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The Case of the Leaky Pipeline:
Exploring the Experiences of Underrepresented Minority Premed Students in the UC System

By

Kelechi Uwaezuoke

A dissertation submitted in partial satisfaction of the
requirements for the degree of

Doctor of Public Health

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor Amani Nuru-Jeter, Chair

Professor Julianna Deardorff

Professor Tina Sacks

Summer 2018

Abstract

The Case of the Leaky Pipeline: Exploring the Experiences of Underrepresented Minority Premed Students in the UC System

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Kelechi Uwaezuoke

Doctor of Public Health

University of California, Berkeley

Professor Amani Nuru-Jeter, Chair

The lack of diversity in the physician workforce poses a complex problem for the US healthcare system. Despite numerous efforts over the last 45 years, the lack of representation in the physician workforce persists, with no significant signs of reversing course. There is therefore an urgent need to engage in research to aid in the development of innovative, systemic and sustainable methods of addressing barriers in the educational pipeline leading into medicine for URM students.

Much of the previous research in this area has focused largely on examining undergraduate program outcomes and impact on physician specialty/service area choice with very few examining the undergraduate premed experience in detail. These experiences can have deleterious effects which serve as barriers to academic achievement and outcomes, thereby preventing matriculation into medical school and the physician workforce. This research seeks to fill this gap in knowledge and employs qualitative methodology to accomplish three overarching goals:

1. Better understand the experiences of URM premed students as they navigate their undergraduate premed pathway. Focusing on the multi-level factors associated with academic achievement and enrollment in post-bac programs.
2. Explore the role and sustainability of post-baccalaureate premed programs in facilitating entry into medical school for URM graduates of the UC system.
3. Develop empirically based recommendations to ameliorate barriers and challenges reported by URM students in the UC system.

This dissertation resulted in three papers. The first paper illuminates the barriers and challenges faced by URM premed students and outlines their relation to student achievement and outcomes. The second paper sheds light on URM student perceptions and the specific reasons they apply to post-bac programs in addition to providing data that suggests that post-bacs are not a sustainable strategy to address diversity in the physician workforce. The third paper presents a list of empirically based recommendations aimed at addressing institutional-wide barriers to student achievement such as campus climate, academic/students services and course size and curriculum.

DEDICATION

This dissertation is dedicated to my grandparents Wilfred and Terresa “Nwaego” Uwaezuoke of Nduhu-Umuchoke, Amaigbo and Stephen and Christiana Nwokeukwu of Umunam, Eziana of Imo State Nigeria. Grandma Nwaego you always used to say “***agam agu akwukwo ruo nga oduru gwu***” (loosely translated: I will reach the highest heights in education). I never got to meet you, but you have been a constant source of inspiration on this journey.

I hope I have made you proud.

Che, Che Che Che, Igbo Kweni!

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PREFACE

My dark brown skin
Brown eyes and kinky hair
All tell me that I am destined to work twice as hard
Only to get to half of where society sees fit for me to be.
-Kelechi Uwaezuoke Fall 1998-UC Berkeley Poetry 4 the People

The above poem was written during my sophomore year at UC Berkeley. As an eager eyed premed student, I had my whole life ahead of me and was excited about the future. I was also very aware that my racial/ethnic identity, like it or not, impacted the ways in which I was able to navigate through society. Walking into a class of nearly 1000 students, to find only a handful of others that looked like you was a constant refresher of where society thinks you belong and can influence your own beliefs about what you can and can't accomplish. Navigating the premed pathways while balancing work, family obligations, and extra-curricular activities that provided me with a sense of belonging was no easy feat. By the grace of God and with "a little help from my friends" I made it, but my grades had suffered leaving me to decide on my next steps if I were to continue along the premed pathway. I initially opted to complete a post-bac program but ultimately found and fell in love with Public Health. Years later after obtaining my MPH, I found myself back at Berkeley, managing the Health Careers Opportunity Program in the School of Public Health. I found myself sitting across from advisees and mentees who reminded me of myself all those years ago. Sharing the same stories of struggle cemented with determination and crying the same tears that were dually therapeutic and exhausting. I listened as they shared their feelings of isolation and being nothing more than a number or GPA to advisors who judged them not on the content of their character but by the characters in their GPA. I thought to myself, "there has got to be a better way". In that moment, I knew that my journey had led me back to Cal to engage in research that would ensure that 20 years from now, underrepresented premed students would not be spattering's in an auditorium that holds 1000 students. Like many researchers, this work is personal for me. It is an opportunity to rewrite the history and experiences that made me and countless other students feel less than and invisible. On this journey I have had the privilege of speaking to numerous students; future physicians who all will leave the world a better place than when they found it. The power of research that comes from the heart and soul is that it touches and changes the lives of countless other hearts. A wise mentor once said: "*when we work with those who are most at risk of being marginalized and excluded from the university we find out lessons that are generalizable to all*". It is my hope that the experiences shared and the lessons learned from this research will take flight and make a difference in the lives of all future leaders and physicians coming through the UC system and beyond.

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The Case of the Leaky Pipeline: Exploring the Experiences of Underrepresented Minority Premed Students in the UC System

Abstract

The lack of diversity in the physician workforce poses a complex problem for the US healthcare system. This issue is particularly evident in California where under-represented minorities (URM) -African Americans, Hispanic/Latinos, Native Americans- make up 46% of the population but only 9% of physicians. Studies have shown an association between having providers of similar race/ethnicity and greater patient satisfaction and a decreased likelihood of unmet health needs. Additionally, URM physicians are more likely to practice in health physician shortage areas thereby filling a critical workforce need. Therefore, investment in research, programs and policies that increase access and facilitate entry into health professions for URMs is needed to increase diversity in the physician workforce. In this paper, I provide insight into the shared experiences of URM students who have navigated premed education in the University of California system. More specifically, I explore barriers and challenges faced by students and illuminate how their experiences are perceived as different from that of their non- URM premed peers. Understanding student experiences is integral to developing recommendations and interventions and revamping institutional policies to improve premed students' experiences and lessen disparities in academic and professional outcomes. The longer term goal of this research is to decrease the number of URM students who, despite desiring otherwise, are forced to take alternate pathways to medicine.

Introduction

The lack of representation and shortage of health professionals from racial and ethnic minority backgrounds poses a complex problem for the United States (US) healthcare system. Despite making up 30% of the US population, underrepresented racial/ethnic minority groups - African Americans, Hispanic/Latinos and Native Americans - represent only 13% of the nation's physicians (AAMC). This disparity is even more pronounced in California where URMs make up 46% of the population but only 9% of the physician workforce. This shortage has been associated with numerous health disparities which persist even after accounting for known confounders such as socio-economic status, age, patient insurance status and severity of condition, making this a multi-faceted and deep-rooted issue (Institute of Medicine; Nivet MA, Castillo-Page L.; Sullivan, 2004).

Having providers of similar race (i.e. patient/provider race concordance) and cultural background has been associated with greater patient satisfaction, better interpersonal care and a decreased likelihood of having unmet health needs (LaVeist & Carroll, 2002; Laveist & Nuru-Jeter, 2002; S Saha, Komaromy, Koepsell, & Bindman, 1999); highlighting the importance of a workforce that is reflective of the population it serves. Data also shows that racial minority physicians are more likely to serve minority patients and practice in health physician shortage areas, thereby filling a critical need in the health care workforce (McDougle et al., 2015; McDougle, Way DP, Rucker YL.; Somnath Saha, Guiton, Wimmers, & Wilkerson, 2008). Furthermore, as the racial, ethnic and cultural landscape of the US continues to diversify, so too

does the need for a health workforce that has the cultural and experiential understanding, sensitivity and language skills required to address their health needs and concerns. As the US approaches a 'majority-minority' demographic, the health of racial/ethnic minorities will become increasingly important to the health of the US population as a whole. The trends in population composition and growth, combined with the burden of poor health in these groups, make this a population health issue. The established link between a more diverse workforce and improved health outcomes undergirds the need to explore approaches for increasing diversity in the health workforce (LaVeist & Carroll, 2002; Laveist & Nuru-Jeter, 2002; Saha et al., 1999)

Over the last 40 years, multiple attempts have been made to close the gap in disparities related to URM representation in the overall health workforce and specifically in the physician workforce (Institute of Medicine, 2010; Nivet, 2010; Patterson & Carline, 2006). Strategies have included federally funded scholarship incentives, focused outreach and enrichment pipeline programs, affirmative action policies and academic enhancer post-baccalaureate (post-bac) programs (Grumbach K & Chen E, 2006; Keith, Bell, & Williams, 1988; Lakhan, 2003; Terrell & Beaudreau, 2003). However, despite these initiatives, and some early successes, the composition of URM physicians in the US has remained relatively unchanged the last 25 years. The inability to achieve representation through these initiatives has led for renewed calls for programming, policy and research to inform best practices and generate evidence based data (Nivet, 2010). This diversity is vital not only to direct service, but also in creating greater representation amongst medical faculty who are responsible for preparing future physicians to provide quality care to an increasingly diverse nation (Pololi et al., 2013). Now more than ever, there is a need to invest in research, programs and policies that have the goal of increasing access and facilitating entry into health professions for underrepresented minority (URM) students.

URM Experiences in Higher Education

Despite overall increases in educational opportunity for racial minorities in the last 40 years, evidence suggests that race remains a salient factor impacting the educational experiences of students in the US (Carter, 2006; Kozol, 1992). Racial and ethnic minority students have a higher probability of leaving post-secondary education and are generally under-represented in higher education (Carter, 2006). A review of the educational attainment of adults aged 25 and older revealed that 23% of Blacks and 16% of Latinos held a Bachelor's degree compared to 36% of Whites and 54% of Asians (US Census 2014, n.d.). Studies have also reported that URM students tend to fare worse academically in the premed curriculum and show a disproportionate decline in interest, ultimately resulting in fewer URMs applying to medical school (Barr, 2008; Alexander 2009).

Aside from the few studies that have focused on early decline in interest and academic outcomes in premed courses, there is currently little data focusing on the undergraduate premed experiences of students in the US. Understanding premed experiences, particularly those that contribute to poor academic outcomes, is vital to the development of targeted interventions to ameliorate barriers faced by students. Qualitative research is a common mode of methodological inquiry that allows the researcher to gather multiple forms of rich data to make sense of human experiences in contextual settings (Creswell JW, 2013). A 2013 critical review of the undergraduate premedical experience yielded a total of 19 articles between 1976 and 2010 (Lin et al. 2013). Of these, only five were based on qualitative interviews, resulting in a limited scope

of data on this topic. Further, the selection criteria resulted in only including studies of students sampled during their premedical years, thereby eliminating students able to speak from a position of having completed their full undergraduate premed experience. Much of this research has focused on how the academic experience; specifically academic performance, influenced outcomes during the medical school years and beyond (Lin et al., 2013). Little is known about the ways in which student experiences impact student achievement, and ultimately their pathway to medicine. It is also not fully understood how racial/ethnic identity shapes undergraduate premed experiences, particularly for students historically under-represented in medicine (URM). Research in this area continues to focus on student experiences in gateway courses and disparities in academic outcomes.

Chemistry courses, in particular organic chemistry, have been identified as a barrier that plays a significant role in the decision of students who decided to change educational and career paths (D. A. Barr, Gonzalez, & Wanat, 2008; D. Barr & Matsui, 2009; Lovecchio & Dundes, 2002). A 2008 study examining early decline in premedical studies among URM students in elite private universities, found a 50% attrition among URM students compared to their white and Asian peers (Barr, 2008). This rate is significant given that it represents a loss of URM students who are seemingly qualified medical school applicants, by virtue of acceptance and graduation from one of the nation's most elite private universities. When asked about their decision to leave the premed pipeline, the principal reason given by students was a negative experience in one or more chemistry courses. A similar study was conducted the following year at UC Berkeley to determine if chemistry courses had a similar effect at a large public university. A total of 1,036 students from three entering cohorts were surveyed at the beginning of their first year and again at the end of their second year. The study found the strength of interest in premedical studies declined for all racial/ethnic groups with chemistry courses identified as the principal factor. Moreover, 97% URM students mentioned at least one chemistry course as discouraging compared to 65% of non-URM students. These studies suggest that chemistry and other premedical courses are more discouraging for URM students than for non-URM students (Matsui, 2009). What remains unknown are the experiences of students in these courses and other specific factors that may be serving as barriers to their academic achievement.

