate program that gives both current graduate students and community professionals the opportunity to partner with an Academic Mentor, a Community Mentor, and other Scholars in order to develop their research study and contribute to the overall improvement of adolescents with substance use and co-occurring disorders while earning a graduate certificate in Translational Research in Adolescent Behavioral Health.

The Institute supports multidisciplinary research and seeks to involve diverse Scholars who can bring multiple perspectives to the service-learning project. This paper evaluates the team-based research mentorship experience of the first cohort of Mentors and Scholars. Scholars were comprised of graduate students and community professionals. The Scholars represented the disciplines of public health (including health education and behavioral health), forensic psychology, psychology, social work, criminology, rehabilitation and mental health counseling, and behavioral and community sciences. The inclusion of both academic and community-based Scholars allowed for an array of ideas and opinions to be shared, and it also increased the likelihood that lessons learned from this experience would be relayed throughout multiple disciplines and venues. Furthermore, a diverse group of Scholars allowed for reciprocal peer development in addition to the research mentorship that the Scholars received from their Academic and Community Mentors.

## Benefits of Research Mentorship

The importance of professional mentoring has been well supported by research (Kram, 1983; Zerzan, Hess, Schur, Phillips, & Rigotti, 2009). There have been a number of articles that have found that those who have been mentored have a more successful career trajectory and more career longevity compared to those who were never mentored (Hunt & Michael, 1983; Kram, 1985; Noe, 1988; Whitley, Dougherty, & Dreher, 1991). Mentors themselves also benefit by having a sense of increased personal and professional satisfaction in addition to enhanced career longevity, compared to those who have never mentored (Kram, 1985; Noe, 1988). In 2009, the Committee on Science, Engineering, and Public Policy (COSEPUP), which is a joint committee between the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, noted that other benefits of being a research mentor include potentially being exposed to new ideas and gaining the friendship and respect of beginning researchers. Moreover, becoming a mentor provides numerous opportunities to model high standards of conduct and gives the mentor moral authority to demand the same of their mentee(s) (COSEPUP, 2009). Research mentors are also able to build a strong research program and network of collaborators which can serve to

enhance their own skills (Jackling & McDowall 2008). Researchers may also function as Professors and/or engage in periodic presentations. Mentorship can also improve relevant educator skills (Buchanan, Baldwin, & Rudisill, 2002; Rockoff, 2008). Research has shown that in addition to the wealth of advantages that the mentoring relationship can provide for individuals, it also yields positive results for organizations (Young & Perrewé, 2000). At the organizational level, mentoring positively impacts productivity, training, socialization, information exchange (Young & Perrewé, 2000).

In addition to the importance of mentoring generally, research mentorship serves as a catalyst which provides young researchers with the skills they need to successfully contribute to their field (Palepu et al., 1998), as these young researchers have the opportunity to build their future work on current phenomena. Moreover, research mentorship can improve professional standards and research integrity, and fosters a sense of social cohesion that enables the profession to remain strong (COSEPUP, 2009). Research mentorship in translational research may also have a positive effect on the community where the research is being conducted. Some of the many possible benefits include: an increased understanding of issues in program fidelity; increased fidelity in the actual implementation of evidenced-based programs; increased communication and collaboration among academicians and community professionals; enhanced organizational capacity; and access to academic resources.

**Mentoring Structure**—A group mentoring approach was chosen by the Institute in an effort to replicate a typical research team, where multiple people participate in research. A group structure is advantageous to the learning of each Scholar, as their fellow Scholars form an eclectic research group that can apply their experiential knowledge to the study. Moreover, Young and Perrewé (2000) indicate the structure of group mentoring has several advantages over individual mentoring. One such advantage is the forging of strong, positive peer interactions that lead to improved mentor-mentee relations. In addition, a group setting is advantageous because it provides mentees with the opportunity to test skills and receive constructive feedback within a “safe environment” (Young & Perrewé, 2000, p.712). This approach also frees Mentors to pay more attention to the structural design and implementation approach, as many other questions may be answered by their peers.

Additionally, the Institute sought to foster the diversity of future drug abuse researchers by recruiting Scholars from underrepresented groups in the field, including women and minorities. In the first cohort of Scholars, 44% identified as members of a racial or ethnic minority group and 81% were female. Though recent evidence indicates that there are now more female students than male students (in both undergraduate and graduate programs) (Lopez & Gonzalez-Barrera, 2014; Gonzalez, Allum, & Sowell, 2013), women are still less likely to find a mentor (Responsible Conduct of Research Mentoring, n.d.) and are often excluded from collegial channels and collaborative opportunities, which hinder their overall productivity (Fox, 2001). Scholars were matched to their Mentors, as research has shown that women and minorities have more perceived barriers in finding a mentor compared to men (Ragins & Cotton, 1991). This design has many benefits, as mentees who are left on their own to find mentors typically encounter many obstacles and sometimes decide to forgo the search (Zerzan et al., 2009).

