Leaving the Premedical Pipeline at Cal

By

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B.S. (University of California, Davis) 1997

A thesis submitted in partial satisfaction of the

requirements for the degree of

Master of Science
in

Health and Medical Sciences

in the

GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA, BERKELEY

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Spring 2001

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ACKNOWLEDGEMENTS

This thesis was would not have been possible without the generous help of many individuals.

First, I thank all the students advisors who volunteered for interviews, referred me to other students, and generally let me spy on the premedical subculture at Cal. Your stories were truly inspiring and made this effort all the more worthwhile.

Thank you to my thesis committee, Henrik Blum, Len Syme, and Dan Perlman. Dan Perlman and Eric Stover helped me jump start this project with their time and patience last year. I also thank all of my thesis group advisors and thesis group students.
To my classmates, and to Brian Tang, Sandy Woo, and Monica Kwan, thank you for watching my presentation and reading this thesis more times than you may have wanted.

Special thanks go to the HMS office staff for years of support and encouragement.

Finally, thank you to my parents, Choi Shun and Hin Chung Kwan, and my family for helping me get this far.

INTRODUCTION

Looking at Attrition

It is natural to assume some amount of attrition from the premedical pipeline is appropriate. Not everyone is meant to be a doctor, and many students enter college unaware of all their career options. Furthermore, in a competitive field in which fewer than half the applicants nationwide are accepted into medical school, it is necessary for students to weigh the premedical investment against the probability of acceptance. So why should we be concerned about premedical attrition? There is reason to believe that premedical attrition may hurt diversity in medical education. Underrepresented minorities (URM)[1] may be more vulnerable to attrition in the premedical pipeline. A three year study at seven universities found that women and non-white students were more likely to leave science, math, and engineering majors and left for different reasons than white students. (Seymour 1997). Another study found that despite the same levels of academic performance, women may be up to three times as likely to leave the premedical pipeline than men (Fiorentine 1987). Since there is evidence that improving diversity in medical education may improve health care for underserved populations, efforts should be made to understand URM attrition in the premedical pipeline.

Preparation for Medical School

To better describe the context for leaving the premedical pipeline, I will first lay out the typical process of preparing simply to apply for medical school. Preparation begins years before a student even applies to medical school. This long process is meant

[1] The AAMC defines "underrepresented minority" as African American, Mainland Puerto Rican, Mexican American, Native American.

to identify students who will be successful medical school and in their future careers as physicians. Academic preparation includes 2-3 years of coursework as seen in Table 1. Virtually all US medical schools require students to take the Medical College Admissions Test (MCAT). The day-long test is composed of four sections that cover most of the premedical curriculum. In addition, students need enough extra-curricular experience to make the personal decision to go to medical school and to make a compelling argument that they know about the career and belong in medical school. Students often get clinical and research experience by volunteering, internships, or jobs.

This is significant in that students need to consider the decision and plan for their application years in advance. Assuming a student spends four years in college and plans to enroll in medical school the fall following graduation, they would apply in the summer after their junior year. This would require that by junior year, they have completed nearly all of their required coursework, have taken the MCAT, and have gleaned adequate experiences to make a mature decision to pursue medicine. Since the coursework alone may take three years to complete, students may need to embark on the premedical process as soon as they arrive in college.

Table 1: Typical Academic Requirements Before Medical School

COURSES	
Calculus	1 year
General Chemistry with Lab	1 year
Organic Chemistry with Lab	1 year
Biology with Lab	1 year
Physics with Lab	1 year
English	1 year
Additional Requirements at some schools:	
Biochemistry or other advanced biology	1 semester
Humanities	1 year

Application and Admission to Medical School

The application to medical school may begin over a year before the intended enrollment. Students apply to a central application service, the American Medical College Admission Service (AMCAS). This application includes a one page personal statement, grades, MCAT scores, and a list of extra-curricular activities and awards. Applications are forwarded to individual schools designated by the applicant. Schools who receive the AMCAS application may then request additional "secondary" information from the applicant, including letters of recommendation, additional essays, and official transcripts. After all materials are received, the admissions committee may decide to invite the applicant for a personal interview.

Although each admissions committee may have individual criteria, the factors considered in admissions decisions may be categorized as cognitive, such as the MCAT and GPA, and noncognitive, which may include motivation, leadership, and life experiences. The relative weight placed on cognitive and noncognitive variables is an area of ongoing controversy, especially around the admission of URM students, who historically have lower average GPAs and MCAT scores. Although MCAT and GPA may not predict a large percentage of achievement in medical school, they remain the most reliable predictor of admission (Tekian 2000). According to a 1997 study of 20 years of a special admissions program at University of California at Davis Medical School, "The students with higher MCAT scores and GPAs were not significantly more likely to graduate, complete residency successfully, become licensed, attain board certification, or enter the full range of career opportunities (including academic medicine) than were the students admitted under the special admission program (with a lower mean GPA and

MCAT). If the highest MCAT scores and GPAs are not predictive of these outcomes, they are not meaningful admission factors (Davidson and Lewis 1997)."

Table 2 shows a very conservative estimate of the costs of applying to medical school. In reality, since medical school admissions is both highly competitive and unpredictable, only the most confident students apply to only ten schools. In addition, since on-site interviews are required at every US medical school and the scheduling is not often flexible, travel expenses and lodging costs alone may cost thousands of dollars.