In a 2009 study of minority student achievement in the health career pipeline, data were collected from 15,000 California college students to determine whether URM students receive lower grades than do non-URM students in pre-health gateway courses. In addition, the study examined the extent to which lower grade performance might be explained by differences in precollege academic achievement and whether URM students are less likely to persist in completing at least four gateway courses. The study found a 25%-30% achievement gap when comparing percentages of Black and Latino students receiving a grade of A or B compared to percentages of white students during these college courses. This gap persisted even after adjusting for measures of pre-collegiate academic performance and did not seem to be fully explained by URM students entering college with less academic preparation. This finding suggests that other factors in the college environment are impacting academic achievement and outcomes of URM students (Alexander et. al, 2009). This is of particular importance given the temptation to attribute the lower grades to a lack of academic ability or preparation. These findings suggest a need to explore the specific factors and experiences of this population of students to better understand the barriers to academic achievement in premed courses and

contextual factors of the campus environment that may foster disparities. The authors suggest that the identification and exploration of these impediments will assist in the development of targeted interventions to enhance URM student achievement in premed gateway courses (Alexander, Chen, & Grumbach, 2009). While the specific experiences of URM premed students remains largely unknown, one potential outcomes of these experiences and poor academic achievement is students needing to enroll in a post-baccalaureate (post-bac) program prior to entering medical school. These programs offer support to students who either did not apply, or did not get into medical school during their initial attempt. While post-bac programs are considered a beneficial stop-gap measure to promote diversity in the medical profession, participating in a post-bac program takes more time, is expensive and does not guarantee admission into medical school. In an ideal scenario, students would have the necessary resources during their undergraduate tenure to successfully apply and matriculate into medical school without the need of a post-bac program.

In this study, we examine the experiences of URM students who have navigated premed education in the University of California (UC) system. The UC system provides a large segment of the nation's URM medical school applicants and hosts the nation's only academic enhancer post-bac consortium. More specifically, we explore barriers and challenges faced by students and illuminate perceptions of how their experience differs from that of their non URM premed peers. This study focuses on students who are either currently enrolled in or have recently completed a post-bac program in California. This positionality equips them with a unique perspective to speak retrospectively about their full undergraduate experience compared to studies focusing solely on current undergraduates. The underlying assumption of this research is that if URM premed students experienced fewer barriers, more would directly apply to medical school (vs dropping out or taking an alternate route e.g. post-bac) resulting in a more representative number of URM physicians. The longer term goal of this work is to decrease the number of URM students who, despite desiring otherwise, are forced to take alternate pathways to medicine and thereby eventually address inequities in the provider workforce. While brief recommendations are provided in the conclusion, this paper is part of a larger project; detailed recommendations to improve the premed educational experiences of URM students will be included in the final paper of this dissertation.

METHODS

Partnership with the University of California Post-Baccalaureate Consortium (UCPBC) which includes UC Davis, UC San Francisco, UCLA, UC Irvine and UC Riverside, allowed for direct recruitment of students. Purposive sampling was used to identify URM graduates of the UC system who were either currently enrolled in or recently completed a post-bac program in California. Participants were identified using the following selection criteria:

1. *Self-identify as an under-represented minority (URM)*
2. *Self-identify as having been premed or interested in pursuing medicine during their undergraduate education (confirmed by the attempt of at least two requisite courses during undergrad)*
3. *Received their undergraduate degree from one of the nine undergraduate degree conferring UC institutions (UC Berkeley, UC Davis, UC Irvine, UCLA, UC Merced, UC Riverside, UC San Diego, UC Santa Barbara and UC Santa Cruz)*

4. *Are currently enrolled in or graduated from a UC post-bac or other academic enhancer post-bac program in California.*

In order to understand the experiences and challenges faced by URM premed students on a majority campus we conducted Semi-structured in-depth interviews were conducted with 18 students representing six undergraduate institutions. These interviews allowed for both increased breadth and depth into the lived experiences presented by students recounting their undergraduate pathway. The interview guide was developed based on a comprehensive review of the literature and discussions with experts on premed pipeline programs and qualitative research. Sample questions included: “Tell me about your overall undergraduate experiences?”, “How would you describe your experience as a URM premed student on campus?”, “How do you believe that your experience as a URM premed student differed from that of your non URM peers?” and “Talk to me about your biggest barriers/challenge as a premed student of color on campus”. Interview times ranged from 70 minutes to 90 minutes.

The data presented in this paper is nested within a larger project examining the role and sustainability of post-bacs in assisting URM premed students pursuing medical careers and recommendations to address major barriers to academic achievement. This paper focuses on the shared experiences and barriers of URM premed students and their perceptions of how these experiences differ from those of their non URM peers.

Data analysis

Audio recordings were transcribed, de-identified and coded using Modified Grounded Theory (Charmaz, 2006; Saldana, 2013). Initial line by line coding of a subset of transcripts was completed to develop an initial codebook. This intensive initial phase included inductive coding as well as coding for a priori constructs such as barriers/challenges in premed courses, overall premed experiences and perceptions in differences of URM premed experiences vs that of non-URM peers. Following initial coding, focused coding of the remaining transcripts was used to determine the most salient categories. Finally, a review of all coded data was used to identify shared barriers and challenges in student experiences as well as perceptions of how their experience as a URM premed impacted their academic outcomes and ability to go apply directly to medical school from undergrad. Themes were categorized within three interconnected levels, individual; interpersonal and institutional to provide a socioecological and practical lens for reviewing results. This framework, adapted from Swail’s Geometric Model of Student Persistence and Achievement (hereafter referred to as Swail’s Model; Figure 1), places students at the center of the model and allows for exploration of the institution’s role in shaping students’ experiences while taking into account individual and interpersonal level factors. Individual factors include academic related abilities, skills, strengths and weaknesses of the student. Interpersonal factors include personal attitudes, cultural background, and social interactions with others such as peers, faculty and staff on campus. The third set of factors, institutional, refers to the practices, strategies, and culture of the university that either in an intended or unintended way impact student persistence and achievement. This framing gives credence to the need to explore strategies extending beyond the individual level framework as a means of addressing student barriers.

RESULTS

Participants

Interviews were conducted throughout Northern and Southern California between December 2016 and November 2017. Participants included 18 students including 10 Hispanic/Latino (five women and five men) and five African American/black (all women), two self-identified mixed URM, and one Native American woman. Students ranged in age from 25-30 years old. Seventeen were first generation college students and only one participant reported having an immediate family member who was a physician. Participants' educational status ranged from current enrollment in a post-bac to third year medical student. Participants held a range of undergraduate majors including Neuroscience, Psychobiology, Bioengineering Public Health, and Spanish/Chicano Studies. Students' overall undergraduate GPA ranged from 2.7 to 3.6, while students' science GPA ranged from 0.8 to 3.3. Participants reported working between 12 hours and 25 hours per week as throughout their undergraduate tenure.

Undergraduate Student Experiences

To obtain a holistic view of their perception towards their undergraduate experience, students were asked to rate both their overall undergraduate experience (which included factors that were not directly associated with being a URM premed student) as well as their experience as a URM premed student on a scale of 1-10, with 1= terrible and 10=awesome. On average, students rated their undergraduate experience as URM premed student lower than their overall undergraduate experience, 7.4 and 5.1 respectively suggesting that their race/ethnicity and status as a URM premed student had some impact on their undergraduate experience. In further examining the factors contributing to these scores five overarching themes were revealed: 1. Feeling underprepared for premed curriculum 2. Negative Social Interactions 3. Racism 4. Competing obligations and commitments and 4. Unwelcome/Isolating campus climate. Theme one hones in on individual level factors such as personal study skills and lack of confidence. Themes two through four include interpersonal level factors such as lack of guidance, negative/inadequate advising, and having ability questioned by others. The final theme, unwelcoming/isolating campus climate, captures the institutional level impact on student experiences. Overall these themes were identified as having contributed to poorer academic performance, a primary reason for applying to a post-bac program rather than applying directly to medical school from undergrad.

Individual Level Factors

Students identified several individual level factors that impacted their URM premed experience. Most evident within this category were themes of inadequate study skills and lack of confidence in ability. They expressed concern that the methods of studying that worked for high school proved unsuccessful when applied to their premed coursework:

“It’s like I didn’t know how to study and prepare for the premed courses here. I thought I could do the same thing I did in high school but learned the hard way that wasn’t working.” –African American female student

“I wish I had analyzed my studying a bit more. I didn’t really figure out until towards the end. I didn’t know how to study for those classes.” –Latino male student

“I didn’t zoom out enough and analyze the way I was studying. To know that there were different ways of studying for these classes.” –Latino male student

Aside from students expressing concern about their lack of knowledge on how to best study for courses in the premed curriculum, they also shared a belief that “other students” (white and Asian students) all seemed prepared, knew the right questions to ask and were excelling in their classes. In addition to the shared experiences related to study preparation, students also described feeling a lack of confidence in the classroom, during office hours or in a group setting such as lab. In reflecting on her undergraduate experience, one student recalls her recurring lack of confidence:

I think a lot of challenges I faced were inherent in being an underrepresented minority in the sciences... I think we all just suffered from a lack of confidence too. Like it was a big theme for me in undergrad and for a lot of my friends. A lot of the time I would tell people I’m premed but I’d feel weird about saying it because I don’t know if this is going to really work out for me. –African American female student

These individual level factors often influenced or were influenced by students’ interactions with peers, faculty and staff as they navigated the premed pathway. In particular, lack of confidence while an individual level factor, was amplified or, in some cases, created by interpersonal interactions. These social interactions are discussed in the following section.

Interpersonal Level Factors

Students spoke candidly about their interaction with other students, faculty and Graduate Student Instructors (GSIs) teaching as part of the premed curriculum. Students identified both the interactions with non-URM premed peers as well as with their fellow URM premed peers as an integral part of their experience. These interactions took place in a variety of settings such as the classroom, office hours, tutoring and study groups. The major themes in this category included: lack of guidance from a trusted figure/negative advising experience, doubting one’s ability, and having their ability questioned because of race, all of which led to a lack of belonging (to be discussed further in the following section). Students described how their lack of representation made them question their ability and whether they belonged in medicine. For one student, recognizing that none of her professors or GSIs were African American made her question whether it was even possible for students who looked like her to do well in these courses.

You are fighting against a tradition of you not being present and you start to think. “Am I not represented because I can’t do it?” You’re fighting against a history of not seeing people like you. So anyone under-represented in the field, when you don’t see yourself you think it’s because we don’t do this well. –African American female student

In addition to the self-doubt created by lack of representation among premed faculty and GSIs, students also shared incidents where their mere presence was questioned. One student reported the following exchange in a physics lab:

Non URM peer: “How can you do physics?”

URM student: “What do you mean?”

Non URM peer: “There aren't many Latino people here in our class like how are you doing this or whatever?”

URM student: “Well I have a brain; you have a brain; we are in this class together. I am trying to learn it.” —Latino male student

The student then went on to say, “That instance because of my ethnicity they think we can't do science and so that is their mentality, and they are curious to know how we are learning the material; as if we are not capable.”

This experience of having one's academic ability and accomplishments doubted and discredited was shared by multiple students.

I remember, even in class sometimes, when it was time to partner up in little groups, I would see some of the white student, the non-URMs being hesitant to partner up with me. I just felt like I was perceived as this one who is not going to be so smart. “We are going to have to pull this one along.” So we got this often, quite often. —African American female student

A Native American female student recalls being told by a white male graduate student during her freshman year, “You only got in because you're a Native student.” She vividly recalls the intense shock and pain of the statement and struggling to resist the urge to cry as a result. Ultimately this single experience forced her to question her academic ability and whether or not she belonged for the next two years. Other students described similar stories and having the effects last well beyond their undergraduate years.

This theme of being viewed as less competent or having one's academic ability questioned or accomplishments attributed solely to race/ethnicity is one expressed by students of color in other studies (Chesler, Lewis, & Crowfoot, 2006; Whittaker & Montgomery, 2012). Students reported how they would shy away from office hours out of fear of “feeling dumb” for asking basic or simple questions, resulting in them not utilizing all resources available to them. For many students, office hours, rather than being a place to obtain help, became a place where one was ridiculed and had their intellectual ability doubted in front of students they already believed viewed them as less academically inclined. Other students shared instances of being told they “don't have to work as hard because they are a minority” and can still get into medical school with a lower GPA. Enduring such experiences of having one's ability questioned or accomplishments attributed to reasons other than student's hard work and created undue burden in an already stressful atmosphere that has systemically and historically not proven to be welcoming.

