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BUILD Peer Mentor Training Model: Developing a Structured Peer-to-Peer Mentoring Training for Biomedical Undergraduate Researchers

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Abstract

One of the key challenges many peer-to-peer mentoring programs face is the lack of high-quality mentor training. In order to address this issue, the BUILDing SCHOLARS (BUILD) program at The University of Texas at El Paso (UTEP) implements a structured peer mentor training and provides the training to BUILD fellows at UTEP for four academic years. This paper focuses on introducing the BUILD Peer Mentor Training (BPMT) model and investigates its impacts on students using program evaluation data. Our results reveal that BUILD peer mentors were satisfied with the BPMT and their relationships with the mentees. They also reported that the training greatly improved their problem solving and action planning skills, and slightly improved their communication skills and ability to assess a mentee's understanding. Finally, four practical recommendations are provided for institutions and programs that might be interested in implementing a similar peer mentor training.

Introduction

Peer-to-peer mentoring in higher education, where experienced students provide guidance and support to new students to enable them to navigate through their college education, is regarded as an effective intervention to ensure the success and retention of students (Johnson 2002; McLean 2004; Pagan & Edwards-Wilson 2002). Therefore, many institutions have implemented peer mentoring programs (Johnson 2002). A growing number of interventions supported by the National Science Foundation (NSF) and the National Institutes of Health (NIH) have also provided peer-to-peer mentoring to trainees. In fact, effective mentoring relationships between students and mentors are the central elements of undergraduate research programs and important drivers of student success (Falconer & Holcomb 2008; Schwartz 2012). Numerous studies have examined the conditions under which mentoring is most effective and identified factors influencing mentor-mentee relationships (e.g., Aikens et al. 2016; Byars-Winston et al. 2015; Daniels et al. 2016; Morales et al. 2018; 2019). For example, training of mentors has been found to be critical to the

success of students and mentoring programs (Anucha et al. 2001; Ehrich et al. 2004; Garvey & Alred 2000; Mee et al. 2003). A recent report on the science of effective mentoring in STEM provided by the National Academies of Science, Engineering, and Medicine (2019) also indicates that successful relationships between mentors and mentees can be nurtured.

However, a key challenge many peer mentoring programs face is the lack of high-quality mentor training (Ehrich et al. 2004). Previous studies on peer mentoring have mainly focused on how students benefit from the program in general, but overlooked the mentor training component (e.g., Beltman & Schaeben 2012; Colvin & Ashman 2010; Phinney et al. 2011). In this paper, we argue that the skills and knowledge required of a peer mentor should be not assumed, and the organization instituting a peer-to-peer mentoring program must commit resources to training.

In 2014, the National Institutes of Health (NIH) Building Undergraduate Infrastructure Leading to Diversity (BUILD) program funded different educational interventions at ten institutions across the US to educate the next generation of biomedical researchers. As one of the institutions, the BUILDing SCHOLARS (BUILD) program at The University of Texas at El Paso (UTEP) is addressing the needs of students in the US Southwest through a multi-institution consortium that includes Texas, New Mexico and Arizona, states which are home to dense concentrations of Hispanic and Native American students. The BUILDing SCHOLARS program implements a peer-to-peer mentoring component, which serves as an integral part of the program to promote a peer mentoring community. A structured peer mentor training was developed by the UTEP BUILD team and has been provided to BUILD fellows at UTEP for four academic years. This paper introduces this peer mentor training model, and investigates its impacts on students, using program evaluation data. We address three specific questions: 1) *What is the BUILD Peer Mentor Training (BPMT) model?* 2) *Are BPMT trainees satisfied with the BPMT model?* 3) *Does the BPMT model improve trainees' mentoring competencies and essential skills for college students?* Finally, recommendations are made for institutions and programs interested in implementing a similar training model.

Institutional Context

El Paso, Texas, is a bicultural, bilingual, binational community with a demographic that is 83% Hispanic. This region is one of the largest metropolitan areas when considering El Paso alongside its sister city Ciudad Juarez, Mexico. In this combined region, nearly three-quarter of households are Spanish and English bilingual, and the region is affected by low socioeconomic and educational factors. In particular, 23% of local families live below the poverty level, compared to 13% nationally; and only 22% hold a bachelor's degree or higher compared to 30% nationally (U.S. Census Bureau, 2018a, 2018b). At $41,637, the median household income in El Paso County is one of the lowest in the state, as compared to the statewide average of $53,207 (U.S. Census Bureau, 2017).

