Student Attitudes About Osteopathic Medical Schools: Increasing Student Willingness to Apply

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Students in pre-medical programs often choose not to apply to colleges of osteopathic medicine due to historical division and bias in the medical environment. These choices are present even when students have a higher likelihood of being admitted to osteopathic programs. Previous research has attempted to understand the attitudes that students have concerning osteopathic medicine and prior interventions have sought to change student perceptions and actions in relation to osteopathic medicine. Providing opportunities for students in the Biomedical Masters Program at the University of Pittsburgh to learn more about the education, practice, and their alignment with osteopathic medicine may lead to higher matriculation to future professional programs after students complete the program.

The Osteopathic Pathway Initiative intervention proposed in this study sought to improve student attitudes and increase student applications to colleges of osteopathic medicine. Interventions included panels, educational activities exploration of osteopathic medical colleges throughout the academic year. An attitudinal measure was used to collect data about student perceptions of osteopathic medicine. Data was collected three times, at the beginning of the program, halfway through and at the end of the program. Additional data on student demographics and application plans was collected from program records, deidentified and paired with the attitude measure data using a randomly assigned identifier.

The data set was deemed inappropriate for statistical analysis due to low participation in certain treatment groups and very little change in overall positive attitude scores across time. However, this provides ample opportunity to continue to explore why students had positive attitudes to begin with, including the impact of previous pre-medical preparation and completion of a bachelor's degree. The impact on the cohort of students due to the BMP selection process is also discussed. Other influences on this group of students, including the Covid 19 Pandemic and the potential for social-desirability effect, are also examined. The benefits of the interventions remain high, as there is positive impact of exposure to students, and there are future plans for continuous improvement to ensure success of the Osteopathic Pathway Initiative in successive iterations.

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1.0 Context

The beliefs and attitudes that pre-medical students hold concerning the similarities and differences between allopathic (MD) and osteopathic (DO) medicine are not well documented. Initial review of the current literature shows a division between the two pathways to medicine based on the professional and accrediting organizations that oversee each option in the United States and Canada. The Association of American Medical Colleges (AAMC) has oversight over all allopathic medical schools and manages and administers the Medical School Admissions Test (MCAT) which is a standardized test intended to evaluate academic readiness in all medical school applicants. The American Association of Colleges of Osteopathic Medicine (AACOM) oversees the accreditation and professional standards for osteopathic school, but still relies on the AAMC's administration of the MCAT to evaluate applicants. Both organizations provide strong professional and education information about and data on institutions and applicants, as well as support students and professionals for the associated medical degree pathway that each organization oversees. The AAMC provides some information on osteopathic practitioners at the residency level and beyond, however they do not publish any information on or for students seeking to apply to osteopathic medical schools. In kind, AACOM focuses solely on osteopathic medicine and mentions of allopathy are only present when comparing the similarities and making the claim that there is no disadvantage to osteopathic medicine.

It is relatively easy to find forums, message boards, opinion pieces or non-academic articles about the perceived differences between MD and DO education; however, the scholarly research into what beliefs are held about MD or DO and the comparisons between the two are currently limited. Prior research by Kuizin (2018) provides preliminary inquiry into the beliefs that

prospective applicants have about osteopathic and allopathic medicine, and Burrell College of Osteopathic Medicine attempted to increase the rate at which students apply to DO schools by providing a MCAT preparatory course and evaluating the effects (Shipley et al., 2019). These studies along with the evidence found in an overview of the publicly and easily accessible material, indicate that more nuanced research is warranted to help understand the attitudes and potential bias that may exist concerning osteopathic medicine. These studies also indicate that a difference in attitudes among students that choose to apply to MD and DO schools may exist. Researchers have studied attempts to influence and change these attitudes and promote a higher likelihood in pre-medical students' application to osteopathic medical school.

1.1 Areas of Review: Themes

Changing the attitudes and perceptions of students in the Biomedical Masters Program (BMP) at the University of Pittsburgh requires understanding three key concepts. First, the similarities and differences in philosophy and practice between allopathic and osteopathic medicine will be examined. Second, exploring the current literature is needed to identify what attitudes and perceptions about allopathic and osteopathic medicine have been found in previous studies. The final concept entails looking for interventions that have been tested to determine potential fit for use in the BMP. The overall goal of changing student attitudes pairs with the BMP's goal of increasing the number of BMP students who matriculate to medical schools. Improving students' ability to be successful by increasing application to Colleges of Osteopathic Medicine (COMs) has the potential to improve overall success rates by BMP graduates. The

current intervention seeks to make progress towards that goal by testing the ability to change student attitudes about osteopathic medicine.

Osteopathic and allopathic medicine operate in similar but distinct philosophical approaches to medicine. Beginning with its founding in 1892 by Andrew Taylor (A. T.) Stills, and continuing to the present day, osteopathic medicine has developed as a unique approach to the practice of medicine. The current inquiry will summarize the branching off of osteopathic medicine from allopathic medicine and discuss the current differences and some of the ways that both allopathic and osteopathic medicine have changed to take on the strengths of the other field.

Unlike the clear difference in philosophy, the attitudes held by students about MD and DO schools are not well understood. Limited research has been done to examine the attitudes that pre-medical students have concerning MD and DO programs. Inquiry into what is currently known about how medical students, residents, physicians, and the public believe about DOs will build a foundation for assessing the attitudes and perceptions among students entering the BMP. The characteristics that are sought after in the admission process by osteopathic medical schools also help us understand factors that may influence pre-medical students to prefer osteopathy.

Finally seeking out interventions that have specifically been used to change attitudes and perceptions about allopathic and osteopathic medical schools and interventions which have attempted to increase application to DO programs will be examined. This will enable an iterative development process of an intervention to change the attitudes and perceptions of BMP students using education, training, and advising. I predict that the consequence of these interventions will be increased application to, and increased matriculation at, DO programs.

1.2 The Biomedical Masters Program at the University of Pittsburgh

The attitudes and actions of students in the Biomedical Masters Program in the School of Medicine at the University of Pittsburgh concerning osteopathic medical school is the focus of this investigation. The goal is to identify the factors that influence student attitudes and perceptions, understand and develop viable intervention options, and test an intervention to change the attitudes and perceptions BMP students hold. The BMP is a 12-month Master of Biomedical Science program that seeks to help students improve academic, experiential and personal preparation for and performance in health care and research professional programs. Looking at the data from applicants for the BMP who select MD or DO as their primary career outcome indicates that less than 6% of applicants prefer osteopathic medicine. After being admitted to the BMP only six out of 156 students began the program with the intention of becoming a DO. When looking at how the average student in the BMP matches up with the average matriculant to MD and DO schools student GPAs are more similar with matriculating osteopathic medical students. According to the Association of American Medical Colleges ([AAMC], 2020a) and American Association of Colleges of Osteopathic Medicine ([AACOM], 2019) allopathic medical school matriculants had an average GPA of 3.72 and osteopathic matriculants entered with a prior GPA of 3.54. Students entering the BMP have continued to be closer to the average GPA of osteopathic medical students. Over the course of the first three cohorts of students in the master's program the average prior GPA was 3.41 in 2017, 3.53 in 2018, 3.52 in 2019, and 3.57 in 2020. Further investigation of BMP graduates reveals that 35 students have previously matriculated to medical schools as of May 2021. Of those students, 28% (10) have matriculated to osteopathic medical schools.

The BMP focuses heavily on the professional and personal development of our students. Through a curricular intervention in the BMP's Foundations of Professional Biomedical Career

Planning and Development and Professionalism and Non-Cognitive Development classes, students are engaged in a guided and self-reflection-based journey for personal, professional, and non-cognitive development. In these courses students are encouraged to develop life-long skills centered on self and other awareness. Empathy and care for others is a key component of this course work. The coursework is also supported by multiple levels of personal and professional coaching opportunities. An added development opportunity is present in the Professional Communications Reflections where students work together to explore how to develop their written and oral communications for medical and other professional school applications. They do so in small and large groups where they receive peer and instructor insight into how they are demonstrating the skill sets and characteristics that are desired by the programs to which they intend to apply.

Evaluation of these themes has prompted the BMP to investigate opportunities to educate, train, and advise, which I believe will consequently result in more students applying and matriculating at osteopathic medical schools. The BMP has done a few things in the past that focus on osteopathic medicine. Students have had the opportunity to interact with alumni of the BMP and practicing DOs in panel discussions and have had content and assignments in classes that allow them to understand the osteopathic pathway. These efforts however have not been evaluated for their impact on students. The efforts have also been conducted in isolation of each other without a clear plan or connection to each other. To address these concerns, I developed an intervention which could be embedded in the BMP to change the attitudes and perspectives of students about osteopathic medical school. Attitudinal change in students was also examined to determine if participation in the intervention increased the students self-reporting their plan to apply to COMs.

1.3 Understanding the Pathway Differences

The history of how and why osteopathic medicine differs from allopathic medicine contextualizes the perspectives that are held about each field, and particularly the lower regard that DOs have experienced throughout their professional history. The results of this bias, along with the head start that allopathic medicine had, prevented osteopathic medicine from expanding and reaching legitimacy in the field of medicine until much more recently. In recent times, however, osteopathic medicine has reached new levels, with faster expansion in number of COMs and gaining a higher percentage of all enrolled medical students. Despite this growth pre-medical students still lack a clear understanding of the distinctions between allopathic and osteopathic medicine. Osteopathic medicine still is preferred at a lower rate overall, and this holds true among students entering the BMP. The Accreditation Council for Graduate Medical Education (ACGME) single accreditation system signifies a watershed change in the opportunities for COM graduates and the medical community's shifting attitude that the differences that do exist between allopathic and osteopathic medical training are not in quality of training and graduate ability to practice medicine.

Analysis of students in the BMP compared to matriculants to both types of medical schools indicates that BMP students are more closely align with the average matriculant to COMs (AACOM, 2019; AAMC, 2018). This is true not only for the academic qualifications, but also the personal and professional development that occurs within the BMP. This alignment indicates that students in the BMP may be highly desired by COMs as there is congruency between what those programs desire in applicants and the traits, skills and attitudes that are present in BMP graduates.

1.4 Problem Statement

A key indicator for success in the Biomedical Masters Program at the University of Pittsburgh is the rate at which graduates matriculate into an appropriate professional program. Students in the BMP enter with a chosen concentration which is used as criteria to determine the best curriculum and academic options to promote student success. There are several options for career concentrations and flexibility in the curriculum that allow the BMP team to work individually with students or for students to follow more prescribed plans in pursuit of successful admissions to future graduate programs.

Students who declare a research-based track will focus on elective coursework in a science discipline they are interested in (such as pharmacology, neuroscience, cellular biology, or other similar disciplines). The focus for students who participate in this concentration is to select appropriate potential PhD programs to which they can apply. This decision is based on the opportunities they participate in, and the ability to help students identify appropriate options has not been a challenge for the BMP team. This seems to be influenced largely by the expertise in PhD advising and admissions of the BMP faculty, particularly given their personal experiences.

