Beyond the Premedical Syndrome: Premedical Student Attitudes toward Liberal Education and Implications for Advising

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Premedical students have often been viewed as academically narrow and cynical about liberal education. To investigate the veracity of this generalization, I conducted a qualitative study of premedical students at a liberal arts institution. Contrary to negative stereotypes, the students in the study expressed a positive attitude toward liberal education and articulated a belief that their own liberal education will benefit them as physicians. However, they acknowledged that obtaining high grades is also an important educational goal. Implications for advisors and medical admissions committees are discussed along with implications for future research.

KEY WORDS: course advising, medical school admissions, premeds, student educational objectives

Introduction

Within the liberal educational context, premedical students present their advisors and instructors with both a challenge and an opportunity. The challenge is based on premedical students' long-held reputation for being narrowly focused academically, caring only about obtaining the high grades and test scores needed for admission to medical school. Over time, this concern has been echoed by medical educators and others (Association of American Medical Colleges [AAMC], 1984, Bruer & Warren, 1981; Clawson, 1990; Gelhorn, 1976; Glicksman, 2000; Thomas, 1979; Wolf, 1978). Ahrens and Akins (1981) identified such behavior among Harvard undergraduates as the "premedical syndrome," an unscientific term that has nevertheless served as a moniker for the negative stereotype attached to premedical students. Students afflicted with premedical syndrome, according to Ahrens and Akins, become "over-achieving, excessively competitive, cynical, dehumanized, overspecialized and narrow" (p. 21).

However, in its guide to medical school admission, *Medical School Admissions Requirements*, the AAMC (2001) recommended a broad-based education in the arts and sciences for medical school aspirants. It notes that "breadth of education is expected" from medical school applicants as is "the pursuit of some discipline in depth" (p. 27). Moreover, such in-depth study need not be in the sciences as long as the student has taken the requisite premedical courses:

> A successful medical student must effectively acquire, synthesize, apply, and communicate information. These are skills that can be developed through a great variety of academic disciplines. Studies in the humanities and in the social and behavioral sciences are strongly suggested. (p. 27)

Advisors, faculty members, and others in undergraduate settings have the opportunity to send premedical students forth to a career that entails both tremendous responsibility to the public and significant political clout. The training of physicians is costly, not just for individual students, but for taxpayers as well: Approximately 60% of U.S. medical schools are publicly subsidized (AAMC, 2002). The federal government also underwrites research at U.S. medical schools and funds medical education through military scholarships and through Title VII of the Public Health Service Act.

Moreover, physicians exercise tremendous professional discretion and power. Physicians must help individuals make critical decisions about their health or about life and death. For all of these reasons, the public needs to be confident that medical doctors have a broad enough educational background to not only make sound clinical decisions but also to conduct themselves with a high degree of moral and ethical reasoning. Liberal education, with its emphasis on "wide ranging intellectual exploration" (Keohane, 2001, p. 186) is designed to engender in students the kinds of skills and habits needed for such a complex professional role.

In this study, I examine the attitudes of premedical students toward liberal education and hence educational breadth. If premedical students care little for broad learning, they could subvert the broad-based academic mission of liberal education, making liberal educational institutions nothing more than stepping stones for students on the road to a high status profession. A negative attitude toward liberal learning would also mean that medical schools are not admitting students who have the broad base of skills needed for successful entry into the medical profession. This study of premedical students will help to clarify whether premedical syn-

drome is affecting the pool of future physicians. More important, a better understanding of premedical student attitudes will assist both advisors and faculty members in their goal of helping these students find the right balance between liberal studies and preparation for a career in medicine.

The research questions for this study were derived directly from the need for educators to better understand the perceptions of premedical students, the desire on the part of medical schools admissions committees to enroll broadly educated medical students, and the need for the public to be confident that physicians are prepared for their complex professional role. Three research questions guided this inquiry:

1. What are the attitudes of premedical students toward educational breadth?
2. Do premedical students see breadth of education as important to their professional goals?
3. Do premedical students believe that educational breadth is important for their sense of personal fulfillment?