Table 2: Estimated cost of applying to 10 medical schools in 2001

•MCAT registration	$175	**Additional Expenses:**
•MCAT prep course	$1299	—Applying to more than 10 schools
•Primary application		—Re-taking the MCAT
–$150 for 1st school		—Additional travel expenses
–$30 each add'l	$420	—Time off from work
•Secondary app		-to study for MCAT,
–$70 each	$700	-to go to interviews,
•1 Interview trip	$600	-to write essays
•Preliminary total	**$3194**	

LITERATURE REVIEW

The Value of Diversity in Medical Education

A growing body of evidence supports the assertion that only diversity in medical profession may ensure that minority populations receive adequate health care. Several studies show that when asked, minority patients prefer to be treated by physicians of the same ethnicity (Garb 1992).Trust between patient and physician is essential to an effective therapeutic relationship. Distrust of the medical profession may affect the health of minorities by affecting patterns of compliance, use of preventative care, patient disclosure, and choice of therapies (Dula 1994). A long history of differential treatment by the medical profession has affected the view of medical profession by minorities. For African Americans in particular, the problem of distrust has a long history that may date back to the days of slavery. Physicians were seen as agents of the slave owners, and the owners' interests were perceived to take precedence over the medical needs of the slave. The medical community later took part in the development of eugenics and 19th century theories that whites were physiologically superior to other races. Medical research has also violated the trust of African American patients. The most infamous example, took place in Tuskeegee, Alabama between 1932 and 1972. In a federally funded study, 400 black men were intentionally denied medical treatment for syphilis so researchers could track the effects of the disease. Furthermore, the medical profession contributed to the maintenance of a segregated, and unequal medical delivery system for African Americans for much of the 20th century (DeVille 1999).

Minority distrust of the medical establishment is also rooted in ongoing inequities in the health care system. Health disparities between majority and minority groups are

widely acknowledged. Minorities, and African Americans in particular, have less access to health care services, higher mortality rates, and higher rates of disease for a wide range of illnesses(Deville 1999). An extensive and growing body of evidence suggests that these disparities are attributable in part to the influence of stereotypes, prejudice, and racism in the delivery of medical care to minority patients. This has been shown in many clinical situations, including the recommendation for cardiac catheterization (Schulman 1999), surgical resection for colorectal cancer (Cooper 1996), and timeliness of follow-up after an abnormal screening mammogram (Chang 1996). Even after controlling for socioeconomic and medical factors, the studies show racial disparities in treatment persist.

The value of diversity in medical education is also supported by consistent evidence that URM physicians are more likely to serve minority and Medicaid populations and to work in physician shortage areas. In 1996, a large physician survey showed that this service pattern much more strongly associated with physician race than socioeconomic status, and was sustained over time (Cantor 1996).

Lack of Diversity is a Persistent Problem in Medical Education

The lack of diversity in US medical schools has remained a persistent problem despite an over 30 year history of efforts to achieve enrollments more reflective of the general population. As recently as 1968, US medical students were 93% men and over 97% white. Of the approximately 3% non-whites, the great majority were enrolled in two historically black medical schools. Only 0.2% of medical students were Mexican American, Puerto Rican, or Native American (Petersdorf 1990). In 1970, an Association of American Medical Colleges (AAMC) task force first defined population parity for four groups underrepresented in medicine as a national priority. Although these initiatives

have had some success in the past, increases in URM representation in medical school have not been sustainable, and has never approached parity. In 1990, the AAMC launched *Project 3000 by 2000*, a new initiative to increase URM representation in medical education. Soon after this new effort, the number of URM students peaked in 1994, at 12.4% of new entrants. Since then, there has been declining URM enrollments in medical schools nationwide (Carlisle 1998).

This decline is especially pronounced in California, which has undergone two controversial policy changes in medical school admissions in the last decade. In 1995, the University of California Board of Regents voted to exclude the use of "race, religion, sex, color, ethnicity, or national origin as criteria for either admission to the University or to any program of study." Before the new admissions guidelines, called SP 1, could take effect across the university, California voters passed Proposition 209 in November 1996, banning affirmative action "in public employment, public education, and contracting."

Despite a growing minority population in the state, California medical schools saw a 25% reduction in URM applicants, a 30% reduction in URM acceptances, and a 32% reduction in URM matriculants compared to peak years in the early 1990s. In the same time period, the reduction in the number of URM Californians who are applying to medical school has declined at more than twice the rate nationwide, 24% vs. 11% across the US (Grumbach 1999).

Premedical Attrition

Few studies have looked directly at premedical attrition. The persistence gap between men and women was studied in 1987 using a combination of surveys and interviews at a state university in New York. The sample of over 600 students found that

compared to males, substantially fewer females applied to medical school despite an equivalent proportion of females embarking on the premedical curriculum at the same rate as men. Using college transcripts to control for the influence of grades, this disparity was found only at low to moderate levels of academic performance. Among students with GPAs between 3.0 and 3.49, 80% of the men applied to medical school while only 34% of the women applied to medical school. At GPAs below 3.0, men were three times as likely as women to apply to medical school. At GPAs between 3.5 and 4.0, however, women were just as likely as men to apply to medical school. The authors attributed this difference to women having an alternate route to social status through her spouse. Theoretically, this may result in women persisting in the premedical pipeline until they experience some reasonable possibility of failure. Men, who depend on occupational achievement for social status, would persist until they experience almost no reasonable possibility of success (Fiorentine 1987).

A 1999 survey asked gifted URM students who had an interest in health professions while in high school why they had switched to other fields. Although these gifted students may have been less vulnerable to academic difficulty than the average URM student, they did not emphasize difficulty with coursework, but focused on a loss of interest in medicine and the development of new interests as a result of internships and mentoring in non-medical fields (Thurmond and Cregler 1999).

The differential attrition rates for URM students in science, math, and engineering (SME) majors is well established. A 1993 longitudinal study of attrition in SME majors shows that half of black and Native American students, and two thirds of Hispanic students leave their SME major, while rates for white and Asian American attrition were

well under one third (Seymour 1997). Seymour and Hewitt conducted a three year study across seven undergraduate schools to look at reasons for attrition in the SME majors. They found non-white students who switched out of SME majors were approximately five times more likely than white students to cite inappropriate reasons for their choice of an SME major, six times more likely to cite conceptual difficulty with SME subjects, and 2.5 times more likely to cite inadequate high school preparation. White students were approximately twice as likely as non-white students to cite loss of interest, poor teaching, and dissatisfaction with the pace of the curriculum. Though these two studies are not directly related to medicine, it may be important because a high percentage of URM students with degrees in the physical and life sciences apply to medical school (Seymour 1997).