**Mentoring Mosaic**—In order to cultivate a successful research mentoring program, the Institute utilized the US federal National Institute on Drug Abuse's (NIDA) Mentoring Mosaic in the planning and implementation of the Institute research mentoring program. According to NIDA's Mentoring Mosaic (2009), mentees should be afforded the opportunity to work with mentors who professionally complement one another. Utilizing this approach not only augments the experience of the mentee (i.e., Scholar), as he or she is receiving well-rounded support, but it also alleviates Mentors from being expected to assist in areas outside of their expertise. According to Chrislip and Larson (1994), a mentoring partnership is “a mutually beneficial relationship between two or more parties (i.e., Mentors) who work toward common goals by sharing responsibility, authority, and accountability for achieving results” (p. 5). Each Mentor brings a specific set of skills and experiential wisdom to a mentoring relationship (Hulse & Sours, 1984; Kram, 1983; Zerzan et al., 2009). With this in mind, each group of Scholars was assigned an Academic and Community Mentor. In addition, Scholars had the option of also seeking advice from the Executive Committee and National (Institute Board) Mentors.

To date, we found limited articles concerning the mentoring of social/behavioral science and public health graduate students and practitioners in translational research. The experience of implementing a team-based approach to research mentoring and the use of the Mentoring Mosaic in a translational research setting with a diverse group of social and behavioral science graduate students did not appear in our literature search. Thus, this paper focuses on the effectiveness of the triangular research mentoring relationship of Scholar, Community Mentor, and Academic Mentor. Mentors worked in tandem to guide Scholars in drug abuse prevention and intervention research. Specifically, Academic Mentors were responsible for guiding theoretical and structural design of the studies. Community Mentors were responsible for introducing Scholars to the community agencies, its needs, and helping with the uptake and sustainability of the projects. These Community Mentors, professionals working in agencies which directly serve large numbers of adolescents, provided the collaborative relationship that is crucial to service learning (Cashman & Seifer, 2008). The Institute's use of the Mentoring Mosaic sought to not only provide an array of knowledge for the Scholars, but to also provide the opportunity for the Community and Academic Mentors to learn from one another. This partnership between the Mentors also may provide tangible benefits for the community agencies and, indirectly, the community. This may include the potential for more grant revenue to be poured into the community, through community agencies' programs, and the potential for more jobs within the community agencies. Additional tangible benefits for the community itself included improved health services from the community agencies (Mosavel & Simon, 2010), due to increased understanding of program fidelity and access to resources.

## Methods

The purpose of this paper is to explore the development of a team-based research mentorship program focused on translational research using the Keyser et al., (2008) conceptual framework. In order to enhance institutional efforts to support research mentorship, Keyser and colleagues (2008) developed a conceptual framework and self-assessment tool which is categorized into five Domains: 1) criteria for selecting mentors; 2)

incentives for motivating faculty to serve effectively as mentors; 3) factors that facilitate the mentor-mentee relationship; 4) factors that strengthen a mentee's ability to conduct research responsibly; and 5) factors that contribute to the professional development of both mentees and mentors. Accordingly, Domain One describes characteristics of a suitable mentor including an individual who is knowledgeable in the social structure of the environment and has considerable experience in the area of research the mentee is interested in pursuing. Additionally, an overview is provided of what the mentor and mentee should consider prior to agreeing to be involved in a research mentorship. The focus of Domain Two surrounds the proper incentivizing of mentors. Incentives serves as both a form of motivation and accountability. Keyser et al., (2008) suggest that incentives can be tangible (e.g., awards, financial resources) and non-tangible (e.g., recognition by senior faculty or authoritative bodies). Domain Three discusses the factors that can engender a positive and productive research mentorship by emphasizing how the processes of matching, orientating, and structuring can impact the relationship. Domain Three also underscores the importance of conflict management. Domain Four focuses on the mentee and factors that facilitate or hinder their ability to conduct responsible research, such as adherence to human subjects' protection, data management practices, interdisciplinary research practices, and authorship guidelines among others. Domain Five outlines ways in which both parties can further themselves professionally through the reciprocal nature of the research mentorship. Areas for potential professional growth as a direct result of the research mentorship include an increase in: 1) the scope of the professional network; 2) published manuscripts; 3) grant submissions and awards; 4) professional skills; and 5) overall research productivity. The Institute used the Research Mentorship Framework and Self-Assessment Tool (Keyser et al., 2008) to evaluate the implementation and effectiveness of the research mentoring program.

Process evaluation of the Institute's efforts took place through in-person semi-structured interviews with Academic Mentors ( $n=6$ ; 100%), Community Mentors ( $n=5$ ; 100%), and Scholars ( $n=13$ ; 87%) after the first cohort had completed all required coursework and the service-learning translational research project. After completing each interview, the external evaluator then listened to the recording of every interview and took summary notes, while highlighting key quotes. Another research team member also reviewed a sample of the interview recordings, corresponding notes, and key quotes for accuracy.

The evaluator took note of re-occurring themes and tallied how often each theme was mentioned within each sub-group: Academic Mentors; Community Mentors; and Scholars. Subsequent to this, the evaluator then assessed what themes presented within two or more of the groups. These themes were reviewed by a member of the research team until consensus was reached. Information obtained from the interviews was analyzed using the Research Mentorship Framework and Self-Assessment Tool to reflect on the team-mentoring approach to public health pedagogy in translational research.