UTEP is located centrally in this bi-national community and is unique among research institutions with its majority Hispanic student population. UTEP's population is around 82% Hispanic, mirroring the El Paso population. UTEP enrolls more than 25,000 students, of which approximately 55% are the first in their families to attend college, and UTEP's core mission is to ensure access and excellence in educational programs. UTEP currently offers 72 bachelors, 73 masters, and 22 doctoral degrees. With over $94 million in annual research spending, UTEP is the first national research university serving a 21st-century demographic (Texas Monthly, 2019). UTEP's institutional setting is an important contextual factor for a peer mentoring program since a majority of the UTEP student body (and BUILD Fellows) are underrepresented students and often first generation college attendees. Interventions that work well in such a setting, transfer well to any research setting, include those that do not have a majority student population that mirrors UTEP (Kuh et al., 2008).

BUILD Peer Mentor Training Model

To answer *research question 1*, we introduce the BUILD Peer Mentor Training (BPMT) model. The BPMT follows a successful model from the University of New Mexico Mentoring Institute. The training was designed with the expert guidance of Dr. Nora Dominguez, Director of the Mentoring Institute. The BPMT runs for one academic year and has an integrated two-level structure (see Figure 1). The first level of the training focuses on providing trainees a theoretical foundation of peer mentoring. Specifically, all second-year BUILD fellows (peer mentors) are required to take a zero-credit peer mentoring course, which was designed by the BUILD Research Enrichment Core and facilitated by the training coordinator (a BUILD postdoctoral fellow) in the fall semester. In total, the peer mentoring course includes 22 two-hour training sessions. During those sessions, the training coordinator discusses theories and best practices related to peer mentoring, leadership, and emotional intelligence skills.

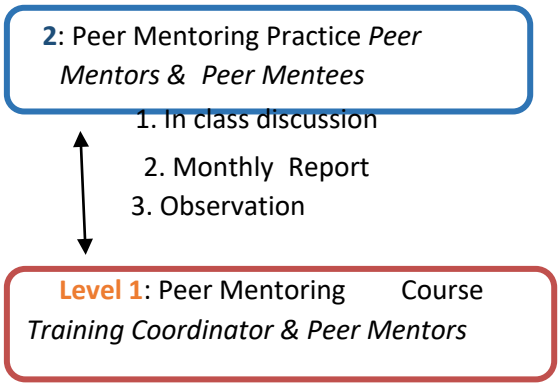

Figure 1. BUILD Peer Mentor Training Model

The learning objectives of the course are to help peer mentors develop and enhance their: 1) strategic planning, 2) emotional intelligence, and 3) mentoring skills. Specifically, three learning outcomes are associated with strategic planning skills, including goal-setting, time-

management, and study habits. In terms of goal setting, after taking the course, peer mentors will be able to create SMART Goals (specific/significant, measurable/meaningful, attainable/action-oriented, relevant/rewarding, and time bound/trackable) in their personal learning plan and facilitate this process to enhance their own and their mentees' academic, research, and personal performance. For time-management, the course helps peer mentors learn to prioritize competing objectives, interests, and activities to facilitate the achievement of their own and their mentees' academic, research, and personal goals. Peer mentors also learn to identify, develop, and use effective study habits and techniques to enhance their own and their mentees' academic performance.

Outcomes associated with emotional intelligence are self-awareness, self-regulation, motivation, empathy, and social skills. From the course, peer mentors learn to develop a deep understanding of their emotions, strengths, weaknesses, needs, and drives, and those of their mentees. They also learn to control and channel their emotions in productive ways, while modeling these behaviors on their mentees. The course helps peer mentors identify their own and their mentees' sources of self-motivation and drivers to achieve beyond their own and others' expectations, but at the same time thoughtfully consider other people's feelings in the process of making reflective decisions. Finally, in terms of social skills, peer mentors learn to actively communicate and interact with other people to create a developmental network to support their own and their mentees' career aspirations.