In addition to the challenges of having one's ability doubted based on their race/ethnicity, URM students overwhelmingly agreed that their experience with an advisor, or lack thereof, greatly impacted their premed experience.

I had done pretty well in high school, so I came here feeling confident...I was going to take my classes, get great grades, and apply to medical school and get in. Things were definitely way more complicated than that! I would say that partially, it was because of the lack of guidance. It's different, if it's not coming from someone that I personally know and trust. –Latino male student

My first encounter with an advisor was at orientation and for me it was the worst. I cried. I wanted to come home that same night. After he got the result of my placement test, he immediately said, you should do something easier because you have to take remedial classes both in math and chemistry and that broke my soul because in high school, I was one of the top kids...hearing that I didn't do good and having this so called adviser come at me...I internalized that experience so much that now even years after that happened, I still doubt my ability to do good in classes or in testing overall. –Latina female student

This lack of guidance and mentorship and negative or non-helpful experience with advisors was perhaps the most dominant theme amongst participant interactions.

Several students also discussed how the lack of representation in the classroom and interactions with non-URM peers and faculty drove them to seek out community through ethno racially based groups on campus. While some found community by pledging Greek organizations, others sought out connection through recruitment and retention centers or pre-health focused and other student run organizations. Ultimately, students described participation in these groups as extremely important in building morale and finding a sense of belonging and support, but their participation also detracted from their ability to focus on academics.

Institutional Level Factors

Many of the experiences discussed by students were linked in some fashion to the unwelcoming and isolating nature of the overall campus environment. The reality of being one of a limited number of URM or URM premed students on campus affected students' academic and social endeavors. Students also discussed the direct impact of institutional policies and infrastructure on their premed pathway. Key themes included a heightened desire to seek out sources of community, usually based on race/ethnicity, due to a lack of belonging. These feelings were ultimately linked to a perceived hostile or unwelcoming campus climate. The energy and time associated with the need to seek out and build a support network/community, highlight a burden that is not equally shared with students who don't identify as a racial or ethnic minority. This was especially true for African American students as evidenced by the following quote:

...aspects of your identity that are not premed always matter, when you are underrepresented those factors impact your engagement with the system. Personally for me and other URM students, other aspects of your identity require more of you than

being premed does. So you may feel the pull to participate with that instead. That's an aspect I don't hear non URM students speaking about... -African American female student

For example, one student recalled being torn between attending a Black Lives Matter rally and a study session for a chemistry midterm. She recalls conducting a “cost benefit analysis” of participating in the rally because of the time it would take away from studying. She went on to describe feeling personally “convicted”¹ by not participating, because she felt she was choosing academics over her own community. This immense guilt adds an additional layer of stress felt when attempting to navigate a curriculum that boasts a 66% drop-out rate and additional obligations such as working to pay for school.

Students also cited the lack of diversity among faculty and GSIs as exacerbating feelings of isolation and not being welcomed on campus. For many students, being one of a handful of students of color in classes ranging from 50 of 600 people stirred up feelings of unease that mirrored larger societal and social justice issues occurring nationwide. Being ever mindful of race/ethnicity was a reality for many students that as one student put it “took up precious mental space”. When asked whether her race or ethnicity impacted her experience as a premed student one student responded unequivocally:

YES!...I think it impacts your perspective. As a woman, as a black woman, as a black woman from southern California... when you think about why there aren't many people like me in the class. The privilege of walking in and not automatically looking for any black people, just walking in and going to sit down. Identity impacts that- African American female student

Another student stated:

Being a URM here is very difficult. You are in classrooms sometimes of 50 or 100 people, where you may be the one person representing your ethnic group and that's kind of disconcerting. It adds this feeling of, lack of belonging. Makes you feel like you're in the wrong place because no one else looks like you. No one else understands your cultural background, where you come from. Grappling with those feelings shapes your experience. -Latino male student

The idea that one's identity takes up mental space in their daily life as a premed student was a recurring theme. Students expressed always being mindful of how their race/ethnicity might impact how they are perceived and viewed. When something negative happened, they wondered if it was because of their race/ethnicity or some other reason. For many students, these questions usually went unanswered. The reality of being “one of a handful” or “the only” constituted an added weight students were responsible for managing as they navigated their premed pathway; a clear example of what Steele refers to as Stereotype Threat (Steele & Aronson, 1995).

¹ The term “feeling convicted” is used fairly often in church culture to describe feelings of immense guilt attributed to participation in a lifestyle or activity that is contrary to one's religious beliefs or ideologies.

Much like feeling alone and a lack of belonging can increase anxiety, having adequate resources and focused support can have the opposite effect. One student spoke about her intentional choice of undergraduate institution due specifically to its smaller size and greater diversity. This Latina transfer student rated her overall undergraduate and premed experience as a URM student a nine out of 10; representing the highest score among all participants. When asked about her premed experience explicitly she stated:

“Had I gone to a different campus I think I would have rated them differently, but [my school] does an amazing job of integrating transfer students.” When asked if she believed her experience was different than her non URM peers she offered the following: *“I think it was different but in a positive way because the campus made a really great effort at providing resources for URM students, and there were specific clubs and specific counseling, specific attention paid to URM students, and I think it was beneficial in that sense.”*

This explicit effort on the part of the institution to recruit, integrate and support URM students affected both her perception of the university and her academic outcomes. This quote highlights the importance of institutions playing an active role to ensure students feel supported and are aware of resources available to them. This reality is expressed in the literature through studies examining the experiences and outcomes of African American students at Historically Black Colleges (HBCUs) and Minority Serving Institutions (MSIs). African American students at these institutions are more likely to major in biological and physical sciences than at Predominantly White Institutions (PWIs). Further, HBCUs and MSIs produce the largest number of URM students with STEM degrees who continue on to advanced and doctoral degrees (Whittaker & Montgomery, 2012). The multi-faceted nature of being a URM premed student at a majority institution plays a significant role in achievement and ultimately who is able to take a direct pathway or an alternate pathway, such as a post-bac to medical school.

DISCUSSION

To my knowledge this is the first qualitative study that includes students from across the UC system to elucidate the complex relationship between student experiences and their positionality as a URM premed student. Embedded in their stories are insights to specific challenges and barriers URM students face while navigating the premedical pathway. Students in this study were able to speak to their full undergraduate experience, which fills an important gap in the literature around the URM premed experience. The majority of students interviewed said that they were better poised to speak more objectively now than if they had been interviewed while still in school and noted their ability to speak to the personal role they played in their outcomes. Students spoke candidly about interactions between peers, faculty, staff, their perceived differences compared to that of non URM students and the overall impact of the campus environment and climate on their experience.

Previous work in this area has focused on quantitative methods of exploring academic outcomes in gateway courses, experiences in research-based programs and reasons for decline in interest in medical careers (Alexander, 2009; Barr et. al, 2009; Hurtado, 2009). These studies provided or supported general findings that URM students tend to fare worse in premed coursework

and/or were more likely to be discouraged by certain courses than their non URM peers. These studies stopped short however of providing details about *why* students fared worse academically or felt discouraged in certain classes, resulting in declined interest in being premed.

Understanding these experiences can better equip faculty, campus administrators, program leaders, policy makers and funders to develop targeted strategies to improve experiences and ultimately academic achievement in these populations. Given that medical school acceptance and graduation rates have remained relatively steady for the better part of the last 25 years, this study sought to gain specific information on barriers faced by URM students. Students in the study identified several challenges including inadequate study skills, lack of confidence, dismissal or questioning of ability based on race/ethnicity, lack of guidance from a trusted figure, lack of representation among faculty, and feeling isolated and unwelcomed on campus. Similar challenges have been presented in previous studies examining student experiences and have the potential to inform interventions to reduce barriers faced by students beyond the premed pipeline (Solarzano et. al, 2000, Rankin, 2005; Hurtado, 2009; Freeman, 2016).

Most of the students in this study reported doing “very well” or having been at the “top of their class” in high school. The transition to a large predominantly white and Asian institution resulted in culture shock for many who had previously lived in neighborhoods and attended schools that were predominantly URM. Even those who attended predominantly white schools described challenges adapting their study skills to those required for success in a premed curriculum. For many of these students it was the first time they felt unsuccessful academically. Students also found themselves combatting external forces that questioned their ability directly or indirectly. The lack of representation amongst faculty in the premed curriculum further served to diminish student’s confidence levels. Hurtado’s 2005 exploration of student experiences in structured research programs discusses the importance and motivation that arises from seeing URM professors in the science curriculum. Students discussed having their ability doubted by some but finding motivation to succeed not only in undergrad but graduate school because they saw faculty of shared racial/ethnic background. In cases where students did not find faculty or other mentors to create a sense of belonging, they often sought out what Solarzano refers to as “alternate spaces” (Solarzano, 2000). Students in this study reported similar coping strategies by seeking alternate or “safe spaces” where they believed they could simply “be themselves without threat or fear of being judged because of their race/ethnicity”.

These “safe spaces” spaces were represented by organizations, groups and activities that foster community and are usually linked to one’s racial/ethnic background. Despite fulfilling a critical need related to their identity and sense of belonging as a URM on a majority campus, they were also distractions from academic centered activities. Many students discussed the “weight” or “burden” of carrying around one’s race/ethnicity everywhere they went and having it affect even the simplest of tasks such as where to sit in class. Referred to as the “invisible student tax”, this burden carried by URM students manifests as a strain on mental, physical and emotional resources that could be allocated to activities that promote academic success but instead is used to merely survive day to day on campus (Givens, 2016). This is of great significance when considering the widely accepted competitive nature of premed culture at top ranking institutions found within the UC system. It signals the need for more resources and

awareness from an institutional perspective to help counter and prevent these negative factors that are stacked against certain populations of often already disadvantaged and vulnerable students. While applicable to all URM students, the “invisible student tax” appears most pronounced for students who identify as part of an URM group with a particularly small percentage, ergo less visibility on campus. The fewer people there are, the greater the pull or need to invest in other activities that help build a sense of community and belonging to combat feelings of isolation, or the sense that they do not belong.

Despite their obstacles, the students in this study represent hope for a more diverse pool of physicians given their determination and persistence to graduation and into post-bac and (in some cases) medical school. Their experiences fill gaps in the scientific literature and inform a better understanding of the individual, interpersonal and institutional level factors that detract from student achievement and outcomes. I acknowledge the potential concern of listing findings under separate categories: individual, interpersonal and institutional. In doing so there is a risk that the data is misinterpreted to blame students for their experiences and outcomes. But much like the socioecological model provides a framework for understanding the multi-faceted and interactive effects of personal and environmental factors that determines behavior, the lens used to present this data illuminates the complex interplay between students, their social interactions and institutional environment and the ultimate impact on academic achievement and outcomes. As such, these data demonstrate the notion that addressing the lack of representation in the physician workforce requires intricate and dynamic approaches rather than a singular programmatic or policy oriented quick fix.

LIMITATIONS AND STRENGTHS

Though small in scale, this study provides insight into the experiences of URM premed students who are positioned to provide a holistic view of their undergraduate premed experiences. It is plausible that these students, given the right support during undergrad, would have been able to successfully navigate a “traditional” pathway directly from undergrad to medical school. Some limitations to this study include a small sample size. Interviewing additional students would supply a greater level of validity to the outcomes. Further, this study did not include the voices of “traditional” URM premed students who successfully matriculated into medical school without the use of a post-bac. These students are positioned to provide insight on factors contributing to student achievement within the undergraduate premed pipeline. Though not necessarily generalizable, this study provides insight from students about their experiences in the UC system and specific factors contributing to poorer academic outcomes and achievement. These students are among the most academically qualified at the time of their admission to college by virtue of their acceptance into a UC institution. The explanations of the barriers they face as minority students at public majority institutions, along with their reasons for enrolling in a post-bac, serve as empirical evidence that can be used to develop interventions across the UC system and at institutions with similar racial/ethnic makeup.

