MOTIVATION UNDERLYING CAREER CHOICE FOR INTERNAL MEDICINE AND SURGERY

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Abstract—Self-determination theory (Deci and Ryan, 1985) was used to predict medical students' career choices for internal medicine or surgery based on their experiences of the autonomy support provided by the instructors in the two corresponding third-year clerkships. Fourth-year medical students ($n = 210$) at three medical schools completed questionnaires that assessed (1) retrospective prior likelihood (as of the end of second year) of their going into internal medicine and surgery, (2) their perceived competence with respect to these two medical specialties, (3) their interest in the problems treated in each specialty, (4) the autonomy support of the instructors on the two corresponding rotations, (5) the current likelihood (late in the fourth year) of going into each of the two specialties, and (6) their actual residency choices. For a subset ($n = 64$), actual prior likelihoods of going into the two careers had also been assessed at the end of their second year. Structural equation modeling confirmed, as hypothesized, (a) that perceived autonomy support of the corresponding clerkship would predict students' choices of internal medicine or surgery, even after the effects of retrospective (and actual) prior likelihood had been removed, and (b) that this relationship between perceived autonomy support and career choice was mediated by perceived competence and interest. The present study suggests that students' experiences on clerkships do affect the likelihood that they will select particular specialties, and that students' interest in the areas are good indicators of the selections they will make. © 1997 Elsevier Science Ltd. All rights reserved

Key words—instructors' autonomy support, medical students' interest, choice of specialty

INTRODUCTION

Because there is increasing need for primary-care practitioners and there are fewer applicants for internal-medicine residencies, several recent studies have explored factors that influence whether medical students choose a career in internal medicine (Babbott *et al.*, 1991; Bland *et al.*, 1995; Marple *et al.*, 1994; Schwartz *et al.*, 1991; Williams *et al.*, 1994). Investigators have focused on a variety of factors such as personality of the students (Friedman and Slatt, 1988) and prestige or earning potential of the specialty (Kassirer, 1993; Levinsky, 1993; Petersdorf and Goitein, 1993). However, because research (Kassebaum and Szenas, 1995) has indicated that approximately 80% of medical students change their declared specialty during their medical school training, other investigators have focused on aspects of the medical school experience that might influence students' specialty choices (e.g. McMurray *et al.*, 1993).

Although few of these previous studies have begun with theoretically derived, *a priori* predictions, Williams *et al.* (1994) explored medical stu-

dent career choices by making hypotheses based on self-determination theory (Deci and Ryan, 1985), which is an empirically verified psychological theory of motivation. The present research uses the same theory, along with its well-validated psychometric instruments, to extend the earlier work.

Self-determination research and medical education

Self-determination theory is built on the assumption that humans are intrinsically motivated toward learning, growth, and intellectual challenge. It suggests, however, that this innate motivation requires nutriments from the interpersonal environment in order to remain strongly operative. Among the necessary nutriments are support and encouragement for the students to be self-initiating and volitional. With respect to education, the theory predicts that learning climates which support students' autonomy will enhance their intrinsic motivation, whereas climates that control students' behavior (and thus diminish their sense of volition and choice) will undermine this natural motivation.

Autonomy support is defined as the degree to which instructors acknowledge students' perspectives and encourage their proactive participation in learning activities. Autonomy support is thus an active process on the part of instructors who facili-

tate students' engagement in self-determined learn-
ing. When instructors are autonomy supportive,
students feel heard and understood, they experience
freedom to behave in ways that feel right to them,
and they have the information they need to make
meaningful choices. In contrast, *control* is defined
as pressuring students to learn and behave in par-
ticular ways. When instructors are controlling, stu-
dents experience tension and anxiety, and the
feeling that they have to do what they are told
rather than what they believe to be right.

Self-determination theory has guided research in
educational settings ranging from elementary school
to medical school, and numerous studies have
found hypothesized relations between autonomy-
supportive learning climates and both student
achievement and adjustment (Deci *et al.*, 1991).
Furthermore, autonomy support has been associ-
ated with greater internalization of the values extant
in elementary-school contexts (Grolnick and Ryan,
1989) and in medical-school contexts (Williams and
Deci, 1996).

