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# The Impact of a Family Physician-Led Undergraduate Public Health Course on Individuals and the Community

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**Abstract**

**Introduction:** In 2014, Dartmouth College implemented its first undergraduate public health course, taught in an experiential service learning model by a local family medicine physician. Interdisciplinary professionals collaborated to advance the vision "Healthy Students Contributing to Healthy Communities" and delivered a course covering relevant personal and public health content.

**Materials and methods:** The course included experiential, service, and team-based learning aimed at achieving measurable improvement in community health challenges and focused public health education in an undergraduate setting. A comprehensive assessment was designed to understand the impact of the course, both on individual students and local communities.

**Results:** Results of student assessment and course evaluation demonstrated success and feasibility of an experiential public health course in undergraduate curriculum taught by a family physician. All students reported ability to meet objectives and ranked the overall quality of the course as excellent. Results also demonstrated student effectiveness in designing and implementing community health interventions. All students completed personal health improvement projects and students collaborated in teams to complete community health improvement projects. All community partners reported a "very high" degree of satisfaction with interventions and deliverables. Students' pre and post course survey results demonstrated enhanced knowledge in public health and leadership skills. By the end of the course, all students indicated that they were very or extremely likely to enter a health-related career, with many intending to pursue public health or primary care specifically.

**Conclusion:** The course's success in providing experiential exposure and mentoring to undergraduates on public health within the context of family medicine prompts us to offer this course as a model to promote knowledge, skills and career interests in primary care and public health.

## INTRODUCTION

Family medicine physicians play a crucial didactic role in the shaping of medical students and family medicine residents in classroom, clerkship, and other educational settings. From pre-clinical doctoring courses to unique public health-focused family medicine residencies such as at University of Massachusetts – Worcester [1], the leadership of family medicine physicians offers a unique voice to the public health education of all varieties of future healthcare professionals. Though the influence of family medicine physicians in incorporating public health into various educational settings has been studied in several environments [1-3], the role of the family medicine physician in educating undergraduate students on public health principles has yet to be examined.

Public health concerns including prevention and population health are present in nearly all healthcare settings [2], so undergraduate students who will ultimately enter a wide variety of fields of healthcare and other professions are ideal beneficiaries of a focused public health curriculum taught by a family physician. From the medical school level [3] to the residency level [4], many students and programs report inadequate training in public health topics. Furthermore, with the experiential, project-based focus of the course, students learned the necessary skills of working in inter-professional teams.

Over the past 15 years, there has been increasing interest in public health courses at the university level. The Institute of Medicine's 2003 report, entitled "Who Will Keep the Public Healthy?" recommended that all undergraduates have access to a public health education [5]. As an indication of this growing interest, in 2000, there were 76 undergraduate institutions offering undergraduate public health courses; by 2008 more than 130 colleges were offering this curriculum [5].

In response to this growing interest in public health education, planning for a new, experiential, service learning-based course began at Dartmouth College in 2013. This paper describes the design and delivery of Dartmouth's Introduction to Public Health course, taught with an experiential focus by an experienced, local family physician. Presented below, we describe the teaching and assessment methods utilized, and a review of the impact of the course on both students and on community health partners with whom students collaborated.

## MATERIALS AND METHODS

### Course development and design

Throughout the course design process, every element from selecting a course director to selecting the individual topics and lecturers was highly intentional. Before moving forward with curriculum development, the course co-creators were first tasked with selecting a course director. After significant deliberation, a family physician and medical school professor with a master's degree in public health and experience in community projects was selected. Her ability to emphasize the clinical relevance of public health in family practice was a critical deciding factor in her appointment to the role. Next, a curriculum advisory committee was established, comprised of undergraduate students, the family physician course director, senior professors from the social sciences, pre-health advisors, and public health graduate program administrators and researchers. To cover the broad range of public health topics, content experts from a variety of disciplines were identified by the course director and invited to lecture (see lesson content in Appendix A). The course was not brought forward by a specific department and Dartmouth did not have an undergraduate public health department at the time, so the sociology department was chosen to house and support the course. "Introduction to Public Health: an experiential approach to individual, community, and population-based health" was subsequently listed as Sociology 37 for the fall of 2014.