CONCLUSION

URM premed students at majority institutions face a plethora of challenges navigating their undergraduate educational journey. For many of these students, the burdens of being a first-generation student of color intersect with numerous competing factors and challenges in an often unwelcoming environment. Many of those who persist to graduation have an academic record that has been compromised and thus they need to apply to a post-bac program as a means of continuing their pursuit of a career in medicine. Understanding student experiences is integral to developing evaluative protocol and recommendations that address inequities in academic outcomes for URMs, thereby facilitating a more direct pathway into medical school. Institutions of higher learning, and particularly public institutions, have an obligation to the students who enroll. As one of the largest suppliers of URM applicants on the west coast, the UC system in particular can play a significant role in addressing the lack of representation in the physician workforce by implementing strategies and interventions that take into account the multi-level factors that affect URM students on their campuses. These institutions can work to provide targeted and sustainable resources to support URM premed students and to ensure they feel welcomed, connected and supported by culturally sensitive and knowledgeable advisors, faculty and staff as soon as they arrive on campus. Ultimately, changes in policies and programming that increase the overall number of URM students, faculty and staff on these campuses and in departments housing premed courses will help to address the institutional issue of unwelcoming campus climates that are often the driving force for negative student outcomes. By creating a more welcoming and supportive environment, students are more likely to thrive academically resulting in a larger numbers of URM students who successfully matriculate into medical school from undergrad and into the physician workforce.

A “Second Chance”?
Examining the Use of Post-bac Programs by Underrepresented Minority Students
Pursuing Careers in Medicine

ABSTRACT

The call for increased diversity in the health professions, particularly the physician workforce, has been echoed by practitioners, researchers, and legislators alike in recent years. Despite numerous efforts over the last 45 years, the lack of representation in the physician workforce persists, with no significant signs of reversing course. There is therefore an urgent need to engage in research to aid in the development of innovative, systemic and sustainable methods of addressing barriers in the educational pipeline leading into medicine. Premedical post-baccalaureate (post-bac) programs have been a focus of such efforts and presented as a promising strategy to combat the lack of representation in the field. Largely missing from the literature however, are studies examining the reasons why underrepresented minority (URM) premed students must enroll in them in the first place, the challenges they address for students who participate, and whether or not they can be relied on as a long-term strategy. This paper provides insight into student perceptions towards post-bacs, supports their existence as a “2nd-chance” for students seeking academic redemption while also offering data that suggests they should not be viewed as more than a stop-gap strategy to improve URM matriculation into medical school. Further, it provides data that supports the need for more systemic and preventative measures to address student barriers earlier in the premed pipeline. The empirical evidence from this study will be used to develop a third recommendations paper as the final component to this dissertation.

INTRODUCTION

The call for increased diversity in the health professions has been echoed by practitioners, researchers, and legislators alike over the last 25 years.(Jordan J. Cohen, Gabriel, & Terrell, 2002; Health and Human Services, 2006; Institute of Medicine, 2010, n.d.; Sullivan, 2004) Diversity in the physician workforce in particular, has been associated with increased access to care, patient satisfaction, provider trust and improved health outcomes for underserved and racial/ethnic minority populations.(Betancourt, J., 2006; Health and Human Services, 2006; LaVeist & Carroll, 2002; Laveist & Nuru-Jeter, 2002; S Saha et al., 1999; S. Saha, Taggart, Komaromy, & Bindman, 2000) Similarly, medical schools nationwide assert that having a racially and ethnically diverse student body is a critical factor in creating physicians that will be best equipped to meet the needs of an increasingly racially, culturally and linguistically diverse society.(Andriole et al., 2015) Despite various efforts over the last 45 years, the lack of representation in the physician workforce yet persists and shows no significant signs of slowing or reversing course. This is particularly noticeable in states such as California where underrepresented minorities (URMs) make up 46% of the population but only 9% of the physician workforce.(Nivet MA, Castillo-Page L., n.d.) As such, the need to engage in research to aid in the development of innovative, systemic and sustainable methods of addressing barriers in the educational pipeline leading into the physician workforce is more urgent than ever.

Addressing Health Workforce Diversity: The Early Years

Nearly twenty years after the landmark Supreme Court case *Brown v. Board of Education* ordered an end to school segregation, significant disparities remained in the enrollment status of minorities in higher education nationwide. The doctrine of “separate but equal” which amongst other things, prevented minority physicians from training in most white educational/medical facilities prior to the Civil Rights Movement, served as a prime source of these disparities. In the early 1970s, responding to the moral and social implications of prior legislation, educational institutions and the federal government attempted to correct inequities in access to health careers by enacting legislation to remove cultural, educational and other discriminatory barriers that historically discouraged minorities from pursuing careers in health.(Testoff & Aronoff, 1983) The Special Health Careers Opportunity Grant (SHCOG) and its successor the Health Careers Opportunity Program (HCOP) provided money to increase the number of minority students admitted to and graduating from health professions schools. In the period between 1972-1981, approximately \$109 million was awarded to 254 institution and organizations to support 300 HCOP funded programs.(Testoff & Aronoff, 1983) Despite the efforts during this initial decade of program implementation, there remained a disparity between representation of minorities in health professions schools and their numbers in the general population.(Testoff & Aronoff, 1983) While the raw numbers of minority students enrolled in medical school initially rose from the period between 1970 and 1998, it has either remained constant or on the decline since this time.(AAMC, 2010) It should be noted that while raw numbers for White students have declined, their overall enrollment still reflects their US population percentage. The enduring disparities in enrollment coupled with drastic cuts in federal and state support along with the aforementioned demographic changes in the general population, signal a need for additional efforts and strategies to close the representation gap in the physician workforce.

Ushering in a New Standard of Diversity

In July of 2009, the Liaison Committee on Medical Education (LCME) began enforcement of newly annotated diversity standards as part of US medical schools accreditation process. These standards outlined requirements (vs. mere recommendations) for focused, significant and sustained efforts to achieve institutional diversity. Standard IS-16 states that any institution that offers a medical education program must have policies and practices to achieve appropriate diversity among its students, faculty, staff, and other members of its academic community, and must engage in ongoing, systematic, and focused efforts to attract and retain students, faculty, staff, and others from demographically diverse backgrounds.⁵ More specifically, the MS-8 standard states that a medical education program must develop programs or partnerships aimed at broadening diversity among qualified applicants for medical school admission.(Liaison Committee on Medical Education, n.d.) Pipeline programs, specifically premedical post-baccalaureate (post-bac) programs have been presented as a promising intervention to address the lack of representation in the physician workforce.(Andriole et al., 2015; Blakely & Broussard, 2003; Giordani et al., 2001; Grumbach K & Chen E, 2006) As such, post-bac programs, are also a potential strategy that can be used by medical schools to meet required diversity standards and deserve further examination.

Post-Bacs: A Lifeline along the Leaky Pathway or Band Aid to a Larger Problem?

Health career pipeline programs are designed to reduce and/or eliminate barriers (e.g. academic, financial) and increase access to health professions for URM and/or otherwise disadvantaged students across the educational spectrum. Premedical post-bac programs are one example of a pipeline program that has been presented as a strategy to increase the pool of medical school matriculants from disadvantaged and URM backgrounds, along with those desiring to work in medically underserved areas.(Andriole & Jeffe, 2011; Andriole et al., 2015; Grumbach K & Chen E, 2006; Grumbach & Mendoza, 2008) Post-bac programs typically last between 12 and 24 months, and assist individuals in pursuing a medical career after they have already received a Bachelor's degree and fall into two general categories:

1. Academic enhancers: designed for persons wishing to enhance an existing academic record; these students have taken some portion of requisite premedical courses, but need to improve their academic record to increase the competitiveness of their medical school applications. Often included within this category are post-bacs designed to increase access to medical school for URMs or students from educationally or socioeconomically disadvantaged backgrounds.
2. Career Changers: designed for persons desiring to change careers who have not yet taken the pre-requisite courses required for the medical school application (i.e. were not “premed” during undergrad)

According to the Association of American Medical Colleges (AAMC) nationwide database, 98 of the 248 (40%) premedical post-bac programs identified themselves as having a special focus on groups underrepresented in medicine and/or on economically or educationally disadvantaged students.(AAMC, 2018) When academic enhancer post-bacs are included, the percentage jumps to 79% (196 out of 248 programs). Participants of this database are included via an “opt-in” request for inclusion and does not fully represent the total number of post-bacs nationwide. In 2011, Andriole et. al. examined the characteristics of 57, 276 med school matriculants and reported that URM students were more likely than white students to have participated in academic-record-enhancer programs prior to matriculating into medical school. (Andriole et al., 2015) This along with results of related studies suggest that increased matriculation of academic-record-enhancer post-bac program participants may have greater impact on the racial/ethnic diversity of medical-school enrollees than increased matriculation of career-changer- post-bac participants.(Andriole & Jeffe, 2011)

Exploration of academic enhancer post-bac programs and post-bac users nationwide is an area that is ripe for research. This is especially true in California given the state’s role as one of the nation’s largest supplier of URM applicants to medical school.(Nivet MA, Castillo-Page L., n.d.) According to a state report by workforce leader, Dr. Bob Montoya, roughly 15% of URMs accepted into medical school each year come from post-bac programs.(Montoya, Bob, 2010) In 2016, the number of URM applicants to UC affiliated post-bacs participating formally in the UC Post-bac Consortium, was roughly equivalent to that of URM matriculants to California medical

schools, 308 and 331 respectively². These statistics signal a missed opportunity to increase the pool of potential medical school applicants and matriculants by better supporting these post-bac applicants during their college years. It is important to note, that in California due to the passage of Proposition 209 in 1996³, post-bac programs operate under a race-neutral admissions process. The programs within the UC Post-bac Consortium seeks applicants who are committed to practicing in physician shortage areas, most of whom are educationally/socioeconomically disadvantaged and are from URM backgrounds.(Blakely & Broussard, 2003)

The “So What?” of it All

While post-bacs have been touted as a strategy for increasing URM representation in medical schools, largely missing from the narrative are the reasons why students must seek them out in the first place and whether they can or should be relied on as a sustainable intervention. One could argue that similar to the importance of promoting prevention in the healthcare system; there is a need to engage in research that can equip institutions of higher learning with knowledge to help prevent leaks in the premed pipeline rather than attempting to pluck and patch students back together once they have fallen through the cracks. This research seeks to fill a gap in the literature by:

1. Exploring whether post-bacs should be considered a long-term intervention rather than a short-term stop-gap to larger systemic and institutional issues occurring at the undergraduate level.
2. Helping us better understand the factors associated with student enrollment in post-bacs (specifically academic enhancer post-bacs which are the focus of this study) and the barriers and challenges they address for URM students.

Equipped with this information, institutions of higher learning can develop empirically based interventions at the undergraduate level to better support students, thereby preventing them from needing to take longer, costlier and uncertain pathways to medical school such as post-bacs. Further, these efforts can prevent other students from leaking out of the premed pipeline altogether, ultimately increasing the pool of successful URM medical school applicants, matriculants and physicians overall.

² This data was provided directly from the UC Post-bac Consortium Program Manager via internal programmatic data reports.

³ Proposition 209 (also known as the California Civil Rights Initiative or CCRI) is a California ballot proposition which, upon approval in November 1996, amended the state constitution to prohibit state governmental institutions from considering race, sex, or ethnicity, specifically in the areas of public employment, public contracting, and public education. Prop 209 has created contentious debates regarding the impact of diversity since its passage. Immediately after its passage, the UC system saw a dramatic decrease in the number of under-represented minority student (i.e. African American, Hispanic/Latino) acceptances, particularly at those known as “elite institutions” such as UC Berkeley and UCLA.

METHODS

Partnership with the University of California Post-Baccalaureate Consortium (UCPBC) which includes UC Davis, UC San Francisco, UCLA, UC Irvine and UC Riverside, allowed for direct recruitment of students. Purposive sampling was used to identify URM graduates of the UC system who were either currently enrolled in or recently completed a post-bac program in California. Participants were identified using the following selection criteria:

5. *Self-identify as an under-represented minority (URM)*
6. *Self-identify as having been premed or interested in pursuing medicine during their undergraduate education (confirmed by the attempt of at least two requisite courses during undergrad)*
7. *Received their undergraduate degree from one of the nine undergraduate degree conferring UC institutions (UC Berkeley, UC Davis, UC Irvine, UCLA, UC Merced, UC Riverside, UC San Diego, UC Santa Barbara and UC Santa Cruz)*
8. *Are currently enrolled in or graduated from a UC affiliated post-bac or other academic enhancer post-bac program in California.*

Additionally, staff from select California post-bac programs mentioned by student participants were included to obtain data to provide insight into specific challenges faced by the post-bac programs.