Prior Research

While many have critiqued premedical students for being narrowly focused and overly competitive, no research has been done to understand premedical students' perceptions of liberal education. Moreover, most of the research on premedical students dates back to the 1970s and 1980s and is based almost exclusively on quantitative methods. A more contemporary study focusing on the voices of the students themselves (as opposed to MCAT scores and grades) holds great potential for helping advisors to understand better their students' thoughts about their own education.

Concerns about the premedical syndrome (Ahrens & Akins, 1981) date back to at least the mid 1970s. Researchers have concluded that premedical students are more competitive than their nonpremedical peers (Davids & Brenner, 1971), are negatively perceived by peers and faculty members alike (Hackman, Low-Beer, Wugmeister, Wilhelm, & Rosenbaum, 1979; Sade, Fleming, & Ross, 1984), seek out courses in which high grades are easily obtained (Creditor & Creditor, 1982), and possess a low level of cultural literacy (Hirsch, 1987; King, 1988).

However, this negative view of premedical students is countered by other studies in which premedical students were found to take a variety of nonscience courses (Niemi & Phillips, 1980) and "differed from others majoring in biology and chemistry by carrying a heavier course load and studying a broader range of subjects" (Lewis, 1985, p. 682). Moreover, Conrad (1986, p. 156) found at Brandeis University "much more evidence of cooperative than cut-throat behavior among premedical students." McCranie and Lewis (1987, p. 926) found that type A behavior, which is "characterized by such traits as competitiveness, intense striving for achievement, overcommitment to job or vocation, impatience, and easily aroused hostility," is no more prevalent in premedical students than in others who aspire to high status professions.

Hence, the answer to whether the premedical syndrome exists depends on who is asked about it. However, advisors' concerns about the breadth of premedical students' academic programs continue to be voiced. Glicksman (2000) noted that the syndrome may look different in today's students than it did in their predecessors from the 1970s and 1980s. Premedical advisors, according to Glicksman, observe their students allocating "more time to improve their performance in science class and in the MCAT" and that leads them to seek out "courses which might be 'lighter' and provide a balance for the science courses that they [perceive] as more demanding and unpredictable" (p. 17). Premedical students also seem more anxious than ever about getting admitted to medical school and are thus "much more likely to believe rumors about unusual challenges or even obstacles associated with the admissions process" (p. 17). Brieger (1999) does not blame premedical students if they have become narrowly focused academically or overly concerned about grades. According to Brieger, medical educators "must take a stand and then convince students that their time in college is not a mere way station on the way to medical school" (p. 904).

Methodology

I conducted a qualitative study in which 15 premedical students in their junior and senior years were interviewed individually at a single institution. Seven of these students then participated in two focus group interviews; the groups are referred to as "Focus Group 1" and "Focus Group 2." The site of the study was the college of Arts and Sciences at Centerville University (a pseudonym). A Jesuit university enrolling approximately 15,000 students (graduate and undergraduate), Centerville University has a strong commitment to liberal education. It was a good choice for this study for several reasons. First, all Centerville students are required to complete an extensive core curriculum

in the humanities, sciences, creative arts, and social sciences. These distribution requirements comprise approximately 40% of a typical student's overall program of studies at Centerville University (though courses in the core curriculum can overlap with students' majors or minors). Consistent with the philosophy of the university, premedical students are encouraged to become broadly educated. The Centerville University Web site (copyrighted 2001) states, "The premedical/predental program is organized within a liberal arts context. Students don't major in premedical or predental: they major in whatever interests them, whether it's history, economics, or biology."

The quality of the student body and its success in gaining admission to medical school are other reasons that premedical students at Centerville were a good choice for study. For example, admission to the university is highly selective; just 35% of applicants were accepted for the class that graduated in 2004. According to the 2000 Centerville University fact book, this class matriculated into undergraduate programs with high SAT scores (a range between the 25th and 75th percentiles or 1230–1370 for the combined verbal and quantitative scores). Because of the academic strength of this student body, it is not surprising that 80% of Centerville premedical students is admitted to at least one medical school (Premedical Coordinator, personal communication, June, 2001). The national acceptance rate in recent years has been approximately 50% (AAMC, 2004).

