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ABSTRACT

A longitudinal study has been conducted on 1960 graduates of a stratified sample of 28 medical schools to provide information on physician characteristics as they relate to career decisions. This 1976 followup study, with a response rate of 73 percent, provides information on the practices of 1,850 respondents. Of approximately 900 items of information collected during the interval, 49 variables were identified for close scrutiny, after a series of data reduction measures. These remaining variables were categorized as belonging to one of six classes of information: (1) general background factors; (2) personal qualities or attitudes as measured during medical school; (3) achievement measures, obtained at the same time; (4) characteristics of premedical college attended; (5) characteristics of medical school attended; and (6) personal factors at the time of graduation from medical school that might operate as constraints on future choices. (SW)

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Abstract

The data for this study were obtained from approximately 1,850 graduates of 28 medical schools. Initial data were collected in connection with their formal entry into medical school in 1956 and the most recent from a survey conducted in 1976 of their practice characteristics. Approximately 900 items of information were collected during this interval, but for purposes of this study, 49 variables were identified for close scrutiny, after a series of data reduction measures. These remaining variables were categorized as belonging to one of six classes of information: (1) general background factors; (2) personal qualities or attitudes as measured during medical school; (3) achievement measures, obtained at the same time; (4) characteristics of premedical college attended; (5) characteristics of medical school attended; and (6) personal factors at the time of graduation from medical school that might operate as constraints on future choices.

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The National Center for Health Services Research also supported a longitudinal study of two classes of medical students who entered the Tel Aviv and Hadassah Medical Schools, Israel, in 1969. The study was conducted by the Hebrew University-Hadassah Medical School, under grant HS 01872. The findings are reported in the NCHSR Research Digest, "Israel Study of Socialization for Medicine," (PHS) 79–3231, available from NCHSR. The full report may be purchased under the same title, from the National Technical Information Service, Springfield, VA 22161 (tel.: 703/557–4650), and may be ordered as PB 284 466 in either paper or microfiche.

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Foreword

In 1970 the National Center for Health Services Research sponsored the computerization of data collected by the Association of American Medical Colleges on 1960 graduates from a stratified sample of medical schools. These data, together with 1972 data from the American Medical Association, established a Longitudinal Study Data Bank for researchers interested in physician characteristics as they relate to career decisions.

The study reported here includes a 1976 follow-up of these physicians in practice. Personal qualities emerge as a significant determinant of physician careers. This is especially impressive between physicians who choose an academic career and those who elect private practice.

The 1976 survey alone, with a response rate of 73 percent, offers a rich source of data for further analysis. Profiles on the practices of the 1850 respondents include professional activities, work locations, debts incurred during education, perceived deficits in medical education, factors affecting career choice, opinions concerning current issues in medical care delivery, patients' characteristics and socio-economic factors. These data, now included in the Longitudinal Data Bank, have not been analyzed except for their direct contribution to the study reported in this summary.

The purpose of this NCHSR publication is not only to provide a summary of results from the AAMC Longitudinal Study but to encourage researchers in professional education in medicine to utilize these data for future studies.

Gerald Rosenthal, Ph.D.
Director

January 1979

Contents

Summary

Do physicians who deliver primary medical care have certain identifiable characteristics that distinguish them from those providing secondary and tertiary care? What are these characteristics? Are they traceable to background? Are they introduced and/or modified during medical school? Do these distinguishing features depend heavily upon other choices or situational constraints? Would it be helpful to have formal assessments of personal characteristics at the time of entrance into medical school?

In the report of the AAMC Longitudinal Study of Medical School Graduates of 1960, questions such as these were focused on that segment of medical manpower which provides first contact care to the American public. A similar set of questions was posed also for five other policy relevant aspects of the medical care system: (1) the career choice between academic medicine and clinical practice; (2) the geographic distribution of physicians; (3) the distribution of manpower into the various medical specialties; (4) the attitude toward government involvement in medical care; and (5) the reported level of income of the physician.

Each of these items was considered to be directly related to the issue of the accessibility of medical care to the American public. Accordingly, the study viewed each as an outcome and posed the above series of questions.

Initial stages

In 1956, there were 78 four-year United States medical schools in operation, with a total enrollment of 28,569 students. Entering freshmen for that year numbered 7,654 (*Medical Education in the U.S. and Canada*, 1957, pp. 1406-1407). Four special mission schools not included in the initial stage of sampling for the Longitudinal Study were Howard University, Meharry Medical College, Women's Medical College of Pennsylvania, and College of Medical Evangelists (Loma Linda). These schools contained student bodies drawn from specific segments of the population that were atypical of the medical student population at that time.

