

Competency evaluated^a

Milestone evaluated^b

Objective 1

Analysis of all participants' responses demonstrated that program participation directly contributes to the acquisition of competencies and achievement of milestones. Analysis of the self-reflective retrospective post-then-pre questions demonstrated statistically significant improvement in trainees' acquisition of competencies.

competencies, the trainees who visited the classrooms two or more times were more likely to show significant

knowledge is heightened when it translates to building effective skills with patients and the community [21].

We suggest that an effective method for developing practical skills in cultural competence could be service-learning opportunities where medical trainees are immersed in a community setting in which the social determinants of health are evident; and in which they have in-person interactions where they can apply the skills required to practice effectively with diverse patient populations. Sparse research suggests that service-learning can play an important role in developing cultural competency skills and may encourage future engagement in the community [22], but more research is needed to validate this methodology and determine which types of service-learning are most effective [23].

Additional program benefits

In addition to the acquisition of competencies and achievement of milestones related to health disparities, medical trainees' feedback suggests program participation may have additional benefits. For example, program curriculum teaches methods for nutrition and physical activity counseling and promotion which is a noted area of deficit in physician training [24]. Program curriculum also emphasizes the fundamental importance of having health goals come directly from the person with diabetes which is a key feature of personalized care planning, a tool frequently touted for its benefits in helping primary care physicians manage patients with chronic disease [25]. Lastly, medical trainees have noted that being present at the high school energizes them and seems to create community relationships and trust that was not present before. One medical trainee noted: I think that it is a great program and that its lessons go beyond discussing diabetes and more into closing the gap (the distrust) between urban physicians and their patients. Many residents describe their experience as a great way to get some perspective and "recharge their batteries." This opportunity fulfills the well-documented desire of physicians to be active participants and advocates for health in their communities [26].

Limitations

The retrospective design of this study has several limitations. Although the retrospective post-then-pre design is shown to reduce response shift bias associated with pretest overestimation or underestimation [14], the design is subject to biases in self-appraisal and recall. We cannot rule out the bias that exists with all self-report studies. It is possible, for example, that medical trainees may have been able to guess the hypothesis of this study and formulated their answers to conform with this hypothesis.

Our participant sample also had limitations. Our program was implemented among five residency programs with which we had established partnerships. Participants were selected based on their availability to teach classes given their training schedules and in some cases, on their willingness to participate. Randomization was not feasible given the resource and scheduling limitations of this multi-site study. The sample differs from an ideal sample that would be randomly selected in that it only occurred at sites where a training program director felt the program was worthwhile which likely led to an overrepresentation of trainees who are interested in community health and outreach. Trainees in programs that do not emphasize community health and outreach were left out of this sample. Additionally, because some of the participating trainees elected to participate, we recognize the potential for self-selection bias. Thus, this non-probability sample

is limited in that it may not provide a representative sample of all residents or medical trainees, and we can't make generalizations pertaining to all residency programs in the US.

Understanding that limitation, however, we believe that for trainees not represented in our sample, participation may have yielded greater gains in competencies, as those trainees not represented in our sample may have begun the process with less confidence and skill in the competencies we were measuring which would create more room for growth.

Additionally, when we compared residency programs where participation in the intervention was mandatory for all residents to programs where participation was voluntary, we found that the 38 residents who were mandated by their programs to participate in the intervention were as likely to report significant positive improvements as the 22 residents who participated on a voluntary basis.

Additionally, in pursuing our second objective, we were limited by lack of randomization to allocate medical trainees into one or two or more sessions, which could also contribute to self-selection bias. Trainees who taught only one class included about the same percentage of males and females, less African American participants (1 out of 20 versus 5 out of 40), a higher percentage of Asian (45%, versus 25% participating in 2 or more), and lower percentage of Whites (45%, versus 60% participating in two or more sessions). To address this issue, we plan to replicate the program making it mandatory for all participants to provide a specific number of sessions. Additionally, we only surveyed trainees after participation using retrospective post-then-pre design to assess perceived competencies prior to and after participating. To ensure this methodology accurately captures differences in perceived competency, we intend to add pre-participation surveys.

Conclusion

Service-learning opportunities for medical trainees have potential to address the problem of medical trainees' lack of knowledge and understanding of underserved populations. Participation in such programs can directly contribute to the acquisition of competencies and milestones developed to address health disparities, and continuity of participation appears to be important to maximize benefit.

Acknowledgments

The authors wish to thank Dr. Kelley Skeff (Professor of Medicine, Primary Care and Population Health; Co-Director Stanford Faculty Development Center for Medical Teachers, Stanford University School of Medicine) and Dr. Lee Sanders (Associate Professor, Stanford Department of Pediatrics; Co-Director Center for Policy, Outcomes, and Prevention, Stanford University School of Medicine) for their guidance and support of this project. The authors also appreciate continued guidance from Dr. Kate Lorig (Professor Emeritus, Department of Medicine, Stanford University School of Medicine). Additionally, the authors appreciate our residency and high school partners in this work. Specifically, we would like to thank Dr. Andrew Schectman (O'Connor Stanford Family Medicine Residency Program, San Jose, CA); Dr. Andrew Berta (Chestnut Hill Family Medicine Residency Program, Philadelphia, PA); Dr. Philip Diller (University of Cincinnati Family Medicine Residency Program, Cincinnati, OH); Dr. Margaret Riley, University of Michigan, Family Medicine Residency Program, Ann Arbor, MI), and Ms. MM [redacted], [redacted] Residency

Funding/Support