Before beginning the interviews at Centerville University, I conducted a pilot study consisting of individual interviews with six students at Green River University (also a pseudonym). Although secular and smaller than Centerville University, Green River University is similar to Centerville in some aspects important for the purposes of this study. For example, it has a strong commitment to liberal education and is highly selective. In addition, a high percentage of its graduates has been admitted to medical school. Green River University also has a core curriculum through which students are required to take courses in the arts, sciences, social sciences, and humanities. I used the pilot study to test the methodology of the main study, thus ensuring that the individual interviews for the main study would produce relevant data. Although the pilot data were not used in the main study, they formed the building blocks for the development of analytic categories in the main study.

I used purposeful sampling (Patton, 1990) to identify individuals at Centerville University who could provide the most in-depth information on the topic of premedical student attitudes toward liberal education. Because of their knowledge of the medical school track, third and fourth year premedical students in the College of Arts and Sciences at Centerville University who were either in the process of applying to medical school or who had plans to apply within a year of completing their undergraduate degree were chosen for the study sample. They represent information rich cases or "those [individuals] from which one can learn a great deal about issues of central importance to the purpose of the research, thus the term *purposeful* sampling" (Patton, 1990, p. 169).

With the assistance of the premedical advisor at Centerville University, I posted an invitation for students to participate in the study on a listserv. The 1,100 subscribers on this listserv consisted of all Centerville students who have officially registered with the on-campus health-professions advising office (some of these students are interested in other health careers such as dentistry, veterinary medicine, podiatry, optometry, or pharmacy). The E-mail solicitation yielded 23 responses from students eligible to be part of the sample. Of these respondents, 16 eventually completed an individual interview. The 7 premedical students who did not interview either could not fit an interview time into their schedules or failed to respond to follow-up inquiries. Of the 16 interviews conducted, 1 was ultimately excluded from the analysis because the interviewee aspired to an MD/PhD program as opposed to a program leading to just the MD. This student's overall academic and extracurricular profile, and her career aspirations, did not fit the guidelines for the sample.

The final interview sample consisted of 11 science majors (6 in biology, 4 in biochemistry, 1 in computer science), and 4 social science majors (2 in psychology, 2 in history). One student with a biology major had a second major in philosophy. Three of the science majors had minors outside of the sciences. Ten students had earned 50% or more of their credits in the sciences. All but 2 of the students had competitive grades for medical school admission, which consist of a cumulative grade-point average of approximately 3.5 (AAMC, 2002, p. 29). Despite efforts to recruit an even number of men and women for the sample, only 6 men participated in the study.

Almost all the students in this sample come from families with highly educated parents. Only 1 of the 15 students is the first in his family to go to college. In addition, most of these students

reported that their parents earn above the national median household income of $42,409 (DeNavas-Walt, Cleveland, & Webster, 2003). Seven students estimated that their family income is over $100,000. Two students estimated their family income as being between $80,000 and $100,000, and five students reported a family income of between $60,000 and $80,000.

I analyzed the data gathered from the individual and focus group interviews via grounded theory methodology in which collection and analysis of data are conducted simultaneously. This constant comparative analysis (Glaser & Strauss, 1967) enabled me to develop, test, and refine theories that emerged from the interviews and the focus groups. Through this strategy, I was able "to explore issues that came up only during the analysis of the [individual] interviews" (Morgan, 1997, p. 23). Also, through the focus groups, which were conducted after all of the individual interviews were completed, I was able to see if ideas and opinions expressed in individual interviews were similarly expressed in a group setting. Following individual interviews with focus groups is a method consistent with an emphasis on constant comparative analysis. I ensured the trustworthiness of the study, which is conceptually related to validity and reliability in quantitative studies (Lincoln & Guba, 1985, p. 290), not only by constant comparative analysis but also by the use of member checks and negative case analysis.

Limitations

Readers evaluating this study should consider two important caveats. First, the Jesuit orientation and strong focus on liberal learning at Centerville University may attract students who are predisposed to having a positive attitude toward broad study. Hence, the findings may simply reflect the clear university mission. However, the negative cases present in the data indicate that Centerville students may not have a homogenous outlook toward liberal education. For example, one student said that the scientific and technical competence of doctors is paramount while skills developed in nonscience courses are far less important.