The other 74 medical schools were stratified on three dimensions: tax or private support, geographic location, and average intellectual ability level of the student body as measured by the Medical College Admission Test (MCAT). The institutions were distributed among the resulting cells and then randomly selected from each cell for participation in the study. If a school declined, another school was drawn from the same cell.

Table 1. AAMC longitudinal study schools by source of support and region

Source of support	Northeast	North central	Southeast	South central	West
Public	SUNY, Syracuse	Cincinnati Iowa Michigan Minnesota	Georgia N. Carolina Virginia	Arkansas Texas	California, S.F. Colorado U. of Washington
Private	Buffalo Harvard Jefferson New York U. Pittsburgh Rochester	Chicago Stritch Marquette Northwestern Washington U. Western Reserve	Bowman Gray Johns Hopkins		Stanford

A total of 2,821 freshmen entered the 28 study schools in 1956, thus forming the Longitudinal Study cohort. A battery of personality, interest, and achievement tests were initially administered to approximately 97 percent of this group. Other kinds of data collected in the late fifties and early sixties included class ranks for each year, evaluations of fellow students, National

Board of Medical Examiners (NBME) scores, career choices, objective information about undergraduate college and medical schools, students' perceptions of their schools, and internship performance. More recently, additional data were obtained from the American Medical Association (AMA) Physician Masterfile (1972) and through the administration of the 1976 Follow-up Survey. The extent of missing data varies for each data subset; however, most data are available on at least 1,800 individuals. The Longitudinal Study data collection calendar is presented in Table 2.

Table 2. Data collection calendar

1954–55	Medical College Admission Test (MCAT)
1956	Freshman Questionnaire Allport-Vernon-Lindzey Study of Values (AVL) Edwards Personal Preference Schedules (EPPS) Strong Vocational Interest Blank (SVIB)
1958	1958 Peer Evaluation Form National Board of Medical Examiners (NBME) test, Part I
1957–59	Medical School Information
1960	1960 Senior Questionnaire: Career choice information 1960 Peer Evaluation Form National Board of Medical Examiners (NBME) tests, Part II Career Attitudes Questionnaire (CAQ) Medical Specialists Preference Blank Personal Attitudes Inventory (PAI) 1960 Medical School Environmental Inventory (MSEI) Personal Ratings Readministration of: Allport-Vernon-Lindzey Study of Values (AVL) Edwards Personal Preference Schedule (EPPS) Strong Vocational Interest Blank (SVIB)
1961	1960–61 Intern Questionnaire: Additional career choice information 1961 Internship Performance Evaluation
1965	1965 Follow-up Questionnaire: Satisfaction with career choice, residency training, current work 1962 Medical School Environment Inventory (MSEI)
1972	American Medical Association (AMA) Physician Masterfile: Specialty, location, professional activities Weiskotten Survey
1976	1976 Follow-up Survey

