EXECUTIVE SUMMARY

Introduction

In September 2014, the National Institutes of Health (NIH), Office of Behavioral and Social Sciences Research (OBSSR), contracted with The Madrillon Group Inc. (Madrillon) to conduct the NIH Summer Research Training Institutes (SRTIs) Outcome Evaluation (Phase II). The evaluation followed a traditional training evaluation design, influenced by the Kirkpatrick Four Levels™ Training Evaluation Model. That is, a mixed-methods evaluation strategy was developed for the SRTI outcome evaluation that measures a series of steps trainees should take in order to move from training to achievement of desired outcomes. The evaluation strategy employed: online surveys of SRTI trainees, unselected applicants and faculty; abstraction of secondary data from sources such as IMPAC II QVR and NIH RePORTER; a review of participant satisfaction forms collected at institute trainings; and stakeholder interview data collected earlier in an outcome evaluation feasibility study. Combined, the data allowed the evaluation team to answer a set of 14 evaluation research questions and sub-questions.

Key Findings

Total Training Institute Costs

The seven SRTIs collectively trained 855 researchers in approximately a 10-year period. A cumulative total of $15 million was spent between 2000 and 2013 on the SRTIs.

SRTI Contributions to Learning via Mentoring, Collaboration Opportunities, and Networking Tools

Each SRTI introduced new professional contacts to help trainees with the development of new knowledge and later to help support the transfer of learning after training. Trainees made new contacts through mentoring, social networking tools, and connecting with other trainees and SRTI faculty. Trainees from the TIDIRH institute were most likely to report receiving an on-site mentor at their training (90%); ISSH participants were the least likely (44%). Nearly all trainee survey respondents (97%) reported having some level of contact with their mentors after training, although most (79%) reported they only had contact a few times. Trainees described their contact with mentors as helpful; especially with regards to helping them design a research study, formulate research questions, and develop a research grant application. Faculty mentors were asked about their experiences with their mentees, and were most likely to describe scenarios where their mentee received a grant award, professional recognition, or other positive outcomes as a result of their mentoring relationship.

A smaller number of trainees stayed in touch with their fellow trainees after training; just over a third continued to network with fellow trainees (38%). Seventeen percent collaborated with their fellow trainees on a publication or presentation after training. Trainees who used social media were most likely to network with other trainees after training via NIH listservs (51%).

Results also revealed that trainees with mentors, who also continued to network with NIH staff, SRTI faculty, and other former trainees post-training, were significantly more successful after training than those who did not have these three types of support. In fact, final analyses revealed that trainees who stated that networking and collaborations had the greatest impact on their success after training had more success than those who mentioned persistence and hard work.

Usefulness, Relevance, and Satisfaction with SRTI Content

There were limitations to measuring trainee satisfaction because satisfaction data collected post training were incomplete and varied widely across SRTIs. Despite limitations, some results could be determined.

Trainees were satisfied with their training, rated the training as useful, acquired new knowledge and skills, and were confident about their ability to use the knowledge and skills after training ended. In particular, trainees were satisfied with the mentoring they received at the trainings and the opportunity to interact with other researchers.

Mentor ratings were among the highest observed on participant satisfaction forms, with most participants rating their faculty mentors, track leaders, and consultations with individual faculty in the high range (4.7 on a 5 point scale where 5=excellent; 71% strongly agree that their core faculty were very helpful). Group activities were also rated highly (4.2 out of 5 where 5=excellent) when asked about how group members worked together; 85% strongly agreed that collaborations with other trainees during the institute were helpful).

Challenges and Support from Home Institutions

Trainees reported receiving a moderate amount of support from their home institutions after training. They gave their local faculty mentors a mean score of 3.28 on a five-point scale where 1=Not at all successful and 5=Extremely successful. Other faculty at their institutions and their supervisors received similar ratings (3.09 and 3.05 respectively). Trainees from the *emerging fields* of science (ISSH, mHealth, and TIDIRH) were more likely to encounter obstacles than those from the *established fields* (CAD, RCT, SW, and ATI). Results indicate there is work to be done to better engage trainees' home institutions in the SRTI process, and this study shows that boosting this engagement could lead to further achievement of expected outcomes resulting from participation in an SRTI.