Second, this study provides a snapshot of the premedical student academic culture at one institution. It brings depth and texture to a topic that should be of interest to advisors and others at both liberal arts colleges and medical schools. However, although it provides depth, this study cannot provide breadth. The findings are specific to the students who participated in the study at Centerville University and hence can most appropriately be characterized as "working hypotheses" (Lincoln & Guba, pp. 122–24). That is, the findings are not broadly generalizeable; rather, they should be thought of in terms of their "fittingness," which Lincoln and Guba (1985, p. 124) defined "as the degree of congruence between sending and receiving contexts." So while the findings of this study can become the bases of future study, researchers using these data must consider the similarities between the setting of their study and that of Centerville University.

Findings

The findings from this study can be grouped into two major themes. First, contrary to the negative behaviors characterized by the premedical syndrome, premedical students at Centerville University expressed a general commitment to the goals of liberal education. Far from being cynical about a broad education across the arts, sciences, humanities, and social sciences, this group of students expressed a clear understanding of the purpose of liberal education and spoke positively about having the opportunity to take classes in a wide variety of disciplines. However, these students also said that obtaining high grades was a major priority for them. According to the study participants, premedical students cannot gain admission to medical school without high grades.

Second, the Centerville University students in this study clearly articulated an understanding that the content and skills learned in nonscience courses are transferable to the medical profession. These results are contrary to the concerns raised in the literature about premedical students being unappreciative of nonscience elements of the curriculum.

Understanding of and Commitment to Liberal Education

When asked to describe liberal education, the Centerville University premedical students articulated a consistent and essentially accurate understanding of the purpose of liberal education. Examples from the interviews with two students are indicative of other expressions made by the group members. They feel that liberal education is a mode of learning that emphasizes a broad variety of subjects and skills. Helen, a history major in her junior year, thinks of liberal education as an education that has "you learning a spectrum of subjects" with "a core requirement so that you can get a little taste of every kind of subject area. . . ." Moreover, she said that colleges that do not offer their students a broad education are not preparing them well for the future.

"I think at schools that aren't liberal arts oriented, you kind of have a bias towards one area or another. I think that really hurts you in the future." Chad, a junior majoring in biochemistry recognizes the compulsory element of liberal education at Centerville University but does not view this negatively. He said, "You're forced to take a lot of classes that you might not initially have interest in, but in doing so you kind of [question] a lot of the assumptions you have about society, yourself, [and] the world around you."

The students in this study talked about their experiences with the curriculum at Centerville University in a way that is closely aligned with their professed understanding of liberal education. For example, Anthony is a biology major and also carries a nonscience minor in theology. Anthony "wanted to take as many nonscience-related courses" as possible. "I found myself really enjoying the theology classes and the theology professors," Anthony said. Later, one of his professors "suggested . . . the idea of a theology minor, and it really just took off from there."

The other science majors in the study also talked about enjoying their nonscience classes. Elana, a biochemistry major, is deeply involved in chemistry research in an on-campus laboratory, but she talks about her enjoyment of the required English courses. "I love English; I love to write," she explained. "I took . . . the core English classes freshman year, and I did very well in them. And I definitely would have taken more." Similarly, Jill is a biology major but also plays the violin. She said, "I took some really great music courses here. I took two music theory courses and got to know some of the music professors . . . which was great." Jill also noted that her "theology course . . . was wonderful," and that the instructor "was great . . . he has actually written a lot of my recommendations that I've needed in the last couple of years."

Those who did not choose science majors said that college might be the only opportunity they will have to engage in substantive learning beyond the sciences. Katherine, for example, had initially planned to pursue biology, but she later changed her major to psychology. She explained:

> I really didn't expect to change majors. . . . I wanted the chance to take nonscience classes. . . . Obviously, I have to take the [liberal arts requirements], which range very much. But I wanted more of an opportunity to take social sciences classes, and it was just more flexible for me and gave me the opportunity to do more.