Semi-structured in-depth interviews were conducted with 18 students and four post-bac staff members. Interview guides included questions aimed at understanding student attitudes and perceptions of post-bacs as well as factors influencing their decision to enroll and experiences in the program. Staff interview guides focused exploring the barriers and challenges faced by post-bac programs as well as their knowledge of factors associated with student enrollment. Interviews ranged from 70 minutes to 125 minutes.

Data analysis

Audio recordings were transcribed, de-identified and coded using Modified Grounded Theory (Charmaz, 2006; Saldana, 2013). Initial line by line coding of a subset of transcripts was completed to develop an initial codebook. This intensive initial phase included inductive coding as well as coding for a priori constructs such as initial and current perceptions of post-bac programs, reasons for applying to a post-bac program, challenges faced by post-bac programs. Initial coding was followed by focused coding to assist in streamlining categories and overall themes related to student perceptions towards post-bac programs, student reasons for applying, challenges addressed by post-bac programs and challenges faced by post-bac programs.

RESULTS

Participants

The interviews were conducted throughout northern and southern California between December 2016 and November 2017. Interviews were conducted with 18 students representing six undergraduate institutions and consisted of 10 Hispanic/Latino (five women and five men) and five African American/black (all women), two self-identified mixed race students, and one

Native American woman. Ten out of 18 students were first generation college students and only one participant reported having an immediate family member who was a physician. Participants' educational status ranged from current enrollment in a post-bac to third year medical student. Participants held a range of undergraduate majors including Neuroscience, Psychobiology, Bioengineering Public Health, and Spanish/Chicano Studies. Students' overall undergraduate GPA ranged from 2.7 to 3.6, while students' science GPA ranged from 0.8 to 3.3. Participants reported working between 12 hours and 25 hours per week throughout their undergraduate tenure. The staff that were interviewed represented four of the six UC Post-bac Consortium institutions.

Student Perceptions of Post-Bac Programs: Initial vs Current

To lay the foundation for understanding students' perceptions and understanding of post-bac programs, participants were asked to describe how they learned about them, their feelings upon initially learning about them, and how they currently feel about them. The timing and source of introduction to post-bac programs varied across participants. While some students learned of their existence as early as their sophomore year in college, others only became aware of their existence after completing their undergraduate degree. The source of introduction also varied ranging from learning through pre-health student groups, to advisors, emails/newsletters and pre-health conferences. Six themes were identified describing students' initial and current perceptions of post-bac programs: 1. Post-bacs as a "2nd Chance" and opportunity for redemption. 2. Post-bacs as a "money pit"/ expensive. 3. Post-bacs as time consuming 4. Post-bacs as stigmatized 5. Post-bacs as a last resort and 6. Not all post-bacs are created equal. Of these six themes, themes one and two were expressed as both initial and current perceptions, acknowledging the tension felt by students who acknowledged the positive role of post-bacs as well as their financial burden.

Initial Perceptions of Post-bac Programs

While students shared a plethora of responses regarding their initial feelings towards post-bacs, four major themes rose to the forefront of the analysis. Firstly, students expressed their belief that post-bacs were a positive thing and frequently referred to them as a "2nd chance" as evidenced by the following quotes:

I feel very positive in terms of the concept and the service of post bacs. Like in my own personal experience, you see people who are very motivated, who are doing this for sure because they know they want to do medicine or a health career in some way. So I do feel positive about it because you know, in undergrad, things happen. I am very much an advocate of second chances and giving people the opportunity to pursue their dream...– Miguel, Latino male student

My first time hearing about post-bacs was when IJ did hers at UCLA for the Dental program. I didn't know what it was but I was happy for her, taking classes to raise her GPA... I was like hey, that's a great thing... –Okoye, African American female student

Miguel, currently a 3rd year medical student, initially learned about post-bacs from a friend and knew upon graduating that he would need to participate in order to boost his GPA. Okoye's pathway was a bit more circuitous in that she worked for several years post undergrad and

ultimately completed two post-bac programs before finally gaining acceptance into medical school after her third attempt. Both students represent the extended pathways that many URM students are forced to take after facing academic hardships and challenges during undergrad, and signal the need for efforts to improve student experiences earlier in the pipeline.

Students also shared their views of post-bacs as expensive or “money pits”, a reality that served as a major detractor from their overall positive description. Leyenne, a Native American student says of post-bacs: “it sounded really cool. Sounded great. Sounded like the perfect opportunity for me. The only negative thing, the only con to it was that I had to pay for it all.” Nancy, a Latina student echoed this sentiment with her response:

I think I already knew that they existed, but my mentor told me to avoid them at all costs, those and master’s programs, because they’re just like money pits... that you’re just going to spend money uselessly and you could be doing something where you get paid...it made sense, why would I go someplace, where I would have to give up money, when I could be making money instead. Um, I think that really speaks to people from my background, especially if you have to help out at home and stuff.

The remaining two themes, referenced post-bacs as being “time consuming” and “stigmatized”. Students openly admitted that their initial perceptions led them to believe that post-bacs would take up more time than desired and delay their envisioned timeline of achieving their goal to become a physician. Notably, this concern of time was expressed only by female students as evidenced by the following quotes:

I mean, I am not going to say that she suggested a post bac to hold me back but she was just saying that I think you would benefit from this and when she told me that, I cried and I was like, I don’t want to do a post bac. I don’t want to take more time. I am a spring admit. I don’t want to be old. When am I going to have a family? I was just scared. – Nakia, African American female student

I remember just feeling like it was very stigmatized, like going the whole post- bac route. Oh, you weren’t smart enough to figure it out in undergrad and now you are doing a post bac...I am still very regretful that like I didn’t go to medical school earlier, or that I am starting at 27, and that I am going to be in a class with 22 year olds. And like being a woman, you know like wanting to have kids, just knowing that this is going to be another decade of my life that is going to be committed to just education. –Ramonda, African American female student

Of the four preceding themes, the idea of post-bacs being positive as well as a money pit extended beyond student’s initial perceptions and through their experience in the program.

Current Perceptions of Post-bac Programs

Upon completion of the post-bac program, students still maintained their overall view that they provided a second chance for redemption as well as the reality of them being an expensive pathway into medicine. This viewpoint was aptly described by Elena, a Latina student in the following response:

I think post bacs are really expensive and I honestly don't know how they only want us to focus on post bac and not work. Where are we going to get money to pay for these classes? Student loans? We don't qualify for student loans. There is a gap. So how flexible are you going to work with us, at least URM students because some of us have to work in order to pay for that and our families. ... I am not married or have kids but I still have to help at home financially. How are you guys going to invest in us? Help us succeed, without being told like you need to pay 30 grand right now. Where am I going to get 30 grand?

The justified financial concern gives a nod to the two additional themes expressed by students, that 1. Not all post-bacs are created equal and 2. Post-bacs should be used as a last resort.

Students experiences varied based on what post-bac program they enrolled in. Their responses revealed that some programs were better supported and were candid about their overall success rate (as defined by student matriculation into medical school). Perhaps expressed most clearly by one of the students who had participated in more than one post-bac program before gaining admission to medical school:

The [medical school] didn't even want to be associated with the post-bac program. I had a horrible time there professionally, I do think it helped personally, but professionally, it was just awful. But my [second] experience was night and day, I loved it and I just appreciated the fact that it was a small program, small cohort and they have a name behind them. I don't know what happened at my first program, it seemed like they were trying to always fight for something. It was hard to explain. But at my second program, they knew who they were as a University and they knew that people were successful. They actually published their success rates. My first program didn't. –Okoye, African American female student

Given the previously expressed concerns around length of time, cost, and stigma, it is no surprise that students also believed that post-bacs should be considered as a last resort.

I think they should be your last resort and you shouldn't really be thinking about them, until maybe you are close to graduating college and you are looking at your career goals and what you have in front of you can give you a small reality check about, whether you can go straight into medicine, or do you actually really need the post bac program? Cuz that loan bill isn't fun. –Jesus, Latino student

I was being very optimistic back then and I still think now that people shouldn't start thinking about post-bac programs until after they have graduated. Because they should try very hard and just keep focusing on upward trends instead of focusing on the post-bac programs. –Marco, Latino student

Related to the idea that post-bacs should be used as a last resort, students also shared their beliefs that post-bacs were being introduced too early in students' undergraduate career:

...right when they gave me that option I have no reason to try harder. I was like “post bac”? Go Bears! I was gonna only take public health classes till I die. And then when I come back I'll do pre-med. That is incorrect. Post-bacs are very expensive. They're not 100 percent. It's not an assurance. I know many people who did post-bac programs and they didn't get into med school. They also are I believe another way in which you can get into tremendous debt before medical school. Ayo, African American female student

Many of the students shared that they were introduced to the idea of post-bacs relatively early in their academic careers. For some this early introduction, at least in theory, planted a seed that they didn't have to work as hard since this “back-up plan” existed.

Overall, students viewed post-bacs as a positive, “2nd chance” to make up for the impact of challenges faced during undergrad but also held negative initial perceptions of the programs related to program cost and the limited/lack of financial support provided. This cognitive dissonance is of importance given it speaks to the reality of what students may or may not be receptive to when contemplating options to continue their pathway to medicine when facing difficulty during undergrad.

Reasons for Applying to Post-bac Programs

Four main themes were identified based on the inquiries to better understand the greatest factor influencing a student's decision to apply to a post-bac: 1. Desire to strengthen one's application. 2. To obtain a support system/“army” during the application process. 3. To boost confidence/prove academic ability 4. To have a back-up to not getting into medical school.

The most frequently shared reason for applying to a post-bac program was student's desire to strengthen their application. Encompassed within this theme were key factors such as the need to improve grades, obtain access to MCAT prep, research opportunities and letters of recommendation. For many students, the post-bac provided an opportunity to strengthen one or more components of their medical school application:

I needed more help with everything it takes to get into medical school, my whole application, my whole GPA, my whole MCAT. I needed someone who you know, obviously works with medical students and helping the pre-med students to get into medical school and I had no one for that. The program helped inform us of what we need to do to get into medical school. —Jaime, Latino student

Aside from strengthening their application, the next most common response was student's desire to have a support system, what some referred to as an “army” to assist them with the application process. Many students explicitly stated they were looking for a level of support they found lacking during undergrad:

Just knowing that you are going to have a support system if you're in a post-bac program that you did not have [in undergrad]”... You know, you didn't really have the premed advisors there, knowing that you are going to have someone that is going to be able to help with your application and guide you, overall was very nice and I think those were probably the major factors that made me want to do the post bac.—Jesus, Latino student

For some students finding this support took several attempts as evidenced by Okoye who shared the following in response to the greatest factor leading her to apply to a post-bac:

“So I said okay, this will be what I need. I just need an army behind me. So I applied for the 3rd time to the UC Consortium and then they called me back. I went for an interview and I got in.”

While the need to strengthen one’s application is an expected response for pursuing a post-bac program, discovering how important it was for students to have a support system stood out as a key finding and has important implications for development of interventions.

Another finding related to the importance of support systems was students’ desire to boost both self-confidence as well as proving themselves academically as a means of securing external confidence in their records. One transfer student shared her intimidation that medical school admissions might view her academic success as an “anomaly” and viewed the post-bac as a means of proving her academic acuity.

... I graduated with like a 3.8 and so there’s a huge disparity in my two GPA’s from both institutions and I think my main concern was that if I gave this to admissions committee they’d say, “oh, it’s anomaly, like [my undergrad] was just so easy. You know it doesn’t have like the reputation that Berkeley and LA have...so the main reason, why I did the post-bac was because I wanted to show them I can do well, no matter where I go. – Nancy, Latina student.

For several participants, being a transfer student or having “blemishes” early in their academic record created anxiety around whether or not they had truly proven they could handle the academic rigors of medical school. The post-bac provided a seemingly viable opportunity to address such concerns prior to applying to medical school.