## Results

### Domain One: Criteria for Selecting Mentors

The first Domain of the Conceptual Framework and Self-Assessment Tool focuses on the criteria for selecting mentors (Keyser et al., 2008). Keyser and colleagues underscore that



the criteria for each mentor will vary based upon the interests and needs of their mentee (2008). In order to be able to best meet the needs of the mentee, NIDA's Mentoring Mosaic was used (as described above). The use of multiple mentors is also encouraged by the COSEPUP (2009) who emphasize that no one mentor can satisfy all of the needs of a mentee. Indeed, collaborative mentoring partnerships are necessary to address the complexity of sound research development. Instituting a collaborative versus academic-only mentoring approach has made a significant impact on the Scholars, as illustrated by this quote.

“The Institute taught me a community-academic collaborative approach. Where it's just as important to hear what they (community mentors) have to say... because often times they know better than we do. So, to get out of that ivory-tower thinking and do some real work and have them guide it just as much as us. It's really changed my approach to research. It's really changed my approach to what I want to do.”

Mentors were selected based upon a high level of knowledge of behavioral health, and academic or practice-based experience, to ensure an integrated and multidisciplinary educational experience. Potential Academic Mentors and community agencies were approached by members of the Executive Committee based upon the agency's and faculty member's area of focus. Community agencies that agreed to be a part of the research mentorship then self-selected a professional representative to serve as the Community Mentor. The final group of Community and Academic Mentors were invited to participate in an orientation prior to the start of the research study. During the Orientation, Mentors were presented with an overview of the Institute, their expected roles and responsibilities, and the expected team mentoring and service-learning project design.

Community Mentors were professionals working at community organizations providing adolescent behavioral health services. These partners and the agencies they represent provided unique mentoring opportunities for the Scholars in order to enable them to conduct translational research projects addressing substance abuse and co-occurring disorders. Community Mentors were participants in the educational experience of the Scholars, in which they: 1) orientated Scholars to the community agency and key stakeholders; 2) provided background regarding the organization's history and needs; 3) and helped to guide scholar projects through administrative and logistical hurdles in the community agency setting.

Academic Mentors included locally identified content and methods experts who facilitated the research design, development, and implementation of the project. The Academic Mentors also ensured the Scholars maintained fidelity in their projects. This interdisciplinary blending of university-based mentors and resources with strategically selected community-based mentors represented a training infrastructure uniquely positioned to address the complex educational issues associated with training young clinical and services research investigators in the translation of evidenced-based interventions for adolescents into real world community agency environments.

## Domain Two: Incentives for Motivating Mentors

Keyser and colleagues (2008) indicated that recognition and support by the institution in which one is affiliated were important factors when encouraging faculty/staff to serve as mentors. This is not only true in the university setting, but also in the community setting. During the evaluation, we encountered Community Mentors who may not have received the support they would have liked from their agency because of competing demands or uncertainty of the value of the partnership. As one community mentor said,

“This became another thing on the to-do list. Although we embraced it, we wanted it, timing for us probably wasn't the best.”

Though some Community Mentors were uncertain of the value the partnership would add to their agencies, all Community Mentors found the results beneficial to their agencies in the long run. For example, a Community Mentor noted he/she found the mentoring partnership made his/her agency credible in the eyes of the community.

“I think it is good for the families we serve to know we have relationship with the university. That it is not just ‘internet therapy,’ we are not just pulling something off of the internet and doing it, that there is actually depth and breadth. I think that gives people confidence in your ability to make a change in their kids' lives.”

Academic Mentors also spent considerable time and energy helping the planning and implementation of the service-learning project. This detracts from their other academic activities and as such, it is imperative for this group to be provided incentives. Community and Academic Mentors were given public recognition at an annual national research and policy conference and at periodic talks where findings were disseminated. In addition to recognition of the Mentors by the Institute and university-affiliated news articles, a small percent of the Academic Mentor's effort were covered by the grant that funds the Institute. One Academic Mentor also benefitted by having an additional research activity to include within his/her tenure and promotion application. Other Academic Mentors benefitted from the strengthening of an existing relationship with the partnering community agency. Community Mentors benefitted by acquiring in-kind professional help from the Scholars. Community Mentors were also able to establish professional relationships with their affiliated Academic Mentor, the other Academic Mentors, and the Institute Executive Committee.

Although the large majority of Academic and Community Mentors did not have a preexisting relationship, an additional incentive for both was familiarity with each other's work. This level of familiarity increased the desire to participate within the research mentorship. Academic Mentors often served in a liaison role as part of their team-mentoring experience which encouraged the Community Mentors to participate in the project:

“The academic mentor was an anchor for both of us, for the students and for the agency, she could serve as a common ground to start with. We didn't know them and they didn't know us and she was familiar with both.”

Community Mentor



### Domain Three: Factors that Facilitate the Mentor-Mentee Relationship

The third Domain discusses the factors that help to facilitate the mentor-mentee relationship. According to the authors of the framework (Keyser et al., 2008), the factors within this Domain of the research mentorship relate to the process of matching the mentors to the mentees, guidelines for structuring the mentoring relationship, and mechanisms for dealing with any concerns that may arise during the mentoring relationship.

**Process of Matching**—The Institute's Executive Committee oversees a track in their annual conference where Mentors and Scholars are matched at the beginning of the research mentorship. During the first day of the conference, the Institute Executive Committee conducted an orientation which was held in order to allow the Institute Scholars and the Mentors (Academic and Community) to formally meet one another. During the Orientation, the Mentors spoke about their organizational affiliations and their areas of research interest. Scholars were then randomly placed into smaller groups and, subsequently, participated in round table discussions with each Community Mentor along with Academic Mentors. This allowed the Scholars to get to know more about each community agency and ultimately decide which agency environment was the best fit for them. Scholars were then able to informally meet with the Mentors and discuss their goals for the service-learning project. Scholars ranked their community agency choices, from 1-3, with 1 meaning they most liked that agency. The Institute faculty then matched each Scholar and the Academic Mentor to a Community Agency based upon best fit.