METHODS

The goal of the study is to generate insights about persistence and attrition that may guide further study and intervention. Qualitative methods were chosen as the most appropriate tool because little is currently known about URM students' decision to leave the premedical pipeline. Although lack of diversity in medicine is a long-standing problem, few studies look at reasons for premedical attrition, and no qualitative studies look at URM premedical attrition. Furthermore, the decision to leave consists of many subjective, interacting factors whose relationships may be best studied using an inductive rather than deductive method.

An interview strategy for premedical and former premedical students was devised using information from participant observation and key informant interviews. Participant observation took place at events such as informational seminars, student group meetings, medical school recruitment events, and prerequisite science classes. Additional information came from email lists and message boards that relate to premedical or URM concerns. Eight key informant interviews were conducted with professionals who work with premeds. Although I will refer to all of these informants as "advisors," they actually include advisors, counselors, tutors, and individuals affiliated with campus offices or groups who advise a significant number of premedical students. Key informant interviews were approximately 1 hour long. Notes were taken during these interviews and further developed after the interview.

Since there is no premedical major and no records at UC Berkeley of a student's intention to pursue medicine, there was no way to get an accurate sense of who is or has ever been premed. Recruitment relied on brief appeals at general education and

prerequisite courses, group meetings, and email lists and "snowball sampling." All contacts from participant observation and key informant interviews, as well as all student interviewees were asked to refer potential subjects. Ultimately, this resulted in an opportunity sample of nine premed and eleven former premedical students.

Premedical and former premedical students were recruited and interviewed about their premedical experiences, and the factors that determined persistence and attrition. The domains covered in the student interviews are in Appendix A. Semi-structured, open-ended interviews were conducted with premedical and former premedical students on the UCB campus and lasted from 45 minutes to 2 hours. . The interviews were tape recorded and transcribed. Transcripts were coded and analyzed using grounded theory methodology. In grounded theory, a systematic set of coding procedures is used "to develop an inductively derived grounded theory about a phenomenon (Strauss A 1990)." According to this method, data is fractured by "open coding" which identifies concepts, compares them, and groups them into categories. "In vivo" codes derived from participants own words were also identified and grouped. More focused "axial coding" then nests and relates subcategories to categories. Memos and diagrams were used throughout coding and data collection to keep a record of the analytical process. Data collection and transcript analysis happened concurrently, so each new interview was informed by previous interviews.

Setting

The University of California at Berkeley was a logical site for this study. First, as students at the most selective public university in the nation, subjects would likely have the potential to do well in medicine. While only 42% of those who applied to medical

school in 1998 were accepted, 50% of UCB applicants were accepted (Office of Undergraduate Admission and Relation with Schools 2000-2001). Approximately 95% of the freshmen admitted come from the top 10% of their high school class. The average weighted and unweighted GPAs of entering freshmen for the Fall 2000 is 4.21and 3.76 respectively. UCB currently ranks 4th nationally in the number of National Merit Scholars [UCB Office of Admission, 2000-2001 #19]. Secondly, UCB consistently sends more students to medical school than almost any other university. The Career Center estimates that approximately 20% of each new class starts UCB with the intention of going to medical school—that's over 1800 new premed entrants per year. Each year, approximately 800 UCB students take the MCAT and 500-700 apply to medical school. Historically, UCB is also among the top sources of URM medical students (Van Houten 2000). In 1999, the undergraduate enrollment of approximately 22,000 was 10.8% Hispanic, 4.9% African American, and .8% Native American [UCB Office of Admission, #177], allowed a reasonable pool of potential research participants. Lastly, as a researcher and graduate student on the UCB campus, I would have better access to the premedical subculture and potential subjects.

Sample

Upper division students were purposely overrepresented since it was felt that students with more time at the university would have the most experience to draw upon, and may be more likely to have made a decision to stay or leave premed. All but one of the URM students in the study was a member of the Biology Scholars Program, a retention program for students in the biological sciences that counts among its members a great majority of the URM premedical students. As members of this program, these

students have access to additional sources of support, including tutoring, advising, and research opportunities.

Demographics

9 Premeds
5 Underrepresented minorities
1 African American
2 Mexican American, 2nd generation
1 Italian/Mexican American
1 Mexican/Puerto Rican American
1 White
3 Asian American

3 Men, 6 Women
Age range 21-32, mean age 24
3 Transfer students
7 Biological science majors
Also: Chicano studies, Psychology

6 First generation to college

11 Former Premeds
6 Underrepresented minorities
1 African American
3 Mexican American, 2nd generation
1 White/ Mexican American
1 Filipino/Mexican American
1 White
4 Asian American

2 Men, 9 Women
Age range 19-22, mean age 21
2 Transfer students
8 Biological science majors
Also: Psychology, Education, Social Welfare
5 First generation to college

Limitations

As in any qualitative research, these findings are not meant to draw conclusions about the general population of premedical or URM students. Since the students were selected after already making a decision to stay or leave premed, their responses are subject to a recall bias, in other words, the outcome of their decision may color the interpretation of events and circumstances. Selection bias may also occur, so that students with the most negative experiences as a premed may have been more likely to come forward. Snowball sampling also creates a selection bias by finding two groups of students, premeds and former premeds, who are too similar because participants are affiliated with the same groups on campus, or were referred by other participants. It is important, however, to note the direction of this particular bias. Since the two groups,

premeds and former premeds were most likely more similar in the snowball sample than they would have been in a random sample, it would be more difficult to find differences between the two groups. Any differences that are found may have been even *more* pronounced in a random sample.

RESULTS

The objectives of this study were 1) to compare the experiences of URM students who stayed with those of URM students who stayed premed at UCB, and 2) explore the factors students attribute to leaving the premedical pipeline. Before describing the key findings that relate to the experiences of URM students that leave the premedical pipeline, it is important to put the findings in context. To that end, I will first present themes that emerged from the interviews that describe the experience of being an underrepresented minority at UCB, followed by general findings common to all students that left the premedical pipeline.

Common Experiences Among URM students

Experiences common to URM students (both premed and former premed) include culture shock, isolation, obligations to family and community, and feeling unwelcome at the university and in science classes.