Research has proven that experiential and problem-based learning results in increased professional knowledge acquisition, critical thinking and problem solving [6]. In developing the course, the curriculum advisory committee decided that an experiential service learning model would best instill the public health concepts while engaging the students with their local communities. Directors of community organizations familiar to the course director were invited to collaborate with the curriculum advisory committee to select sites for the Community Health Improvement Projects (CHIP). The sites chosen were local nonprofit organizations that offer a range of public health services:

1) The Upper Valley Haven, an organization that provides food, housing, education, clothing and support for the homeless;
2) WISE of the Upper Valley, an organization that provides advocacy, crisis services, and community education on domestic and sexual violence;
3) West Central Behavioral Health, a community mental health center; and
4) The Upper Valley Trails Alliance, an organization that supports area walking and hiking trails, and promotes physical activity in elementary schools.

These individual sites were chosen for both diversity of program public health offerings and for pre-existing relationships with the course director.

Student enrollment was capped at 16 for the first year of the course in order to assure individualized attention and manageable group sizes. Four teaching assistants were selected to each facilitate a team of four students in partnering with one community organization. The teaching assistants received additional training in facilitation and team performance, piloted assignments, and served on the curriculum advisory committee. Two longitudinal projects served as learning tools in educating the students about both their own health and the health of their communities. Descriptions of both of these projects are outlined below. The curriculum advisory committee sought to maintain continuity of course sessions by establishing a common "class format" to be followed for each lecture. Additionally, methods of teaching and course objectives were emphasized in the syllabus and in the first class session.

### General class format

Discussion of Pre Class Reflections - 15 min

Introduction of Speaker and Career Pathway - 15 min

Lecture –Discussion, Q&A, In-Class Exercise - 60 min

Check in - Community of Learners - 15 mins

Post Session Feedback /Next Session Prep - 5 min

### Methods of teaching

Large Group Topic lecture and discussions with content experts. Individual readings, guided reflections, assignments and project completion. Team based Community of Learners: small group exercises, team final paper and presentation. Experiential Community-based Learning: with site visits and hands on applications. Topic Specific Interventions: large group lecture-discussions led by regional and national experts and community health organizational leaders on their improvement strategies, interventions, successes, challenges and lessons learned. The course director will partner with expert speakers to align session content to the overall course objectives and content.

Oral Presentations with Faculty/Peer Feedback.

### Course objectives

At the culmination of the course, students will be able to: Compare and contrast individual, public and population health. Discuss public health challenges and complete a needs assessment at the local level. Describe career opportunities in health related fields. Apply motivational interviewing and systems based improvement strategies to propose and participate in health interventions. Perform effectively as a team member. Create a personal health vision and a Personal Health Improvement Project (PHIP). Develop and present a collaborative Community Health Improvement Project (CHIP).

### Personal Health Improvement Project (PHIP)

Over the duration of a two-week period during the middle of the course, students, teaching assistants, and the course director completed Personal Health Improvement Projects (PHIPs). The PHIP served as an opportunity to experience the challenge of changing personal behavior and develop an appreciation for the potential impact of an individual's health improvement on population and public health. Each participant was tasked with choosing an element of their health behavior and working towards improvement on their chosen topic. Each day throughout the PHIP period, students would report on their individual progress and share anecdotal experience highlighting their successes and challenges in bringing about change within themselves. The goals of the PHIP were introduced by the family physician course director and inspired by her prior experiences in working with her individual patients to take their health into their own hands. Common PHIP themes included physical exercise, nutrition, sleep, time management, self-reflection, and mindfulness.

### Community Health Improvement Project (CHIP)

Once the PHIP was completed, the students were assembled into teams of four to partner with one of the community organizations to begin to work to bring about change on a population level. The team-based Community Health Improvement Project (CHIP) experience established a collaborative and experiential approach to apply the principles of teamwork, public health, and systems change. Teams established roles, rules, and a project aim and developed a plan for implementing, monitoring, communicating and sustaining their progress and project. Deliverables (Table 1) were presented and evaluated by peers, the curriculum advisory committee, community organization leaders, and public health leaders. The SMART objectives for the CHIP projects were: (1) to design, distribute, and analyze a survey to assess the Haven employees' current levels of physical activity, smoking behavior, weight control, and eating practices; (2) to compile a report on teen suicides in West Central Behavioral Health's catchment area (Southern Grafton and Sullivan Counties) in the past 10 years.; (3) to create an informational brochure for WISE that provides "reader-friendly" research on community mind-body practices as a healing activity for survivors of domestic and sexual violence; and (4) to increase participation and completion in the Passport to Winter Fun physical activity youth program by providing the UVTA recommendations on program reform and an informational toolkit for faculty at participating schools.