Students in our dental concentration have limited options, as they take specific electives with first year School of Dental Medicine students. This prepares them to have a strong scientific and content knowledge base when applying to dental medicine programs. The dental students have been the most successful, with 100% matriculation rate of BMP graduates in the first three cohort years.

Other options for concentrations are less formal due to low numbers of students that may choose them. The Physician Assistant concentration does not have the same expertise of the PhD or structure of the Dental concentration; however, due to the very limited number of students (less

than 2%) there is an opportunity to work directly with students to find an optimal outcome for future graduate program enrollment.

The Medicine concentration is the most challenging group of students to guide towards appropriate professional program matriculation. This group is the largest, with more than 85% of BMP students seeking to become doctors. This group of students also enters with a broad range of academic records, MCAT scores, experiential portfolios that need to be addressed during their enrollment in the program, and attitudes on how to prepare and where to apply. This group of students often do not understand how competitive it is to gain admissions to medical school. The factors that influence why students choose to pursue medicine, and how they make decisions on which schools to apply to is currently not well understood in the literature.

Often students choose how to apply on a complex set of factors. A pre-health advisor may think the student is best suited to apply to a narrow set of schools, or they may encourage students to apply broadly. To complicate this issue further, there is often a difference in how students make decisions to apply to the two different types of medical education options. Students often seem to prefer allopathic medicine over osteopathic programs. This may be due to not only accurate knowledge of, but also perceived differences in MD and DO training and practice (Kuizin, 2018).

National trends in medical school application and matriculation help explain the landscape within which students make decisions. The number of students applying to medical school has increased dramatically in the past four decades. In 1982 the AAMC had 35,720 applicants (Association of American Medical Colleges, 2018), and, though the trend was not linear, the total number of applicants climbed to 52,777 allopathic medical school applicants in 2018 (Association of American Medical Colleges, 2019), which is nearly a 50% increase. When evaluating osteopathic applicants, a proportionally larger growth in applicants emerges. In the same time

frame Osteopathic Medical applicants increased from 3,924 in 1982 to 20,836 applicants in 2018 (American Association of Colleges of Osteopathic Medicine, 2019), an increase of more than 500%. For osteopathic medicine, the growth has been steadier even when considering a spike in the mid-1990s. Until 2002, there were a total of 19 US COMs, and the number of schools has grown rapidly in the past two decades. There are now 37 COMs across 58 teaching locations (AACOM, 2021). The number of applicants to osteopathic medicine was already on the rise as new programs opened their doors and these efforts have provided more space for training future physicians. The number of applicants to all types of medical school has increased drastically in less than 40 years; however, there are still far more applicants than spaces available. Allopathic programs welcomed 21,622 students in 2018 while Osteopathic programs welcomed 8,088 students. Despite the increase in applicants the United States is still expected to see a shortage of over 90,000 doctors by 2025 (AAMC, 2019; Commins, 2015). The main indicators of success in matriculating to medical schools for students includes strong undergraduate GPAs, a competitive MCAT score, and well written application materials that clearly articulate a diverse and comprehensive engagement in preparatory experiences as competencies for entering medical school. The Biomedical Masters Program seeks to enhance all or some of these components for our students, while promoting thoughtful consideration of where students can find the best opportunities for medical school training. Training future practitioners and ensuring our graduates reach their goals is part of the mission of the BMP; as such, it is important that we enable all our students to be well-informed and trained and think broadly about the best pathways to that success. This is directly measured by students successfully matriculating to and graduating from a terminal degree program in their chosen concentration.

1.4.1 Organization, Culture and Context of the Biomedical Masters Program

The Biomedical Masters Program at the University of Pittsburgh is a 12-month master's degree program that seeks to equip students to succeed in biomedical professional programs, such as medical or dental school, or biomedical research programs and positions. One of the unique aspects of the BMP is that it is housed within the School of Medicine at the University, which is an allopathic medical school; however, the BMP trains students for other career and professional degree pathways as well. More than 85% of students who attend the BMP are in the medical school pathway.

Throughout the first three years of the program many students have found success applying to COMs, despite very few of those same students selecting DO programs as options prior to beginning their education through the BMP. The average GPA and MCAT test score data achieved by BMP students are closely aligned with the matriculants to COMs. An additional factor that the BMP focuses on to ensure students are equipped for all application processes is the academic focus on experiential portfolios. Providing an opportunity for students to complete needed clinical exposure, research and community engagement hours for credit supports the GPA and MCAT portion of student applications. The BMP emphasizes the importance of both the academic achievements and the experiential activities as students prepare to apply to medical school.

In contrast, these data of BMP students are consistently lower when compared to matriculants to MD programs. However, the knowledge and expertise of the faculty and staff in the BMP may be ill equipped to change student perceptions about MD and DO programs, particularly given the location of the program within an allopathic medical school.

To address this deficit in available resources, the BMP has been working to understand how to promote student engagement with the osteopathic medical school pathway for the past four

years. throughout this time, I have begun to recognize that the BMP is currently not equipped to make a large or lasting impact on how students view osteopathic medicine. The allopathic focus and institutional culture at the university has led to a discrepancy in content knowledge that faculty advisors have concerning DO programs. The BMP does not naturally talk about both pathways of medicine, and this will not change without an intervention that is specifically designed to increase student attitudes about osteopathic medicine. When starting this inquiry, I believed that the interventions proposed and implemented in the BMP, would have the consequence of eventually increasing the number of applicants and matriculants from the BMP to COMs. In my role as a coordinator and instructor, I have numerous contact points with students. There are two areas in which I have direct influence over the student experience in relation to their future careers. The first is as a course director for the Experiential Learning class. In this course, students gain experience in research, clinical and community environments. They interact with a variety of professionals in the research and clinical experiences. Previous students who have been amenable to pursuing osteopathic medicine have expressed the need for opportunities to interact with DO physicians, as opposed to the current model where the majority of interactions are with MD physicians. This can be accomplished through designing workshops that enable students to interact with DO physicians, both in terms of informational settings as well as in panel discussions. The other area where I have direct influence on how students perceive their future careers is the BMP Professional Communications Reflection (PCR) course. The PCR course is specifically designed to help students improve their written application materials through a combination of lectures, self-reflective writing, and in class peer and instructor feedback. I have previously coordinated with the course director to implement change in language and content to ensure students are presented with osteopathic medicine in the class. The current inquiry took these efforts farther and

implemented a dedicated class session that focused on osteopathic medicine, including the benefits and differences that students should be aware of when selecting which medical schools for application. One of the challenges was ensuring that students are receiving messages from their advisors that support the pursuit of osteopathic medicine, rather than advisors defaulting to their perspectives of or preference for allopathic medicine due their familiarity with it. Faculty advisors hold a large amount of power over the direction of the BMP, including programmatic outcomes, and they influence student perceptions. I believe it is important to continue to refine the ways that these interactions (between faculty advisors and students) are supportive and reinforce the work that happens in the classroom and informally with students to promote positive career outcomes, including student desire to pursue osteopathic medical schools.

Reflecting on the context within which students and faculty interact, I continued to come back to the idea that students in the BMP will likely have a strong opportunity to be successful in gaining acceptance to COMs. Some stakeholder buy-in will still be necessary to shift how faculty interact with this problem over multiple iterations of the interventions; however, when evaluating where change can be most effective, direct interventions that target student exposure to DO physicians and help students understand the benefits of the osteopathic pathway stood out as a preliminary step to address change. The points of contact that I have with students in the classroom as well as in the daily student experience provide an excellent context where I am are most likely to have an impact on the attitudes students possess. These types of interventions were able to be performed in the classes I work with, as well as through workshop events.

2.0 Review of Scholarship

2.1 Understanding the Medical School Options

Allopathic medicine is the predominant medical practice in the United States and is the outcome of centuries of medical practice and study throughout the western world. The formalization of allopathic medicine occurred in 1876 with the founding of the Association of American Medical Colleges (2020a). The eventual adoption of curriculum standards in 1905, scientific backing for practice of medicine in 1910, and accreditation standards in 1942 pushed the AAMC to become the organization for medical practice oversight beginning in the late 19th and throughout the 20th centuries in the United States.

Osteopathic medicine is an alternative pathway and philosophy of medicine. The philosophical basis of osteopathy was put forth by Andrew Taylor (A.T.) Stills in the late 1800s. He believed that there were ways to treat patients that were not present in allopathic medicine. Stills believed that medical practice at that time was not based in the scientific method and that the body has the ability to heal itself (Lesho, 1999). This led Stills to focus on looking at the patient more holistically and recognizing that treating the patient was the goal of medicine, not just treating the medical problem independently of the patient as a person. Modern interpretations of this seeing the patient holistically have been described as empathy in medical practice. The focus on holistic treatment led Stills to develop musculoskeletal system-based treatments. Osteopathic Manipulative Treatment was the primary treatment Stills developed (Ballejos et al., 2019; Gevitz, 2004), and it was the foundation on which he described the interconnectedness of body systems and health. The philosophy and changes to medicine that Stills sought to enact were largely ignored

or ridiculed by allopathic physicians and he was ostracized from the medical community (Gevitz, 2004). In response to this controversy Stills founded the American School of Osteopathy (now known as A.T. Stills University) in 1892 to train physicians to ensure his principles were able to be taught (Gevitzl; Lesho).

The founding of the American School of Osteopathy is significant in that it formally separated the practice of allopathic medicine and Stills' new form of medicine, a change that has had lasting impact on medicine and the practice of osteopathy as a whole. This division became stronger when the American Association of Colleges of Osteopathic Medicine (AACOM) was founded in 1897. Throughout the past 130 years, osteopathic medicine has lagged behind allopathic medicine. As allopathic medicine grew, it cemented its position as the medical choice of practice for most physicians, meanwhile osteopathic medicine remained on the margins and has had a lower number of opportunities for training and practice. Since Stills founding of osteopathic medicine, the field has continued to face challenges. Despite the current similarities between allopathic and osteopathic medicine, allopathic medicine has enjoyed a higher level of prestige.

The prestige has been made easier by the access greater exposure to and influence of allopathic medical schools. With 143 allopathic schools in the United States access to allopathic medical school has become prevalent. Osteopathic medicine, however, has seen much smaller growth. Currently there are 36 colleges of osteopathic medicine. The lower number of options for osteopathic medical training have had an impact on the number of practicing physicians in the United States. MD physicians comprise 70% of practicing physicians, while DOs make up only 8%. The remaining physicians are graduates of foreign medical schools (AAMC, 2020b). The number of osteopaths is increasing slowly, as nearly one quarter of current medical students in the United States attend a College of Osteopathic Medicine. The gap in the number of schools and

total enrollment seats between allopathic and osteopathic medical school trainees is closing, but more students are still graduating with an MD degree. As older physicians who are predominately allopathic physicians begin to retire the percentage osteopathic physicians will continue to grow as a share of all practitioners of medicine.