Culture shock

Difficulties adjusting to life in college are nearly universal. For underrepresented minority students, however, the transition may be complicated by feelings of culture shock, defined by Merriam-Webster's dictionary as "a sense of confusion and uncertainty, sometimes with feelings of anxiety that may affect people exposed to an alien culture or environment without adequate preparation." In eleven interviews URM students, all but two biracial minorities mentioned culture shock. The degree of culture shock was most significant for those from predominantly minority communities. For

these students, the culture shock was due to both being around different people and being perceived by others as someone very foreign.

> *When I walked into my chemistry class, I thought, 'I've never seen so many Asians in one room!' It was a culture shock. Coming from East LA college to here, where everybody is either Asian or white. I lived in the dorms and asked, 'where are all the Chicanos?' I didn't think I'd fit in, but I knew that I had to because this was a once in a lifetime opportunity. When I came up here last year and it was the hardest thing I had ever done in my entire life.*
>
> Michael, Mexican American premed

> *Because I didn't know anyone who went to college, and it was my first time away from home, it was a total culture shock. I never had been away from home. It seemed like everybody's parents were doctors or engineers and had more money than I did or they came from a background with some family in college. I looked for people that were like me, but still I always had that self-doubt.*
>
> Anna, Mexican American premed

> *From all nationalities, there's a general ignorance about black people—like we're aliens! I've had people ask what black people eat! They make assumptions. Not just racially but socioeconomically. Like, 'you're from South Central, have you seen people shot?' There are middle class areas in South Central. Because I have braids, they expect me to speak Ebonics. I know I'm perceived a certain way by people in the sciences.*
>
> Karen, African American premed

> *Honestly, sometimes it made me mad to think that some of these students could call home and be like, 'Hey mom and dad can I get a thousand dollars into my bank account?' It's not like these were rumors. I would literally hear from people in my dorm call their parents and ask for money. And one thing that made me mad was when I told people that I had to work and send money home they would get mad. they would say things like, 'why do you have to send money home? Why can't they send money to you?' They couldn't understand and relate to my situation. They made it seem like my parents didn't care about me.*
>
> Marcia, Mexican American former premed

Isolation

URM students often had to deal with the isolation of being among the relatively small number of students in the sciences who had similar backgrounds. Although isolation was relieved to a certain extent by association with groups such as the Biology

Scholars Program, the inevitability of having to be in the larger university community, and the variety of backgrounds within each ethnic group and that made isolation another nearly universal experience among URM interviewees.

> *Though I have all of my friends in this small little segment I sort of identified with, I still have to go in the larger arena, like go in a class with 800 people you know, I would still be a very, very distinct minority. I could probably count on my two hands all the African American girls I ever saw in my bio classes. So, I guess it sort of balanced out pretty much 'cause when I was in the larger premed community, I felt like I was very much singled out as an individual.*
>
> Mary, African American former premed

> *I came from an inner city environment. My high school had one microscope and it was broken. We didn't have enough textbooks for each student in the class and so we photocopied the chapters of the books, and yet we couldn't even write on the photocopies. So, I never found anyone in my four years here that could relate to those experiences. I've found other Mexican Americans, but no one has the same experience—I'm sure there are people like that here, but I have never run into them.*
>
> Marcia, Mexican American former premed

Going to college proved particularly isolating for Karen. Although her parents supported her going to college, other members of her family accused her of coming home changed. After four years at UCB, where she never felt at home, she is anxious about moving back to her neighborhood, where she no longer fits in.

> *Family thinks I think I'm better. You go back different—you've been exposed to a world that they haven't—You're not better you're just different. I have a lot of ideals that are different from when I left my Mom's house. It's very different. It's hard being different and I'm emotional—I break down and cry. I don't feel like I belong here I don't feel like I belong there.*
>
> Karen, African American premed

Obligations to Family and Community

Family issues were often a big concern for URM students, especially those who were the first in their families to go to college. Though approximately half the URM

students said their families did not initially recognize the value of moving away to attend UCB or even of going to college, many of these students later became role models for younger family members. Since the alternative to college was earning an income that could support the family, and since many URM parents did not go to college, students approached college as a special privilege. There was often a pressure to make the experience worthwhile and to set an example.

> *When I was starting out, people in my family would ask me "why do you have to go to college? None of us went. You graduated from HS, that will get you a job. You can go to computer school. You don't have to leave home. They finally realized what it meant. It means change for us. Since I've graduated, 3 younger cousins have graduated HS and gone to community college. We're seeing change of attitude in my family by a lot of people. I think that if I quit, what will keep them from quitting? They look at me as a role model to keep from quitting.*
>
> Anna, Mexican American premed

URM students also had a strong commitment to helping their community. Seven of the eleven URM students interviewed had a specific goal of helping the underserved neighborhood where they grew up, or working with minority patients. Two others had goals of returning to other "communities" to which they once belonged—working with premature babies and working with athletes.

Feeling Unwelcome

URM students had a strikingly different view of the atmosphere at the university, and in science classes in particular. The campus atmosphere was seen by many of the URM students as unwelcoming. Four URM students felt the atmosphere in their science classes was overtly hostile.

> *You have to contend with the students—the stares when you first go into a lab or a class—people stare, and if you're black, you feel it. It's like, what are you doing here? They don't want to work with you until you say something that would deem you smart. Then it's like, "oh, hi, can I see your notes? Before that, they won't*

speak to you, won't work with you. Not every class, but there's some classes that I've experienced that.

Karen, African American premed

Many factors contributed to feeling unwelcome, including the campus debate on affirmative action, personal experiences with discrimination, experiences of friends, and the perception that the low numbers of URM students and faculty is a statement in itself.

Being minority in the university makes you feel not wanted. There's not many people like you here, so you have to think, maybe you're not wanted here. I can think of 5-6 black MCB majors graduating with me, and there is not one black MCB professor—that speaks volumes to me. I've even had one person tell me black people are the cause of all the crime in the country and we're savages and ignorant. He lived in my dorm and we were constantly arguing because I wasn't going to let him get away with that.