Even with their professed enjoyment of courses in the humanities, arts, and social sciences, many of the students talked about their strong interest in science. Although he has a minor in French and spoke about a variety of interests in the humanities and fine arts, James, a senior, is a biology major because his main interest is science. "I like biology a lot. It's the field that I'm most interested in," he said. When asked if he selected the biology major to enhance his preparation for medical school, especially with upper-level biology-elective courses, James explained, "It's mostly for the interest in it. I like finding out the way biological systems work. You know, bacteriology, virology, cell transport, these things, you know, they're all offered. I just can't study all of them." Despite this strong interest in science, many students talked about their dislike of the basic, introductory level, science courses (which are required for medical school admission) as well as their belief that these courses are designed to purposely decrease the number of premedical students. Garth, a junior majoring in biochemistry, expressed the beliefs of many others in the study: "I think in the chemistry part, obviously organic seemed like a weeding out process for all the students to see who's really serious about it or not." Similarly, Katherine believes that "there's a weeding out process. . . . I think that they make the freshman year classes difficult purposely."

The Pragmatic Premed: Placing a Priority on High Grades

Although the study participants expressed positive attitudes toward liberal education, most of them also described the importance of obtaining high grades. In fact, this group of premedical students articulated an acute awareness that they will need good grades to be accepted into medical school. Even those students who understand the benefits of broad education would not be satisfied if their undergraduate education did not result in high enough grades for medical school admission. One of the students from Focus Group 2 made this point in a way that is consistent with statements from his peers:

> You know, when you apply to your med schools they don't say, "What did you learn?" They look at your GPA, you know? And that's how it is. It's a numbers game. But, on the other hand, you have to say to yourself: Am I actually enjoying what I'm getting out of this? Or am I getting anything out of this? Can I use this class as more than just a means to an end? And it's nice to be idealistic: "This is a great class, I'm really enjoying it." But the bottom

> line is you're there for a number. . . . And then if you enjoy it then it's just a win-win situation.

This need for high grades is most clearly manifested in the students' thoughts about and selection of courses. Although the curriculum at Centerville University has many requirements, students have some choices in the courses that they take to satisfy requirements. The students in this study believe that careful selection of courses can help them effectively balance their workload to maximize their grades in all classes each semester. If the workload becomes too heavy, grades may suffer. For example, Mary, a senior majoring in biology, at one point chose a relatively easy requirement course to ensure that she would have enough time to devote to keeping her grades high in other classes. She did not, however, pick a class that was uninteresting to her.

> I thought I might not get [a good] grade. I didn't have the time to put into it without taking it from something else. So I have made decisions—I've changed. But I wouldn't just take a class that I had no interest in.

Mary's decision to take a less challenging course does not necessarily mean that she is sacrificing breadth within her overall educational program of studies. However, she allows the perceived need for high grades to limit the selection of courses she may take. Mary's story demonstrates the pragmatic approach that these students take in aligning their academic planning with their medical school aspirations. The choice of an easier course over a more difficult course is simply a matter of practicality, even if it means sacrificing personal interest in a particular subject.

The Nonscience Curriculum

The premedical students in this study believe that liberal education will give them more than just the scientific foundation they will need as physicians. They recognize that a physician must also be empathetic and able to communicate well with a diverse patient population. The nonscience curriculum, according to these students, plays a role in engendering interpersonal skills in the aspiring physician while also helping him or her to develop empathy for others and an understanding of diverse cultures. On this latter point, James believes that a course he took on the literature of North Africa compelled him "to look at a new culture and really dive inside of it and see what it is that [others] value themselves. It just forces a new global understanding. . . .You start understanding that my perspective is not the only perspective." According to James, such understanding "is hugely important for doctors. . . . I would say the ability to sort of step back and value another culture and see it as verifiable is a good understanding and that came through a language course."

In a similar explanation, Elana said, "I think there's only so much experience that you can have yourself, and I don't think it hurts to gain experience from outside sources," such as books. She believes that through literature,

> You experience what the characters are experiencing. . . . And you may not ever be exposed to that kind of situation in your own life but . . . if you've experienced it through literature, it doesn't hurt to carry that with you.