Furthermore, Academic Mentors and Community Mentors were given a “Service-learning partnership agreement” (Table 1) that indicated the purpose of the Institute and outlined the roles and responsibilities of the Institute, Academic Mentors, Community Mentors, and Scholars.

**Mechanisms for Dealing with Concerns**—The authors of the conceptual framework and self-assessment tool noted there were numerous concerns that could arise out of a mentoring relationship due to imbalances in power (Keyser et al., 2008). Power imbalances could lead to a lack of credit for work completed by the mentees, requiring mentees to work exclusively on a Mentor's project, or even a misguided dependency on the mentors, to the point where mentees were fearful to conduct their own projects. The Institute conducted regular seminars in order to assess how the projects were progressing and also where issues may need to be resolved (Table 2). These seminars were conducted by members of the Institute Executive Committee and routinely included just the Scholars or the Scholars and Mentors.

Within the interviews that were conducted during the evaluation, Academic Mentors raised some concerns about the level of input in the Scholar pairing process and level of informational support. As described earlier, each Scholar was paired to a community agency (and thus, also the Community Mentors) based upon similar research interests. Academic Mentors were also paired to a particular community agency based on similarity of research interests. During the evaluation of the first cohort, Academic Mentors indicated they would have liked to have more input in the matching process. In context, this spoke to a desire to

not only include research interests as a factor for the pairing process, but also personality traits and overall group compatibility, which is supported by the literature (Keyser et al., 2008).

“It would be helpful for us to be able to rate students as well.”

“I would have liked to interview with them.”

In addition to the request for input inclusion within the pairing process, Academic Mentors, overall, wanted more informational support. This included a list of scheduled activities. Academic Mentors also suggested the Institute should have a shared online work space that includes a timeline and FAQ sheet, with separate pages for Mentors and Scholars.

“They should have an online portal where we could have a FAQ sheet, a mentor portal where we can ask questions and give feedback and obtain resources and list our expectations there. The team could even ask us questions through the Canvas site. All of the information would be in one spot. It would be great for mentors, scholars, and community partners. We now know, based upon one round, when the scholars should be doing certain things. So it would be great to have a projected timeline available.”

Although “flexibility” was identified as a programmatic strength, it was also a concern; it both contributed to and detracted from the overall professional development of the Scholars. Academic and Community Mentors and Scholars all indicated that although they enjoyed some level of flexibility in order to create individualized projects and learning experiences, they also wanted more structure. Given the novelty of the project, Mentors and Scholars felt like everyone involved was learning as they were going along.

“In hindsight, maybe a little bit more directive to the agency. A little more guidelines---maybe what would have been helpful is that the first day that we met with the interns, is maybe having a representative from the university with us. To make sure that we are not going down the wrong rabbit trail.”

– Community Mentor

Flexibility was also seen in the written roles and expectations of Mentors and Scholars. A majority of the selected Community Mentors and Academic Mentors attended an initial orientation to the Institute where they each received copies of the expectations of mentors, scholars, and the Institute. Those who were not in attendance were e-mailed copies of the expectations and also the power point slides from the meeting. These roles were reiterated during the annual national conference meeting the following March. However, most of Scholars and Mentors indicated that the expectations for themselves and others could be made clearer. Largely, this concern came from situational factors in which there was uncertainty on how to proceed.

[When speaking about disagreements amongst a Scholar group] “I am unclear as to my role as a mentor. I’m unclear what I should be doing. Should I be trying to create opportunities where we can talk about that? I’m not sure if the Executive Committee should be doing that.”

– Academic Mentor

“The mentoring expectations given at that meeting were clear with what they wanted us to do. The part that was less clear was how much responsibility we would have with monitoring the student methodology. But overall the expectations were clear enough that I felt comfortable with it” – Academic Mentor

“There should be a guideline indicating how frequent one should be meeting with the mentor. Also guidelines on expectations for both the Scholar and the Mentor given to both scholars and mentors.”

– Scholar

Rather than indicating that the role expectations were vague, some of the Scholars and Mentors perceived the definition as flexible and thus more accommodating to an array of projects.

“The definition is flexible, which is needed because each project is different.”

– Academic Mentor

The experience of the first cohort will inform how the role expectations are presented and the frequency of their presentation in future Scholar and Mentor cohorts within the Institute.

#### **Domain Four: Factors that Strengthen a Mentee's Ability to Conduct Research**

The fourth Domain details factors that serve to strengthen the Scholars' ability to conduct responsible research. The emphasis here was to evaluate ways in which the Institute ensured that the Scholars followed established ethical and normative research protocols and regulations. This includes but is not limited to best practices in human subjects research (Keyser, 2008). In order to facilitate proper training in research conduct, coursework was provided on responsible research practices, submitting to the Institutional Review Board (IRB), research methods, and principles of applied research (see Table 2). Scholars also had to complete a human subjects' protection course prior to engaging in active research. Over the four semesters of the Institute graduate certificate program, Scholars actively engaged in coursework that prepared them for the service-learning translational research projects and instructed them on what they should be doing during each phase of the research.