Selection of outcomes

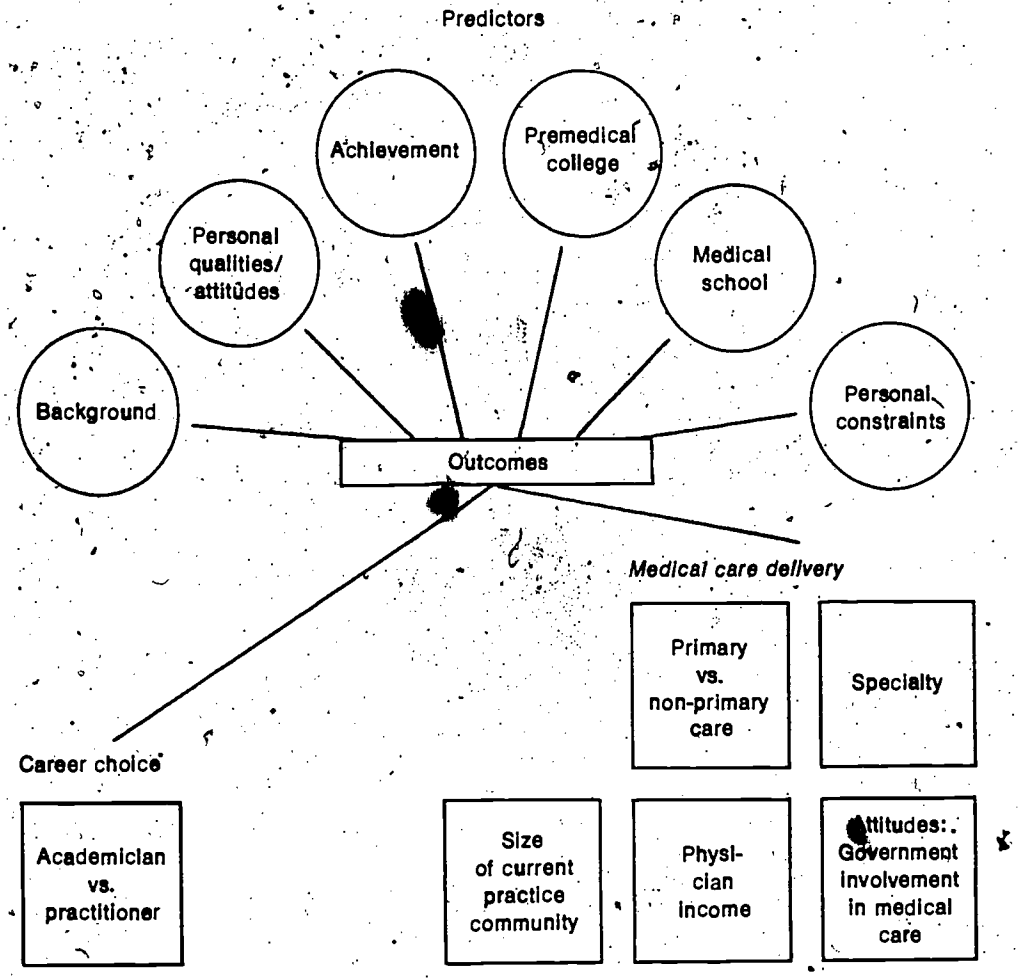
The enormity of the Longitudinal Study data base made it necessary to set priorities for the analyses. The data base was viewed as unquestionably unique in that information was collected on more than 1,800 physicians over a 20-year period. Thus, the first priority was judged to be the investigation of the longitudinal character of the data, even though the relationships among the 1976 Follow-up measures themselves may be material for additional interesting studies. Also, considering the study was sponsored by an organization of medical schools, it seemed reasonable to pay particular attention to the institutional variables and to determine their influence on the outcomes of interest.

Of the approximately 900 items of information collected during the study period, for purposes of this report 49 variables were identified for close scrutiny, after a series of data reduction measures. These remaining variables were categorized as belonging to one of six classes of information: (1) general background factors; (2) personal qualities of attitudes as measured during medical school; (3) achievement measures, obtained at the same time; (4) characteristics of premedical college attended; (5) characteristics of medical school attended; and (6) personal factors at the time of graduation from medical school that might operate as constraints on future choices.

The research questions then revolved around the determination of the role each of these types of information may be considered to play when attempting to predict each outcome under study. In addition, the study sought to clarify the relationships among the various types of predictor information with respect to each outcome. (See Figure 1).

It needs to be emphasized that this conceptual division was more than just a convenience. Rather than seeking quite specific and perhaps isolated findings, it was judged to be a far greater value for research if the findings of this study could help focus future exploration. It seemed that this could best be accomplished if classes of variables rather than specific variables were the object of the study's conclusions. Rather than simply pointing to the perhaps trivial usefulness of any single index, refinements of existing measures and development of new ones could be concentrated in the areas indicated as having special promise. The analysis, of course, had to deal with specific variables, but the authors were concerned throughout with the significance of the findings for the class of measures studied, rather than any one specific measure.

Figure 1. Summary of predictors and outcomes examined



Methods

The general plan involved randomly dividing into two "samples" the records of the 1,850 physicians for whom data from the 1976 Follow-up were available. In addition to the 1976 data, each of these "samples" (N-925) was expanded to include the extensive data acquired earlier. The first "sample" was used for purposes of general exploration and development of hypotheses. The second "sample" was used to test the stability of the preliminary findings.

Two stages of the research process were involved in the first "sample": construct development and model development.

Construct development refers to a series of activities directed toward: (1) sharpening the definition of the outcomes measured (e.g., a cluster of attitudinal items regarding government involvement in medical care delivery was formed through factor analysis); (2) deciding on appropriate subsamples to be used in the analyses of certain outcomes (e.g., medical care delivery outcomes were analyzed using only a "practitioner" segment of the cohort); and (3) narrowing and refining the list of "predictor" variables to be examined more closely in relation to the six outcomes (e.g., reduction of the listing of nearly 900 items of information contained in the data bank of the 49 variables eventually retained in the present study).

Model development refers to an empirically-based approach to hypothesis formulation. The specific activities at this stage involved the use of hierarchical regression analysis to explore the ways in which several predictor variables relate to a particular outcome measure.