For mentoring skills, the course focuses on active listening, engaging conversations, and constructive feedback. Specifically, peer mentors learn how to use active listening skills (focus, hold judgment, reflect, clarify, summarize, and share); how to partake in engaging conversations with their mentees, by asking powerful questions that are personal, resonant, acute/incisive, reverberating, and explicit; and how to offer and accept constructive feedback to and from their mentees. Table 1 is the class schedule from a sample syllabus of the course.

Table 1. Class Schedule from a Sample Syllabus

Date	**Time**	**Location**	**What happens?**
Aug 26	**1:30pm – 2:30pm**	CCSB 1.0202	**Session 1: Why Peer Mentoring** • Program Overview • The Role of a Peer Mentor • Benefits for Peer Mentor and Mentee **Discussion**: • How to use Chronus to connect with your mentees ***What is Due?*** • Have matched with your mentee

Sep 16	**3:00pm – 4:30pm**	SCALE-UP (CCSB G.0706A)	**Session 2: Mentoring Skills** • Active Listening • Developing Self-Awareness • Problem Solving • Putting the Skills to Work **Discussion**: • Peer Mentoring Practice for Research Foundations/Driven Courses • Meetings with your mentees ***What is Due?*** • Have reviewed peer mentoring guide • Have reviewed mentee profile
Sep 23	**12:30pm – 2:30pm**	SCALE-UP (CCSB G.0706A)	**Session 3: The College Success Formula** • What You See—The Power of A Paradigm • What You Do—The Power of A Habit • What You Get—The Power Of Effectiveness **Discussion**: • Peer Mentoring Practice for Research Foundations/Driven Courses • Meetings with your mentees **What is Due?** • Monthly Progress Report for September • Have met with your mentee twice for September • Have conducted a social activity with your mentee for September
Oct 7	**12:30pm – 2:30pm**	SCALE-UP (CCSB G.0706A)	**Session 4: Principle-Centered living** • What are Principles? • What is Principle-Centered? • How to become a principle-centered person? **Discussion**: • Peer Mentoring Practice for Research Foundations/Driven Courses • Meetings with your mentees

Oct 14	**12:30pm – 2:30pm**	SCALE-UP (CCSB G.0706A)	**Session 5: How to Study in College** • How to study in college • Review previous lectures **Discussion**: • Peer Mentoring Practice for Research Foundations/Driven Courses • Meetings with your mentees
Oct 28	**12:30pm – 2:30pm**	SCALE-UP (CCSB G.0706A)	**Session 6: Be Proactive** • Choosing Your Own Weather • Taking Responsibility: Proactive Language • Your Circle of Influence • Breaking Negative Cycles **Discussion**: • Peer Mentoring Practice for Research Foundations/Driven Courses • Meetings with your mentees **What is Due?** • Monthly Progress Report for October • Have met with your mentee twice for October • Have conducted a social activity with your mentee for October
Nov 4	**4:15pm – 5:00pm**	SCALE-UP (CCSB G.0706A)	**Session 7: Think Win-Win** • The Win-Win Paradigm • Balancing Courage and Consideration • The Emotional Bank Account **Discussion**: • Peer Mentoring Practice for Research Foundations/Driven Courses • Meetings with your mentees

Nov 11	**3:15pm – 5:00pm**	SCALE-UP (CCSB G.0706A)	**Session 8: What Makes a Leader?** • Self-awareness • Self-regulation • Motivation • Empathy • Social Skills **Discussion**: • Peer Mentoring Practice for Research Foundations/Driven Courses • Meetings with your mentees
Nov 18	**12:30pm – 2:30pm**	SCALE-UP (CCSB G.0706A)	**Session 9: Celebration** • Summary • Evaluation and Survey **What is Due?** • Monthly Progress Report for November • Have met with your mentee twice for November • Have conducted a social activity with your mentee for November