A final unexpected finding is that there were a number of students who shared that post-bacs were used as a back-up plan in conjunction with applying to medical school:

I remember telling myself, I don't ever want to apply to something and not have a back-up plan, in case something doesn't happen. I learned that literally through that experience. So when I applied the second time, I said, I am going to apply to medical school, but I am also going to apply to post-bac programs. –Okoye, AA student

For others, the fear of not being accepted to medical school, was motivation enough to invest additional time, energy and money during what is already known to be a stressful, expensive and time-consuming process. In addition to exploring student perceptions and reasons for applying to post-bac programs, this research sought to identify whether post-bac programs addressed challenges faced by students during their undergraduate tenure and explored challenges faced by the programs. Both of which shed light on the potential to address challenges earlier in the pipeline and whether post-bacs can serve as a sufficient long term intervention to addressing physician workforce diversity as is suggested in the literature.

Challenges Addressed by Post-bac Programs

After detailing their experiences in post-bac programs, students were asked whether they believed that the program was addressing the barriers/challenges they faced as a premed during undergrad. Students reported that post-bac programs were vital in addressing four key challenges from undergrad: 1. Provision of a strong support system 2. Increasing study skills/tools 3. Provision of smaller class sizes and 4. Providing trusted mentors and good advising. All of which were identified as having contributed to a positive overall experience and personal success in the program.

Provision of a strong support system was one of the strongest themes identified by students. The idea that they now had a structured system of support to help them navigate the medical school application process was something that they identified as being a completely different experience from undergrad:

It was nice to have them every Fridays to remind us, you can do this as well as just our peers, we all sat in the front row together. We would study together and really supported each other and I feel like that is what I needed. The amount of support and family and cohesiveness we had is what carries you. –Nakia, AA female student

In relation to having a support network, some students went on to describe the importance of having that network be comprised of URM students. Having students who shared similar backgrounds as well as a common future goal, created a sense of community and comfort that many found lacking during their undergraduate years. Jamie, a Latino student describes one of his first experiences in the post-bac where students were asked to come together and share a vision board of where they saw themselves in the future:

It was emotionally purging for everyone because we realized how much each person had to struggle to get to where we are. We all felt alone and had to cover it up...I think it helped all of us out, realizing that we have to come together once in a while and be URM's because being around non-URMs, they don't understand the struggle and they expect us to act a certain way, they have their assumptions and so that helped us out for sure. Having people from the same backgrounds going through this together was different from college. I didn't have a set group of people especially URM's helping each other succeed so that exposed me to study groups and resources and helping each other out and I thought wow this is nice. I wish it was like this the whole time.

Following the strong support system was the ways in which the post-bac helped improve student's study skills. Inadequate study skills were identified as a major challenge for URM premed students in previously reported findings from this study. Students specifically identified the post-bac's provision of a learning specialist and counseling around study techniques as a vital factor to their academic success in the program. Most students expressed that this was the first time they were able to have a real understanding of their personal learning style and access to resources such as recorder pens to assist with note taking during lectures. The following quote effectively sums up the sentiments expressed by several participants: *"I think the most important*

thing is it taught me how to study. It was the most valuable gift I could have been given because I just didn't know at first. –Nakia, AA female student.

In addition to newfound exposure to improved study skills, students noted that the smaller class sizes of post-bacs were an important factor to their success. Virtually all of the students identified having participated in large premed courses during undergrad; some having many as 1000 students. These large class sizes and being one of only a handful of students of color often led to students feeling isolated and not being able to connect with faculty. Students directly connected the smaller class sizes in post-bac to their ability to develop a deeper connection with faculty:

...it addressed it a little bit because at least for me, my class sizes were a lot smaller at the post bacs, the most was like 30 people so I feel like I was able to make a deeper connection with my professors. –Alan, Latino student

I would also add that I got to know the professors better. Two of my science, or all of my science letters of rec were from this program because I got to know these professors ...I don't know necessarily why but they were smaller and less people...I did get to know these professors more and I felt that they got to know me better based on them being willing to write letters of rec and even approach me outside of class, like hey, what's up? So I did feel like in general it is a fairly large campus, but it did feel like more condensed. –Miguel, Latino student

Coupled with the smaller class sizes, students also mentioned that their professors were more diverse both racially/ethnically as well as based on their professional background. Sanai, a Native American student specifically recalls that it made a difference for her that her professors in the program were not just “typical faculty” and that some had a Masters degree instead of a PhD and referred to them as more “professional teachers who cared more about their students”.

Finally, students shared that the post-bac program provided trusted mentors and good advising; an issue identified by most students as a major challenge during their undergrad experience. Students who identified as first-generation identified the challenges this presented as they navigated the transition from high school to college.

The pathway from college to medicine was identified as even more challenging, particularly when coupled with negative encounters with advisors or counselors. Having access to advisors and mentors that they could trust was a vital component of their post-bac experience that contributed to their success:

So, like I mentioned the mentoring, also you have like post bac directors being very, very blunt with you, saying like this is what you need to do and just like feeling like they really care about you and having them check in with you, knowing that there is someone you can go and ask questions about academics or life in general...being assigned a mentor to tell me this is what you have to do and knowing that they genuinely wanted me to succeed, like really trusting that person to help me succeed. –Marco, Latino student

Challenges Faced by Post-bac Programs

In efforts to assess the long-term sustainability of post-bac programs, staff was asked to describe any barriers and challenges that they faced. A review of the data revealed two major findings in this area: 1. High program cost coupled with unstable/insufficient funding 2. High demand coupled with low supply.

The financial burden presented by participating in post-bac programs was a recurring theme shared by students. Considering that some students participated in multiple post-bacs while others participated in post-bacs after an initial or multiple application attempts to medical school signifies a challenge that has a direct impact on who can actually access these programs. The cost to participate in a UC affiliated post-bac program ranged from \$18,000 to \$33,000 annually which did not include living expenses or other required materials and supplies. Many students took out loans or incurred credit card debt while working in order to pay for their program. The amount of financial aid varied from program to program with one of the most generous offerings being a \$4000 scholarship for each student at one institution. Most programs however are unable to provide scholarships. Additionally, depending on the status of the program, certificate awarding or non- certificate awarding, students are ineligible for federal loans which often results in them taking out private loans which are less forgiving in their repayment options and have higher interest rates.

Staff also discussed the challenge of funding for their program. While one of the staff members expressed their unique position of being financially supported by their affiliated medical school, this was not a standard practice across the consortium or at other post-bac programs. Additionally, programs have faced significant cuts in funding that comes from the state which was originally a large source of support:

Over the years, as the funding has been cut, we have had to get more and more grant money. A small portion comes from the state, a bigger portion from private foundations, and then the school of medicine pays our salaries, but they don't pay for programmatic costs. So that becomes a challenge because there have been a couple of years, over the last 18 years, where we haven't gotten foundation funding. Foundations want to know, that the university will support the programs that they have, so that's kind of a challenge that we have. – Staff

The fluctuation in funding has a reported ripple effect into other areas such as insufficient staffing which is linked with high staff turn-over and insufficient student resources.

The final challenge discussed by staff was related to the consistently high demand for slots in the program which could not be met due to lack of funding. There is a direct correlation between the amount of funding received and the number of students that are admitted to the program. One staff member discussed this reality while sharing program cohort photos:

This is when we had lots of money. And as money trickled, you'll see with those two classes right there, that there was only 8 students, so when we had a couple of years,

when we didn't have the foundation funding, we could only have as many students as our state dollars would support and that was basically 8 students. When we have foundation funding, we can have anywhere from 15-20 students. So it impacts the program, and actually the outcomes greatly, because it's less people that we can train in our program and less people who can go to medical school, and become physicians and serve underserved communities. – Staff

Staff across the board expressed the difficulty of having to accept only a fraction of applicants each year due to their program's limited capacity. One staff member expressed his frustration of this reality by posing the following questions:

How do we address the fact that we have more and more students that do need post-bac? We don't have enough seats even as a consortium we're getting upwards of 500 almost 600 applications and our seats here tends to be the biggest program out of the consortium and that's 20 seats. So how do we do we do it? –Staff

The above challenges faced by post-bac programs, provides insight into their long-term viability as a sustainable intervention to address diversity in the physician workforce.

DISCUSSION

Through an in depth exploration of student and staff experiences, this study unearthed several findings about student perceptions towards post-bacs, reasons for applying to post-bacs, challenges these programs address for students in efforts to help them matriculate into medical school, and the challenges faced by post-bac programs while trying to accomplish this goal. Previous work examining the premed educational pipeline, often referred to as the “leaky pipeline”, has focused mainly on academic outcomes and the widely accepted competitive and “cutthroat” nature of premedical curriculum as factors contributing to the lack of diversity in the field (Alexander et al., 2009; Lin et al., 2013; Muller, David MD; Kase, Nathan MD, n.d.). Meanwhile, studies of post-bac programs sought to identify program effectiveness or the characteristics of students who participated in post-bac programs and whether participation had an effect on their decision to practice in physician shortage and medically underserved areas (Andriole et al., 2015; Grumbach K & Chen E, 2006; Grumbach & Mendoza, 2008; McDougle et al., 2015; McDougle, Way DP, & Rucker YL., n.d.). Missing from this scope of focus, are studies that provide insight into student perceptions of and experiences in post-bacs, the reasons why they seek out post-bac programs in the first place and whether or not post-bacs can/should serve as sustainable interventions to address issues of diversity in the physician workforce. The findings of this study can be summarized into three main points:

1. Post-bacs can provide a chance at redemption for students seeking a career in medicine, but are expensive and should be utilized as a last resort.
2. Post-bacs address many challenges that students identified as being barriers to academic success during their undergraduate tenure.

3. Post-bacs, while serving as an important stop-gap to the lack of representation amongst medical school matriculants, should not be viewed as a long-term solution to addressing diversity in the physician workforce.

Post-bacs can provide a chance at redemption for students seeking a career in medicine, but are expensive and should be utilized as a last resort:

Post-bacs were identified as a largely positive but expensive “2nd-chance” for students seeking a career in medicine. Ranging in cost from \$18,000 - \$33,000 annually, many students expressed the cost as the main detractor from the mostly positive experience in the program. Comparatively speaking, the programs in this study fell in the mid-range of program costs, with some private east coast programs costing as much as \$60,000 annually. Influenced by program cost and benefit, students expressed the belief the “not all post-bacs were created equal”. Using the analogy of “orphan diseases/medications” (those which despite their impact do not command the attention of drug developers and manufacturers), Grumbach refers to post-bacs as “orphan programs”. (Grumbach, 2011) This study supports this idea and extends it beyond a philosophical notion. While some post-bacs maintained formal relationships with their affiliated medical schools, others existed as stand-alone and operated peripheral to their affiliated medical schools. This lack of formal partnership often impacted the financial resources available to the programs and ultimately program participants. One long-term staff member summed up his opinion of post-bacs with the following statement: “post-bacs should be plan Z, but the challenge is that need is increasing rather than decreasing and ultimately it all revolves around funding”.

Students also expressed concerns that post-bacs were being introduced “too early” in their academic careers and in some cases provided a false sense of hope. The notion that one didn’t have to work as hard due to the availability of post-bacs to make up for poor grades introduced a detrimental narrative around the amount of effort one needed to spend on classes. The idea of post-bacs as “back up” plan was a catch-22 for some who simultaneously struggled with feeling relieved of significant pressure to perform academically while maintaining the knowledge that their current grades could gravely impact their future career options. Another point of concern was students’ misconception that admission to the post-bac would result in admissions to the medical school, an error which led to disappointment to a handful of students who found themselves in the precarious position of having to complete more than one post-bac prior to gaining entry to medical school. The variation in timing and mode of introduction to post-bacs impacts students’ attitudes towards them and ultimately whether or not they decide to apply. Equipping staff who work with URM students with knowledge of these concerns and misconceptions may increase the likelihood that they will be presented in a way that prevents a false sense of security regarding outcomes and maximizes consideration by those who could benefit the most from them at the appropriate time in their educational trajectory.