Hierarchical regression analysis is a multivariate statistical technique which allows the development and testing of a specific prediction model by entering predictor variables in a prescribed sequence. At each stage a test can be performed to ascertain if the information represented by the predictor variable or set of predictor variables just entered adds to the overall prediction of variation in the outcome measure. Thus, while a specific predictor variable may be related to an outcome measure on an individual basis, it may not add significantly to the prediction of that outcome once other factors have been considered.

Consistent with the overall philosophy of the approach, predictor variables were entered into the regression models as sets. Not all possible predictor variables were used in the definition of any one set. The predictor variables chosen differed depending on the outcome measure. Variables were selected on the basis of preliminary analyses. Regression models consisting of two or more sets were developed on the basis of preliminary analyses.

After these stages of the research plan were completed, the second sample (N-925) was introduced. The purpose of this sample was to provide a test of the stability of the preliminary findings from the first sample. Insofar as the research process included the development of conceptual bases for the preliminary findings, the analyses performed on the second sample were also tests of these ideas. The results presented are based on the second sample, since this is the "test" sample that allows confirmation of preliminary findings. The testing and replication of the regression models comprise the major analyses reported.

Conclusions and implications for future research

The overall findings of the study are highlighted geographically in Tables 3 and 4. Table 3 summarizes the relationships between each outcome and each set of predictors, with predictors taken one at a time and without regard to any other predictor. Each predictor is related separately to an outcome, not considering whether it might overlap, duplicate another predictor, or might itself be determined by some other variable. On this basis, for example, it can be seen that characteristics of medical schools have a great deal to do with the choice between an academic and practice career, but that medical

Table 3. Summary of individual relationships between predictor variables and outcome measures

Predictors	Academician vs. practitioner	Primary vs. non-primary care	Size of current practice community	Physician income	Orientation toward government involvement in medical care
Background	●	●	●●		
Personal qualities/ attitudes	●●	●●	●	●●	●
Achievement	●●		●	●	●●
Type of premedical college	●	●	●		●●
Type of medical school	●●●	●	●		●●
Personal constraints	●	●			

Key: ● indicates one or more significant bivariate correlation(s) less than .15.
●● indicates one or more significant bivariate correlation(s) between .15 and .25.
●●● indicates one or more significant bivariate correlation(s) greater than .25.

Table 4. Summary of hierarchical regression results, with predictors entered in the order listed

Predictors	Outcomes: Academician vs. practitioner	Primary vs. non-primary care	Size of current practice community [a]	Physician income [b]	Orientation toward government involvement in medical care
Background	Δ	Δ	Δ		
Personal qualities/ attitudes	ΔΔΔ	Δ		Δ	ΔΔ
Achievement					
Type of premedical college					Δ
Type of medical school	ΔΔ[c]				Δ
Personal constraints					

Key: Δ indicates significant increase in explained variance of between 1 and 5 percent.
ΔΔ indicates significance increase in explained variance between 5 and 10 percent.
ΔΔΔ indicates significant increase in explained variance of more than 10 percent.

[a] Analysis performed for specialty.
[b] Analysis performed controlling for specialty and hours worked.
[c] Interpretation modified by the presence of a significant interaction between type of medical school personal qualities/attitudes.

school characteristics are not significantly related to physician income. Similarly, entering a primary or non-primary field of care is definitely related to certain personal qualities, but not significantly related to any achievement measure.

Table 4, on the other hand, summarizes the results of the analytic procedures in which the sets of predictors are entered in the order of developmental precedence (background first, then personal qualities, etc.). In this method of analysis, overlap of content between and within sets of predictors is taken into account, and only unique, independent contributions of particular predictors are displayed as significant. Thus, for instance, it was found that, when background and personal qualities are considered first, achievement measures add nothing significant of their own to the prediction of any of the outcomes.

Given this overview of the analyses of the six major outcomes, the following are among the observations that are offered:

1. There is an impressive difference between physicians who choose an academic career and those who become practitioners. Undoubtedly, there is a great deal of individual variation within both groups, but, as aggregates, they are very distinct. Career academicians have different sets of life values (more often theoretical, aesthetic, as against economic), tend to be more achievement oriented and of higher scholastic ability, go to more select schools, and have different attitudes toward the governance of their profession and the regulation of professional practice. This dimension appears to be central to an understanding of career choices in medicine and as such deserves greater attention in future studies.

2. Personal qualities emerge as a significant and often substantial determinant of physician careers, professional styles, activities, and attitudes. Even within the more homogeneous cohort segment of the practitioners (with academicians excluded), personal qualities as assessed in the early stages of career development are predictive of what the physician's career choice will be, what rewards will be sought (economically oriented or otherwise motivated), and what he or she will believe (attitudes toward professional governance and control). The most telling dimension of these personal qualities seems to be the seeking (or avoidance) of patient contact.