### Surveys and assessments

To assess the impact of the course, pre-course and post-course surveys were completed by all students, and community health organization leaders were surveyed post-course. These surveys were intended to measure the impact of the course in providing guidance on eventual career choice, public health skills gained, and effectiveness of teaching. The surveys were administered on paper in class on the first and last day of the course (Appendix D). Additionally, every student enrolled in a Dartmouth College course must complete the "Universal Course Assessment" (Appendix B) online at the culmination of each course. The course director added an addendum to the Dartmouth-wide course evaluation that was completed at the end of the course (Appendix C) and required the students to complete an additional paper survey to assess effectiveness of teaching modules (Appendix E). All questions were constructed to allow feedback on course objectives and structure, as well as methods of teaching and individual principles addressed.

The grading system revolved primarily around participation in both class discussion and group projects to emphasize the importance of engagement in the course lessons. "Pre-Class Readings and Narrative Reflections" were worth 15% of the final grade, "Pre-Class Assignments" were worth 25%, the PHIP was worth 20%, the CHIP was worth 30%, and "In Class Exercises, Participation, and Professionalism" were worth 10% of the final grade. Readings were available on the course webpage and students were required to complete brief reflections before class each day. Occasionally, an additional assignment was added to augment the student's knowledgebase, and these assignments generally revolved around researching for the Community Health Improvement Project.

## RESULTS

### Student evaluation of classroom environment and overall learning experience

In the post course survey, students reported that the vision "Healthy Students Contributing to Healthy Communities" was "easily articulated" and the regularly revisited values "promoted a culture of trust and support." Students ranked the most valuable course components as the acquisition of new knowledge and skills, the Personal Health Improvement Project (PHIP), the Community Health Improvement Project (CHIP) and the opportunity for career mentoring.

Comparative data from the student pre- and post- course surveys indicated that, over the duration of the course, students became more knowledgeable about public health, more skilled in developing needs assessments and SMART (Specific, Measurable, Achievable, Realistic, and Timely) objectives, completing health improvement projects, and more committed to contributing to the health of their communities (Figure 1).

On Dartmouth's universal course evaluation, all 16 students rated the overall quality of the course as "excellent" and reported personal ability to meet objectives. 100% of the students strongly agreed that they "learned a lot" and 87.5% of the students reported being "intellectually engaged" compared to 50% and 45 % respectively of all of the students for all other Dartmouth courses in the Fall of 2014 (Figure 2). Across the board, students in Sociology 37 rated the class consistently high in all metrics, particularly as compared to general Dartmouth College courses (Appendix F).

### Public Health Improvement Project (PHIP) impact on student health behaviors

Teaching assistants expressed initial concern that the PHIP may be too personal to share with the larger class. However, as one student wrote, "admitting self-improvement suggests that there is something wrong with you in the first place, but the PHIP