The graduate certificate program takes four academic semesters to complete (see Table 2). Scholars were enrolled into the Institute's Course I during the Spring Semester and attended a national research and policy conference during this time. Within a week of the close of the conference, Scholars were matched to a community agency and ultimately to their Mentors and other Scholars. During the summer semester (May to August 2013), Scholars were enrolled in the Institute's Course II and, concurrently, the Service Learning (SL) I course. During the SL I course, Scholars met with their Team (other Scholars and Mentors) to identify a project and establish a research plan.

By the third semester (August-December 2013), Scholars took Course III and the Service Learning II course. At this time, Scholars implemented their projects and collected data. During their final semester, Scholars were enrolled in the Service Learning III course in which they analyzed their data and wrote a paper. Within this plan, Scholars, as a team with their Mentors, decided when, how, and to whom they would present their findings. Scholars

were also responsible for writing a final report to be presented to the Institute faculty and at an annual national conference focused on child and adolescent behavioral health research and policy.

Throughout the three SL courses, Scholars met with one of the Institute Executive Committee members to present their research proposals, discuss the IRB process, and ask research-related questions. Each group of Scholars also shared their data collection and analysis experiences and any other experiences with the Institute faculty during these meetings. In addition to these meetings, seminars were also held which included the Academic Mentors and Community Mentors. These seminars were held at least once within each semester that contained a Service Learning course, for a total of three sessions. The seminars provided an opportunity for both Mentors and Scholars to interact across teams to enhance project progression. The seminars were held on the university's campus. During these sessions, Scholars were able to present on the current status of their project in the presence of their Mentors, and obtain constructive feedback from fellow Scholars of other teams. This allowed for a diversity of perspectives, which produced a more holistic analysis of each project and subsequently, greater applicability to the community and potential for utility by the community agency.

Overall, Scholars reported newly learned skills and/or skill enhancement as a direct result of engagement with their Mentors throughout the service-learning based research mentorship. Some of the new skills reported by the Scholars included the ability to: 1) conduct qualitative research; 2) maintain a relationship with community stakeholders; and 3) conduct data analysis. Some of the enhanced skills included: 1) critical thinking; 2) organizational skills; and 3) presentation preparation. All of these skills strengthened the mentee's ability to conduct responsible research.

Despite the newly gained and enhanced skills by the Scholars, they still found the timeline to be challenging. A shorter timeline was initially envisioned in order to allow all Scholars, inclusive of students in their last year of their respective program, and Mentors the opportunity to participate in a worthwhile venture while not having to take on a lengthy or onerous commitment. However, both Scholars and Community Mentors wished they had more time to work on their projects. In order to remedy this concern while still allowing for the flexibility of a shorter timeline, any replication of this study should consider beginning the service-learning portion earlier in the certificate program.

### **Domain Five: Factors that Contribute to Professional Development**

The fifth and last Domain included factors that contributed to the professional development of both Scholars and Mentors. A consistent desire for all Scholars was the opportunity to develop professionally through this program. The most commonly stated areas in which Scholars sought to develop further were: 1) research; 2) building connections within the community agencies and community; 3) networking; and 4) publication and presentation experience.

“This was my first time to really conduct true research under faculty and this would give me the opportunity to publish.”

–Scholar

### Scholars' Professional Development

As a result of the research mentorship, all Scholars were able to successfully produce a research study and present their findings at a national research and policy conference. Scholars were also encouraged to present their findings back to the community agency's board and at other local venues. Some Scholars presented their findings at other national conferences specific to their areas of expertise. Additionally, Scholars were presented with opportunities to network with local and national academicians through their Mentors and at conferences. Some Scholars were also able to network with community members and community board members for the respective agencies. As one Scholar said,

“We attended a number of events and a number of community coalition meetings, community trainings, and the organization provided different trainings. So we got a better sense of what the agency was before we decided on our project. So I feel as if our project was a lot more meaningful to the community agency”

Two Scholars were employed by a Department within the University after the completion of their graduate certificate and degree. A factor that contributed to their successful hire was the skills they learned from the research mentorship. One Scholar discussed the value of the experience relative to future employment

“There is a job that I am being considered for that deals with translational research. So this experience makes me a viable candidate. The experiences during my time with the Institute makes me stand out.”

Scholars were also encouraged by their Mentors to prepare a manuscript for peer reviewed publication. One group, thus far, has been able to successfully navigate the manuscript development process and their paper is under review. The large majority of Scholars reported their service learning experience reinforced their desire to conduct translational research within the community or encouraged them to participate in future translational research.

“I love translational research. Before I started this I thought of myself as just a clinician, but now see where I can do both.”

–Scholar

Another Scholar described how the practical experience from the Institute's education program can help to integrate the knowledge and skills acquired as a graduate student.

“I really value the practical application that we got from this. If I didn't have this experience then I wouldn't be satisfied with my degree. Because a lot of the classes here are theoretical and I really crave a more practical experience. Within a research methods class we may talk about making a survey, but then we never really make one and disseminate it. I feel like this experience was the completeness of everything that we have done. We were able to take it all from start to finish. In class we don't get to see that full cycle. I think practical is more relevant and more representative of what we will be asked to do.”