Karen, African American premed

Since a movement has been underway to reverse SP1, the ban on affirmative action in the University of California system, the campus has been engaged in a dialog that has presented both sides on the issue. Some students perceived the reaction from the university and the general campus population as apathetic, and the efforts also brought about backlash from those who are against affirmative action. For example, on one science department email list, a long string of heated messages was started when one student posted a message about the "failure" of affirmative action that included many inflammatory statements. Although this was the initial trigger for the email debate, this message was not unique in its assumptions about URM students.

When you look at the Science, Math, Computer Science, Engineering classes at Berkeley, you don't see any Afro-Americans or Latinos in it. These people takes the easy way out and choose easy majors... How can these people advocate equality when they are allowing kids with lower GPA and SAT scores to get in over more deserving kids, just because the smart kid is white and the dumb kid is black? Why should we accept a black kid when he slacks off and go play basketball as a White or Asian kid studies his ass off for the SAT?

Excerpt of a mass email to science department list

Common to all Students who Left

Four important themes emerged consistently from the eleven former premeds. 1) Regardless of their own satisfaction with leaving, all former premeds felt that others saw the decision to leave was due to inadequacy, failure, or an uninformed or illegitimate interest in medicine. 2) All decisions to leave were made over time, and students often vacillated for a year or more before finally leaving. 3) Most of the former premeds left after a significant amount of time in the process. Nine of the eleven former premeds spent 2 or more years pursuing medicine and taking prerequisite classes. 4) Possibly most significant was the fact that all former premeds report being more pushed away by negative experiences as a premed than pulled away by other more attractive opportunities. In fact, none of the students were lured away by other fields. All the former premeds were first disenchanted by medicine, and then looked for alternatives.

Underrepresented Minority Students who Leave

URM premeds and former premeds were not inherently different

There wasn't a clear distinction between the groups in terms of background, interest or ability. The URM students were often very similar in their paths to medical school and their initial experiences at UCB which often included culture shock, isolation, and feeling unwelcome. All students interviewed, premed and former premeds alike, had thought about leaving at some point.

Both URM premeds and former premeds had initial interests that may have been vague or naïve. Premeds were just as likely to have an "illegitimate" interest initially, such as an interest suggested by family, or a favorite television show.

> *My mom tells me I used to love this show called Quincy, M.D., which was about a forensic doctor. My family always used to call me smart when I was little and when they found out I liked Quincy, they encouraged me to become a doctor.*
> Anna, Mexican-American premed

Premeds, however, were able to further develop their interest in medicine through a variety of experiences while in college.

Both URM premeds and former premeds had initially experienced similar degrees of academic difficulty. The severity and frequency of the initial academic difficulty was comparable in both groups. Nearly all the students interviewed had some difficulty adjusting to college studies and saw a drop in their grades in the beginning

> *It wasn't until college I realized that in order to become a doctor you had to do well. I actually didn't do too well in a couple of my science courses and I had to repeat those. It took me almost five years to get out of the community college system.* Robert, Mexican American premed

Furthermore, both URM premeds and former premeds had negative experiences as in prerequisite science classes. This often included complaints about teaching and evaluation, bad experiences with and low opinions of other premeds, and experiences of overt discrimination.

Although nearly every student shared the common experience of academic difficulty in their prerequisite classes for medical school, the former premeds had more trouble recovering. Many students found themselves in a vicious cycle. Despite great efforts to improve their grades, they saw little improvement. This led to doubts about their ability and a feeling that there would be no way to recover given the structure of science classes. Eventually, students had less motivation in these classes because it seemed less and less possible for them to do better.

> *I would stay up really late studying, sometimes I would only sleep 2 or 3 hours, and that didn't even help. I mean, it was ridiculous! Then I was left to think, 'what*

the heck is wrong with me? I don't belong here.' I even got on academic probation after my second year.

Frieda, Mexican American premed

I struggled from the beginning with the premed track here. It wasn't that I felt I didn't understand what I was learning. It was really the way the classes are formed and the way the grades were set up. Finals were half the grade and so if you messed up on your final... I started getting discouraged really early. I was getting C's. I felt I was doing all this work, studying really, really hard and not seeing anything come out of it. I struggled for two and a half years.

Cathy, Mexican American former premed

I think a lot of people leave premed because they aren't up for competing. I guess where I really see the competition is in classes like Bio1B. It wasn't a hard class, yet it was still hard to get an 'A' because there were so many people in the class, all doing pretty well, so you had to get almost perfect to just get an 'A.'

Sandy, White/Mexican American former premed

The efforts to recover academically combined with work and family obligations often diminished the chances of getting experience in medicine, or research. Since some students blamed themselves for being in the position of needing help, and were less willing to "take up time" at office hours because they were not performing well in class or felt inadequately prepared to ask questions. When they did access help from professors and graduate student instructors, it was often later in their careers.

Talking to TAs and professors was a major obstacle. Just recently, I've been starting to talk to the professors but I don't know, I guess you could say I was just intimidated, I just didn't want to say something dumb and they'd think like, why are you here, you should know that kind of thing. I felt overwhelmed because it was on my own part that I was behind, you know... So, I guess my problem was that I was doing so bad in my class it was kind of like I didn't want them to know who I am; I'll just hide back here. Until I do better, they don't have to put a face to the name.

Frieda, Mexican American former premed

> *I guess I was just more comfortable going to my peers. With the science professors, I felt like they were pretty intimidating. Office hours were always really crowded. It's pretty hard to meet those teachers since the classes were so large. I felt like everybody was out for letter of recommendations. So, when I went to office hours I felt like it was this huge ordeal, like I had to have something prepared to ask. I didn't feel like it was something I could just go in, drop by, and ask a question that I wasn't clear about. Office hours were pretty intimidating to me.*
>
> Cathy, Mexican American former premed

URM students who left had a weaker connection to support networks.

The difference between the two groups was dramatic when looking at connectedness to sources of support. None of the former premeds could name a role model or mentor in medicine. They also had significantly fewer experiences in medicine, such as clinical experience, research, or the experience of illness in the family. The only two URM former premeds who had any clinical experience had health care workers in their immediate family. Research experience was just as uncommon. Two URM former premeds had any research experience, and only one considered it a quality learning experience.