Williams *et al.* (1994) suggested that the basis of
students' selecting a medical specialty could be con-
ceptualized in terms of their internalizing the value
of that field, and that their relevant clerkship ex-
periences could influence the internalization process.
They used self-determination theory (Deci and
Ryan, 1985; Williams *et al.*, in press) to derive a
model of how learning climates can affect students'
selection of internal-medicine residencies, predicting
and confirming that students whose internal-medi-
cine clerkship preceptors were autonomy supportive
would be more likely to choose a residency in that
field.

Williams and Deci (1996) applied the theory to a
different, but relevant, issue in medical education.
In that study, the degree of autonomy supportive-
ness of instructors in a biopsychosocially oriented,
second-year course on medical interviewing was
found to predict students' becoming more interested
in the course material and internalizing the biopsy-
chosocial values. Those values, which were found to
have been maintained two years later, led the stu-
dents to behave in more "patient-centered" ways.

The "instructor facilitates interest" model. In the
Williams *et al.* (1994) study, using LISREL ana-
lyses, the model involving "Instructors Facilitating
Interest" was found to be a much better predictor
of students' choice of an internal-medicine residency
than was a model involving "Instructors Control-
ling Learning." Confirmation of the model was
based on finding that the instructor's autonomy
support significantly predicted both perceived com-
petence and interest, that perceived competence sig-
nificantly predicted interest, and that interest
significantly predicted choice of internal medicine
even after controlling for the retrospectively recalled
prior likelihood (before the internal medicine clerk-
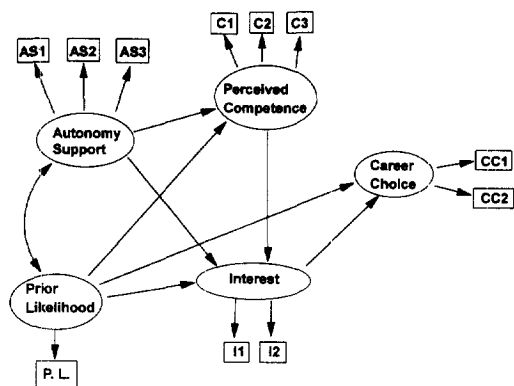ship) that the students would eventually select in-

Fig. 1. General structural equation and measurement
models representing the "Instructor Facilitates Interest"
hypotheses of career choice. Latent constructs are shown
in ellipses, and observed variables are shown in rectangles.

ternal medicine. This model is shown schematically
as the connections among ellipses in Fig. 1.

The current study used a considerably larger
sample to replicate and extend the findings from the
previous study in the following ways: (1) it explored
selection of a surgery residency as well as an in-
ternal-medicine residency to test whether the model
is generalizable beyond internal medicine; (2) it
included factors other than the students' experiences
in the relevant clerkships which had previously been
found to have some relation to career choice (e.g.
the students' current level of debt) to ensure that
the effects of the clerkship experiences were over
and above these other variables; (3) it compared the
relative importance of perceived competence and
interest in predicting career choice; and (4) for a
subsample, it assessed the actual prior likelihoods,
before the students' clerkships, that they would go
into each medical specialty, to ascertain whether the
retrospectively recalled prior likelihoods were
reasonably accurate.

In addition to the central hypotheses of the
model, we expected that students with more debt
would be less likely to select internal medicine,
because of the lower incomes for internists (Dial
and Elliot, 1987). Also, we expected interest to be a
more important predictor of career choice than per-
ceived competence.

METHODS

Participants

Fourth-year medical students (*n* = 383) at three
U. S. medical schools (one private university from
the northeast; one private university from the mid-
west; one state university from the midwest) were
asked to complete a confidential questionnaire con-
taining several scales about their experiences on
their third-year clerkships in internal medicine and
in surgery and to report their residency selection.
At the time, students had submitted their match

lists but had not received their match results. Of the students approached, 210 (55%) returned their questionnaires.

Each student completed a demographic questionnaire. Their responses indicated that the students' mean age was 27.4 years (sd = 3.6), and 39% were female. Fifteen percent of the participants were married, and 15% had children. The mean debt of these students was $71 500 (sd = $40 800). Of the students returning the questionnaires, 31.2% reported selecting an internal-medicine residency and 23.9% reported selecting surgery. The remaining 44.9% reported selecting a residency in one of 21 other specialties.