The lower number of osteopathic physicians is viewed as one of the key contributors to how medical doctors are viewed in the United States. MDs are the more well-known and have enjoyed a stronger professional reputation throughout the past 150 years. Organizations that support and train DOs have been working to improve the perception of osteopathy. According to Eckber (1987), there have always been similarities between allopathic and osteopathic medicine; however, osteopathic has had lower prestige among the two. Despite continued efforts on the part of organizations such as the AACOM and the American Osteopathic Association (AOA) in the United States and other osteopathic professional organizations internationally, allopathic medicine has still been held in much higher regard in the medical community (Eckberg, 1987). On top of the fight for legitimacy and prestige, osteopathic medicine may also be struggling with its ability to convey its legitimacy and quality of medical care to the public. Baer (2009) found evidence that some osteopathic physicians' description of the field is characterized by professional identity crisis and these physicians feel the need to seek credibility in the medical profession, despite being accredited physicians. While both Eckberg and Baer focus on the history of osteopathic medicine, more recently Kuizin (2018) has theorized that the challenges of osteopathic medicine's past have not been overcome and are still present.

As osteopathic medicine has grown in number of schools and physicians in the medical field, it has become more recognized and accepted. The historical and philosophical differences between allopathy and osteopathy have also begun to converge. Osteopathic medicine has

increased its share of contributions to the research basis of medicine, and allopathic medicine has begun to incorporate the holistic perspectives that osteopathy has long held as key tenets of medical treatment. Allopathic medicine has also begun to place a greater emphasis on empathy as a key expectation for future physicians in the medical school admissions process. Recent changes to the MCAT in 2015 further exemplified the convergence of allopathic and osteopathic medicine with the addition of a Psychological, Social, and Biological Foundations of Behavior test section of equal weight to other content sections (AAMC, 2020c).

In 2014 the ACGME, the AOA, and AACOM announced a merger of the oversight of residency programs. In July of 2020, the merger began accrediting all residency programs under a signal standard (Brennam, Campea, & Cole, 2014). Previously there were different standards and oversight, and options under the ACGME were not always available to graduates of COMs. Graduates of COMs previously relied on AOA accredited residency programs for the main source of residency opportunities. This is not to say that graduates of each type of medical school did not gain residency opportunities in programs accredited by both groups, but there has been a strong division in where students trained for residency based on the accrediting agency. With the single accreditation change, all graduates of both osteopathic and allopathic schools can apply to all residency programs. The merger has become possible due to the convergence of allopathic and osteopathic medicine, with much more similarity than difference in the training and capability of graduates of osteopathic medical schools and allopathic medical schools and a recognition that the historical disparities in training have been overcome. One of the expected results is that this change in opportunity will change the composition of graduate trainees in specific fields of medicine (Peabody et al., 2017). It is also expected that this change will bring about more similarity in competency standards and will raise the visibility of osteopathic medicine in all training programs

(Buser et al., 2015). The merger is a significant change in the divisions that have existed in medicine and is important for ensuring growth of the field and for the opportunities that students who attend medical school will encounter upon graduation.

2.2 Beliefs About Osteopathic Medicine

The factors that influence students to prefer allopathic or osteopathic medical school are not well documented in the literature. Inquiry into research that identifies the factors that pre-medical students use to choose a medical school pathway is limited. Academic alignment, based on GPA and MCAT scores, with each pathway is a strong indicator, but not the only measure of success. These factors do not help in providing and understanding of the attitudes and perceptions students have, nor does it help us understand if these attitudes and perceptions influence student decision to apply to prefer osteopathic or allopathic medicine. What is missing in the literature is an understanding of why students hold the attitudes they do. The research does begin to assess if specialty preference, personal characteristics such as an emphasis on holistic medicine and empathy, academic proficiency, and alignment with a medical school impact student decision. Additional research examines the course work and advising that students receive and how that impacts matriculation to medical schools. There still remains much to learn about the attitudes that students have, and why they make their application decisions.

Social attitudes and awareness of the field of medicine may help us understand why students in the BMP have indicated a preference for allopathic medicine. Exposure to MDs and DOs is strongly weighted in favor of MDs. As previously discussed, there is a much higher percentage of MDs than DOs in the medical work force (AAMC, 2020b). The difference in number

of practicing physicians with MD or DO degrees provides a higher chance that an encounter with a physician will be an MD. A second factor is that individuals are not focused on the physician's credentials, but rather the treatment and care they are receiving. Despite a growth in osteopathic trained physicians, exposure to a physician is still much more likely to occur with an MD rather than a DO. This is true even when considering specialties where DOs are more representative. Primary and family care-based fields of medicine see a higher rate of DOs, but, at best, they still only account for 15% of all physicians in those specialties. Primary care is one of the main specialties groups that osteopathic physicians end up practicing in (AAMC, 2020b).

Concerns about the future of primary care and career stability within primary care specialties are growing (Beverly et al., 2016). This may be one factor that may push students away from COMs (Beverly et al., 2016). When analyzing data about specialties chosen, primary care fields indicate that the number of DO physicians in specialties such as internal, pediatrics, obstetrics and gynecology, geriatric, and family medicines comprise 45% of active physicians, whereas only 37% of MD physicians practice in these specialties (AAMC, 2020b). Awareness of allopathic physicians is one explanation of why students gravitate towards this pathway more strongly.

Personal beliefs and characteristics are also valuable to understand when considering student perceptions and attitudes concerning the medical profession options. Students who choose to apply to COMs are more likely to have beliefs or perspectives that mirror the holistic medical philosophy of osteopathic medicine (Kuzin, 2018). Empathy is a key indicator of both success in application to and completion of COMS (Lietz & Matthews, 2010; Chrisman-Khawam & Manzi, 2020). As previously discussed, empathy is foundational to the philosophy of osteopathic medicine and the educational approach of osteopathic schools. Personal values of college students are an

important motivator in the choices they make in their educational and learning environments (Lietz & Matthews, 2010). Empathy has been shown to be a key value or characteristic both of students entering COMs (Chrisman-Khawam & Manzi, 2020) and of medical students (Agahi et al., 2018). These research findings on student beliefs about osteopathic medicine all point towards a congruency between the practice of osteopathic medicine and personal beliefs. Given the lack of understanding what a DO physician is for many people, students may be more receptive to the field of osteopathy when they understand the values, they possess line up strongly with the education they would receive at COM.

The holistic perspectives have long been a strength of osteopathic medicine. In addition to strong academic performance, COM are focusing on incorporating holistic criteria in their decision making. Characteristics and attitudes that focus on "empathy, altruism, duty, and the ability to effectively use language to explain complex topics (Calabrese et al., 2013). Efforts in many areas of education focus on developing these skills and they are embedded in the curricular focus of the BMP. Others' research on medical students has shown that the level of empathy displayed in entering osteopathic students stays consistent, compared to allopathic graduates who were observed to have a lower level of empathy upon graduation (Kasiri-Martino & Bright, 2016). Applicants may not only prefer the emphasis on empathy, the curriculum in osteopathic training and the alignment with the admission criteria, they may be selected for admissions by COMs due to these factors. These characteristics are then perpetuated and developed throughout the curriculum, the training and practice of DO physicians. Students who become aware of their own characteristics lining up with osteopathic medicine and COM admissions that specifically select for the holistic and empathetic characteristics in students may result in a higher likelihood of those students receiving an offer of admissions. The connection between beliefs about holistic care and

empathy, along with the values that an individual holds concerning medicine can help us understand the perspective differences between applicants who choose osteopathic or allopathic medicine.

The trend in osteopathic medicine has shifted over time. Educators in osteopathic medicine are becoming conflicted about the relevance of some of the principles in the field, especially when considering evidence-based clinical decision making (Vick, McKay, & Zengerle, 1996). Attitudes and perceptions of the validity and emphasis on evidence-based medical interventions are becoming more important in osteopathic medicine and are key indicators of success in the application process (Agahi, 2018).

2.3 Interventions

Studies indicate that the courses that were offered to students in undergraduate education are important in promoting matriculation to medical school. This effect was especially true for students who are traditionally considered underrepresented minorities (Barr et al., 2008)

Pre-medical advising is often ill equipped to support students, especially students who start with economic and educational disadvantages. Throughout the first three cohorts of students in the BMP we have received numerous students who report they chose the program due to the advising support and other resources that they did not receive during their undergraduate studies. These three cohorts are consistent with other findings that students did not find strong support early in college, especially in navigating through difficult basic science courses, ultimately forcing many students to decide not to persist in the pursuit of medical school (Ballejos et al., 2019). Students who apply to medical school also face similar challenges in feeling equipped to be successful.

Over the most recent ten-year span from 2011 to 2020 of available data, between 25 to 27% of matriculants to allopathic medical schools had previously applied and not been accepted to a program (Ballejos et al., 2019). To address this the University of New Mexico School of Medicine (UNMSM) provided a program focusing on post-application advisement to applicants who did not receive an offer of admissions. Utilizing seminars, self-assessments, and action plan exercises, Lebensohn et al. (2014) observed that nearly 80% of re-applicants who participated in all aspects of this program received an offer of admissions compared to only 17% of re-applicants who did not participate in the program at all. Similar types of interventions are prevalent in the pre-medical advising community. Both the AACOM and AAMC provide resources and information for pre-health advisors to use in informational workshops, assessments, and action plans. The UNMSM initiative is distinctive in its approach. Not only does the program leverage all three of these types of interventions, but it also does so in a cohesive and interdependent manner which is targeted towards the needs of students who have previously applied to medical school. Understanding the differences in equipping re-applicants compared to first time applicants is important in understanding further intervention planning. This model provides an understanding that reapplicants are a unique population and they have different needs compared to first time medical school applicants. This suggest that interventions should be tailored to the uniqueness of the group to which they are intended to help.

Tailoring curriculum is also a method that has been implemented. When working to recruit medical school graduates to residency programs in Family Medicine, a specialty which is chosen by many osteopathic graduates, curricular design focused on integrative medicine including complementary and alternative treatments. The results of adding these elements to the residency curriculum was selected as highly important among nearly 50% of the resident applicants (Ramos

et al., 2017). The curricular changes focused on integrative medicine had a strong impact on residency preferences among the applicants.

While these results are not directly applicable to students in a master's degree program, they indicate that further exploration of how curriculum changes in the BMP can change students' attitudes and perceptions about osteopathic medicine. The BMP currently does not have a strong focus on specific career trajectories and outcomes other than baseline concentration tracks (medical, dental, and research). Development of more sophisticated curriculum focus on specific areas of medicine and exposure to how specific philosophies of medical practice may yield a change in osteopathic preference among BMP students. Other curriculum development efforts have also been shown to improve success in medical school admissions. A strong foundation in microbiology was found to be key indicator of academic success for osteopathic medical students (Ramos et al., 2016), while other research has indicated that neuroscience study prepares applicants well for success in matriculating to COMs (Ramos et al., 2016). This research provides additional insight into the importance of a strong scientific understanding for students wishing to matriculate to medical school and indicates that the current BMP curriculum may support our students in their pursuit of and success in training to become osteopathic physicians.