The lack of mentoring among the former premeds more dependent on campus services for advising and support. Not only were the former premeds less likely to have a mentor in medicine, they were less likely to know anyone involved in medicine or have any college educated adults that could provide perspective about college. Campus services were helpful for basic information, but students found them less helpful when seeking advising about leaving. It was difficult for some students to seek help from advisors. Many were ashamed of their poor academic performance, and felt that others assumed leaving premed was always due to failure. It was also a common feeling among advisors and students that advising on campus was more suited to helping students

prepare an application to medical school. Students who were undecided, or looking for guidance in their decision to stay or leave premed did not find the advising as helpful. Frieda talked about how many advisors, once they knew her GPA, tried to help her by suggesting she look into other health related fields. One advisor told her she may be better off at a community college. Without any other sources of advising, these suggestions were taken as an indication that she wasn't meant to be a doctor.

> *When I was on academic probation, an advisor looked at my transcript and told me, 'maybe you should think again whether you want to be premed, because the proof is here you know.' He said 'maybe you should go away from Berkeley and go to a community college and come back in two years'. It just felt so horrible! I thought it had to be true. I couldn't say anything to him because he knows more than I do, you know.*
>
> Frieda, Mexican American former premed

Advisors, who see an endless stream of premeds come in for advising, seemed more ready to suggest students look into other fields than to strategize with a struggling student how they may improve their application or find alternate paths to medicine.

> *Nobody ever said, 'okay you can do this. If you still want to go to medical school, this how you're gonna do it. Let's try these different ways to do it.' Nobody ever really said that to me...I don't feel like I had support from any of the you know, older people, people who are supposed to mentors here at Cal. I was just like, gosh, medicine is just not for me I guess. I just felt like I was sinking deeper and deeper.*
>
> Frieda, Mexican American former premed

Former premeds also had less knowledge about medicine—both the training and career. With surprising frequency, former premeds would cite television shows or rumors in giving their impressions about medicine. They were also much more likely to have inaccurate assumptions about premedical preparation and the demands of medicine. Several recurring themes illustrate the perceptions of former premeds. First, if they don't

like the "cut-throat" atmosphere in prerequisite classes, they won't like medical school. Similarly, if they don't perform well in these classes, it somehow predicts their ability as doctors. There was also a common assumption that the lifestyle of a doctor is necessarily stressful and that competent doctors could not make mistakes. The "life and death" consequences of mistakes was brought up in three separate interviews.

Lastly, although many of the former premeds were affiliated with the same groups and campus services, their level of participation tended to be less than that of the premed students interviewed. In general, these students were less likely to consider their affiliations with student groups or campus organizations as social outlet, but used them for specific services, such as advising or tutoring.

To understand the consequences of having no mentors, and less experience, knowledge and participation, it may help to look at the significance of these factors to URM premeds. Nearly every premed could name a role model or mentor in medicine. These people would often know the student well and provided opportunities to participate in medicine in a meaningful way. They also gave advice, confidence, and perspective to premeds. For Rob, it helped make medicine seem possible despite an imperfect academic record and a background unusual among premedical students.

> *The experience of farm labor when I was a kid, volunteering at the clinic and establishing close personal relationships with patients, having a strong support system, and seeing Latino doctors who have made it and who came from similar backgrounds—I think all that together has helped me see that this is definitely going to happen. It's important to have a great support system and role models who have gone through the same thing as you're going through and want to see you succeed. I know now that it sucks to get C's, but it won't stop me.*
>
> Rob, Mexican American premed

Experience in medicine was a key motivator for premeds, especially at times of academic difficulty. Premeds tended to have a clear vision of their future career as

physicians, which frequently developed through experience gained while in college. This vision helped students remember the relevance of their premed struggles. Michael, a Mexican American premed could not only name the exact neighborhood in East LA where he wants go back to practice, he has already named his future patients. During school, he stays motivated by working in a Fruitvale clinic on the weekends.

> *When I study for the ochem exam, I want to get the good grade because there is a big need for me to to go medical school. I always think of senora Rodriguez, Pablo, Maria. I have to get this because this is the next step to my goal, which is to become a physician in my community. A lot of people are depending on me, but I make up imaginary people. You know Senor Rodriguez, Maria, I have all these names in my head already and I haven't met these people!*
>
> Michael, Mexican American premed

For premeds, experience and mentorship led to a more accurate view of medicine. Having more knowledge of medicine made them more able to identify an appropriate niche for themselves within medicine. Knowledge also protected students from the rumor and misinformation that is widespread within the premedical subculture.

> *As I was considering public health, I met two physicians at Children's, who redirected my interests in medicine again. These two doctors had MD's, but were doing more than just seeing patients in the clinic. They were doing public health and education stuff and I realized that I had a very narrow vision of what a doctor can do. In this vision I thought that doctors go to medical school and become either a family practitioner or a specialist who help people who are sick. Meeting these doctors showed me that as a physician I could do many different things—research, community health, administration, public health, teaching, etc. I realized that medicine is not a dead end career.*
>
> Melinda, Mexican and Puerto Rican American premed

Premeds said that participation in the community and on campus relieved the initial isolation that all URM reported. Some also derived a great deal of satisfaction from the concrete achievements associated with their extra curricular activities.

> *The Biology Scholars Program is the greatest thing. Now I think anything is possible, but it has to be done in a community environment. And that's what I want to do. I like the way John has it, like the way everything is community*

> *oriented. It makes you feel like you are not alone. Now when I go to my lectures, there are 500 hundred people there, but there are fifteen people from BSP. I have something related to these people, so it's a connection. We study together, exchange notes, help each other out. It's cool.*
>
> Michael, Mexican American premed

URM students may leave for different reasons than majority students

All former premeds had more than one reason for leaving. The most frequently mentioned reasons were bad grades, a loss of interest in medicine, and feeling the career isn't worth the work. URM students, however, cite additional reasons that were rarely cited by non-URM students. It was mainly URM students who attributed leaving to the competitive atmosphere in classes, doubts about their ability, and financial barriers. Every participant acknowledged the competitive atmosphere in the prerequisite science classes, but its effects on students varied. URM students more frequently considered the negative effects of the competition one of their primary reasons for leaving.