**Table 1:** CHIP site and project details.

| Organization | **The Upper Valley Haven (Haven)** |
|---|---|
| Background | Assess the overall health of the Haven employees in order to identify needs and opportunities for promoting wellness within the organization. |
| Broad Goal | To highlight areas of potential intervention/ improvement for employee wellness |
| SMART Objective | To design and distribute a survey to assess Haven employee's current levels of physical activity, smoking behavior, weight control and eating practices. |
| Methods | 1. Create a survey to collect data regarding employee health<br>2. Analyze data about employees' current physical wellness behaviors, health environment and interest in health improvements |
| Deliverables | 1. Haven employee physical health survey<br>2. Haven employee physical health report |
| Organization | **Upper Valley Trails Alliance (UVTA)** |
| Background | Low participation and completion rates for the Passport to Winter Fun Program, which promotes and encourages physical activity in an effort to instill a lifelong love for outdoor activity especially during the winter months |
| Broad Goal | Improve participation and completion rates for the Passport to Winter Fun Program |
| SMART Objective | Provide the UVTA recommendations on program reform and create an informational toolkit about the program's benefits for faculty at participating schools |
| Methods | 1. Faculty Interviews: 4 Schools<br>2. Literature Search:<br>-Similar physical activity programs country-wide<br>-Benefits of activity on physical and mental health<br>-Benefits of activity on academics<br>-NH and VT state physical education curriculum |
| Deliverables | 1. Recommendations:<br><u>Top 5 Most Impactful:</u><br>1. Have the UVTA partner with the PTO/PTA of each school district.<br>2. Put on a culminating winter celebration at the end of the program for all participants.<br>3. Put an interactive version of the Passport online.<br>4. Put up big, colorful posters in all participating schools.<br>5. Give students smaller, material incentive prizes throughout the program.<br><u>Top 5 Most Feasible:</u><br>1. Put an interactive version of the Passport online.<br>2. Provide extra Passport back flaps or make them harder to lose.<br>3. Provide classrooms with a poster that each student can use track his/her progress.<br>4. Have the UVTA present to each school using more interactive methods, such as a skit.<br>5. Put on a Passport cover design contest throughout the participating schools.<br>2. Toolkit on Benefits of Physical Activity and Curriculum Integration for Teachers |
| Organization | **West Central Behavioral Health (WCBH)** |
| Background | WCBH wanted to understand if and why there was an increase in teen suicides in the WCBH catchment area over the last 5 years. |
| Broad Goal | Evaluation of teen suicides and increase rates in the Upper Valley. |
| SMART Objective | Compile a report on teen suicides in WCBH's catchment area (Southern Grafton and Sullivan Counties) in the past 10 years. |
| Methods | 1. Literature review of the existing suicide interventions in the Upper Valley<br>2. Suicide risk factor research<br>3. Demographic data analysis<br>4. Analysis of the data related to factors contributing to suicide as well as teen suicide trends in WCBH's catchment area and nationally. |
| Deliverables | 1. Report of the results of analysis of the suicide trends and factors contributing to increased teen suicide.<br>2. Recommendations to help WCBH prevent teen suicide.<br>3. List of the top priorities for further study. |
| Organization | **WISE of the Upper Valley (WISE)** |
| Background | WISE identified the need to investigate and support efforts to incorporate yoga as a method of team therapy. |
| Broad Goal | Desire to strengthen WISE's on and off group yoga therapy for survivors of sexual assault. |
| SMART Objective | Create an informational brochure that provides "reader-friendly" research on community mind-body practices as a healing activity for survivors of domestic and sexual violence. |
| Methods | 1. Needs assessment<br>2. Literature Review<br>3. Synthesized literature into an accessible deliverable |
| Deliverables | 1. Survivor centered booklet on the benefits of yoga for trauma victims. |