Post-bacs address many challenges that students identified as being barriers to academic success during their undergraduate tenure:

It was expected that students enrolled in an academic enhancer post-bac program listed desire to strengthen application as a driving factor in applying to the program. Students also

professed their need for a support system, boosting self-confidence/ability, improved study skills and greater connectivity to professors, mentors and advisors; all of which were described as being provided by post-bacs. In particular students noted the importance of having of a strong URM premed support network, supportive professors/ advisors, access to learning specialists and smaller class sizes as key barriers faced during undergrad that was addressed by their post-bac program. While a first in examining post-bac participants, these findings support previous work that found positive correlations between faculty support/encouragement and academic achievement and success for Latino/a STEM majors at highly selective Predominantly White Institutions (PWIs) and African American women at Historically Black Colleges and Universities (HBCUs).(Cole & Espinoza, 2008; Hurtado et al., 2008; Perna et al., 2009)

The importance of having a support network of peers with shared career goals and from similar backgrounds has also been expressed in other studies. Hurtado et al. found that receiving peer support and advice from upper-class students was positively correlated with a sense of academic adjustment for first-year URM students in STEM majors.(Hurtado et al., 2008) Students expressed “feeling free to be themselves” amongst their peer cohort in the post-bac and the freedom this allotted them unlike their undergraduate days then many felt alone and isolated in large premed classes. The idea of going through the process together with people who understood was a critical factor that was expressly different from their undergrad experience. A 2009 study by Perna, exploring how Spelman College (HBCU) supports attainment of STEM fields by African American women reported that even in their supportive environment, STEM students experience social conflicts with friends who are outside of the major due largely due to their lack of understanding the rigors and expectations associated with STEM courses.(Perna et al., 2009) One can argue, that these conflicts have even greater potential to negatively impact student achievement in environments that are already less than supportive and welcoming; such is the case for many URM students at majority institutions.

Post-bacs, while serving as an important stop-gap to the lack of representation amongst medical school matriculants, should not be viewed as a long-term solution to addressing diversity in the physician workforce:

Post-bacs are undoubtedly playing an important role for URM students seeking entry into medical schools nationwide.(Andriole et al., 2015; Blakely & Broussard, 2003) Their existence as a “2nd chance” while providing some mental relief for students, remains largely insufficient as a long-term strategy to address the lack of representation in the physician workforce. In an ideal scenario, students would not need a post-bac to gain acceptance into medical school. Stated aptly by one staff member:

Ultimately I think it would be grand to not need post-bacs and ultimately that's my goal because it shouldn't [be this way] you know...I know it's more a big thought but ultimately if we could provide those resources to the students so that they wouldn't have to take an additional year they wouldn't have to spend more money. I mean isn't that what we ultimately need because the need for doctors is only increasing so delaying these students an additional year technically two...that just seems counterproductive.

At least one author suggests post-bacs are a cost-effective intervention when compared to the full cost of a medical school education. (Grumbach, 2011) While correct in theory, this notion is

based on the idea that medical schools are absorbing the cost of the post-bac rather than the student. The fact is that the cost to attend a post-bac is actually bared largely by students rather than by the medical schools, resulting in many students adding to their undergraduate debt and ultimately medical school debt for those who gain acceptance.

Given this fact, coupled with the reality that most post bacs rely on unstable outside or minimal state funding, the stability of post-bacs from year to year remains largely uncertain. Further, even the most financially stable post-bacs in this study were only able to accept 15-20 applicants per cycle out of as many as 600 applicants. As such, post-bacs are only able to accommodate a fraction of the people who seek them out and should not be relied upon as a magic bullet to address workforce diversity.

Given the important role post-bac programs are believed to play in increasing the number of underrepresented physicians, we sought to examine the reasons students seek out these programs, whether or not they offer students the second chance that they promise and are whether they are addressing problems that could potentially be addressed at the undergraduate level with appropriate planning and intervention. Furthermore, this research sought to examine the sustainability of post-bacs program as an effective intervention for increasing matriculation of URM students into medical school. Findings support previous research that suggest these programs can play a pivotal role in increasing physician workforce diversity. Findings also highlight factors that jeopardize their ability to serve as a long-term solution. Finally, this research suggests that there are ways to embed some of the key program components that students and staff attribute to program success at the undergraduate level. As previous research supports(Alexander et al., 2009), implementation of college level interventions may potentially help increase academic outcomes and reduce the number of URM students who are forced to take this alternate pathway into medicine. The end result being a savings of student time, money and energy as they navigate the premedical pipeline.

LIMITATIONS AND STRENGTHS

To my knowledge, this is the first qualitative statewide study of URM post-bac students and staff to examine student perceptions towards post-bacs, the challenges addressed by these post-bacs and their viability as a sustainable intervention to addressing the lack of representation in the physician workforce. Further, this study adds to the literature by identifying post-bacs not solely as a currently necessary intervention but addressing the elephant in the room by acknowledging their existence as a “band-aid” to larger systemic and institutional issues that exist at the undergraduate level. As such it lends support to two main takeaways, namely: 1. Medical schools and institutions must do a better job of financially supporting post-bac programs if they are to be considered a truly sustainable intervention and 2. The challenges being addressed by post-bacs can potentially be prevented and/or intervened on at the undergraduate level, thereby circumventing the need for post-bacs in the first place. Though not generalizable in the quantitative sense, the results of this research have thematic generalizability when considering the experiences of URM premed students at majority institutions in California and beyond. The reported experiences of students is supported by previous findings in literature related to URMs in other fields such as STEM and can serve as an importance source of direction for the development of recommendations aimed at addressing student experiences as a

means of improving academic outcomes.(Cole & Espinoza, 2008; Hurtado, Cabrera, Lin, Arellano, & Espinosa, 2009; Hurtado et al., 2008, 2011; Perna et al., 2009)

Implications and Future Work

The post-bac programs in this study share a similar mission to post-bacs nationwide that are committed to preparing a diverse cadre of physicians who are committed to caring for vulnerable and underserved populations. By filling a critical gap in knowledge around the factors associated with post-bac enrollment by URM students and the challenges they address, it also contributes to the narrative that is growing increasingly supportive of post-bacs as an important intervention to address diversity issues. While, our findings support the critical role that post-bacs currently play in providing access to medical school for URM students, it also highlights the fact that the current financial and institutional set-up of post-bacs are not sustainable in the long run. This work supports commentary by Andriole who states that post-bacs “may be an effective strategy to addressing physician workforce diversity if they are sustained through consistent institutional funding”(Andriole et al., 2015). It also provides evidence for the need of continued state and federal support of post-bacs through programs such as HCOP which have been significantly reduced or cut in the last decade. Findings also suggest that post-bacs are helping to address challenges that can and should be addressed at the undergraduate level which also has the potential to reduce URM premed attrition rates as well as attrition amongst students in related fields such as STEM. Further research is needed to extend the purview of knowledge around URM student experiences in post-bacs beyond the UC system as well as during undergrad and to develop and better understand best practices utilized by these programs to support students from underrepresented and disadvantaged backgrounds.

CONCLUSION

Despite evidence pointing towards post-bacs as a potential strategy to address diversity in the physician workforce, little attention has been given to better understanding the reasons driving students to enroll in post-bacs in the first place and whether or not they are ameliorating challenges that could potentially be addressed by changes in policies and practice at the undergraduate level. Access to post-bac programs depends largely on limited and unstable funding sources and demand for these programs continually exceeds the availability of resources allotted. Post-bacs also serve as an additional source of debt for students, many of whom already come from economically disadvantaged backgrounds and will likely face additional debt burdens based on their medical school attendance. I have argued, and the data supports, that post-bacs while currently playing an important role in the pipeline to medical school for URM students, are an insufficient long-term strategy, largely due to financial instability which limits staffing and access beyond a limited pool of 10-20 students per program annually. Moreover, post-bacs appear to serve as a band-aid to larger systemic and institutional issues rooted in a lack of adequate mentorship, advising, and support occurring at the undergraduate level. Through an exploration of student perceptions, reasons for applying, and challenges addressed by these programs, this study has provided evidence that post-bacs in fact ameliorate many issues that have the potential to be addressed during a student’s undergraduate tenure and more focus should be paid on how to apply best practices earlier in the student premed pipeline. This will be the focus of the third and final paper of this dissertation. A longer-term goal of this investigation and the recommendations that emerge is to create improved educational experiences that lead to a

reduction in attrition rates among URM premed students during undergrad as well as a decrease in the number of students who are forced to take longer, costlier alternate pathways to a career in medicine. The end hope? A more positive and equitable educational experience for URM premed students resulting in increased pool of successful medical school matriculants and greater diversity in the physician workforce.

Changing the Soil: Addressing Barriers to Academic Achievement for Underrepresented Minority Premed Students in the UC System

Abstract

The persistent lack of representation in the physician workforce beckons the need for strategies aimed at increasing access to medical school for students from underrepresented minority (URM) populations. While much of the research in this area has focused on examining program outcomes and impact on physician specialty/service area choice, very few studies have examined the undergraduate premed experience in detail. The social milieu and resulting experiences of one's undergraduate education are critical components of a successful pathway to medicine for many students, particularly those from underrepresented and disadvantaged backgrounds. These experiences can have deleterious effects which serve as barriers to academic achievement and outcomes. Utilizing qualitative data from the premed experiences of URM students, this paper provides recommendations to address environmental and contextual barriers reported URM premed students in the University of California system.

INTRODUCTION

Despite decades of repeated calls for action to close what former Association of American Medical Colleges (AAMC) president John Cohen once referred to as “the appalling diversity gap that separates medicine from the society it professes to serve”; the lack of representation in the physician workforce yet persists.(J J Cohen, 1997) Further, nearly fifty years of federal and institutional funding, programming and efforts, have yielded only moderate results. Research aimed at addressing this diversity gap has focused largely on program outcomes and impact on physician specialty/service area choice. Very few studies have examined the undergraduate premed experience in detail, resulting in a gap in the literature that is ripe for current and future research efforts. The social milieu and resulting experiences of one's undergraduate education are a critical component of a successful pathway to medicine for many students, particularly those from underrepresented and disadvantaged backgrounds.(Morgan, Haggins, Lypson, & Ross, 2016) URM students navigating the premed pathway at majority institutions experience barriers and challenges related to campus environment that impede their academic achievement and outcomes in ways that are not experienced by non URM students. A 2009 study of 15,000 California college students reported that gaps in achievement persisted even after adjusting for measures of pre-collegiate academic performance and suggested that other environmental campus factors were impacting academic achievement and outcomes for URM students.(Alexander et al., 2009) The author went on to suggest that identifying these factors can assist in the development of interventions and strategies to enhance academic achievement among URM premed students. The underlying premise being that improved academic outcomes will lead to a greater pool of successful applicants and matriculants from undergrad directly to medical school and ultimately the physician workforce.

PROBLEM STATEMENT

Despite continual efforts, URM premed students across the University of California (UC) system fare worse academically compared to their non URM counterparts.(D. A. Barr et al., 2008; D. Barr & Matsui, 2009) This disparity in academic achievement often leads to URM students being forced to take longer, uncertain, costlier pathways to a career in medicine; thereby delaying the supply chain of already insufficient numbers of URM physicians. To our knowledge, no previous study has been conducted with the immediate goal of developing recommendations to ameliorate the factors that serve as barriers to academic success within the URM premed student population. Similar to the ‘Gardner’s Tale’ allegory of the three levels of racism depicted by Dr. Camara Jones(Jones, 2000), this research has unearthed that URM premed students entering the UC system often find themselves in environments that are not conducive to academic growth. Additionally, these students often lack access to the additional ‘supplements’ (i.e. resources) that are embedded in the home and social lives of their non-URM peers which enable them to counteract the effects of any nutrient deficient environments they face on campus. If we are to adequately support and ‘grow’ our students, there must be a changing of the soil through acknowledgment of deficient areas and implementation of policies and programs aimed at creating a rich and thriving environment for all students. Utilizing rich qualitative data from students and staff with nearly 100 years of experience working with URM premed populations, personal experience managing federally funded pre-health pipeline programs and best practices from the literature, this paper will provide recommendations to three major categories of barriers identified by URM premed students in the UC system: campus climate, academic/student services and course instruction/curriculum.