> *When I was taking science or premed classes here my freshman and sophomore the level of competition in the classes was really discouraging. I'm a competitive student in terms of myself. I always want to do better for myself, but I can't compete with other people. I don't like to compete with other people. I just feel like it's a tug of war.*
>
> Marcia, Mexican American former premed

The relatively small numbers of URM students in the prerequisite science classes affected the comfort of many of these students. Despite a strong connection to other premed URM students that often developed through the BSP, there was often a feeling of entering unfriendly territory when attending science classes.

> *Sometimes it was really hard to relate to people. I felt I was entering a hostile environment. People would really try to discourage you or were really competitive about grades. Sometimes I did feel like (being Mexican American) it was an issue, maybe more like a comfort issue of who I could trust and study with. A couple times I had problems with people when I asked to see their notes after being absent. They'd say 'no, I don't share notes or,' or ' okay, but I need them*

right now.' They'd make up weird excuses, but it was transparent that they didn't want to share. Sometimes I felt it was really competitive in that aspect.

Cathy, Mexican American former premed

URM students commonly felt that the intense competition for grades bred tunnel-vision premeds who were responsible for the "cut-throat" atmosphere in science classes and were only out to help themselves. About half of the URM former premeds saw this negative premed stereotype in most premeds and felt they didn't have the "cut-throat" mentality required to do well as a premed at UCB. Furthermore, they felt that these premeds represent the kind of people they would encounter in medical school and as colleagues if they were to stay premed. Three of the six URM former premeds also changed their major out of the biological sciences when they left premed and found themselves much more satisfied with the classroom environment. This was a marked contrast from the Asian American students, who felt that other students were generally very helpful. These students did not consider the competition a factor in their decision to leave and all of them stayed MCB majors.

A majority of the people in science classes are premed, so everybody knows that they are competing against each other for the grade. I felt like everybody was trying to have the best internship and the best volunteer experience. Everybody was trying to show every one up, like, "Oh, this is how good I am". "What are you doing?" It's probably the classes and that you have to compete for grades, but I think it's the types of people who are taking the classes or at least the ones I ran into.

Cathy, Mexican American former premed

I feel like Berkeley breeds these horrible awful people who are just out there to get the best grades...That's not what medicine is about. I think it's really sad that's what this school does to people. People feel so compelled that they have to get the best grade and best score and beat the curve, so they're willing to do whatever it takes... I'd hate to go to med school with these people. They'll get in and they'll be so used to competing. I think that's scary.

Sandy, White/Mexican American former premed

Four of the six URM students said doubts about their ability to be competent physicians contributed to their decision to leave. Several themes frequently recurred in interviews with URM former premeds. The most common theme was using science class performance as a predictor of future ability as a physician. This usually came as a variation on, "I'm already struggling now, and it's only going to get harder." There was also a common fear that "everyone else is more prepared than I am." Though URM premeds also shared this fear, former premeds were more likely to interpret their initial poor performance in science classes as a confirmation of this fear. This quote from Frieda speaks to the separateness she feels from physicians and also shows a narrow understanding of medicine as a career.

> *Thinking about the actual academic aspect of doctor, I was just like, wow, I don't even know of being capable of this. It seems like it's a special race of people who, you know, are only able to, you know, really learn the concept, really get it down. Cuz it's like you know, can't make a mistake, because it's a person's life sometimes you know. It just seems overwhelming sometimes I'm just like well, maybe I just can't do this.*
>
> Frieda, Mexican American former premed

URM students were much more likely to cite financial barriers among their primary reasons for leaving. Two students wanted to support their family (parents and younger siblings) financially, and felt they could not delay earning an income during the many years of medical training. One was unable to take the diagnostic tests for a suspected learning ability because of the prohibitive cost. The staggering cost of the application process was a concern for half the URM students—both premed and former premed. In addition, every former premed who worked during school to support themselves felt that their grades were compromised.

Marcia had already participated in the minority enrichment programs at two California medical schools before entering college. She left the premedical pipeline after completing just one prerequisite class due mainly to financial difficulties.

> *I debated a lot whether or not to drop out of college and go back home and help my family because they were struggling a lot financially...Rather than have them lose the house, I decided I would work and send them practically all of my money. I would just save enough money to pay my phone bills to call home. Sometimes I didn't even have money for coffee freshman year. My friends would be like, "Oh, let's go out for coffee". And I would tell them, 'I don't have money for coffee.'*
>
> Marcia, a Mexican American former premed

During freshman year, Marcia worked 20 hours a week because her mother, a seamstress, was laid off. She feels that juggling work, school and the difficult transition to college set her up for failure. Marcia eventually decided to become a high school teacher, because she could then work soon after graduation to help support her parents and siblings, and would be able to help other students with her background get to medical school.

Though most students were aware of fee waivers, the costs associated with applying to school remained a concern. Students were not certain they would qualify and did not know how complicated the process may be. They did know that there were significant expenses aside from the actual application fees, such as MCAT prep and interview trips. Many of the URM students, whose parents were just getting by financially, the thousands of dollars it may take to apply was a strong deterrent because there was no guarantee of an acceptance. The process was like a big gamble, in which the student often tried to determine the odds by looking at her transcript.

DISCUSSION

Leaving the premedical pipeline may be considered appropriate if it is caused by an attraction to another field, a decision that proved inappropriate, or lack of interest, ability, or effort. At a school where advisors see hundreds of students who apply to medical school each year, of which half will not be accepted, it may be difficult to reframe premedical attrition as a problem. The interviews in this study, however, suggest that appropriate attrition may be widely overestimated and that the experiences of URM students during college may be a key determinant in premedical retention.

There was a striking mismatch between the impressions of advisors and the actual reasons of the students interviewed for this study. The reasons advisors most consistently attributed for URM attrition were 1) new interests in another field, 2) bad grades from inadequate high school preparation, and 3) an illegitimate interest, such as an interest influenced by parental pressure.