## Mentors' Professional Development

Per NIDA's Mentoring Mosaic, there are a number of role expectations that Mentors should embody which include being a(n): 1) teacher and role model; 2) agent; 3) networker; 4) counselor; and 5) a mentee (NIDA, 2009).

As a teacher/role model, mentors instructed mentees on how to conduct research and disseminate findings (NIDA, 2009). The role of an agent included supporting the mentee's work by providing recommendations for respected committees and grant applications (NIDA, 2009). A networker provided opportunities for the mentee to shadow them and network with their colleagues (NIDA, 2009). As a counselor, mentors provided feedback to ideas put forth by the mentee (NIDA, 2009). Lastly, the mentor simultaneously becomes a mentee. This duality occurs as the mentor learns from ideas put forth by the mentee (e.g., new technical advances) (NIDA, 2009). Relevant to this study, Community and Academic Mentors also served as a mentee when either side (academic or community) communicates and teaches normative ideas relative to their field. As noted by several mentors:

“I really got to know the organization and I love it now. I would be proud to be on their board.”

– Academic Mentor

“I learned more about the community agency and built rapport with the community partner.”

– Academic Mentor

“The students are still very much involved with agency and co-presenting at conferences.”

–Community Mentor

## Discussion and Conclusion

Research mentorship in translational research served as an effective form of pedagogy. Scholars enrolled in this team-mentoring experience, along with the mentors themselves, experienced benefits from their involvement in the Institute service learning program. Academic Mentors established or strengthened relationships with Community Mentors to encourage further translational research into practice and vice versa. Community Mentors were able to validate or strengthen their use of EBPs to address adolescent behavioral health issues. Scholars experienced professional growth through designing, implementing, and disseminating the results of their translational research projects under the guidance of their mentoring teams. Additionally, through this team-based mentoring experience, the Scholars were able to acquire some of the competencies established by the Association of Schools and Programs of Public Health (ASPPH) (Association of Schools and Programs of Public Health, 2014). The ASPPH competencies addressed by the Institute coursework and team-mentoring experience included: 1) epidemiology; 2) social and behavioral sciences; 3) diversity and culture; 4) leadership; 5) professionalism; 6) program planning; and 7) systems thinking (Table 3).



Fulfilling the NIDA role expectations led to professional growth for the mentors as well. Mentors were able to solidify knowledge and research skills and further professional connections as they help their mentee network. Similar to other research projects, mentors reported an increase in research productivity (co-presenting at conferences, manuscripts) and increased recognition and networking due to well performing mentees (Ragins & Scandura, 1994; Russell & Adams, 1997).

Our research mentorship program was also congruent with the current aims of *Healthy People 2020*. One objective of *Healthy People 2020* (HP2020) was to improve both educational and community-based programs that seek to "...prevent disease and injury, improve health, and enhance quality of life" (U.S. Department of Health and Human Services [HHS], 2014, p. 1). The mentorship program allowed bi-directional learning among scholars, community mentors, and academic mentors. Educators gained insight regarding the operations of service agencies, and the challenges of implementing new programs in real world settings. Community Mentors gained insights regarding the research process, and new evidence-based programs and procedures. The Scholars, naturally, gained a unique understanding of the interface of these two perspectives, and have the opportunity to offer what they have learned in their future teaching, service, and research careers.

The research mentorship program also facilitated the health promotion aim of enhancing the skill level of community health workers. The Institute's research mentorship program supported this HP2020 goal by seeking to improve the research capacity and network ties of all stakeholders within the community-university partnership. By facilitating the development of a strong mentor-mentee relationship, the Institute was helping to improve the knowledge of best practices and provided continuing education for health professionals in community settings (i.e., community-based Scholars and Community Mentors), which can lead to improved outcomes for the individuals that are served by the participating community organizations and may potentially inform future public health policies and goals.

Our study not only filled the gap of research mentorship in the social and behavioral health sciences, but provided insight concerning the matching process of mentor to mentee in research mentorship for translational science. The lessons learned from our matching process were not only applicable within the social and behavioral health sciences disciplines, but extend beyond.

Future cohorts, within the Institute and similar programs, should not only consider the skill set of mentors, but also the personal characteristics (e.g., values, styles of interaction) when matching mentors to mentees. These factors should also be considered when placing multiple mentees within a group as we did. The mentees spend a considerable amount of time together. According to Keyser et al., (2008), matching an appropriate mentor to a mentee along a continuum of factors can be challenging. With this in mind, it behooves future team-based mentoring programs to match the mentees based upon personal characteristics in addition to work ethic, work schedule/availability, research interest, and area(s) expertise. We found the more successful groups were those who had Scholars with diverse expertise, and thus, as a group, could better meet complex challenges. In order to facilitate this process a list of sample questions for both the mentors and mentees to ask one

another should be given prior to the selection process. Questions should be geared towards research goals, community goals, and personal characteristics. All participants, Scholars and Mentors, should be able to rank their top choices for persons within their group.

Since many of the Scholars and Community and Academic Mentors come from different fields, a periodic training program in team dynamics should be employed. This will aid in the sustainability of a positive research team. Separately, the Scholars should undergo a workshop that teaches them how to successfully navigate professional collaborations. It is natural for researchers to undergo periods of stress during a research study. This stress may be heightened for mentees who are new to the field of research and may lead to tension between group members.