3. Throughout the analyses, the practitioner's specialty looms as a most conspicuous variable, related as it is to almost every aspect of the medical career, both in its formulation and its implementation. The choice to specialize itself is predictable at an early stage in training, particularly on the basis of personal qualities. In turn, specialty is a powerful indicator of what rewards the physician prizes, what he earns, where he is likely to practice, and what attitudes he holds on professional issues.

4. The influence of medical school on the outcome of medical careers might have been expected to be more richly documented by the results. Clearly, type of medical school makes a significant difference in certain outcomes through direct influence on the student. This seems to be the case with the choice of an academic versus practice career, and, to a lesser extent, in the formulation of attitudes on professional issues. In other instances, medical school makes a difference through the type of student it selects, as appears to be the case with the size of community in which the physician is likely to practice. Even where direct influence is demonstrable, this selectivity effect is also clearly present.

5. At first glance, the failure of achievement measures to relate more substantively to any of the outcomes may appear noteworthy. It would seem sensible to expect that work styles and attitudes of the "superstar" students would be distinctive. When achievement measures are considered outside the context of the rest of the information such relationships are suggested.

Rather than pursuing the tenuous associations between ability and outcomes, it would appear to be much more fruitful to consider the extent to which the highly competitive basis for admissions to medical school, on the grounds of ability, might be counterproductive. It may be that certain undesirable personality patterns are unwittingly overincluded contrary to long term interests both of society and the profession. This should be addressed in future research.

Specific findings

Outcome 1. Career choice: academician versus practitioner

In this outcome, five classes of predictor information were suggested as useful explorations with the first sample: background, personal qualities/attitudes, achievement, type of premedical college, and type of medical school.

The first model tested involved the entering of predictor sets in their developmental sequence, viz., background, personal qualities/attitudes, type of premedical college, and type of medical school. Achievement measures were not included in this model since they were found not to contribute independently to the prediction of career choice in the first half-sample.

A total of 22 percent of the variation in the choice between academic and practice careers was found to be predictable from the combined information of the student's background, personal qualities, and type of medical school he attended. It is noteworthy that data collected early in the professional development of the physician can be quite effective in distinguishing between those choosing an academic or a practice career and persisting in this choice 15 to 20 years later.

Personal qualities provided the largest contribution to the prediction of career choice, accounting for 11 percent of the total variance explained. The results portray the academic physician as having early theoretical and aesthetic values, but relatively lower pragmatic and religious orientations as measured by the Theoretical, Economic, Aesthetic, and Religious scales of the Allport-Vernon-Lindzey Study of Values (AVL). Complementing these qualities is a comparatively lower need for social support as measured by the Deference scale of the Edwards Personal Preference Schedule (EPPS). Rounding out the early profile of the academician was a clear preference for Intellectual Challenge as measured by the Career Attitudes Questionnaire (CAQ).

The usefulness of information regarding type of premedical college was not supported by the results from the second half-sample.

Information regarding the type of medical school accounted for an additional 9 percent of the variance in career choice. This predictor set was defined by a cluster of variables reflecting the nature of institutional support (public or private), the size of the faculty, the levels of research and research training support available, and the perceived emphasis of the academic program on internal motivation and scientific inquiry.

The failure of academic achievement measures to contribute independently to the prediction of career choice was given attention by Model II. This model introduced a variation in the sequence of predictor sets in order to address this question. When entered as predictors before qualities, achievement measures were found to be not only significant but also rather substantive (8 percent) predictors. Nevertheless, in this model, personal qualities still made a major, although somewhat reduced (7 percent) contribution.

The two models, when contrasted, revealed rather pointedly the degree of overlap between personal qualities and achievement; and also suggested that, at least in relationships with career choice, personal qualities are more basic. Achievement predicts career choice by virtue of the personal qualities it implies, (e.g., an intellectual orientation, low valuation of economic rewards) and thus may serve as a convenient "proxy" for these qualities. However, if such qualities are used in prediction, achievement measures have little, if anything, to add on their own.

Similarly, Model III helped to understand the contribution of information on type of medical school in career choice. When entered as the first set of predictors, the variance attributable to type of medical school increased substantially (to 16 percent of variance). The contribution of personal qualities was reduced to 5 percent of the variance (from 11 percent in Model I), indicating that the medical school cluster can serve as a proxy for a sizeable component of this predictor set. The conclusion drawn was that certain schools attract and select students with certain personal qualities. In other words, private schools with research orientations admit more students with characteristics conducive to academic careers.