The second level of the BPMT focuses on providing trainees opportunities to actively engage in peer mentoring so that what they learn can be readily applied. At the beginning of the fall semester, peer mentors are matched with mentees (first-year BUILD fellows). The matching process is managed by the training coordinator. In fact, a matching algorithm is designed specifically for the program and operated through an online platform, Chronus. Generally speaking, peer mentors and mentees are matched based on their professional and personal similarities. Once matched, mentors and mentees interact in various ways. For example, every month, peer mentors are required to schedule at least two face-to-face meetings with mentees. During those meetings, peer mentors provide mentees with psychosocial support, academic advice, or they study or prepare for exams together. Besides the meetings, peer mentors also organized an on-campus activity once a month focused on supporting the mentee's social and navigational skills. For example, at the beginning of the semester, peer mentors usually take mentees for a campus tour; during the semester, they participate in various activities organized by UTEP student organizations together; and working with the BUILD outreach coordinator, peer mentors and mentees go to local high schools to promote the BUILDing SCHOLARS program and recruit students for the next year. By the end of the semester, the training coordinator and all peer mentors work together to organize a get-together event for the peer mentoring program (Figure 2).

Figure 2. Peer Mentoring Social Event, Fall 2015

There are two main advantages of the BPMT model. First, the two levels of training are very well connected. In each training section, peer mentors have opportunities to discuss their mentoring practices. The training coordinator facilitates the group discussion and explains how to connect peer mentoring theories to practices. Peer mentors report progress, ask questions, and provide feedback to each other. Every month, peer mentors are also required to submit a report on their own and their mentees' progress in achieving the goals established in their mentoring plan. The training coordinator reviews those reports and provides timely written feedback. In addition, the training coordinator randomly attends mentor-mentee meetings to observe their interactions and provide the peer mentors constructive feedback.

Second, the BPMT model is based on strong interpersonal bonds and frequent interactions between peer mentors and mentees. Both peer mentors and mentees are BUILD fellows, and most of them are from El Paso. In other words, they all share similar socio-demographic

backgrounds and interests in pursuing biomedical research careers. More importantly, during the first year in the program, all BUILD fellows had peer mentors. This ensures that prior to becoming peer mentors, BUILD fellows already experienced being a mentee. Taken together, similar personal or professional backgrounds and previous mentoring experiences mean that BUILD peer mentors tend to have a good understanding of the program and their mentees. Additionally, mentors and mentees have many opportunities outside the peer mentoring program to interact with each other. For example, they attend professional development workshops together, which are offered by the BUILD Student Training Core, and they might also conduct summer research at the same university. Previous research suggests that similar backgrounds, previous mentoring experiences as a mentee, and frequent mentor-mentee interactions all contribute to positive mentoring outcomes (Allen 2003; Lattuca et al. 2006; Morales et al. 2019).

To facilitate mentor-mentee interactions, time and other resources are required from those championing the peer-mentoring program and the institution (Garvey & Alred, 2000). Frequently, there are a few research faculty on campus who have interest or are charged with the overseeing a peer-mentoring program. The institution should respect the time invested in these activities as a legitimate and important use of research faculty time. Perhaps providing credit for teaching or research mentoring would help alleviate time commitments for research faculty administering a peer-mentoring program. Moreover, the institution should also contribute resources, such as facilities and funds, when available, to support these mentoring activities. The type of resources can be as simple as providing a space on campus for informal peer-mentoring interactions or providing funds to students to plan activities on or off-campus. In addition to faculty time and resources, any peer-mentoring program will require a time commitment by the peer mentors and any staff assisting in the program. The institution and the students' research mentors should also recognize this time commitment and understand the importance of peer mentoring training in the students' professional development.

To summarize, the BPMT model provides peer-to-peer support to undergraduate biomedical researchers participating in the BUILDing SCHOLARS program. It cultivates an inclusive scientific community, which reduces power differentials, social distance, and fosters more active engagement among BUILD fellows. In particular, power differentials convey the apparent difference between mentor and mentee in terms of status and authority, while social distance has been shown to be a detriment to underrepresented minorities' college life (Parrillo & Donoghue, 2005). That is why it was essential to create a model that fosters a safe environment for mentors and mentees. After taking the BPMT, BUILD fellows become more academically and socially prepared for challenges they may face along the biomedical research career path.