Applications of Learning: Grant and Publication Experiences of Trainees and Unselected Applicants

Trainees and unselected applicants were asked a series of questions intended to measure the depth and breadth of their post-SRTI activities in the topic area relevant to their SRTI training. These questions asked about follow-up training, collaborations, professional memberships, incorporating materials/training content into their teaching, grant activity, and professional publications. In all areas but one (collaborations), trainees engaged in these post-training behaviors more than unselected applicants at a statistically significant level.

In the case of grant and publication activity, data were collected through online surveys and through data abstracted for the total population of trainees and unselected applicants. The abstracted data demonstrated trainees were likely to have submitted more grant applications prior to training as well as after, when compared to unselected applicants. This was not the case, however, for survey respondents receiving grant awards. Grant award history was statistically the same for trainees and unselected applicants prior to training, but was different after training (trainees received significantly more grant awards). This suggests that even though trainees were more likely to apply for grants pre-training, they were not likely to receive more grant awards until after training.

Trainees were also more likely to publish both before and after the SRTI, when compared to unselected applicants. Trainees, though, were significantly more likely to incorporate new research aims specifically related to their SRTI topic area into their research than unselected applicants. Trainees were also significantly more likely to contact an NIH Program Officer to discuss ideas about grant applications in the SRTI topic area.

Results of this study demonstrating indicators of increased scholarly productivity, and effectiveness as a result of participation in the SRTIs, provide evidence that NIH's and OBSSR's expected outcomes are being achieved.

Career Development Following the SRTI

Trainees and unselected applicants were asked a series of questions about how their careers may have developed since applying to or attending the SRTI. They were asked about participation on NIH internal review panels, editorial activities for journals, and their stature in the research community. Trainees were significantly more likely than unselected applicants to engage in all of the post-SRTI professional activities, such as serving as a peer reviewer for a journal (100% of trainees surveyed compared to 58% of unselected applicants), serving as a Federal grant reviewer, organizing activities for a scientific association, serving on an editorial board, and serving as a member of a Data Safety Monitoring Board for a clinical trial. Trainees were also significantly more likely to receive recognition from their home institutions for their research activities in the SRTI topic area after training when compared to unselected applicants. Trainees were likely to say their attendance at the SRTI contributed to advancing their research career in general, but it was not as likely to help them achieve tenure. Tenure was the only area where trainees and unselected applicants advanced at the same rate.

Impact of the Training Institute on the Scientific Field

Measuring outcomes was the most difficult area of measurement for this study. In most cases, a longer timeframe is needed to measure the true long-term impacts of the SRTI. This evaluation did look at some items that are likely to contribute to long-term impact on the SRTI scientific fields. One area was the development of new RFAs, PAs, or PARs in those fields. Sixty-three percent of faculty survey respondents indicated that the SRTIs contributed to new RFAs, PAs, and/or PARs in their targeted research fields. Faculty from two of the emerging fields (TIDIRH and ISSH), were most likely to report new funding opportunities, which is especially significant to the growth of new and emerging scientific fields. Faculty also indicated other benefits attributable to the SRTIs. Seventy-four percent believe the SRTIs have contributed to an increased enthusiasm in the scientific field, and four in ten observed increased networking and new partnerships developed in the scientific field. Equally important, 40% reported seeing better grant applications from SRTI trainees. Bibliometric topic analysis conducted on twelve years' worth of trainee and unselected applicant publications showed that trainees were more likely than unselected applicants to publish in the social sciences as compared to basic science. This may suggest trainees acquired knowledge, skills, and professional contacts that assisted them in producing more publishable research in the social science field, compared to unselected applicants.

A success scale was created for this study to look at the overall success of trainees in using their training in a variety of ways once they returned to their home research institutions. The results revealed that trainees with mentors, who also continued to network with NIH staff, SRTI faculty, and other former trainees post-training, were significantly more successful after training than those who did not have these three types of support, demonstrating the importance of the social component (i.e., networking, collaborating, discussing ideas and getting feedback) to the SRTI initiative.

Meeting Training Goals and Return on Investment

Results from this evaluation established that each of the SRTI training goals was met.

- **Professional Networking:** All seven SRTIs offered opportunities for trainees to network with SRTI faculty, NIH staff, and other trainees. Ninety-seven percent of trainees reported having contact with their mentor after training at least a few times. Faculty mentors reported that mentoring

relationships resulted in positive outcomes for their mentees, such as grant awards and professional development and recognition. Further, 38% of trainees stayed in touch with other trainees and these relationships were particularly important to their success (those with more trainee relationships had higher success scores). Seventeen percent collaborated with other trainees to present or publish their research.