Thus, evidence was obtained that attention to either the goal of developing manpower projections or the goal of influencing the distribution into academic versus practice choices must simultaneously consider both personal qualities and medical school characteristics. Each of these types of predictors makes a sizeable contribution to predicting the outcome and neither can serve as a satisfactory proxy for the other.

Outcome 2: Primary versus non-primary care

In the study of this and the remaining outcomes only the practitioner subgroup was used.

As a result of preliminary analyses conducted on the first half-sample, three classes of predictor information were found to be relevant: background, personal qualities, and type of medical school. The background variables, deciding to study medicine at a later age and having lived most of one's early life in a small community, are associated with entering primary care. In the personal qualities/attitudes set, a desire for patient contact (CAQ), and a need to interact with persons in a way that pleases them (EPPS-Deference) describe those entering primary care. Finally, the primary care physician group is depicted as coming from schools with MCAT averages at the lower end of the

range. Also, the students perceive these schools as providing an educational environment that encourages relying on external structures for guiding and facilitating learning (MSEI-Extrinsic Motivation), rather than on one's own motivation and direction (MSEI-Intrinsic Motivation). The three predictor sets found useful in distinguishing primary from non-primary care physicians were juxtaposed.

In Model I, predictors were entered in their chronological order: background, then personal qualities. Medical school information was not used in this model, since it did not contribute significantly to the prediction of the outcome when exploratory analyses were conducted on the first half-sample. In order to investigate if characteristics of medical school, while making no unique contribution, had any predictive value, information on the type of medical school was entered first in the sequence of predictors in Model II, followed by background and personal qualities. The characteristics of the medical school were subsequently found to be of significance in explaining career choice.

The most striking result is the relatively low degree of predictability of the primary versus non-primary care choice. Only 6 percent of the total variance was accounted for by the combination of all classes of predictor information used in this study. This finding suggests that a problem exists in the definition of primary versus non-primary practitioners. Public policy designates general/family practice, general internal medicine, and pediatrics as primary care specialties. The "gray line" involves obstetrics/gynecology, general surgery, and other specialties which may exhibit the same characteristics as those in the designated primary care specialties.

In Model I, background predicted 2 percent of the variance and personal qualities an additional 4 percent. When the sequence of predictor sets was altered to introduce characteristics of medical school first (Model II), information on the type of medical school was found to be significantly predictive, albeit to a small degree (2 percent). It was observed that the three sets of predictors, taken together, do no better (6 percent) than background and personal qualities without information on the type of medical school. Thus, it was concluded that the type of medical school is related to production of primary care physicians by virtue of selection and self-selection of particular kinds of students, and not by direct influence on their choice of career.

In connection with this outcome, the attrition in primary care choices was analyzed using three points in time: 1960, 1965, and 1976. As has been found elsewhere, there is a greater shift from primary care to non-primary care than the reverse.

Outcome 3: Specialty

In analyzing the relationships of specialty to the various predictors, it was necessary to follow a procedure different from the hierarchical multiple regression/correlation scheme employed throughout the rest of the study. Specialty as a multi-category variable does not lend itself to direct application of the multiple regression analysis method.

Accordingly, a multivariate synthesis of predictor relationships with medical specialty was attempted by means of multiple discriminant function analysis applied to the two half-samples. The method defines a parsimonious set of major dimensions along which designated groups, in this case, specialty groups, may be maximally discriminated.

Four discriminant functions emerged on which specialty groups are significantly differentiated. Three of these were clear replications of functions obtained on the first half-sample.

The first of these was defined primarily by the Pressure scale of the Career Attitudes Questionnaire (CAQ). The scale includes such items as "frequently required to meet emergencies," "important decisions made rapidly," "on call at all hours." Secondarily, this function was defined by lower MCAT Verbal scores of individual students, lower AVL Aesthetic Values, and a personal constraints variable of having already started a family prior to graduation from medical school. Basically, the dimension can be viewed as one of personality and describes persons who prefer challenges to their energy, stamina, and decisiveness versus intellectual challenges and pursuits. The dimension was termed Active versus Reflective Orientation. This dimension discriminated obstetricians/gynecologists at one extreme (Active) from psychiatrists at the other (Reflective).

The second dimension, also nearly perfectly replicated, was defined almost exclusively by the CAQ scale, Patient Contact, and was assigned that label. Secondarily, it was defined, in both analyses, by having grown up in a small community. This dimension differentiated a cluster of general/family practice, pediatrics, and psychiatry from the cluster of radiology, pathology, and anesthesiology. The remaining three specialists (obstetrics/gynecology, surgery, internal medicine) were lodged near the center of this dimension.