According to Rebecca, physicians who have been educated only in the sciences, with little or no exposure to nonscience subjects, do not communicate effectively with others. "I think a lot of doctors that I've had or know of are so science minded that they don't really have relational skills." To Rebecca, some doctors "think on such a different level, that they just can't relate to people a lot of times." The danger is that a physician may not be able to convey effectively the complexities of illness to her or his patient: "You have to be able to relate with someone. You have to be able to relate to people in ways that they can relate to you, and they're not going to understand everything that you understand."

While most of the students in this sample expressed the belief that the nonscience curriculum will help them to be better physicians, some did not believe this. Garth, for example, said that doctors should put a high priority on technical competence rather than interpersonal skills:

> I think a lot of people overplay, when they say, "Oh, you need to be a people person." I'd like my doctor to be nice, but I'd rather [that he] know what he's doing. . . . In 15 minutes I'm going to die; I hope he knows what he's doing.

Conclusions and Implications for Practice

The two themes that emerged from the data lead to the conclusions that a) the students in this study have a positive attitude about liberal education, and b) they generally believe that skills learned beyond the sciences are transferable to their future work as physicians. With regard to the first theme, the students not only clearly articulated the goals of liberal education, but they also talked about their enjoyment of learning across the sciences, humanities, social sciences, and creative arts. With

regard to the transferability of skills, students in this study talked of the connection between liberal education and their anticipated medical careers. They said that their education beyond the sciences helps to build both the communication skills and cultural awareness that doctors will need to do their jobs effectively.

However, the students' positive view of liberal studies and of the transferability of their undergraduate education to a medical career does not mean that the students are idealistic about liberal education. Their expression that high grades are of primary importance shows that they also view their college education as a means to an end: admission to medical school. Without good grades, their undergraduate course work might be generally interesting but not helpful in achieving a practical end.

The latter finding regarding the importance of high grades might lead one to conclude that the students in this study exemplify the premedical syndrome. However, to label these students with the syndrome is to ignore their expressed enjoyment of the learning process and their appreciation of a nonscience undergraduate curriculum that will help them as medical professionals. Therefore, the premedical syndrome fails to describe accurately the students in this study. It also does not serve as a helpful guide for educational practice. These premedical students' attitudes are complex and pragmatic but not necessarily cynical.

Because of the findings of this study, as well as the realities of the medical admission process, advisors are placed in the position of both encouraging premedical students to explore their academic interests while also reminding them of the need for academic excellence in the form of good grades. Advisors cannot responsibly avoid communicating this twofold message, but communicating the need for high grades need not (and should not) be the focus of an advisor's message to his or her students. Rather, the focus should be on academic program planning as well as on maneuvering through the complex medical admission process. The advisor's task is to help students find a balance between the need for high grades and the pursuit of a fulfilling, substantive, undergraduate education. If they assume that students enjoy broad learning, then advisors do not necessarily need to sell premedical students on the idea of liberal education as much as they need to help them define for themselves how educational breadth fits into their overall undergraduate programs of study. Advisors at liberal arts institutions can further the mission of their school and serve their advisees well by individualizing their advising as much as possible. As Cheesman (2001) noted, no single model can promote liberal education among premedical students, and therefore, premedical advisors "need to be flexible enough to accommodate students of varying needs" (p. 26).

Advisors can accommodate the needs of premedical students by developing systematic and proactive ways of helping them plan and document their programs of study early in their college careers. They can use a questionnaire or individual education plan that students complete in cooperation with their premedical advisor during the first year of study. This instrument need not be a contract between the advisor and the student. Rather, it is a device for generating dialogue between the advisor and the premedical student. Advisors can use it to bring the most pertinent issues in a premedical student's academic plan to the forefront while also challenging her or him to try and make meaning of her or his education.

In my own practice, I am developing an instrument to use when advising students who are new to the premed track. I will use it as an advising tool and as a way to prompt students to think about premedical studies in the broader liberal arts context.