3.0 Theory of Improvement & Intervention Plan

Success for students in the Biomedical Master's Program is not only completion of the program with a strong academic and co-curricular experiential portfolio, but also continued academic progress through matriculation to professional degree programs. For students in the medical track, matriculation may occur at either an allopathic medical school or an osteopathic medical school. Students in the BMP have less of an inclination to pursue osteopathic medicine, despite the average BMP student being ideal candidates for those schools. This inclination was hypothesized to be due to the lack of understanding and consequent bias in attitudes about DO compared to MD across the medical profession, society, and among pre-medical students (such as students in the BMP). Students in the BMP who do not apply to both MD and DO programs are at a lower likelihood of matriculating to a medical school. To improve the success of students in the BMP via matriculation to medical school, increasing the likelihood of students applying to DO programs is a goal that will be explored to improve program success outcomes. Previous research indicates that student attitudes are significant factors in their acceptance of osteopathic medicine (Kuizin, 2018). Direct intervention was planned to improve BMP student attitudes towards osteopathic medicine and increase their success in entering medical school. The current problem of practice sought to address this by developing and evaluating a program to promote exposure and engagement with osteopathic medicine for BMP students.

Evaluation of potential efforts to influence attitudes that BMP students have about osteopathic medicine allowed two main themes emerge. First, student knowledge about osteopathic medicine needed to be considered. Second, the emphasis that the program had on osteopathic medicine could be improved. The first category centers around supporting students in

their efforts to understand which medical schools to apply to and involved exposure to osteopathic medical students and professionals, discovering information about schools, and having a clear sense of residency opportunities upon completion of medical school. The second category was focused on how the BMP as a program promotes consideration of osteopathic medicine, including how it is portrayed to prospective and current students, how it is discussed by advisors and faculty members, and career and application mentorship that focuses on osteopathy. Much of these efforts took e place in voluntary workshops, in written communication, and in the course Professional Communications Reflections (PCR), which is required for all students.

The interventions of exposing BMP students to osteopathy and the opportunities it provides were theorized to create a stronger awareness of the osteopathic pathway for BMP students and will equip them with appropriate knowledge to identify medical schools that are a good fit, not just at allopathic schools but also at osteopathic schools as well and aimed at helping students develop a strong rational for their application choices. Students were exposed to medical students and physicians in osteopathic medicine through panel discussion workshops, the goal of which was to spread awareness of the similarities and strong overlap between allopathic and osteopathic medicine. Finally, students had the opportunity to gain an understanding that many of the same opportunities are present upon completion of medical school for graduates of both pathways.

3.1 Drivers

3.1.1 Aim Statement

The aim of this project was to test the change interventions with BMP students in the 2021-2022 academic year and produce a meaningful improvement in scores, measured by statistically significant decrease with a strong effect size change on an attitudinal scale that measures attitudes and beliefs about osteopathic medicine. The attitudinal scale measured BMP student responses to questions about their knowledge, experiences, perception and attitudes about osteopathic medicine and their future plans and decisions to apply to COMs. To distinguish between attitudes that students may have about osteopathic medicine consequent to these proposed interventions, I surveyed the BMP students during their orientation to the program, between the fall and spring semesters, and at the end the spring semester. I compared the change in attitudes from the first to second survey, the second to third survey, and the change between all three surveys to evaluate the success of each intervention. Underneath the aim was the prediction that these changes in knowledge, training, and attitudes would result in more students reporting willingness to apply to COMs and a higher rate of BMP graduates matriculating to medical schools. The medical school application process is very complex, however, and the external factors that influence student decisions on where to apply were not considered for this intervention. Thus, knowledge and attitude change was the sole aim of the current attempt to create change.

3.1.2 Primary Drivers

Two primary drivers were identified that drive BMP student attitudes towards osteopathic medicine at the beginning of the 2021-2022 academic year (Appendix A). The first primary driver is student knowledge about DO schools and the field of osteopathic medicine. This is a prime area for impacting change, as students are looking to find the best options for their success as future physicians and having a comprehensive knowledge about all pathways may improve their chances of choosing pathways for success. The second primary driver is the BMP's emphasis on favoring MD over DO in word and action. Effecting change in this driver was already underway at the time of the intervention; continuing to determine the best ways for advisors and staff to discuss career pathways with BMP students provided a strong parallel effort alongside increasing student knowledge.

3.1.3 Secondary Drivers

Secondary drivers for each of the two primary drivers were identified. Student exposure to DOs, students understanding their fit with school's profiles and students understanding of their options upon completion of medical school are associated with the knowledge primary driver. Changes in these drivers supports the primary driver by providing opportunities and activities for students to expand their knowledge and understanding of osteopathic medicine. Specificity in the BMP's language use about DO and a curricular shift in the PCR course with specific content focused on DO is associated with the program emphasis driver. Specificity of language falls into this category due to it being changes in word choice, both through conversations with students, as well as in written materials, such as the program website, handbook, and other program related

documentation. These secondary drivers support the primary driver by ensuring the BMP is taking active steps to incorporate osteopathic medicine as a pathway into official program perspectives.

3.1.4 Driver's Relationship to Change

Change in attitudes among BMP students can be accomplished through many different methods and activities. Providing a suite of opportunities for students to interact with and hear from osteopathic students and practitioners targeted both exposure to osteopathic medicine and the in-class changes that the program can take. These opportunities targeted both primary drivers and numerous secondary drivers. Providing and guiding opportunities for students to learn about osteopathic medicine, COMs, and the residency pathways they may have, was a second change idea. Embedding these activities in the PCR course also targeted both primary drivers, as it enabled students an opportunity to gain knowledge through a structured activity in the classroom. The final change idea considered was changing the language that is used by the BMP. This change idea was focused primarily on primary driver two, the education, training, and advising interventions that the program provides on osteopathic medicine and would have been comprised of changes in the language used in official program documents such as the website and student handbook, as well as prompting change in the language used by the academic and staff advisors in the program. A driver diagram of these concepts is included in appendix A.

3.1.5 System Measures

The process measures that were considered are as follows: Do shadowing panels, specific course module sessions, and presentations from osteopathic students and physicians occur? Are

changes implemented in the materials and language choice of the BMP both in writing and in conversation? Do students in the BMP complete assignments to explore the Osteopathic College Information book and research on the residency process and opportunities?

The driver measures to consider were: Is there an increase in exposure to osteopathic medicine via interactions with DO students and physicians? Does engaging in learning about osteopathic medicine enable BMP students able to articulate their fit for specific DO schools? Does this engagement in learning enable students to articulate what options they will have in residency if they attend a DO school? Does the BMP use different and appropriate language to promote osteopathy? Are new sessions and presentations implemented in the PCR course?

The outcome measure of these interventions was to determine if there was a change in student attitudes and willingness to apply to COMs on pre-mid-posttest survey. This outcome measure was evaluated to determine if there was a change in overall student attitudes between orientation and the end of the spring term.

When considering balance measures there was a need to determine if other aspects of the program would be influenced by these efforts. Two main monitored areas were the impact on non-medical track students and not letting the increased focus on osteopathic medicine overcome the existing focus on allopathic medicine. If an emphasis not previously present was added to the culture of the program, there was risk of neglecting other concentrations in efforts to produce change for one group of students. The risk of neglecting other concentrations such as research, dental or physician assistant tracks in the BMP however was likely not to be a large issue as there was little comparison to previous efforts for each cohort of students. That is to say, any given group of students only experiences the BMP in comparison to their cohort. This does not mean that the program could not show a stronger preference to supporting medical concentration, in fact

that was likely; however, the preference should not be any stronger than it previously had been. The issues that needed to be addressed for other career outcomes were outside of the scope of this project, and thus not considered to be an issue. The second area monitored was ensuring that adding a focus on osteopathic medicine did not override the opportunities for allopathic medicine. This was seen as an issue that would not occur, as the BMP is strong at providing opportunities for allopathic interactions, has direct langue that is allopathic focused, and is within the structure of an allopathic medical school.

3.1.6 Intervention

The improvement project sought to change BMP student attitudes through implementation of the BMP Osteopathic Pathway Initiative. This initiative consisted of leveraging the following suite of interventions: 1) DO student and 2) DO physician panels, 3) an osteopathic information session in the PCR course, and 4) two exercises in the PCR course. These exercises entailed students reading and reflecting on the philosophy and fit of osteopathic medicine as a career pathway and exploring the 2021-2022 Student Guide to Osteopathic Medical Colleges to identify appropriate schools, based on academic and test performance match to which they might apply. This four-part intervention condensed previously occurring activities into a streamlined suite of opportunities for students to engage with osteopathic medicine and was expected to increase student scores on the attitudinal scale and increase the number of students who expressed a willingness to apply to osteopathic medicals schools on the posttest, as compared to the pretest and midtest It was also hypothesized that students who displayed an decrease in scores on the attitudinal scale would apply to COMs. This program was implemented throughout the 2021-2022 academic year. Data on the attitudinal scale was gathered during student orientation (August 2021),

between fall and spring semesters (January 2022), and at the end of the PCR course (April 2022). Data on the application to COMs was gathered at the end of and after the spring term of 2022 (April and May 2022).

3.1.7 Improvement Science Cycles

The current inquiry represents the first planned cycle of a Plan, Do, Study Act (PDSA) process, where the initial plan is developed, the test is done, then the outcomes are studied, and action is taken based on this analysis to plan for the next iterative cycle. Interventions uses in this inquiry have been centralized into the Osteopathic Pathway Initiative, even if they were previously occurring in the BMP. The centralization of these interventions into an umbrella initiative was chosen specifically to leverage all formal interactions that BMP students may have with topics about osteopathic medicine. The PDSA sheet is in Appendix B

3.2 Inquiry Question

Three guiding inquiry questions emerged to test these change ideas:

1) How does participation in the BMP Osteopathic Pathway Initiative influence student attitudes about osteopathic medicine?
2) How does participation in the BMP Osteopathic Pathway Initiative affect the number of students who are willing to apply to osteopathic medical schools?
3) To what extent do changes in attitudes about osteopathic medicine result in students submitting applications to osteopathic medical schools?

These questions provide a framework to evaluate if the interventions produce change in attitudes of students in the BMP and if changes in attitude are related to changes in student application decisions. To better understand the change, it was important to determine if there are specific aspects of the intervention that produce change. It was hypothesized that: 1) the BMP Osteopathic Pathway Initiative would increase student attitudes about osteopathic medicine on the attitudinal scale, and 2) that it would increase the number of students who express willingness to apply to COMs compared to their initial responses.

3.2.1 Population

All students in medical track of the 2021 cohort of BMP students comprised the population with which the intervention will occur. The number of students in this group was based on students who selected MD or DO as the primary career outcome on their application to the BMP and who then matriculate into the BMP. It was expected that this group would contain between 30-40 students. This was the group of students that the initial intervention cycle was tested with. They were the first cohort of students who were studied to determine if attitudes and willingness to apply to COMs can be improved among BMP students through direct intervention, and future iterations will be planned based on the outcomes of the intervention from this group of participants.