As reported above, however, not a single student was lured away by new interests. Every student reported being pushed away by negative experiences as a premed rather than pulled away by positive experiences in other fields. Indeed, many URM students were leaving frustrated and disenchanted with medicine, without a mentor or adequate experience within medicine to help inform their decision to leave. These students often based their decision to leave on several inaccurate assumptions about the admissions process, training, and medical career all of which emerged as recurring themes.

URM students interviewed clearly had a different experience in college from majority students. These differences are especially pronounced in science classes, where Asian and white students predominate. In addition, there was no significant difference

between premeds and former premeds in the frequency or severity of initial academic difficulty or the legitimacy of their initial interest. These students did not start out on clearly different paths: the paths more often diverged during college.

This may indicate that URM students who leave premed may be leaving prematurely and may have the potential to do well in medicine given timely and appropriate intervention. As is the case for most premeds, the decision to leave was often ultimately determined by the student's impression of her probability of eventual success in the application process and as a competent doctor. This impression, however, is influenced by many factors, and less informed students may not make accurate evaluation of their chances of success. There are indications, however, that former premeds may not have an sufficient knowledge of the situation to gauge their of their chances of admission or their potential as physicians. Former premeds, who were less connected to sources of support, had less knowledge about medicine, and frequently made inaccurate assumptions about the admissions process, training, and career. These students often alluded to a profile of a "good" applicant that required near perfection in all elements of the application. Would these students have felt their chances of acceptance were as remote if they had more insight into medicine, or if they had someone in the medical community with whom they identified?

If students believe perfection is necessary to be successful applicant, the students from low-income families may be even more vulnerable to leaving because in addition to the time and effort at stake, they risk money that may otherwise be used to help family. The commitment to family obligations was very strong among URM students, two of which actually used their earnings and financial aid to help parents. At moderate and low

levels of academic achievement, the possibility of acceptance may be so uncertain that students whose families are most financially unstable may consider the stakes too high. Other students with more financial resources may not be as hesitant to "gamble" the amount of money and could afford to reapply if not accepted.

How likely is it that the atmosphere in UCB will change? Many people I spoke to during the course of this study were not hopeful. Retention of premedical students is not seen as the role of the undergraduate institution. Except for the fact that having students accepted to medical school may be good for the school's reputation, the university is only as obligated to help students get to medical school as it is to help an English major publish a book, or a an engineering major get a job. More difficult to change is the feeling that the rigorous experience of premeds at UCB is something of a proud tradition. Although it may be an unofficial philosophy, students and advisors alike felt that the level difficulty in science classes and the heterogeneous, decentralized sources of support at the UCB are meant to "weed-out" the students who are less qualified. Students who fail to thrive at UCB are either less motivated or less capable. In the words of one advisor, "Medical school admissions committees know that all premeds who successfully make it through Berkeley are high caliber. They know there's no hand holding here." This view of the tough premed experience as a means of quality control neglects any need for change because it assumes all students who leave are less qualified.

With so many premedical students at UCB, it may be unrealistic to expect advisors give the quality of attention and personalized advice that would be provided by a mentor or friend who has an ongoing relationship and is invested in the student's success. Smaller groups within the university, such as the Biology Scholars Program, have made

strides in providing a smaller-school environment within the university. It provides more individualized support and brings URM and other students together in a cooperative atmosphere, forming a supportive peer network. Indeed, most URM premeds felt the BSP deserved a great deal of credit for helping them stay premed. Being among other URM students working toward the same goal helped them overcome doubts and remain motivated.

These interviews suggest that students may be best served by having someone with some knowledge of the medical field and who knows then well—advisor, mentor, peer group or family— see them through the process of attaining this goal. This person may encourage a well examined decision to pursue medicine, share insights about medicine, restore damaged confidence, help access experiences that can enrich and develop their interest in medicine, and strategize to improve a less competitive application. For students who are deciding to leave, this person could explore the assumptions used to make the decision to leave, and can validate leaving when leaving is the best choice. Many of the former premeds described a particularly solitary effort because family and friends were not involved in medicine. Indeed, half of the URM who left premed spent all or a majority of their time at UCB having barely a professor, advisor, or any authority figure who knew their name.

An important caution that emerges from these interviews is that no one may be able to predict which URM students will recover from initial setbacks and thrive as premedical students. Many of the premedical students admit that they would never have predicted how much they could accomplish, and at times, it was the support of others who helped them see the possibility of success. Anna went from nearly dropping out of

college after getting a 1.7 in her first semester at UCB to being recently admitted to a UC medical school. "When students see people from the university or doctors—people who count—show their support, then you start to believe that you're welcome there and that this may happen for you…I'm at the point I know I'm not going to fade away, and I've been fortunate to have people supporting me along the way. It still amazes me how far I've come."

As evidence of the disparities in health indicators, health care access, and quality of care between majority and minority groups continues to be uncovered, the proportion of underrepresented minority students in medical education is becoming less and less representative of the general population. Efforts to improve diversity have met with limited and only transient success. Legal challenges to affirmative action are appearing in courts across the nation, and anti-affirmative action bills have been introduced in over a dozen states in the past two years. With affirmative action under siege, it is even more important to understand issues of retention in the premedical pipeline. This study presents evidence that appropriate attrition from the pipeline may be overestimated, and that students who may have been successful as physicians were turned away by negative experiences. More research is needed to understand the experiences of underrepresented minority premedical students and the complex decision to leave medicine. Aside from issue of fairness, as long as the history of inequitable treatment by the medical community damages the trust of minority patients, the only way to provide the best care to our most vulnerable populations is to provide them with physicians they may trust.

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APPENDIX A— Interview Domains

Demographic and Background Information
Family background
Parent occupations
High School Experience
Finances in school

Interest in Medicine
Initial interest in medicine
Development of interest while in college

Experiences at UCB
Prerequisite and other classes
Extra-curricular activities
Work

Decision to leave premed
When decision was made
Reasons to leave
People involved in making decision
Satisfaction with decision

Sources of support used
Advising
Academic help
Study habits
Groups
Enrichment Programs
Mentors
Other supports