RECOMMENDATIONS

These recommendations have been developed as strategies to prevent and/or ameliorate barriers reported by URM graduates of the UC system who are either currently enrolled or recently completed a premedical post-baccalaureate (post-bac) program. While empirically based, the recommendations provided do not constitute a comprehensive list of potential strategies. They have however, been developed and/or selected taking into account the importance of creating interventions that are sustainable and can be built into the infrastructure of the institution. To date, many programmatic efforts serve as a “crutches” or “band-aids” to larger systemic issues occurring at the institutional level. These recommendations seek to remove the pressure from such important but often under-funded programs which are unable to accommodate the need of all students who desire its services. The recommendations will address three major categories of barriers: 1. Campus climate, 2. Academic/Student Services and 3. Course size and instruction/curriculum and be organized in two major categories: 1. “Low Hanging Fruit”-strategies that can be addressed in a relatively short-term window (1-3 years) and 2. “The Long Haul”-depicting efforts that will require longer-term implementation strategies. Given the multi-level interconnected nature of the barriers faced by students, the recommendations presented, though listed under a specific category, have the potential to improve student experiences thereby addressing barriers from other categories as well.

Campus Climate Recommendations

Campus climate was identified as one of the major barriers influencing student experiences and academic outcomes. Specifically, students reported feeling unwelcomed and isolated as a URM premed student on campus often citing the lack of student, GSI and faculty diversity as factors that served to further exacerbate feeling isolated and lack of belonging.

Low Hanging Fruit

1. **Implement strategies to identify URM premed students during the SIR (Student Intent to Register) process as a means of creating a URM premed database.**
Currently, there is no systematic way to identify or conduct targeted outreach to students of color who have an interest in pursuing medicine. Databases can be used to disseminate relevant information and resources during the summer, fall and throughout the students' undergraduate education starting with a Welcome letter from campus leaders and premed/pre-health advisors. Students often mentioned feeling a lack of guidance and support and having these initial touch-points can serve as a welcomed introduction to the university.
2. **Develop premed summer bridge or Orientation week programs for URM premed students to welcome and acclimate them to campus.** Each UC campus offers some variation of summer program such as Summer Bridge that is aimed at easing the transition process for incoming freshman and transfer students to the university. These programs may include campus orientations and "institutional experience" courses that introduce students to a plethora of resources available on campus or provide them with the opportunity to begin prep courses to assist with their premed requirements.
3. **Implement residence hall based Living-Learning Communities (LLC) for first year URM premed students.** LLCs are residence hall based programs which provide students with social, academic and career related support while living together in a community setting. (Morgan et al., 2016) LLCs have been associated with smoother academic transitions to college, increased sense of belonging and have been proven particularly beneficial for URM and first-generation students in STEM fields. (Hausmann, Ye, Schofield, & Woods, 2009; Kuh, George, 2014; Soldner, M., Rowan-Kenyon, H., Inkelas, K. K., C., Robbins, C., & Garvey, J., n.d.) Similar to ethnic based theme floors in residence halls, LLCs provide students with a sense of belonging by creating an environment that mimics the home environments/neighborhoods of URM students and promotes cultural diversity and pride. The Health Science Scholars Program (HSSP) at University of Michigan is an example of a pre-health LLC funded by the undergraduate College of Literature, Science and Arts. One major cornerstone of this program is the inclusion of a director that comes from one of the institutions own health professions schools since its inception in 2001. (Morgan et al., 2016) Having a provider from a health profession serve as an instructor, advisor and director helps bridge the gap often felt by students who feel courses are taught in ways that omit clinical exposure and relevance. By providing a diverse living and learning environment that incorporates exposure to

career interests at the start of their transition to college, students are likely to feel a sense of belonging during their critical first year of undergrad.

4. **Increase the number of URM Graduate Student Instructors (GSIs) and Teaching Assistants (TAs) in premed courses.** When students fail to see faculty that represent their own racial or ethnic backgrounds, it becomes increasingly important to have another point of connection in the classroom. Generally speaking, there are less barriers to recruiting and hiring more diverse GSIs compared to faculty. Institutions should outline strategies that include partnering with graduate programs or affiliated medical schools to increase the promotion and hiring of GSIs from historically underrepresented backgrounds.
5. **Create opportunities for students to interact with faculty in non-academic/ informal settings.** Students often mentioned feeling that they could not relate to faculty or didn't feel that faculty could relate to their personal life experiences or passion to a career in medicine. Developing social mixers and informal activities provides students opportunities to interact with faculty in ways that currently do not exist and can assist in easing the anxiety felt by URM students who have little experience engaging with professors outside of office hours.

The Long Haul

1. **Increase the number of premed faculty from underrepresented and disadvantaged backgrounds.** Of the 18 students interviewed for this study, only one mentioned having had a faculty of color in one of her upper division courses. The lack of representation amongst faculty in premed gateway courses was a major source of feeling like they didn't belong. Students expressed that not seeing themselves represented amongst responsible for teaching the material, made them question their personal ability to successfully accomplish their academic and professional endeavors. Studies have identified the importance of race concordance for mentorship and self-efficacy.(Hurtado et al., 2008, 2011; Perna et al., 2009) Institutions should therefore increase support of pipelines programs aimed at increasing diversity of faculty in biomedical and science track careers such as Minority Access to Research Careers (MARC), Health Careers Opportunity Program (HCOP), and the Biology Scholars Program. Additionally, UC campuses can benefit from the creation and expansion of partnerships with Historically Black Colleges and Universities (HBCUs) and Hispanic Serving Institutions (HSIs) as a means of creating a more diverse applicant pool for future faculty and lecturers.
2. **Increase the number of URM students who matriculate into UC institutions.** The lack of diversity and representation among premed students was one of the major themes presented by students who reported feeling isolated and a lack of belonging. Efforts to increase SIRs from underrepresented students should include a wide array of components such as more funding and formal support of admissions recruitment and retention offices, and student-run recruitment and retention centers who are often successful in their efforts to outreach and recruit students to campuses. Activities such as "Black Senior Weekend" at UC Berkeley provide African American students the opportunity to visit the campus for a weekend and experience campus life during the spring semester. For many students

this weekend has been the deciding factor to attend UC Berkeley vs. another non UC institution.

- 3. Implement system-wide trainings and interactive sessions for all faculty, staff and students on topics such as implicit bias, micro and macroaggressions, cultural humility.** As the demographic and sociopolitical shift intensifies in the nation and California, there is an increased need to implement checks and balances to promote the importance of understanding and respecting differences in culture and social upbringing. While largely missing from current literature, one can hardly deny that current social and political events are undoubtedly having an impact on student undergraduate experiences. If UC is to maintain its claim as global leader in research and training of future leaders across multiple fields including healthcare, it has to be strategic about incorporating learning opportunities that extend beyond the classroom and across multiple stakeholders.

Academic/Student Services Recommendations

Negative and “non-helpful” experiences with advisors was identified as a major barrier for URM students navigating the premed pathway. The lack of guidance from a trusted advisor or mentor and feeling “lost” on campus were recurrent theme amongst students describing the biggest challenge they faced as a URM premed student on campus. For many students it wasn’t until their experience in a post-bac program that they were finally connected with someone that they felt was genuinely interested in and concerned with their success as a student.

Low Hanging Fruit

- 1. Implement “near-peer” advising programs within major departments.** In the absence of available staff or faculty, students often sought out near-peers as a source of information on coursework selection, crafting study skills, and advice on medical school applications. Given the ratio of students to advisor there is a need to supplement student access to information and advice to assist them as they navigate their premed curriculum. Currently, some career centers offer these services, but greater efforts should be made to recruit and train students from diverse backgrounds and personal life experiences.
- 2. Implement interactive training workshops to promote student centered, culturally sensitive holistic advising.** One of the major complaints from students is that advisors often took “one look at their transcript and told them they should pursue something other than medicine”. These types of experiences can be highly detrimental to students already feeling the pressures of trying to acclimate to a large unwelcoming campus. Students described their desire to have advisors see them as “more than just a grade or GPA” and take efforts to better understand the underlying factors contributing to their academic outcomes. Students also expressed the belief that many advisors did not understand the ways in which their cultural upbringing might impact their ability to take up the “matter of fact” counseling offered by advisors. Training advisors to adequately use restricted time allotments in a manner that makes students feel heard, supported and encouraged can be greatly beneficial in improving student experiences.

The Long Haul

1. **Increase the numbers of dedicated premed advisors on campus.** One of the most surprising findings from this study was that not all schools had a dedicated premed advisor. Some campuses despite boasting several thousand premed students and a medical school, reported that most premed students were left to seek out advising from departments such as Chemistry and Engineering. If improvements are to be made to the quality of advising received by students, institutions must first ensure that they are providing accurate and relevant advising from those knowledgeable of what it takes to be successful in the premed pathway.

Course Size and Instruction/Curriculum Recommendations

Low Hanging Fruit

1. **Offer smaller course sizes for introductory premed courses.** For many students, the culture shock of being one of only a handful of URM students coupled with massive 500-600 person courses left students feeling overwhelmed. Students also expressed concerns that professors assumed a certain level of knowledge beyond what was provided in their high school courses and disseminated information in a style and pace that was difficult to keep up with. These same students however were able to thrive in a post-bac that offered smaller course sizes which promoted greater opportunities to connect with professors in a meaningful way, suggesting that smaller course sizes and greater intimacy with faculty can have positive outcomes on academic achievement.
2. **Implement mandatory review meetings for any student receiving a non-passing grade on their first midterm.** One critical component to academic success is recognizing and asking for assistance early in one's academic career. Many URM students are caught in a cycle of not having adequate advising to equip them with the tools to reach out for help in a timely manner and not wanting to appear as if they are "giving up on their dreams" by dropping a course. By incorporating policies that require students to meet with faculty or GSIs to discuss poor performance on an initial midterm, students are able to engage earlier in the semester when there is still an opportunity to incorporate strategies to improve grades on the remaining exams.

The Long Haul

1. **Increase the diversity of faculty teaching premed courses.** While race/ethnicity was the number one factor listed by students in reference to schools lacking diversity, students also mentioned gender inequity and a lack of professors from professional degree programs such as nursing or medicine as a barrier. Students repeatedly cited disconnect between professors who were formally trained as chemists and physicists who taught courses as if they were "teaching their fellow colleagues". Students who took courses with URM faculty or those with non-PhD health related degrees reported feeling greater connectivity due to faculty not only understanding but sharing similar backgrounds and

educational experiences as the student. Given that many institutions are affiliated with medical and nursing or public health graduate programs, efforts should be made to expand the pool of faculty and lectures that are recruited to teach the future generation of health providers.

2. Revamp premed curriculum to incorporate relevant issues from medical practice.

Universities have a long history and reputation of offering premed courses that are often referred to as “weeder” courses (courses designed to “weed out” students who are not deemed medical school material). Additionally, the long standing tradition of tenured non physician faculty holding large influence and power over course development and instruction has resulted in courses that are largely out of tune with current issues in medicine and healthcare. Students often find themselves struggling to make the connection between the concepts being taught in their courses with the career in medicine that has driven their passion throughout much of their educational pathway. One hundred years after the monumental Flexner Report(Duffy, 2011) which transformed the medical educational curriculum in the US, researchers, institutions and the profession is calling for a review of medical education and preparation in America with some institutions such as Harvard abandoning the traditional premed requirements for recommended “areas of knowledge” that are deemed critical for future practitioners. UC institutions are at an advantage given their affiliation with several medical schools. Campuses should take advantage of these relationships to help create a premed curriculum that is better adapted to develop and test the knowledge, skillset and attributes desired in practicing future physicians.

CONCLUSION

Research shows campus climate, advising/student services and pedagogical practices/curriculum development are critical to student retention, which is a necessary but insufficient component of student achievement and success.(Swail, 2003; Tinto, 1975) URM premed students at majority institutions are especially vulnerable to “leaking” out of the educational pipeline due to barriers and challenges that result in negative student experiences. The recommendations provided in this paper reflect empirically based strategies aimed at not merely supporting retention of URM premed students through to graduation, but promoting academic achievement. It is our belief that these recommendations can help create more nurturing and supportive environments and assist in the reduction of student burdens. The long term goal is to create an educational system that helps students thrive academically and socially resulting in a larger pool of successful medical school applicants who are able to matriculate directly from undergrad into medical school and ultimately the physician workforce.

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APPENDIX A

Figure 1. Conceptual Framework- Adapted from Swail's Geometric Model of Student Persistence and Achievement.(Swail, 2003)

Figure 1. Conceptual Framework. Depicts the impact of student experiences on educational/academic outcomes through the educational pipeline. (*Factors in parenthesis within the shaded boxes were those identified as negatively impacting student experiences.