3.2.2 Methods

Data consisted of an attitudinal scale that measures participant attitudes about osteopathic medicine. This scale was administered as a pre-test/post-test for the intervention. The pre-test scale was administered during the orientation period for new BMP students. This data was collected

between August 27 and September 11, 2021. The Mid-point test was conducted between the fall and spring semesters during January 7 –24, 2022. The post test was administered at the end of the spring term from April 15 to May 2, 2022. These interventions used the same measure that was used by Kuizin (2018), and included additional questions that ask BMP students if they intend to apply to COMs. The measure is found in Appendix C.

Additional data were collected from students on what schools they plan to apply to or applied to via end of year application plan survey which was available to students throughout the month of April 2022. These data were used to identify the number of BMP students in the medical track who specifically report a plan to apply to COMs. This instrument already existed and is used annually by the BMP. This data was used to evaluate if changes in willingness to apply resulted in students reporting they planned to apply to COMs.

3.2.3 Attitudinal Measure

Kuizin (2018) developed a scale to measure the attitudes of premedical students about their perceptions of osteopathic medicine. Kuizin developed the scale after reviewing previous research and combined and modified items from two previous studies done by Draper et al. (2011) and Reeves & Burke (2009). Kuizin also added questions to focus specifically on pre-medical students in her study. The current inquiry uses the attitudinal questions from the instrument but does not include the demographic questions used by Kuizin, as this data is collected when students apply to the BMP. The measure includes a total of 42 questions. The first 28 questions are rated on a five-point scale of 0 (Strongly Agree) to 4 (Strongly Disagree). The first 23 questions are knowledge/belief statements. Questions 24 to 28 ask respondents to provide response to agreement statements that focus on how faculty, DO and MD physicians, and peers influence their perceptions

of osteopathy. The 29th question is an ordinal response that asks participants which medical school pathway they prefer. The remaining 13 items are included in a matrix response, and participants are asked to rate 12 factors about their choice of medical school pathway on a five-point priority scale (4 – Essential to 0 – Not a Priority). The final choice is a "other" option that prompts participants to explain. In addition to Kuizin's measure, students are asked to report their attendance and completion of each of the intervention workshops and completion of the two exercises that are provided in the PCR course.

3.2.4 Applications to COMs

The BMP annually collects data from students about their post program plans and information via the end of year surveys. This data includes a question that asks students to report their application to or plans to apply to a selection of health and science professional programs including osteopathic and allopathic medical schools. The current investigation evaluated responses to this question and assessed if there is a correlation between attitude changes and applications to COMs.

3.2.5 Data Gathering

Both data measures, the attitudinal scale and the End of Year Student Survey were administered online via the Qualtrics survey platform. The attitudinal measure was distributed to all in the BMP for each of the pretest, midtest, and posttest time periods. The Application to COMs data were gathered as part of the Health Professions Committee Letter Profile Survey, an annual survey used by the BMP to learn what applications each student plans on submitting. Due to the

complex nature of gathering data from multiple sources and at multiple stages each student in the BMP was assigned a randomly generated identifier prior to orientation. This identifier was used to associate demographic data from existing student information, data from the Attitudinal Measure and data from BMP Annual End of Year Student Survey. The demographic data from existing student information and the Health Professions Committee Letter Profile Survey had all identifying information, such as e-mail or name removed prior to being associated with the Attitudinal Measure via the randomly generated identifier. The Attitudinal Measure was collected with the "Anonymize Response" option in Qualtrics to ensure that no contact information, location data or IP address data were collected. Data were stored on Qualtrics and downloaded directly to OneDrive prior to being cleaned. All data were stored securely on my University of Pittsburgh OneDrive account. Cleaned Data in both measures will be used for other evaluation purposes in the BMP and will also be part of the annual program assessment of the BMP and will be stored on the BMP's University of Pittsburgh OneDrive account.

3.2.6 Analysis of Data

The attitudinal measure was analyzed to determine if there is a meaningful change in attitudes towards osteopathic medicine. The data were analyzed in three groups of students from the population: 1) students who did not participate in the interventions, 2) students who participated in some but not all the interventions, 3) students who participated in all the interventions. Data from the pre-test, mid-test and posttest were evaluated to determine if it is appropriate to analyze using a one-way repeated measure ANOVA. The data were deemed inappropriate for this analysis due to the number of groups and participants in each group.

Additional statistical evaluation was done to determine if t-tests between each set of data would be appropriate and deem inappropriate as well.

The influence questions, 24-28, were analyzed to determine what impacts student motivations for their choices in what medical schools to apply to. The final part of the data analysis consisted of analyzing applications to COMs to determine if there are any patterns between attitudes about osteopathic medicine and decision to apply to COMs.

3.3 Conclusion

The BMP has continued to improve ways to promote application to COMs, however, there has been little formalization in the approach and analysis of these previous interventions. Previous conversations have occurred in the PCR course concerning osteopathic medicine and COMS, and students were given the opportunity to participate in panel discussions during the spring of 2021 via a student-initiated and student-led panel. These previous opportunities have provided a foundation for continued improvement and iterative implementation. The current intervention builds on previous efforts and provides a platform for evaluating the interventions and adjusting these interventions in successive years to continue to improve the attitudes of students about osteopathy and applications to COMs.

Taking deliberate actions to provide opportunity through deliberate education, training, and advising for BMP student to change their attitudes towards osteopathic medicine and DO schools can be accomplished by direct change of language used by the BMP, implementing curricular changes to the PCR course, and providing opportunities for students in the program to engage with individuals and knowledge about osteopathic medical practice.

Implementation of these efforts create environments where exposure to osteopathic medicine is consistent and accessible to all medical track students in the BMP and promotes consistent language that is used in publication and by all advisors (both faculty and staff). In addition, these efforts ensure that students engage with projects that prompt them to explore opportunities in osteopathic medicine. The language, exposure and investigation of osteopathic medicine will ensure that all students are knowledgeable, have real-world experience, and provide them with the advising needed to make informed decisions on their application to medical schools.

4.0 Results

The sample for this study was comprised of 28 participants. 12 other potential participants were excluded from further analysis due not completing at least two of the surveys. 21 participants were female, 7 were male. Ages ranged from 21- 39; however, 25 participants were between the ages of 21-26). Table 1 below shows these demographics in detail. This indicates that most participants were within the general age range of medical school applicants. Only one participant selected Osteopathic Medicine as their primary pathway at any point and this selection remained across all three tests. One participant did not indicate a preferred pathway choice, the remaining 26 participants indicated they preferred Allopathic Medicine throughout all survey tests. Examination of participants' plans to apply to medical schools found that 15 reported a plan to submit an application to COMS, and 12 reported they planned to only apply to allopathic medical schools. The one participant who did not indicate a pathway preference did not report any application decisions.

Table 1 Participant Demographics

	n	%
Gender		
Female	21	75
Male	7	25
Age		
21	1	3.6
22	5	17.9
23	7	25.0
24	5	17.9
25	4	14.3
26	3	10.7
28	1	3.6
30	1	3.6
39	1	3.6

4.1.1 Intervention and Survey Participation

Participants had the opportunity to voluntarily engage with the four interventions presented. 10 participants reported engagement with all four interventions. Six participants

reported engagement with the Osteopathic Student Panel discussions only. Five participants reported engagement with the alternate assignments and in class workshop. Seven participants reported no participation in any of the interventions.

A total of 14 participants completed all three surveys, 7 participants completed the pretest and midtest surveys only, three participants completed only the pretest and the posttest surveys, and four participants completed only the midtest and posttest surveys. Table 2 shows the breakdown of survey participation and intervention groups.

Table 2 Survey and Intervention Groups

Survey Participation	All	1-2	1-3	2-3
	n	*n*	*n*	*n*
Intervention Groups				
All interventions	8	**0**	1	1
Panel Discussions	1	4	**0**	1
Assignments & Class	3	**0**	1	1
None	2	3	1	1
Total	14	7	3	4

4.1.2 Analysis of Data

The breakdown of intervention participation was broader than initially expected. The data was tested for suitability for an ANOVA analysis and Initial analysis of the groups indicated that there were too few respondents in each group to appropriately conduct an ANOVA. Consolidating the data into groups of participants who interacted with any intervention (n=21) compared to those that reported no participation in any intervention (n=7) also did not fit the model for an ANOVA

test. These factors were compounded when looking only at participants that participated in all three surveys or any two survey tests. There were two major factors that indicate the data was not fit for analysis. First, the number of participants in each survey varied, and some participants skipped participation in the surveys at different points. Second, the homogeneity of mean scores across each survey test show little variance. Table 3 below shows the participants engagement with each test followed by the mean score of each test. The data in this table is shown for all participants as well as restricted to the subset of participants who completed all three survey tests. As seen in this table individual participant score changes over time followed no pattern, and that mean scores for all participants stayed extremely similar. The data indicates an insignificant change in attitudes from pretest to midtest, and an increase from midtest to posttest. When looking at all participants the pretest and post test scores are nearly identical. When looking at the subset of participants who completed all three survey tests the increase from midtest to posttest is limited. However, the changes in these scores were clustered close together and no relationship was able to be found due to any of the treatments participants engaged in. Looking at the average item rating for participants also shows that there was little change across time periods. Table 3 shows the average score assigned to all items across each survey test.

Table 3 Participant Scores and Mean Scores

Participant	Pretest Total	Pretest Average	Midtest Total	Midtest Average	Posttest Total	Posttest Average
1	26	1.13	34	1.48	33	1.43
2	21	0.91	21	0.91	18	0.78
3	36	1.57	16	0.70	n/a	n/a
4	n/a	n/a	43	1.87	45	1.96
5	n/a	n/a	26	1.13	31	1.35
6	22	0.96	29	1.26	n/a	n/a
7	n/a	n/a	31	1.35	27	1.17
8	32	1.39	29	1.26	25	1.09
9	22	0.96	35	1.52	32	1.39
10	29	1.26	35	1.52	41	1.78
11	32	1.39	31	1.35	n/a	n/a
12	17	0.74	n/a	n/a	24	1.04
13	55	2.39	42	1.83	50	2.17
14	46	2.00	40	1.74	44	1.91
15	16	0.70	27	1.17	n/a	n/a
16	35	1.52	43	1.87	n/a	n/a
17	n/a	n/a	39	1.70	34	1.48
18	34	1.48	32	1.39	n/a	n/a

19	33	1.43	27	1.17	39	1.70
20	34	1.48	38	1.65	38	1.65
21	46	2.00	45	1.96	39	1.70
22	37	1.61	26	1.13	n/a	n/a
23	24	1.04	n/a	n/a	28	1.22
24	36	1.57	30	1.30	19	0.83
25	45	1.96	44	1.91	29	1.26
26	40	1.74	26	1.13	31	1.35
27	22	0.96	14	0.61	26	1.13
28	48	2.09	n/a	n/a	37	1.61
Mean score all participants	32.83	1.43	32.12	1.40	32.86	1.43
Mean Score for participants who completed all test	34.79	1.51	32.86	1.43	33.14	1.44

4.1.3 Research Questions: What does the data tell us?

1) How does participation in the BMP Osteopathic Pathway Initiative influence student attitudes about osteopathic medicine?" I hypothesized that participation in the Osteopathic Pathway Initiative would result in an increase in positive attitudes towards osteopathic medicine, however the lack of variance in the participation groups and in the overall change from pretest to midtest to posttest shows no discernable impact of the interventions on student attitudes towards osteopathic medicine. No support for this hypothesis was found in the data.