Using the NIDA Mentoring Mosaic to diversify the practical skills imparted to Scholars and the Research Mentorship Conceptual Framework and Self-Assessment Tool to evaluate the experience of the first year of the Institute has been a useful approach. The conceptual framework and self-assessment tool allowed the Institute Executive Committee to critically reflect on the helpful components and the areas that need to be improved within the current research mentorship structure. Although all Scholars and the majority of Mentors had an overall positive experience, the results of this initial cohort experience has highlighted research-supported steps that can be implemented within subsequent Institute cohorts. This includes clarifying role expectations and adapting the pairing process to include more feedback from all partners. Understanding these challenges may allow for continued receptivity to the Institute from community-based Scholars and will help to build more productive relationships between the community and university.

Although the interpersonal relationships of the Scholars within a team were not discussed at length nor evaluated within this paper, it is important to note the contribution of the reciprocal peer development aspect. As mentioned earlier, Scholars were chosen from heterogeneous education, work experiences, backgrounds, and competency areas. Such diversity provided continuing education for Scholars who worked full-time in the community as well as a unique perspective for Scholars who previously had only been instructed through didactic sessions. The integration of these Scholars allowed for additional learning to occur, which helped each team in the planning and implementation of the service learning project.

Even though the research mentoring partnership proved beneficial for the Community Mentors involved, it is also important to realize there may be some initial level of fear within the agency as the results of the evaluations conducted by the Scholars may engender negative findings, which could impact funding or community trust. Future mentoring partnerships should seek to acknowledge these fears and work with the agency to ensure there are strategic plans to help the agency improve.

There is an overwhelming need for theories and models that support research mentorship in public health. Research mentorship aligns research, teaching, and practice, and serves to enhance scholarship and career preparedness (COSEPUP, 2009). Future research should expound upon a team-based research mentoring approach that utilizes multiple mentors.

Information gathered from these studies could be used to develop innovative models for future programs.

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**Table 1**  
**Service-learning Partnership Agreement**

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**Purpose:**

The Institute provides service-learning opportunities for student scholars that will fulfill learning objectives and provide service that meets a true community need. We believe:

- The community mentor is entitled to a responsible adult learner with a serious commitment to the agency's goals and to delivering a service or product of value to the agency.
- The student scholar is entitled to a meaningful practical learning experience that builds on prior experience and coursework.
- The Institute is entitled to reasonable evidence that both sides of these commitments have been fulfilled before it gives the student scholar a passing grade.
- The service learning experience can be mutually beneficial to the agency, the institution, and the scholars.

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To accomplish the objectives of the service-learning experience, members of the partnership will fulfill the following obligations:

**The Institute Will:**

- 1 Develop and conduct service learning orientation activities for student scholars, community mentors, and academic mentors.
- 2 Instruct scholars in understanding their roles in the experience and expectations for the experience.
- 3 Provide written objectives and guidelines for the experience desired.
- 4 Provide local and national mentors and content experts to community agencies and student scholars to ensure successful completion of the service learning project.
- 5 Participate in team meetings and provide guidance and logistical support for the service learning experience.
- 6 Evaluate the scholar's performance in collaboration with agency and community mentors.

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**Academic Mentors Will:**

- 1 Work with scholars and community mentors to develop a service learning research project of high academic caliber that is consistent with the goals of the community agency and the Institute.
- 2 Serve as the primary communication link between the Institute and community mentors.
- 3 Provide advising to scholars in collaboration with community mentors.
- 4 Participate in Institute service learning seminars.
- 5 Contribute to the evaluation of scholars' performance in collaboration with community mentors.

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**Community Mentors Will:**

- 1 Provide orientation to the scholars to the role, mission, and structure of the agency.
- 2 Work with scholars and academic mentors to develop a service learning research project of high academic caliber that is consistent with the goals of the agency and the ITRE.
- 3 Hold regular meetings with scholars and academic mentors as necessary, to provide guidance and evaluate progress.
- 4 Provide appropriate resources to facilitate the service learning experience (e.g., work space, support, access to needed data).
- 5 Participate in Institute service learning seminars.
- 6 Participate in the assessment of scholars through feedback and evaluation.

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**Student Scholars Will:**

- 1 Participate in identifying a community agency need that can be fulfilled through the service-learning experience and successfully execute a service learning research project.



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**Purpose:**

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- 2 Engage in 45 hours of service activities per semester over three semesters that will fulfill objectives of the service learning experience. These activities are for the purpose of learning about the assets and challenges of conducting translational research in a community setting.
  - 3 Attend regularly scheduled meetings with academic and community mentors.
  - 4 Be professional in attitude, manners, and appearance.
  - 5 Attend regularly scheduled meetings with academic mentor and community mentors.
  - 6 Actively participate in classroom and assignment activities to develop knowledge and skills to enable participation in the service-learning experience.
  - 7 Participate in Institute service learning seminars.
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**Table 2**  
**Institute Coursework and Activities Timeline**