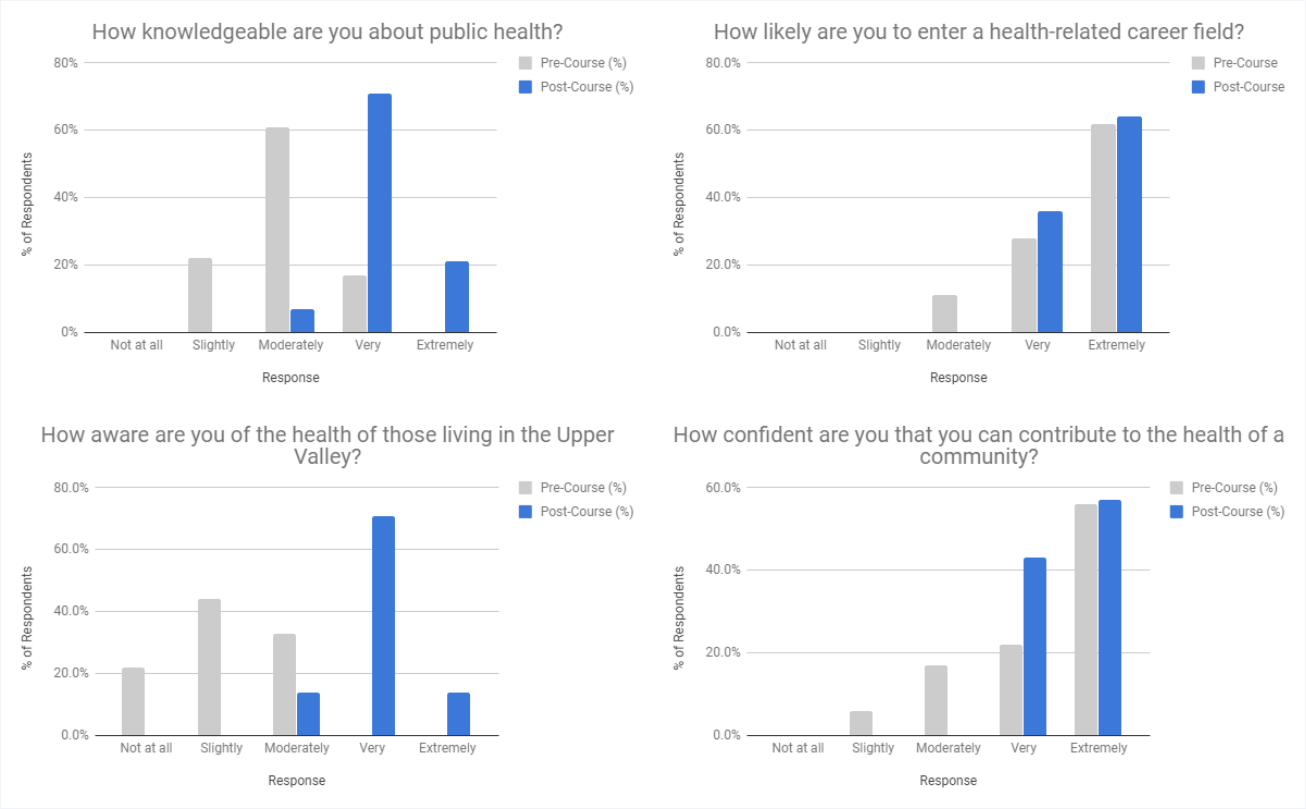


**Figure 1** Pre and Post Course Student Survey Results.

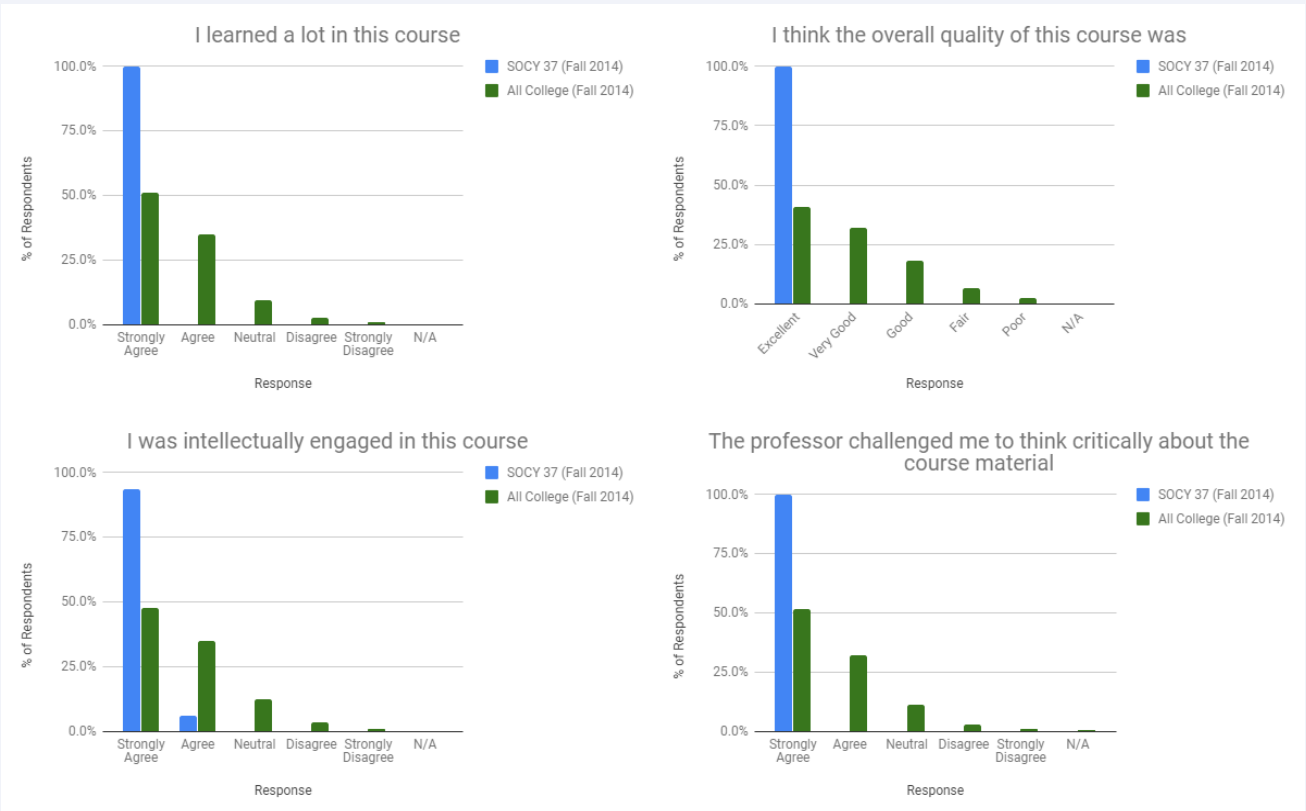


**Figure 2** Dartmouth College Standard Post Course Evaluation (with comparison across Dartmouth College courses).

re-framed health as a continuum, and there is always room for improvement in the different areas of personal health." At the beginning of each class period, participants reported progress on their PHIP metrics. PHIP daily completion rates ranged from 8/16 to 16/16 days, while health outcome rankings as a result of the PHIP ranged from 11/16 to 14/16 days of success, roughly following PHIP completion rate trends.

All students completed the PHIP and 14/16 of students reported it was a "very" or "extremely" valuable component of the course. In a reflection exercise, one student responded: "the PHIP really gave me the tools and confidence that I need to improve my health going forward." Another student wrote: "the PHIP made me think a lot more critically about my health and how hard it is for others with fewer resources … I was often inspired to make changes in my own life based on other people's PHIPs."

### Community Health Improvement Project (CHIP) impact on student learnings

The post-class survey revealed the CHIP was "extremely" valuable to all students (16/16) in the class. Survey results also suggested an increase in confidence for leading change and in commitment to caring for the underserved. Although not necessarily primarily goals for the project initially, these positive outcomes suggest the acquisition of a variety of critical public health improvement skills.