2) How does participation in the BMP Osteopathic Pathway Initiative affect the number of students who are willing to apply to osteopathic medical schools? I hypothesized that participants who engaged with the Osteopathic Pathway Initiative would result in an increase in the number of students who reported a preference for osteopathic medicine at the midtest and or posttest points compared to the pretest.

This hypothesis was not supported in the data. Only one participant selected a preference for osteopathic medicine at the pretest, and this response was consistent for that participant through the midtest and posttest. All participants who initially responded with a preference for allopathic medicine confirmed their preferences for allopathic medicine in subsequent tests. The current data does not indicate change in preference for osteopathic medical school based on the interventions participated in. Table 3 above shows the lack of consistent change in scores over time; there was no discernable pattern to score change based on interventions that participants engaged with.

3) To what extent do changes in attitudes about osteopathic medicine result in students submitting applications to osteopathic medical schools? I hypothesized that participants who had a change in scores on the attitudinal scale would be more likely to submit an application to COMs. The current data is insufficient to evaluate this hypothesis and it is not possible to evaluate if the number of students who plan to apply to COMs is related to any change in attitude due to the interventions.

Analysis of the findings indicate that the individual and mean scores of the 23 attitude statements skew towards the positive side of the scale. In the pretest six respondents had a mean score equal to or below 1, indicating agreement with the measure, 16 respondents

had a mean score between 1-2, indicating they were on the somewhat agreement side of neutral, two respondents had mean scores of 2, indicating neutral attitudes, and only two respondents had mean scores between 2-3, indicating somewhat negative attitudes. No respondents had mean scores of above 3, which indicates a strong disagreement with the attitude scale measures. In the midtest, three participants had mean scores below 1, and the remaining 22 participants had mean scores between 1-2, indicating strong or somewhat agreement with the attitude scale questions. In the posttest two respondents had mean scores below 1, 18 participants had mean scores between 1-2, and one participant had a mean score between 2-3. The mean scores are presented in Table 4.

Table 4 Respondent Attitudes by Mean Score Counts

Total Respondents	Strongly Agree-Somewhat Agree	Somewhat Agree-Neutral	Neutral	Neutral-Somewhat Disagree	Somewhat Disagree-Strongly Disagree
26	6	16	2	2	0
25	3	22	0	0	0
21	2	18	0	1	0

5.0 Discussion and Implications

The initial findings from this cycle of the intervention were mixed compared to the expectation. As predicted, most students who participated expressed a clear preference for allopathic medicine over osteopathic medicine. However, there was no evidence to support changes in participant attitudes in the data. Participants did however report a willingness to apply to COMs.

5.1 Participants

Only two participants did not choose allopathic medicine as their first preference, and of those two, one did not make a selection nor did that same participant report applying to medical school. It is highly likely that this participant was not in the medical pathway of the BMP to begin with. Only one participant reporting a preference for osteopathic medicine lined up with the expectation of which pathway BMP students would report preferring. Table 5 shows the pathway preferences of participants.

Table 5 Medical School Application Plans

	n
Osteopathic Preferred	1
Allopathic Preferred	26
No Response	1

In contrast, however, the mean scores of participants in this study were lower compared to previous scores on the same measure in other populations. The comparison between students in this intervention study compared to previous data suggests that BMP students have somewhat positive to neutral attitudes about osteopathic medicine. Participants in Kuizin's (2018) study who expressed a preference of osteopathic medicine had a mean score of 1.54 and participants who had a preference for allopathic medicine had a mean score of 1.94. Participants in the current study ranged from 1.51 to 1.40 mean scores across all categories shown above in Table 3. This may mean that participants in the current study began with a fairly positive attitude about osteopathic medicine compared to previously studied groups. While the lack of change in scores was a surprising finding, students in the BMP may already have thought about both pathways prior to entering the program and may have already held osteopathic medicine in higher regard compared to other groups. This does not mean that these same students are motivated to choose osteopathic medicine as their preferred pathway; however, this idea may be supported by the high number of students who participated in the study who indicated they planned to apply to COMs. Table 6 shows the self-reported application plans of participants. 54 percent of the participants reported they planned to apply to both COMs and CAMs.

Table 6 Medical School Application Plans

	n	~%
COMs included	15	54
CAMs Only	12	42
No Response	1	4

5.1.1 Cohort Effect

Characteristics about this cohort of students may be a factor that influenced how participants responded to the survey tests. The participants share a common career goal. This group had already completed four or more years of collegiate education and have all obtained an undergraduate degree. This baseline of education is a requirement for the BMP and differentiates the current participant group from previously studied groups, who had various levels of education, but were still in undergraduate education. The participants in the current investigation were specifically selected by the BMP admissions committee due to the participants' previous efforts to prepare for medical school The BMP selects not only for degree satisfaction; specific courses are required to be admitted to the BMP. These courses are based on the requirements that medical schools have. The impact of all students having baseline of prerequisite science, math and language classes further differentiates them from previously studied groups. In addition to completing their undergraduate degrees, these efforts also include experiential activities such as research training, community service and clinical and patient contact hours. Additionally, BMP students are expected to have planned to take the MCAT exam. Individuals who have completed these requirements and are admitted to the BMP have often participated in pre-medical advising, have pursued self-initiated research, and have found ways to engage with clinical experiences. This preparation, planning and forethought differentiates BMP students from other groups of students who are pursuing medical education, as they ideally have taken specific steps to learn and understand the options before them. Participants in Kuizin's (2018) study were spread across various stages of this preparation but were all at the undergraduate level. This preparation may have produced a difference in the participants in this investigation, and they may as a cohort have already developed a more positive perspective of osteopathic medicine.

The length of educational experience may also contribute to BMP students understanding and may have previously worked to overcome the bias against osteopathic medicine that is seen in non-academic sources. Experiences with shadowing, advising and previous exploration of career options may explain the positive attitudes and perspectives that participants displayed throughout the survey tests in this investigation.

5.1.1.1 Impact of Covid 19

The BMP students that participated in this project may also differ from previous BMP students due to the COVID 19 pandemic. It is unknown what impacts the pandemic has had on medical school admissions and applicants. What is certain is the students in the BMP during this investigation all experienced a vastly different context immediately prior to their enrollment in the program. Dowd, McKenny and Elkbuli (2021) observed that changes to several requirements to medical school have been changed or adjusted, such as temporary truncation of the MCAT or the potential for remote interviews, and that these changes presented numerous challenges to premedical students. The pandemic has affected students in the current cohort directly and I have discussed what some of these affects are with them, and with other staff and faculty. It is still unknown if the pandemic will create short and or long-term changes to medical school applicant cohorts and admissions decisions at medical schools. These challenges and conversations may have become a prime consideration of the current cohort of students, and many of them have talked about how they are trying to understand if the pandemic changes how they should view their opportunities at both types of medical schools.

5.1.2 Social-Desirability Bias

The social-desirability bias is an important factor to consider in the current investigation. The solicitation for participation describes the study as evaluating attitudes towards medical school pathways. The self-reported answers in the survey used for the attitudinal scale in this investigation may have suffered from a social-desirability bias. Social-desirability bias is a risk to the current study that must be considered. This language may have influenced participants to view the surveys as comparative measures between allopathic and osteopathic medicine. It is possible that participants began the surveys expecting questions about both allopathic and osteopathic medicine, and the foreknowledge of the survey being about personal attitudes may have resulted in participants selecting responses based on what they believed were the desired answers. The risk of this occurring may also have been increased with questions on the survey that specifically asked about osteopathic medicine or compared allopathic and osteopathic medicine directly.

5.1.3 Response Persistence and Intervention Variability

The inconsistent participation in the surveys and the interventions also impact the results of the study. I initially expected that almost all students would participate in the study and that survey response rates would remain strong throughout the year. This was not the case, and the inconsistent participation caused some of the comparison groups to have too few participants to perform an analysis on the data. I also expected that a subset of the participants would participate in the voluntary interventions offered (DO workshops and alternate assignments) and that all participants would participate in the course-based DO session. More surprising was the number of participants who reported not having participated in the course-based session. Initial expectations

were that almost all students would be present for that session. Class attendance was not compared to determine if there were at least seven students absent from that session; however, participants either missed that session or did not accurately report their participation. This added an additional group that was not expected in the data set. The variability in survey responses and intervention participation resulted in many very small treatment and observation groups. Rather than having a small number of outliers there were no strong patterns of treatment and response groups to compare. The bigger number of groups in the data made it inappropriate to compare groups across treatments and time with analysis of variance methods.

5.2 Contextualizing Outcomes to the Drivers and System Measures.

Student knowledge about DO schools and osteopathic medicine was a primary driver that influenced the design of this investigation. I may have underestimated the knowledge students had entering this investigation. It is possible that this occurred due to an unfair comparison between previous populations studied and students in the BMP, or it may be that some of the cohort effects discussed influenced the BMP in ways that I did not anticipate. It is also possible that the interventions did not provide new information and only reinforced existing knowledge that the participants had about COMs and osteopathic medicine. It is also possible that the interventions are beneficial, but do not provide the type of knowledge base that can change student attitudes. The final primary driver, the continuing to focus on the way that the program may favor MD over DO, changes rapidly as staff and faculty become more aware of their own biases. The current investigation may have hastened change in awareness by these groups and more change may occurred compared to the change that would have happened naturally in the BMP without the

intervention being present. It is possible that many students who participated in the study have seen this favoritism at a decreased level compared to previous cohorts of BMP students.

5.2.1 Does Exposure to Osteopathic Medicine Change Student Perception and Actions?

Students who participated in the interventions gained an increase in exposure to osteopathic medicine; however, it is not clear at this stage if that has the ability to change student perceptions of osteopathic medicine. The number of students who indicated they planned to apply to osteopathic medical schools was much higher than the number that reported a preference for osteopathic medical schools. This indicates that as students progress through the BMP there is a correlation between their experiences and education and their willingness to consider osteopathic medicine. What is not clear based on this study is if that is due to the specific interventions that were focused on osteopathic medicine. It is possible that these interventions impacted students planned decision, but it is also possible that other factors that were not anticipated or outside of the program primed students to be more willing to apply to osteopathic medicine, even if they did not express it as preferred pathway. Monitoring if there was a change in students who were not in the medical track was not viable as only one participant indicated they did not have a preference or plan to apply to medical school.

5.3 Improvement to the Process Over Time

The methodology used in the current study did not result in variable groups within the data that allowed for analysis to determine if the interventions created a change in attitude and action

by BMP students. This, however, does not mean that the model does not work. Changes should continue to be evaluated both to determine if the current model used is the best set of interventions and if the current measurement methodology captures the best data for these interventions.