	<b>Spring Semester Year 1</b>	<b>Summer Semester Year 1</b>	<b>Fall Semester Year 1</b>	<b>Spring Semester Year 2</b>
<b>Courses</b>	<u>Course 1</u> Foundations of Research in Adolescent Behavioral Health	<u>Course 2</u> Translational Research Methods in Adolescent Behavioral Health	<u>Course 3</u> Advanced Research Education in Adolescent Behavioral Health	N/A
<b>Service Learning Activities</b>	N/A	<u>Service Learning</u> <u>Course 1</u> Project Identification  Research Plan Seminar I	<u>Service Learning</u> <u>Course 2</u> Project Implementation  Data Collection & Analysis Seminar II	<u>Service Learning</u> <u>Course 3</u> Final Report Seminar III
<b>Conference</b>	Orientation, Matching, & Educational Programming	N/A	N/A	Service Learning Project Presentation

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**Table 3**  
**Association of Schools and Programs of Public Health (ASPPH) Competencies and Institute Activities**

ASPPH Topic Areas	ASPPH Competencies	Institute Activities
<b>Epidemiology</b>	<ul style="list-style-type: none"> <li>Identify key sources of data for epidemiologic purposes.</li> <li>Describe public health problems in terms of magnitude, person, time, and place.</li> </ul>	<ul style="list-style-type: none"> <li>Course I</li> <li>Course I</li> </ul>
<b>Social and Behavioral Sciences</b>	<ul style="list-style-type: none"> <li>Identify basic concepts and models from a range of social and behavioral disciplines that are used in public health research and practice.</li> <li>Identify individual, organizational and community concerns, assets resources and deficits for social and behavioral science interventions.</li> <li>Identify critical stakeholders for the planning, implementation and evaluation of public health programs, policies and interventions.</li> <li>Describe steps and procedures for the planning, implementation and evaluation of public health programs, policies and interventions.</li> <li>Describe the role of social and community factors in both the onset and solution of public health problems.</li> <li>Describe the merits of social and behavioral science interventions and policies.</li> <li>Apply evidence-based approaches in the development and evaluation of social and behavioral science interventions.</li> <li>Specify multiple targets and levels of intervention for social and behavioral science programs and/or policies.</li> </ul>	<ul style="list-style-type: none"> <li>Course I, II, III</li> <li>Course III &amp; Service Learning I, II, &amp; III</li> <li>Course II, III, &amp; Service Learning I, II, &amp; III</li> <li>Course II, III &amp; Service Learning I, II, &amp; III</li> <li>Course I, II, III &amp; Service Learning I, II, &amp; III</li> <li>Course III &amp; Service Learning III</li> <li>Service Learning I, II, &amp; III</li> <li>Course III &amp; Service Learning I, II, &amp; III</li> </ul>
<b>Diversity &amp; Culture Leadership</b>	<ul style="list-style-type: none"> <li>Apply the principles of community-based participatory research to improve health in diverse populations.</li> <li>Describe alternative strategies for collaboration and partnership among organizations, focused on public health goals.</li> <li>Engage in dialogue and learning from others to advance public health goals.</li> <li>Demonstrate team building, negotiation, and conflict management skills.</li> <li>Use collaborative methods for achieving organizational and community health goals.</li> </ul>	<ul style="list-style-type: none"> <li>Course III &amp; Service Learning I, II, &amp; III</li> <li>Course III &amp; Service Learning I, II, &amp; III</li> <li>Service Learning I, II, &amp; III</li> <li>Team-mentoring experience</li> <li>Service Learning I, II, &amp; III</li> <li>Team-mentoring experience</li> <li>Course III &amp; Service Learning I, II, &amp; III</li> <li>Team-mentoring experience</li> </ul>
<b>Professionalism</b>	<ul style="list-style-type: none"> <li>Apply evidence-based principles and the scientific knowledge base to critical evaluation and decision-making in public health.</li> <li>Appreciate the importance of working collaboratively with diverse communities and constituencies (e.g. researchers, practitioners, agencies and organizations).</li> </ul>	<ul style="list-style-type: none"> <li>Service Learning I, II, &amp; III</li> <li>Course III &amp; Service Learning I, II, &amp; III</li> <li>Course III, Service Learning I, II, &amp; III</li> </ul>

ASPPH Topic Areas	ASPPH Competencies	Institute Activities
	<ul style="list-style-type: none"> <li>Promote high standards of personal and organizational integrity, compassion, honesty, and respect for all people</li> </ul>	<ul style="list-style-type: none"> <li>Team-mentoring experience</li> </ul>
<b>Program Planning</b>	<ul style="list-style-type: none"> <li>Describe the tasks necessary to assure that program implementation occurs as intended.</li> <li>Explain how the findings of a program evaluation can be used.</li> <li>Explain the contribution of logic models in program development, implementation, and evaluation.</li> <li>Differentiate the purposes of formative, process, and outcome evaluation.</li> <li>Differentiate between qualitative and quantitative evaluation methods in relation to their strengths, limitations, and appropriate uses, and emphasizes on reliability and validity.</li> </ul>	<ul style="list-style-type: none"> <li>Course III &amp; Service-Learning I, II, &amp; III</li> <li>Course III &amp; Service-Learning III</li> <li>Service Learning I, II, &amp; III</li> <li>Service Learning I</li> <li>Course II, III &amp; Service Learning I, II, &amp; III</li> </ul>
<b>Systems Thinking</b>	<ul style="list-style-type: none"> <li>Explain how systems (e.g. individuals, social networks, organizations, and communities) may be viewed as systems within systems in the analysis of public health problems.</li> </ul>	<ul style="list-style-type: none"> <li>Course III</li> </ul>

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