Advisors should not be alone in encouraging premedical students to take full advantage of their undergraduate education. Medical schools can develop programs to enhance premedical students' comfort level with exploring their interests. Early assurance programs, such as the ones at Tufts University, the State University of New York medical schools at Buffalo and Syracuse, Wake Forest University, and Mt. Sinai Medical School (Rifkin, Smith, Stimmel, Stagnaro-Green, & Kase, 2000) hold the most promise for easing students' anxieties about grades and about the time-consuming and costly admission process. Through these programs, undergraduates in their sophomore year can apply for early acceptance to medical school. Admitted students must complete their undergraduate degree, but they are guaranteed a place in medical school once they graduate. Medical schools can use these types of programs (as Mt. Sinai does) to more purposefully encourage premedical students to pursue their undergraduate academic interests without focusing solely on grades or the admission process. Freed from the expensive and cumbersome admission process, students in early assurance programs have significantly more time and energy to devote to their undergraduate studies. Early assurance programs must be structured carefully to ensure that students do not use them merely as a safety net for the regular admission

process or as a mere practice for a subsequent admission process with real consequences. To this end, early assurance program applicants could be asked for an academic plan for their final 2 years of college and perhaps a recommendation from the health professions advisor or a faculty member who can vouch for the student's sincerity.

Implications for Future Research

The findings from this study raise some questions that could be pursued through further research. First, can liberal education, as both the AAMC and the students in this study suggest, really help physicians do their job more effectively? Having more empirical insight into the link between liberal education and medical practice would give medical school admissions committees more confidence in their admission criteria, or it would allow them to make more informed choices about which criteria to use. It would also provide premedical students and their advisors with more guidance on program planning within the liberal educational context.

The extensive research on patient satisfaction provides a possible model for studying the connection between liberal arts and professional practice. Roter, Stewart, Putnam, Lipkin, Stiles, and Inui (1997) examined patterns of communication between patients and doctors. Their work revealed a continuum of five communication styles. On one end of the continuum, doctors had almost complete control of their interaction with patients; at the other end, patients dominated the interaction. Could educational background have an influence on the behavior of a physician in his or her interaction with patients? To study this communication style, the researcher would need look at the encounter between patients and doctors from the perspective of both parties while also accounting for the educational background of the physician.

Second, what are the attitudes toward liberal education of premedical students at other postsecondary institutions? Further research would increase the generalizeability of the findings in this study. Even with the noted limitations attributed to the characteristics of Centerville University, the findings of this study can serve as working hypotheses that can be tested further, either through quantitative or qualitative study, in other settings.

The degree to which liberal education engenders development of the personal attributes (AAMC, 2002, pp. 12–13) demanded by the medical profession should be of interest to the leaders of undergraduate programs and medical schools. The AAMC (1998) breaks personal attributes down into two broad categories: dutifulness and altruism. Doctors are not only expected to be broadly knowledgeable about the causes of disease, but they should also understand ethical issues in medicine and principles of ethical decision making. Medical professionals will need this understanding if they are to place a high priority on the welfare of the patient.

In undergraduate programs, growth in personal attributes falls generally under the rubric of ethical, moral, or interpersonal development. Do premedical students exhibit growth in these areas during college? Are they prepared to be dutiful and altruistic professionals? If premedical students must gain both scientific knowledge and certain personal attributes in preparation for medical education, how can medical schools be sure that applicants possess some degree of the latter? More specifically, to what degree will premedical students bring sophisticated ethical thinking and advanced interpersonal maturity to their work as physicians, and to what extent does liberal education foster these attributes? While there is evidence that college attendance fosters growth in moral and ethical judgment (Pascarella & Terenzini, 1991), the literature is unclear about whether premedical students benefit from this type of growth as much as, or more than, their peers. Inquiry into this question might involve the use of assessment instruments such as Kitchener and King's (1981) Reflective Judgment Interview or the use of in-depth qualitative interviewing. Baxter Magolda's (2000) longitudinal qualitative study of the ways that students develop interpersonal maturity, both in college and beyond, could also provide a promising model for the study of premedical student development. Premedical students could be interviewed in college and then during and after their medical training to see if liberal education, or other aspects of the undergraduate experience, prepares physicians for the challenges they will face.

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