Program Evaluation Methods and Results

Methods. *Data and Data Collection.* Using program evaluation data, we conducted statistical analyses to address research *questions 2 and 3.* This analysis focuses on the 2016-2017 cohort. Pre- and post- surveys were administered to peer mentors by the UTEP BUILD evaluation team to assess the role that the BPMT had on their development as mentors. The pre-survey was administered in early fall 2016, and the post-survey was administered at the end of spring 2017. The surveys included questions measuring the peer mentors' perceptions of skills and behaviors needed to excel both academically and professionally. A total of 35 peer mentors participated in the program in the academic year 2017-2018. Out of the 35 peer mentors, 23 completed both the pre- survey and post-survey.

Variables. Trainees' satisfaction: In the survey, peer mentors were asked to indicate their level of satisfaction or dissatisfaction with the following items: (a) The relationship with your peer mentee and (b) the overall Peer Mentoring Program. Peer mentors provided their answers using a five-point Likert scale ranging from "extremely dissatisfied" to "extremely satisfied."

Essential skills for college students: Peer mentors were first asked to provide their level of agreement or disagreement using a five-point Likert scale (from 1 = "strongly disagree" to 5 = "strongly agree") regarding their communication skills. Students were also asked to provide their level of agreement with statements regarding being skilled at searching for opportunities/services provided by the university. Students indicated their level of agreement using a five-point Likert scale ranging (from 1 = strongly disagree" to 5 = "strongly agree"). Further, peer mentors were asked to indicate how much they agreed with statements related to being skilled at problem solving and action planning using a five-point Likert scale (from 1 = "strongly disagree" to 5 = "strongly agree."

Mentoring Competency Assessment: Peer mentors were asked to complete the Mentoring Competency Assessment (MCA), which is a validated skills inventory that can be used to evaluate different competencies of a mentor (i.e., maintaining effective communication, aligning expectations, assessing understanding, addressing diversity, promoting professional development, and fostering independence) (Fleming et al. 2013; Pfund et al. 2014). The MCA consists of 26 items. Peer mentors were asked to rate themselves using a 7-point Likert-type scale in which 1 = "not at all skilled," 4 = "moderately skilled," and 7 = "extremely skilled" for each of the items. (Although the MCA was originally designed for faculty, post-doctoral, or graduate student mentors, the six competencies it assessed also apply to peer mentors in this study. However, future research should seek to develop a specific mentoring competency scale for peer mentoring programs.)

Emotional Intelligence: Peer mentors were asked to complete the Trait Emotional Intelligence Questionnaire—Short Form (TEIQue-SF). This is a 30-item questionnaire aimed at assessing global trait emotional intelligence. The peer mentors were asked to provide their level of

agreement with various statements related to emotional intelligence using a seven-point Likert scale ranging from "completely disagree" to "completely agree."

Statistical Analyses. Using the survey data, a mean score for each skill (i.e., communication, searching for opportunities/services, problem solving) and scale (mentor competency skills and emotional intelligence) was computed for each peer mentor. Higher mean scores represent probable success in that area, whereas lower scores may be indicative of an area that potentially needs improvement. To assess differences related to those skills and scales reported in the pre and post-surveys, a Wilcoxon Rank Sum test (V and p) and resampling-based paired t-test (presamp) were conducted. The rank test, a nonparametric alternative to a paired t-test, examines the similarity between the distributions while the paired t-test compares the means of both populations. Resampling was used for the paired t-tests due to a lack of evidence of normality. We note that, in most cases, the two test results show reasonable consistency. In all reported results, a p-value associated with the V test statistic of the Wilcoxon test is reported alongside a corresponding p-value resulting from a resampling based test.

Results. Results from the peer mentor satisfaction portion of the survey indicate that two-thirds (66%) of the peer mentors reported being extremely satisfied with the relationship formed with their peer mentee. Similarly, about 48 percent of the students indicated being extremely satisfied with the Peer Mentoring Program overall. Interestingly, based on the results, satisfaction with the mentoring relationship was positively correlated with satisfaction with the overall Peer Mentoring Program (r = .479, p = .009).