The two major discriminant functions were viewed as jointly discriminating among most specialists (i.e., most specialty groups were spatially separated in the plane defined by the two dimensions). Only the pairs of radiology and pathology, and of obstetrics/gynecology and surgery, appeared to be too close together, possibly requiring further discriminants.

These results, in general, were viewed as more explanatory than predictive. The best "predictors" of medical specialty are the self-assessments of senior medical students as to their preferences and interests within the medical profession. The stability of those choices between 1960 and 1976 was examined. General/family practice and obstetrics/gynecology (approximately 50 percent each) have the highest attrition rates, and radiology, the lowest (20 percent). Both radiology and anesthesiology have high gain rates (proportion switching into a specialty after 1960) while general/family practice has the lowest. On the average, 59 percent of senior year choices correspond to their practice specialties 16 years later.

Outcome 4: Size of current practice community

Previous research on size of community indicated a clear relationship between medical specialty and the ultimate choice of location to practice. In view of

this, it seemed that the study of practice community should be focused on determining what, if any, variance could be accounted for by variables other than specialty. It was decided, therefore, that the variation in the size of practice community selected that could be accounted for by specialty would be systematically removed first. The major interest then would be in determining how much of the remaining variation could be accounted for by other classes of predictor variables.

Findings from preliminary analyses of the first half-sample resulted in the inclusion of three classes of predictor information: background, personal qualities/attitudes, and type of medical school.[5]

The primary model of analysis considers these three predictor sets in the "chronological" order, after first entering specialty as a control factor. Clearly, the most striking aspect of the results was that practice community size is predictable to a very small degree regardless of what predictor information is used. Once specialty differences are taken into account, only background factors (particularly the size of community lived in most of life) are significantly related to location choice. Beyond background, neither personal qualities nor the type of medical school was confirmed on the second half-sample as useful additional predictors. Even when characteristics of the medical school were entered in the analyses (Model II), their contribution to the prediction of practice location was minor (2 percent).

It was concluded that neither the data from this study nor the findings presented in the literature identified a single variable or class of information that can account for a sufficient amount of variation in the choice of practice location to justify targeted policy action.

Outcome 5: Physician income

It was immediately noted that any unadjusted measure of income reflects the amount and kind of work that the practitioner does. It thus becomes a rather complex index and one difficult to interpret. If income is to be taken as a measure of "economic orientation," then variations in the amount and kind of work (specialty) need to be controlled.

For this reason, specialty and hours worked were introduced into the models of analysis as statistical controls. Two models of prediction were analyzed. Model I introduced personal qualities and information on the type of medical school as predictor sets, in that order. Model II entered medical school characteristics as the first predictor set.

It should be noted at the outset that 15 percent of the variance in level of income was accounted for by knowledge of the specialty to which the physician belongs. This clearly reflects the different opportunities within the specialties to attain varying levels of income.

The hours worked, introduced as a second control variable, made a small, although significant, addition to explained variance.

The results of Model I showed that prediction of income was possible only to a small degree when specialty differences and intensity of practice (hours

worked) are first taken into account. The only class of information significantly predictive of income was that of personal qualities (3 percent of variance).

When the specific variables comprising this predictor set were examined, the picture provided was a rather classic characterization. The profile was one of an economically motivated (AVL-Economic), power-desirous (AVL-Political), aggressive (EPPS), dominant (EPPS) person who shows relatively little insight or concern for the feelings and behavior of others (EPPS-Intraception), and relatively little interest in cultural and artistic expression (AVL-Aesthetic).

Model II introduced information on the type of medical school directly after the control variables. The results showed no significant predictive effect and, therefore, did not corroborate the tentative finding in the first half-sample of a relationship between the type of medical school and income.

It was suggested that short of some kind of "affirmative action" in selecting candidates with low economic motivation, the medical education community is not likely to directly affect the economic aspects of the system of medical care delivery. Much more far-reaching are the potential indirect influences through policies and programs, that would affect the distribution of specialties.

Outcome 6: Orientation toward government involvement in medical care

This outcome was defined for the study on the basis of the cohort's endorsement of a variety of attitudinal statements relating to various aspects of the medical care system. Two clusters of items were empirically identified, one called Professional Control and the other, External Quality Review. Because of conceptual and empirical support, the two sets of items were combined into one scale to define this outcome.

Four classes of predictor information were found to be of value in attempting to account for the liberal versus conservative orientation of physicians toward government involvement in medical care. These included: personal qualities/attitudes, achievement, type of premedical college, and type of medical school.