The first step in determining what can be improved in the next iteration is to change the model from an experimental design towards a model that is embedded in program wide assessment and evaluation. Rather than relying on surveys and self-reported anonymous data, the information that is most important to capture could be integrated into broader program assessments. This can be done by focusing solely intention to apply questions that are asked at the beginning of the program and again at the end of the program. Other questions such as asking what has impacted student perceptions on their application decisions is also a potential change that can help bring a perspective on what students find most useful activities that are offered. This will allow the BMP to evaluate if the interventions used in this study are helpful and useful or if they are viewed as requirements with little value. Directly asking the question of why students engage with the interventions and if those interventions were worthwhile and helpful can provide insight into the ability for the interventions to impact change.

Directly measuring the intervention participation is also a valuable change to consider. During this study all participation was voluntarily reported by the participants. It is not clear how valid this data is. Changing the model to one that is embedded in other assessments allows the BMP to use identifiable data to determine if there are changes in attitudes and actions rather than relying on self-reports.

Changing to a model where data is solicited as an exit survey after each intervention may also yield more viable data to analyze. Requiring students to take a brief survey at the end of each intervention to receive credit for their participation can eliminate persistence issues among student

participants, and further moves the data into already occurring existing and regular program assessment.

Finally using interviews and focus groups may yield more usable data to determine if the interventions are having the intended effect. Providing the opportunity for students to discuss and contextualize their experiences in the BMP through a guided questionnaire may allow for more detailed insight into the effectiveness of the interventions and the attitude changes that were not able to be measured through the survey, it also allows for students to discuss cofounding factors or other variables that impact their perceptions and decisions.

5.4 Intervention Benefits

Despite lack of measurable impact of the interventions during the current investigation it is still important to analyze and consider the positive impact the interventions may have had on the students in the BMP. Students who engaged with the activities continued to expand their knowledge of osteopathic medicine, took steps to identify COMs they could apply to, and gained insight into the life and education of osteopathic students and physicians. In addition to the unmeasured benefits that may have occurred existence of the Osteopathic Pathway Initiative also demonstrates direct support of osteopathic medicine by the BMP. As previously discussed, the context of the BMP being within a college of allopathic medicine (CAM) has placed a default emphasis on the MD pathway. The Osteopathic Pathway Initiative is a visible set of workshops and class activities that BMP students are exposed to, and its existence provides an opportunity for students to continue to learn about osteopathic medicine, even if they already have a positive perspective. The lack of analyzable data in the current investigation should not be taken as an

indication that the Osteopathic Pathway Initiative does not improve student perceptions, rather it is important to recognize that the measure was not successful at indicating if a change did occur.

5.5 Lessons Learned

There are three primary lessons I have learned in this investigation that impact future changes and the PDSA process for the current model. These lessons also offer more generalizable applications for future practice, research, and policy.

1) Student participation in extracurricular activities is inconsistent and not a reliable way to measure impact

2) Attitudinal surveys may lack the precision to evaluate BMP student perceptions about osteopathic medicine.

3) Student Preference for MD does not preclude them from having a positive perspective about osteopathic medicine.

5.5.1 Student Participation

Ensuring student participation in extracurricular programmatic activities that are not directly related to building their resume or academic portfolio has continually been a topic of discussion in the BMP. This conversation has occurred both in terms of being sensitive to the vast array of opportunities and activities that are presented to students, with recognition that they do not have the time to participate in everything offered, and often are faced with competing opportunities. Reflecting on the interventions offered in this study and how students participated

has helped me to recognize that many students choose to skip participation in good and beneficial activities due to competing priorities. Throughout the year students apologized to me for not attending the DO panels, or other opportunities that the BMP offers, often referencing academic commitments, exam preparation, presentation meetings, or needing to participate in an experiential learning activity that results in academic credit. I assumed students would choose the opportunities that are being studied over other important priorities; however, in retrospect I have a greater understanding of the desire to participate but the need to choose other options. This observation will result in a reevaluation of all of the activities and opportunities that the BMP conducts and determine a more appropriate timeframe within which to conduct the Osteopathic Pathway Initiative activities This observation can also help guide policy implementation in the BMP to ensure that each activity offered or passed along to students minimizes the impact of competing priorities.

5.5.2 Attitudinal Survey Precision

Choosing the appropriate tools for measuring the outcomes that the BMP is seeking is a theme that has surfaced through this intervention study. In the current cohort of students, the attitude scale did not produce viable data to evaluate change in perspective. Future evaluation of BMP students must consider if this measurement should continue to be used, and what additional measures are helpful in evaluating intended outcomes. One policy consideration that I have identified is how the BMP determines what is measured and why. The answer to this question should be flexible and, on a year-to-year basis, so as to avoid stagnation in measuring the same things over and over with little results or changes moving forward. It is important that any tools

used to evaluate the BMP initiatives follows an improvement science model that critically evaluates what is working and what is not working on a regular basis.

5.5.3 Preference Versus Perspective

Entering into this study I assumed that students' medical pathway preferences would directly be directly related to their perspectives about osteopathic medicine. This assumption was built on previous BMP students and data on other populations. Having no discernable connection in the current group of participants has induced two clear themes for continued improvement. First, prior groups of the same types of students may not represent a new cohort of students. Understanding that each group of BMP students are different cohorts with different experiences, some of which can be extremely significant to their perspectives, can enable future efforts to be tailored directly to the students who the BMP is working with in the moment. Part of the challenge in this investigation was the timeframe of building a model for change based on one cohort and implementing that change on a different cohort. In the future I plan on gaining a better understanding of each cohort at the beginning of the year and considering the interventions based on that group. This directly impacts the next cycle of the interventions offered, as the decisions about what to do next academic year should be built off of the results of this study but should also include initial data from the new cohort. The lesson learned here is also more generalizable to other aspects of the BMP, and I recommend that we think about ways to learn about and understand our cohorts of students as quickly as possible and build systems and programs that are nimble and the staff and faculty to pivot to address the needs of specific cohorts, rather than building solely from the perspective gained from past cohorts.

The second lesson is that the BMP student cohorts may be unique from other populations of premedical students. Basing the interventions on undergraduate data, which was the main source of previous data, may not be the best process in future research within the BMP. The lesson learned form this is to build a new data set over time that is based on BMP students and is sensitive to the advanced education and experiences they have gained compared to other populations that have been studied by other researchers.

5.6 Reflections

5.6.1 Continuing to Learn: Improvement Science

Improvement science has enabled me to put a new name and specific process to a loose framework of change that I have implemented throughout my career. In previous roles I have continually asked the questions “Why do we do things the way that we do?” and “Does doing it this way server our students or values, goals and outcomes in the best way?” These questions have guided conversation and allowed me to challenge the status quo while ensuring that the approach forward is focused on change that is beneficial. Throughout the past six years I have had to ask different questions for the BMP. Rather than challenging the status quo, I entered into my role with the BMP when the initial course curriculum was planned, but the day-to-day policy, procedures and processes that were needed to ensure program success were actively being developed. I was tasked with taking the lead on developing much of these policies, procedures and processes. Starting with the question “What do we need to be doing to make a new program a success?” was a different mindset. The ability to start from the beginning and work towards

building a program from the ground up was initially hectic, but it provided opportunities to enact policy and procedures and programmatic support that, while based on university and school of medicine graduate program precedent and boundaries, were tailored specifically to the population of students that the BMP serves. I began to rework my standard questions. No longer was I interested in why we did things in the way we did; I was asking how to get started and plan for change in the future? This shift enabled me to begin to plan for change from the onset, but there was still an element that seemed incomplete.

Improvement science, which shares commonalities with many other change models, began to add more structure and context to my questions. Learning the PDSA cycle added a clear methodology for me to approach change, and the timing lined up well with a shift in my role in the BMP. No longer was I part of beginning a program, I now needed to evaluate many of the early things we did and think about how to improve them and iterate, while also thinking about gaps that were still present in how the BMP operated. Directly contrasting my personal model of change with the PDSA cycle, I learned that I was very adept at the planning and doing stages; however, I lacked clear frameworks for studying and acting. That is not to say I did not study, and act based on that study, but rather that it was disjointed and often not planned as part of the initial process. It was reactive and often with observational data that may or may not measure the outcomes of the process or activity I was evaluating. Throughout the experiences in the Educational Doctorate program, I have been able to systematically leverage the improvement science model to plan and evaluate numerous other projects and programs in the BMP.