In terms of communication skills, results demonstrate that there was a possible increase in peer mentors' self-reported communication skills between the pre-survey (M= 4.22, SD= 0.59) and post-survey (M= 4.43, SD= .44), but fails to show evidence of statistical or practical significance using either the rank test or t-test ;V=129.2, p = 0.168, p_{resamp} = 0.082 (see Table 2). In the section of the survey related to peer mentor's perceived ability to search for opportunities/services, results indicate that there was a self-reported increase in peer mentors' skills related to searching for opportunities/services. Further, a paired samples t-test showed that the difference between the pre-scores (M= 4.60, SD=0.58) and post-scores (M= 4.71, SD= 0.54) was not statistically significant; V = 143.0, p = 0.172, p_{resamp} = 0.172 (see Table 2). As suggested in Table 2, our results suggest that there was an increase in student mentors' skills related to problem solving and action planning. Moreover, the difference between the pre-survey scores (M= 4.77, SD= 0.50) and postscores (M= 4.92, SD= 0.56) was statistically significant using either the rank or t-test results; V= 106.5, p = 0.009, p_{resamp} = 0.005.

Table 2. Communication Skills, Searching for Opportunities, and Problem Solving and Action planning (N=22)

	Pre		Post		Mean Diff	*V*	*p*	*presamp*
	M	***SD***	***M***	***SD***				
Communication Skills	4.22	0.59	4.43	0.44	0.22	129.2	0.168	0.082
Searching for Opportunities	4.60	0.58	4.71	0.54	0.17	142.0	0.172	0.172
Problem Solving & Action Planning	4.77	0.50	4.92	0.56	0.28	106.5	**0.009**	**0.005**

Results in Table 3 indicate evidence of an increase in self-reported competencies in assessing a mentee's understanding with pre-scores (M=4.69, SD=1.27) and post-scores (M=5.21, SD=1.17), showing practical as well as statistical significance; V=172.5, p=0.047, p_{resamp}=0.147. However, the difference between the pre and post-scores is only indicated by the rank test, implying that the score distribution across the rating levels differs for the two groups. The t-test does not provide evidence about a difference between the reported means, so there is no evidence that these central values differ. See Table 3 for details on the other subscales of the MCA.

Table 3. Mentor Competency Assessment Skills (N=22)

	Pre		Post		MeanDiff	*V*	*p*	*presamp*
	M	***SD***	***M***	***SD***				
Maintaining Effective Communication with Mentee	5.39	0.81	5.52	0.85	0.18	150.5	0.230	0.343
Aligning Expectations with Mentee	5.13	1.09	5.33	1.19	0.15	127.5	0.409	0.616
Assessing Mentee's Understanding	4.69	1.27	5.21	1.17	0.50	172.5	**0.047**	0.147
Fostering Mentee's Independence	5.59	1.07	5.76	1.14	0.14	132.0	0.577	0.707
Promoting Mentee's Professional Development	5.43	0.93	5.57	0.92	0.15	129.0	0.378	0.333

Finally, means scores showed that, on average, student mentors' emotional intelligence scores did not increase between the pre and post survey. A paired samples t-test revealed that the differences between the pre-scores *(M*=5.35, *SD*= 0.67) and post-scores (*M*= 5.12, *SD*=0.76) was not statistically significant; $V = 144.5$, $p = 0.570$, $p_{resamp} = 0.914$ (see Table 4).

Table 4. Emotional Intelligence (N=22)

	Pre		Post		Mean Diff	*V*	*p*	Presamp
	M	***SD***	***M***	***SD***				
Emotional Intelligence	5.35	0.67	5.12	0.76	0.01	144.5	0.570	0.914

Discussion, Conclusion, and Implications for Practice

To summarize, the evaluation results suggest that peer mentors were satisfied with the BPMT and their relationships with the mentees. After taking the BPMT, peer mentors reported improved problem solving and action planning skills and slightly improved communication skills and skills in assessing a mentee's understanding. These initial results should be regarded with some caution since the peer mentors reported initial high scores for those skills prior to the training. In view of these initial high scores, we have transitioned to a retrospective pre-post assessment of these scales for all future data collection efforts and recommend this approach for other programs. These possibly inflated pre-survey scores could affect accurate measurement of growth in reported results. Though the remaining items are not statistically significant, most indicate increases that could indicate potential growth. This supports the belief that the peer mentors are experiencing positive changes in their skills as they continue to develop as peer mentors and, with more data, these increases can be confirmed. In addition, the implementation of other measures focused on different aspects of peer mentoring and or the use of qualitative questions may be a fruitful consideration for the future studies.