- **Skills to Utilize New Methodologies:** Trainees were significantly more likely than unselected applicants to incorporate new research aims specifically related to the SRTI topic area into their research. Further, trainees reported their SRTI training experience influenced the way they think about and conceptualize research problems and the research methods they are focusing on for their research.

- **Cultivating Interest:** Faculty respondents were asked to write about contributions SRTI has made to their research fields. Their most common response, reported by 74% of faculty members, was "increased enthusiasm in the field." Trainees opted to stay engaged in the SRTI research fields by staying in contact with mentors, networking and collaborating with other trainees, and publishing in the social sciences.

- **Build Capacity for Qualified Researchers:** Trainees reported their participation in an SRTI increased their ability to design an appropriate research study and their ability to formulate a researchable problem or question with mean scores of 4.19 and 4.11 on a scale where 5=A lot. Trainees were also significantly more likely than unselected applicants to engage in professional activities in the SRTI topic area (such as peer reviewer for a journal or NIH grant reviewer), incorporate the SRTI topic into their teaching activities, and gaining professional recognition at their home institutions. Each of these activities helps trainees to share their SRTI knowledge with others, thus building capacity to stimulate the science by developing a new cadre of behavioral and social scientists.

- **Increasing Grant Activity:** Trainees were significantly more likely than unselected applicants to submit grant applications and win grant awards. Trainees were more likely than unselected applicants to submit grant applications pre-training, but they did not receive more grant awards than applicants until after training. Additionally, the number of grant applications submitted by trainees increased after training.

- **Return on Investment:** NIH's investment in the SRTIs has trained 855 researchers in approximately a 10-year period. Results of this evaluation show that this investment has contributed to the development of the next generation of behavioral and social science researchers. Researchers who attended trainings were more active in the SRTI training areas, wrote more grant applications, won more awards, published more, were more likely to incorporate the topic area into their teaching and engage in professional activities than researchers who were not selected for the training. The existence of the SRTIs has increased enthusiasm in the field and contributed to the creation of more funding vehicles. Although this is particularly relevant to emerging fields, existing fields would also benefit from highly trained researchers who are more engaged with NIH staff and other faculty/trainees in the SRTI fields of interest.

Recommendations

The results from this evaluation support the recommendation to continue SRTI training into the future. The evaluation results also suggest ways that the SRTIs might be strengthened.

Refine the SRTIs' Design and Evaluation

- Refine the core components of the SRTI designs to focus on what this study has shown to contribute the most to trainee success. Trainees stated that they learned best from faculty lectures and Question-and-Answer sessions.
- Incorporate formal mentoring into all SRTIs and focus this component to emphasize assisting with writing successful grant applications and defining research questions and methods for research proposals. Also, mentors and trainees should be encouraged early on in the SRTI process to build and keep relationships beyond the formal training. Trainees who continued to have contact with their mentors used those mentors to answer questions, help them make additional contacts, design studies, and submit grant applications. Faculty mentors stated that the mentees they worked with after training won more grant awards and received professional recognition. Mentor support is critical to transfer learning into research.

Promote Institutional Support for Trainees at Home

- SRTIs must improve engagement of trainees' home institutions in the SRTI application process—beyond letters of recommendation—to promote and ensure the most robust institutional supports are in place when trainees return to their home institutions. Results from this study demonstrated factors that produced the highest success scores for trainees were high levels of support from local mentors, supervisors, and faculty at the trainee's home institution.
- Trainees who received low levels of support from the above sources, were less successful in applying their training knowledge on the job. Conference calls, webinars, and online chatrooms that engage trainees' local supervisors or mentors before and after training might help to ensure higher levels of support, and thus higher trainee success. Further, letters of recommendation should include 2 to 3 things the institution will pledge to do to support the trainee when they return to their institution.

Continue to Assess the Cost-Benefit of the SRTIs

- This evaluation was able to begin measuring longer-term outcomes, but a longer time span is needed to more fully examine long-term outcomes and to assess the cost/benefit of the SRTIs. Additional analyses should continue to measure trainee success and investigate deeper into bibliometric analyses when a larger, more robust set of data are available. Long-term bibliometric analyses could track the growth of publications in the various SRTI research fields over time. The two-year time frame allowed for this evaluation found promising results, but future analyses could extend this timeframe to learn more.