Students additionally developed an appreciation of community health needs and challenges. One student commented: "I learned how challenging a process like long-term planning and needs assessment can be when the daily fires that need to be fought never cease, especially at an organization like ours, with so many people depending on it and such limited resources." Teamwork was critical to each group's success. One student commented on group-dynamics in her CHIP reflection, saying, "We experienced little to none [in degree of] in-group difficulty. I think that this was helped by our shared interest and goals, as well as clear-cut accountability to 'rules' beforehand. This clear vision was a crucial part of our group-dynamic success."

### CHIP impact on community

The impact of this course extended beyond the Dartmouth campus to the local community. Following the course, all community partners reported that partnering with the class had either mostly or completely met their expectations. All agreed that the course positively impacted their relationship with Dartmouth, and all committed to partnering again in the 2015 course. One partner commented that the "energy, ideas, and fresh perspectives that the students brought to the project were impressive and helped rejuvenate our program." Another partner recognized how important the course was for the development of the students, writing, "it was clear how much they valued the class and what they were able to take away from it."

### Impact on career choice and commitment to health-related fields

The post-course survey also gauged the impact of mentoring on students' career choices. When asked of the degree to which their commitment to a health-related career had increased following the course, 11/16 of students responded "extremely" and 5/16 of students responded "very." Responses to this same prompt prior to the course in comparison with the post-course survey indicated that 15/16 of students were ultimately "extremely" committed to a health-related career.