We provide four practical recommendations for institutions and programs that might be interested in implementing a similar peer mentor training: 1) implementing programs that emphasize different skills; 2) matching students with peers with similar goals; 3) implementing a two-level model; and 4) having a training coordinator. While this study was conducted at a large university with a majority Hispanic population, we believe that the following recommendations are well suited for other universities (Kuh et al., 2008) if they are implemented in their entirety.

First, preliminary evidence presented here suggests that BUILD peer mentors benefitted from the BPMT by improving their self-reported problem solving skills. Though our findings provide the strongest evidence about this outcome, we note that communication skills and understanding the peer mentee's understanding also show some gains. Based on this evidence,

we suggest implementing programs that emphasize all skills assessed in the self-reported surveys, but focus on those outcomes that may provide greatest payoff. Second, for institutions or programs that are interested in increasing the recruitment and retention of students with underrepresented backgrounds, we suggest they consider matching students with peer mentors that have similar professional and personal characteristics. In addition, we also found that a model following a two-level structure has the potential for peer mentors to build strong relationships with their mentees and gain leadership skills in the process. Finally, having a training coordinator is crucial for the BPMT model, as the coordinator provides peer mentors with the tools necessary to improve their problem solving and communication skills. Future research with more extensive data can investigate in greater detail the features of the model that are more beneficial for the peer mentors.

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References

Aikens, M. L., Sadselia, S., Watkins, K., Evans, M., Eby, L. T., & Dolan, E. L. (2016). A social capital perspective on the mentoring of undergraduate life science researchers: an empirical study of undergraduate–postgraduate–faculty triads. CBE-Life Sciences Education, 15(2), ar16.

Allen, T. D. (2003). Mentoring others: A dispositional and motivational approach. Journal of Vocational Behavior, 62(1), 134-154.

Anucha, U., Regehr, C. and Daciuk, J. (2001) Evaluation of the Volunteer Connections Programme, Toronto: Centre for Applied Social Research, University of Toronto.

Beltman, S., & Schaeben, M. (2012). Institution-wide peer mentoring: Benefits for mentors. The International Journal of the First Year in Higher Education, 3(2), 33-44.

Brown, A. (2010). Quantitative study of leadership self-efficacy and peer mentorship at the University of Wisconsin-La Crosse (Doctoral dissertation).

Byars-Winston, A. M., Branchaw, J., Pfund, C., Leverett, P., & Newton, J. (2015). Culturally diverse undergraduate researchers' academic outcomes and perceptions of their research mentoring relationships. International journal of science education, 37(15), 2533-2554.

Colvin, J. W., & Ashman, M. (2010). Roles, risks, and benefits of peer mentoring relationships in higher education. Mentoring & Tutoring: Partnership in Learning, 18(2), 121-134.

Daniels, H., Grineski, S. E., Collins, T. W., Morales, D. X., Morera, O., & Echegoyen, L. (2016). Factors influencing student gains from undergraduate research experiences at a Hispanic-serving institution. CBE—Life Sciences Education, 15(3), ar30.

Ehrich, L. S., Hansford, B. & Tennent, L. (2004) 'Formal mentoring programmes in education and other professions: A review of the literature', Educational Administration Quarterly, 40, 518-540.

Fleming, M., House, M. S., Shewakramani, M. V., Yu, L., Garbutt, J., McGee, R., ... & Rubio, D. M. (2013). The mentoring competency assessment: validation of a new instrument to evaluate skills of research mentors. Academic medicine: journal of the Association of American Medical Colleges, 88(7), 1002.

Garvey, B. & Alred, G. (2000) 'Educating mentors', Mentoring & Tutoring, 8, 113-126.

Johnson, W. B. (2002) 'The intentional mentor: Strategies and guidelines for the practice of mentoring', Professional Psychology: Research and Practice, 33, 88-96.

Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J., and Gonyea, R. M. (2008). "Unmasking the effects of student engagement on first-year college grades and persistence." The Journal of Higher Education, 79(5), 540-563.