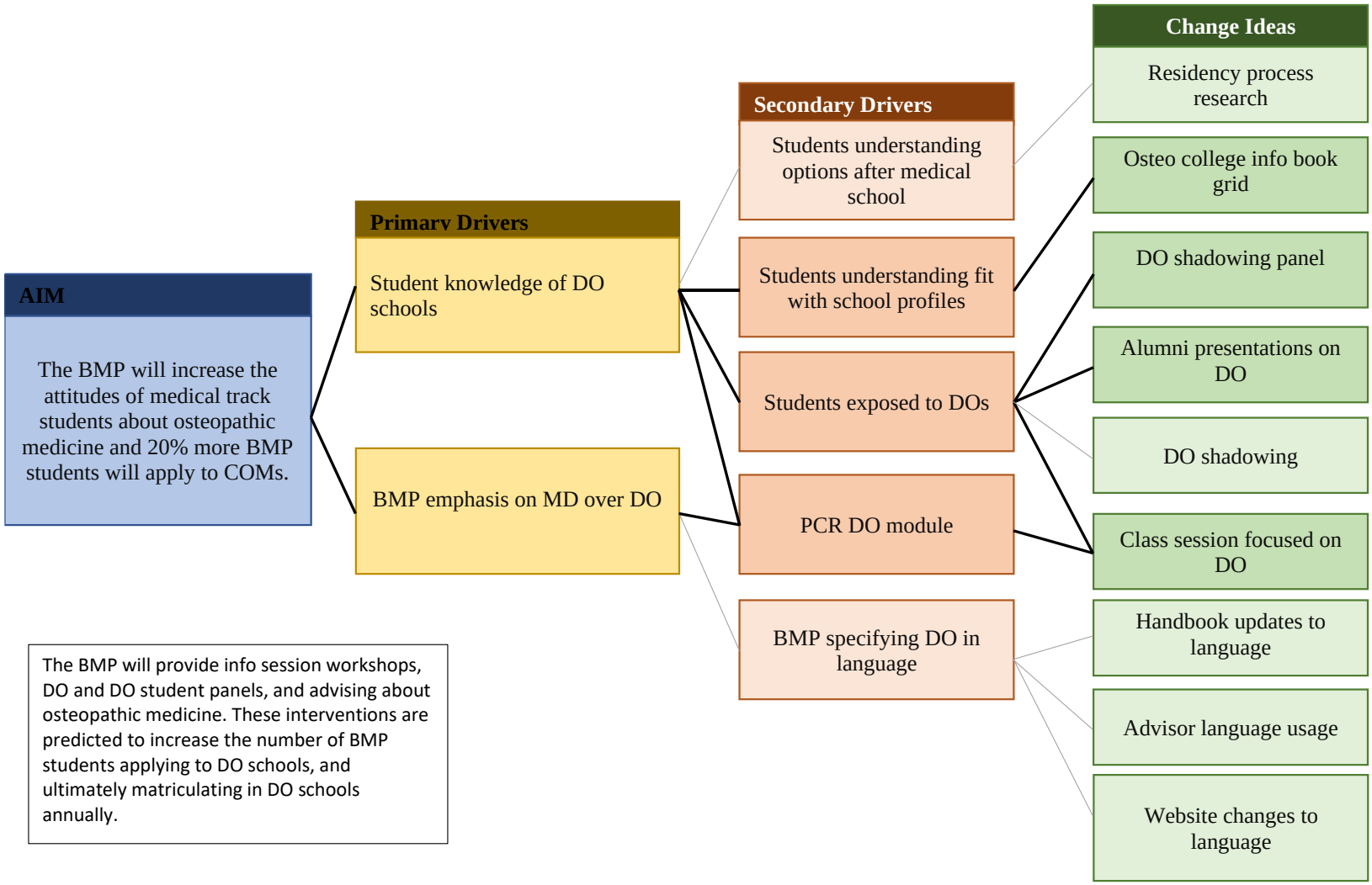
5.6.2 Personal Growth

Considering my personal growth throughout this process has proved a challenge. This challenge was exacerbated by working through the process in the midst of campus environment changes due to the COVID 19 pandemic. It has been much easier to solve the challenge of what to do to support students in and after the initial changes the pandemic brought about, but it was much more challenging to understand how the pandemic impacted my work with the BMP and the Osteopathic Pathway Initiative. In retrospect I have been reminded that I still need to ensure I have proper support to perform my work well. This became extremely evident when our program went remote along with the rest of campus in March 2020. Suddenly I found myself interacting with my peers in very different ways, and it took time to reconnect with my classmates and coworkers and develop new ways of maintaining strong relationships, good communication, and ways to maintain productivity. Throughout the past two years I have had to ensure that I have taken specific actions to maintain those supports, and the feedback that comes with them. Without the casual conversations that yielded support and feedback I found myself needing to find ways to pursue support directly. This lesson has been valuable as it has continued to shift my perspective from expecting the environments I work and learn in to be supportive by default and has pushed me to develop more intentional support networks, both within my role with the BMP and with others outside of my day to day working environment. This growth was necessary as much of the work to design this study came about through conversation with and feedback from others. This lesson is different than relying on stakeholder buy in or other information gathering attempts that must be done to design an improvement process, it is the direct feedback on the plan and implementation and the later study and changes that are built into the improvement science model.

5.6.3 Improving future Problems of Practice

Improvement science informs how I approach changes to this investigation and sets the stage to plan well for other challenges or problems of practice that present themselves in my work with the BMP. The ability to identify problems and systematically define what factors impact the problem is a necessary step in seeking out effective solutions. Not all problems will be immediately addressable and taking the time to map out the contributing factors, environmental concerns, relevant stakeholders, allies and what aspects of a problem are within my control to influence enables a new approach. The analysis of problems has helped me learn that I should not write off certain problems as ones that are too big, or are outside of my ability to create change, but rather it prompts me to take a systematic approach to engage with problems and look at all factors, and all ways that problems can be approached. Often times problems seem bigger than I can handle, however when breaking them down and identifying the places where different factors impact the problem, I am able to focus on smaller parts and determine what parts of the problem hidden beneath the surface may be ripe for change. In the future I am able to utilize tools such as the fishbone diagram, process mapping, and driver diagrams to better understand problems, the influences on them, and potential solutions. I have learned that future problems are not too big to be solved, but rather they can be solved in small steps, looking at one part of the problem at a time.

Appendix A Driver Diagram



Appendix B PDSA Sheet

Test Title:	DIP - Osteopathic Pathway Initiative (OPI)	Date:	8/21-5/22
Tester:	Steve Mattiace	Cycle #:	1
What Change Idea is being tested?	Changing Student attitudes and increasing DO applications	Driver:	Student Knowledge of DO Schools
What is the overall goal/hypothesis you are testing?	Students who participate in the OPI activities will have a decrease in score on the attitudinal measure (meaning an increase in positive attitudes) about osteopathic medicine, and this will result in more of those students applying to COMs		

1) PLAN **Details:** Describe the who/what/where/when for the test. Include your data collection plan.				**2) DO** Briefly describe what happened during the test, surprises, difficulty getting data, obstacles, successes, etc.
Who: BMP students, will engage with: 1) DO student and 2) DO physician panels, 3) an osteopathic information session in the PCR course, and 4) two exercises in the PCR course. A Pre/Mid/Posttest survey will be distributed to all students in the BMP Med track, and data gathered from end of year application plan survey.				many students participated in the OPI activities, and of those that responded to the surveys there was not enough detail to determine if the OPI activities had an impact. The overall scores on the attitude measure were not differentiated.
Questions: Questions you have about what will happen. What do you want to learn?	**Predictions:** Make a prediction for each question. Not optional.	**Data:** Data you'll collect to test predictions.		**What were your results?** Comment on your predictions in the box below. Were they correct? Record any data summaries as well.

1) How does participation in the BMP OPI influence student attitudes about osteopathic medicine?	Students who engage in OPI will have more positive attitudes about Osteopathic medicine	Attitude scale score changes and self-report of engagement with OPI activities		No measurable difference found in mean attitude scores. Positive attitudes were present at pretest and did not change significantly
2) How does participation in the BMP OPI affect the number of students who are willing to apply to COMs	Students who engage in OPI will be more likely to apply to COMs	self-report of engagement with OPI activities and plan to apply to COMs		no pattern of plan to apply to COMs was associated with OPI engagement
3) To what extent do changes in attitudes about osteopathic medicine result in students submitting applications to osteopathic medical schools?	Students whose attitudes become more positive will report intention to apply to COMs	Change in scores on attitude measure and plan to apply to COMs		Lack of changes in scores meant attitude changes could not be used as an indication of plan to apply to COMs

4) ACT Describe modifications and/or decisions for the next cycle; what will you do next?		**3) STUDY** What did you learn?
The next iteration will seek to eliminate impact of cohort effects as well as to improve OPI activity interventions to be more precise. Additionally, changes in data gathering and methodology should be considered. This may be due to numerous factors and a retest with a new cohort of students is warranted.		The current cohort of students had a positive attitude about osteopathic medicine. This may not be consistent across cohorts of students so better preliminary evaluation of each cohort is needed prior to tailoring interventions to students.

Appendix C Attitudinal Measure

1. Osteopathic medicine is as effective in treating illness as allopathic medicine.
    a. 0 - strongly agree
    b. 1 – somewhat agree
    c. 2 – unsure
    d. 3 – somewhat disagree
    e. 4 – strongly disagree
2. Osteopathic medicine is different from allopathic medicine.
    a. 0 - strongly agree
    b. 1 – somewhat agree
    c. 2 – unsure
    d. 3 – somewhat disagree
    e. 4 – strongly disagree
3. Osteopathic medicine is primarily based on preventative medicine.
    a. 0 - strongly agree
    b. 1 – somewhat agree
    c. 2 – unsure
    d. 3 – somewhat disagree
    e. 4 – strongly disagree
4. Osteopathic medicine is primarily based on a holistic approach to medicine.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – unsure

d. 3 – somewhat disagree

e. 4 – strongly disagree

5. Osteopathic medicine primarily involves medical care without drugs.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

6. Most DOs practice as family practice or primary care physicians.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

7. Most DOs practice in rural areas.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

8. DOs use advanced medical technology more often than MDs.

    a. 0 - strongly agree

    b. 1 – somewhat agree

    c. 2 – neutral/no opinion

    d. 3 – somewhat disagree

    e. 4 – strongly disagree

9. DOs prescribe medication more often than MDs.

    a. 0 - strongly agree

    b. 1 – somewhat agree

    c. 2 – neutral/no opinion

    d. 3 – somewhat disagree

    e. 4 – strongly disagree

10. DOs perform surgery more often than MDs.

    a. 0 - strongly agree

    b. 1 – somewhat agree

    c. 2 – neutral/no opinion

    d. 3 – somewhat disagree

    e. 4 – strongly disagree

11. The quality of education provided for DO medical students is equal to that of MD medical students.

    a. 0 - strongly agree

    b. 1 – somewhat agree

    c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

12. The amount of time it takes to get a DO degree is equal to the amount of time it takes to get an MD degree.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

13. The length of residency training for DO programs is equal to MD programs.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

14. The quality of residency training for DO programs is equal to MD residency programs.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

15. DOs with osteopathic residency training are equal in performance to MDs with allopathic residency training.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

16. DOs with allopathic residency training are equal in performance to MDs with allopathic residency training.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

17. The osteopathic profession trains medical and surgical specialists and subspecialists.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

18. The osteopathic profession certifies medical and surgical specialists and subspecialists.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

19. There is a scientific basis that supports the foundation of osteopathic medicine.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

20. Osteopathic medicine is as effective as traditional medicine for most medical problems.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

21. Osteopathic physicians earn the same income as allopathic physicians.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

22. Osteopathic medical treatment has the same level of prestige as allopathic medical treatment.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

23. The DO degree has the same level of prestige as the MD degree.

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

24. Faculty have provided comparable information about the MD and DO degrees:

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

25. Faculty have influenced my perception of the MD and DO degrees:

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – neutral/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

26. A DO has influenced my perception of osteopathic medicine:

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – I do not know a DO/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

27. An MD has influenced my perception of osteopathic medicine:

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – I do not know an MD/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

28. College peers have influenced my perception of osteopathic medicine:

a. 0 - strongly agree

b. 1 – somewhat agree

c. 2 – I do not know an MD/no opinion

d. 3 – somewhat disagree

e. 4 – strongly disagree

29. Please indicate your first choice of medical degree desired:

a. Doctor of Osteopathic Medicine (DO)

b. Medical Doctor Degree (MD)

30. Please indicate priority level for first choice of medical degree using the following scale:

Essential (4) High Priority (3) Moderate Priority (2) Low Priority (1) Not a Priority (0)

a. Cost of medical school 4 3 2 1 0

b. Location of medical school 4 3 2 1 0

c. Acceptance rate 4 3 2 1 0

d. Requirements for admission 4 3 2 1 0

e. Reputation of medical degree 4 3 2 1 0

f. Length of time to medical degree 4 3 2 1 0

g. Faculty influence 4 3 2 1 0

h. Family influence 4 3 2 1 0

i. College peer influence 4 3 2 1 0

j. Residency options 4 3 2 1 0

k. Practice/specialty options 4 3 2 1 0

l. Job opportunities 4 3 2 1 0

m. Other. Please explain:

31. Please indicate your attendance/participation or completion of the following opportunities

a. DO Student Panel Workshop

b. DO Physician Panel Workshop

c. Watched the Osteopathic Informational Session Video for PCR

d. Completed the Osteopathic Fit Optional Assignment

e. Completed the Student Guide to Osteopathic Medical Colleges Optional Assignment

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