Additionally, 14/16 of students reported the guest lecturers' career pathway discussions were "extremely" valuable to their learning. Responses indicated that learning about the speakers' key life experiences and lessons learned served as potential road maps for possible careers in public health and medicine more generally. One student commented, "over the years, particularly with volunteer organizations near my home, I have had ideas for improvements, but with no way of going about making them. Now having experience with the Quality Improvement process, changes could be made." Students and teaching assistants who have completed this course have been accepted to medical school, and many are currently pursuing careers in primary care medicine. Additionally students have pursued public health programs locally, regionally, nationally and internationally, including the Johns Hopkins School of Public Health, the CDC, Partners In Health, Dartmouth's Dickey Center for International Understanding, Dartmouth's Tucker Foundation, the Mascoma Valley Health Initiative (NH), the Columbia University Summer Public Health Scholars Program, and the Fulbright Scholarship program.

## DISCUSSION

In 2015, the AAMC reported that the nation will face a shortage of between 46,000-90,000 physicians by 2025 with primary care physicians expected to represent 12,000-31,000 of this shortage [8]. We believe that exposure to public health and family medicine has the potential to inspire undergraduates to pursue healthcare and specifically primary care related careers. In addition, we assert that family physicians interested in undergraduate education can play meaningful mentorship roles in public health courses. We hope this course provides a model for experiential public health curriculum for other undergraduate institutions and encourages family medicine leaders to engage as educators, mentors and role models.

The key themes of service learning and personal reflection were critical to the success of the course. Service learning provides an ideal platform to enhance students' understanding of the relevance of course content. The experiential course design allowed for an extension of learning beyond the walls of the classroom. Moreover, service learning intentionally blurs the teacher, faculty, and learner roles, resulting in greater collaboration and teamwork. The opportunity to work with community organizations instilled in students the necessity of accountability toward stakeholders and team members, and the importance of understanding one's greater community, resulting in a more holistic learning experience. Particularly with the focus on community health and family medicine, the service learning component of the course was integral in providing very real examples to students of the need to address Social Determinants of Health in caring for individuals as well as communities.

Personal reflection and assessment throughout the PHIP and the CHIP complemented the course content and allowed students

to appreciate their successes and challenges. This emphasis on self-cultivation promotes the personal development of healthy public health leaders. One student shared, "I found that applying a quality improvement process to the community had very different challenges than applying a QI to myself. A community QI process requires such a high level of effective communication; in comparison, the PHIP required introspective skills."

Additionally, college campus settings provide many personal and public health challenges such as binge drinking, eating disorders, stress, and sleep deprivation. Embracing these challenges as opportunities provided students a microcosm of public health from which to observe and apply their knowledge and skills.

### Challenges and opportunities for future improvement

Throughout the course, the teaching team requested feedback, analyzed challenges, and made continuous improvement. For example, the compressed timeline of a 10-week long quarter was a challenge for many aspects of the course, particularly in preparing sites and completing the CHIP. Prioritizing communication and focusing projects added to timely completion. The family physician course director's vision and previous work with community organizations and the collaborative process of identifying projects prior to the course enabled students to see their work come to fruition.

The diversity across topics and speakers had the potential for lack of cohesion. However, the shared vision and values, standard class format and the course director's continuity and summary at each class provided alignment and integration across the course. One student wrote, "one might think that the variety in material might result in an experience that lacks cohesion. However, I think the overlap within the class, in my life, and between other classes exemplifies the concept of experiential learning."

Funding for teaching assistants and honorariums for speakers was requested but unavailable; we anticipate needing and are seeking innovative sources in order to assure sustainability of this model.

## LIMITATIONS

The sample size in this inaugural year was only 16 students. While this limits our analysis power, the small class size and large ratio of teaching assistants to students may have contributed to our high level of satisfaction in comparison to other larger and less experiential courses across the college. In 2015, we piloted a class of 24 students with 6 community partners and the same number of 4 teaching assistants. Analysis of data over time at the student, college and the community level will assist in understanding the long-term impact of the students' interventions on the health of the student body and the community.

## CONCLUSION

The course's success in providing experiential exposure and mentoring to undergraduates on public health within the context of family medicine prompts us to offer this course as a model curriculum lead by a family physician with the intention of promoting knowledge, skills and career interests in primary care and public health.

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