Lattuca, L.R., Terenzini, P.T., Volkwein, J.F., and Peterson, G.D. 2006. "The changing face of engineering education." Bridge Washington National Academy of Engineering 36(2), 5.

McLean, M. (2004) 'Does the curriculum matter in peer mentoring? From mentee to mentor in problem-based learning: A unique case study', Mentoring and Tutoring, 12, 173-186.

Mee Lee, L. & Bush, T. (2003) 'Student mentoring in higher education: Hong Kong Baptist University', Mentoring & Tutoring, 11, 263-271.

Million, S. K. (1988) 'Training mentors and protégés: The key to successful mentoring programmes', Paper presented at the Annual Conference of the National Council of States on Inservice Education, New Orleans, LA.

Morales, D.X., Grineski, S.E., & Collins, T.W. (2017). "Increasing Research Productivity in Undergraduate Research Experiences: Exploring Predictors of Collaborative Faculty–Student Publications." CBE-Life Sciences Education 16(3), ar42.

Morales, D. X., Grineski, S. E., & Collins, T. W. (2018). Effects of gender concordance in mentoring relationships on summer research experience outcomes for undergraduate students. Science Education, 102(5), 1029-1050.

Morales, D. X., Grineski, S. E., & Collins, T. W. (2019). Effects of Mentoring Relationship Heterogeneity on Student Outcomes in Summer Undergraduate Research. Studies in Higher Education. Published Online. DOI: 10.1080/03075079.2019.1639041.

National Academies of Science, Engineering, and Medicine. (2019). The Science of Effective Mentoring in Science, Technology, Engineering, Medicine, and Mathematics (STEMM). http://sites.nationalacademies.org/pga/bhew/mentoring/index.htm.

Pagan, R. & Edwards-Wilson, R. (2002) 'A mentoring programme for remedial students', Journal of College Student Retention, 4, 207-226.

Parrillo, V. N., & Donoghue, C. (2005). Updating the Bogardus social distance studies: A new national survey. The Social Science Journal, 42(2), 257–271. https://doi.org/10.1016/j.soscij.2005.03.011

Pfund, C., House, S. C., Asquith, P., Fleming, M. F., Buhr, K. A., Burnham, E. L., ... & Shapiro, E. D. (2014). Training mentors of clinical and translational research scholars: a randomized controlled trial. Academic medicine: journal of the Association of American Medical Colleges, 89(5), 774.

Phinney, J. S., Torres Campos, C. M., Padilla Kallemeyn, D. M., & Kim, C. (2011). Processes and outcomes of a mentoring program for Latino college freshmen. Journal of Social Issues, 67(3), 599-621.

Power, R. K., Miles, B. B., Peruzzi, A., & Voerman, A. (2011). Building bridges: A practical guide to developing and implementing a subject-specific peer-to-peer academic mentoring program for first-year higher education students. Asian Social Science, 7(11), 75-80.

Schulze, S. (2010). A structured programme to develop novice researchers at the University of South Africa. Acta Academica, 42(3), 169-193.

Texas Monthly. (2019) "2019 Texas College Guide", http://collegeguide.texasmonthly.com/university-of-texas-at-el-paso, accessed 8/6/2019.

Tierney, J. P. & Branch, A. Y. (1992) College Students as Mentors for At-risk Youth: A Study of Six Campus Partners in Learning Programmes, Philadelphia, PA: Public/Private Ventures.

Tindall, J. A. (1995) Peer Programmes: An In-Depth Look at Peer Helping – Planning, Implementation, and Administration, Bristol, PA: Accelerated Development.

U.S. Census Bureau (2017). State & county quick facts: El Paso, Texas. Retrieved from https://www.census.gov/quickfacts/table/PST045216/4824000.

U.S. Census Bureau. (2018a) Quick facts: El Paso County, Texas. Accessed August 3, 2018 from https://www.census.gov/quickfacts/fact/table/elpasocountytexas,elcajoncitycalifornia,tx/PST045 217

U.S. Census Bureau. (2018b). Quick facts: United States. Accessed August 3, 2018 from https://www.census.gov/quickfacts/fact/table/US/EDU685216#viewtop