The primary model of analysis considered the sets of predictor information in the order of assumed developmental precedence: personal qualities, achievement, premedical college, and medical school. Implicitly, therefore, the model hypothesized that each class of variables added new, independent, and significant information predictive of attitudes toward government involvement in medical care.

Two other models were also used, for the specific purpose of determining if the type of medical school attended might be a good overall predictor of attitudes, since selection and self-selection to medical schools certainly includes considerations of personality, achievement, and premedical college preparation. Thus, these models were testing the possibility that the type of medical school attended "carried" information about the student's personal qualities, achievement, and prior educational experience, and in this way acted as a useful "proxy" for prediction.

The overall results were noteworthy from two aspects. First, relatively little variance (9 percent) of attitudes is accounted for by all the predictors collectively, regardless of their sequence. The second noteworthy aspect was that regardless of the sequence of predictor sets, the amounts of variance accounted for by a specific set remained almost identical (personal qualities, 5 percent; premedical college, 1-2 percent; medical school, 3 percent). This suggested that in explaining orientation toward government involvement in medical care, these sources of influence are essentially independent of each other.

When considering the specific indices included in the personal qualities set, the overall picture that emerges portrays the medical liberal as high on aesthetic values (AVL), having a need to support and help others (EPPS-Nurturance), seeking the stimulation of intellectual problems (CAQ-Intellectual Challenge), and desirous of sharing responsibility with others (CAQ-Teamwork). On the other hand, the physician with a conservative orientation tends to welcome situations requiring quick and decisive action (CAQ-Pressure), places primary importance on the usefulness and practicality of things (AVL-Economic), and tends to enjoy attacking contrary points of view and criticizing others (EPPS-Aggression).

It was proposed on the basis of first half-sampling results that achievement measures provided information that were predictive of liberal versus conservative orientation and were independent of personal quality indices. This failed to be replicated.

The type of premedical college attended did add a significant, although small, contribution to the expanded variance. It appears than an undergraduate college with a large proportion of its students planning careers in engineering and related fields, rather than in social fields, was more likely to produce a graduate who is conservatively oriented, than the school whose students have, on the whole, high academic aptitudes and are planning careers in science or the arts.

Characteristics of the medical school attended provided unique information that is not shared with personal qualities and/or premedical college domains. A private school, with more selective admissions and with the resources necessary to support research and research training, is more likely to graduate a physician with an orientation reflecting less opposition toward government involvement in medical care.

Potential further research

The data used in this study are available in the AAMC Longitudinal Study Data Bank, with the exception of selected identification variables, for further research. Applications are made in the form of a research proposal. Proposals are reviewed by a Supervisory Committee representing the AAMC, the American Medical Association, and the National Center for Health Services Research.

Guidelines for application to use the Data Bank along with a detailed description of its contents are available by writing to:

Longitudinal Study Data Bank
Association of American Medical Colleges
Division of Educational Measurement and Research
1 Dupont Circle, N.W., Suite 200
Washington, D.C. 20036

Current NCHSR publications

National Center for Health Services Research publications of interest to the health community are available on request to NCHSR, Publications and Information Branch, 3700 East-West Highway, Room 7-44, Hyattsville, MD 20782 (telephone: 301/436-8970). Mail requests will be facilitated by enclosure of a self-addressed, adhesive-backed mailing label. These publications also are available for sale through the National Technical Information Service (NTIS), Springfield, VA 22161 (telephone: 703/557-4650). PB and HRP numbers in parentheses are NTIS order numbers. Publications which are out of stock in NCHSR are indicated as available only from NTIS. Prices may be obtained from the NTIS order desk on request.

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Program Solicitations

(HRA) 77-3196 Conference Grant Information
(PHS) 78-3224 Grants for Dissertation Research Support

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15. Supplementary Notes
DHEW Pub. No. (PHS) 79-3235. The final report of this study will be published by the Journal of Medical Education as a Supplement in the Fall of 1979.

16. Abstracts
This report summarizes the results of the Assn. of American Medical Colleges longitudinal study of medical school graduates of 1960. Data were obtained from approximately 1,850 graduates of 28 medical schools. Initial data were collected in connection with their formal entry into medical school in 1956 and the most recent from a survey conducted in 1976 of their practice characteristics, providing a rich source of data for further analysis. Approximately 900 items of information were collected, but for this study, 49 variables were identified for close scrutiny. These variables were categorized according to six classes of information: (1) general background factors; (2) personal qualities or attitudes as measured during medical school; (3) achievement measures, obtained at the same time; (4) characteristics of premedical college attended; (5) characteriatics of medical school attended; and (6) personal factors at the time of graduation from medical school that might operate as constraints on future choices.

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