All students completing the questionnaire provided retrospective accounts of what the likelihood had been, prior to their clerkships, of going into each of the two relevant specialties. These provided the baseline for exploring whether the clerkship experiences had affected their residency choice over and above their prior likelihood. In addition, a subset of 64 students at one of the schools had completed a questionnaire at the end of their second year on which they reported how likely they were to choose internal medicine and surgery residencies. In some analyses, this subgroup was treated separately to determine whether the results would be the same when using actual prior likelihoods as when using the retrospective reports.

Measures

The Learning Climate Questionnaire (LCQ) assessed students' perceptions of the autonomy supportiveness of their internal medicine and surgery instructors, using a 5-point Likert scale. Students rated their instructors on items such as "tried to understand how I saw things before suggesting how to handle the situation" and "provided me with choices and options for how to treat the patients' problems." The 15 items on the LCQ had been validated in a previous study (Williams and Deci, 1996) in which second-year medical students who perceived their instructors in a six-month interviewing class as more autonomy supportive (versus controlling) were found to experience an increase in interest, perceived competence, and autonomy with respect to that course. In the present sample, the alpha reliability for the 15 items was .94 for medicine and .96 for surgery.

The Competence in Internal Medicine (and Surgery) Scale (CIMS and CSS) consisted of four items concerning the level of mastery the students believed they possessed in treating hospitalized internal-medicine (and surgical) patients. A sample item is "I feel that I have the skills to be an effective caregiver for hospitalized internal medicine (or surgical) patients." The alpha reliability for the CIMS and the CSS were .85 and .89, respectively.

The Interest in Internal Medicine (and Surgery) Scale (IIMS and ISS) has three items. A sample IIMS item asks "How curious are you about the types of diseases treated by internists?" The alphas for the IIMS and ISS were .88 and .89, respectively.

Retrospective Prior Likelihood of choosing internal medicine (and surgery) was measured by asking the students to think back to the end of their second year, prior to their internal medicine and surgery clerkships, and to recall their beliefs at that time about how likely it was that they would go into internal medicine or surgery (marked on a 10-cm visual-analog scale). These variables will be called "retrospective prior likelihood, medicine" and "retrospective prior likelihood, surgery." As mentioned previously, a subset of 64 students had actually been asked at the end of their second year, "How likely is it that you would go into internal medicine (or surgery) if you were to choose now?" These variables will be referred to as "actual prior likelihood, medicine" and "actual prior likelihood, surgery."

Internal Medicine (and Surgery) Career Choice was assessed in two ways. First, the students were asked to indicate how likely it was that they would go into internal medicine (and into surgery), by making marks on 10-cm visual-analog scales anchored at the two ends with 0%, "not at all likely," and 100%, "certain you will." Second, they were asked to indicate whether they had requested an internal medicine, surgical, or other type of residency. Based on the results of a previous study (Williams et al., 1994), the dependent variable of career choice was a composite of these two variables.

Analytic strategy

We began by calculating the means and standard deviations for each motivation-related variable for internal medicine and for surgery within three groups of students: those who selected internal medicine residencies, those who selected surgical residencies, and those who selected some other residency. Each demographic variable (age, gender, debt, marital status, and number of children) was then correlated with the internal medicine and surgical career choice variables.

The primary analyses in this research employed LISREL to do structural equation modeling (SEM) on the full sample (n = 207) for both internal medicine choice and surgery choice. We also tested whether the relations among the variables were equally strong with regard to internal medicine choice and surgery choice. Finally, because the sample was small (n = 64) on whom we had actual prior likelihood assessments from the end of second year, we used multiple regression (rather than LISREL) to do path analyses testing the model with actual prior likelihoods.

Structural equation modeling (SEM). LISREL 8W was used to test the career-choice models for medicine and surgery using latent variables

(Joreskog and Sorbom, 1993a). Joreskog and Sorbom (1993b) refer to one appropriate way of doing model testing as "strictly confirmatory," and this is the strategy we chose to test our "Instructor Facilitates Interest" model (derived from self-determination theory) for selection of both internal medicine and surgery. We then used a second strategy, "comparing alternative models" to compare the importance of perceived competence and interest in predicting career choice.

LISREL analyses test two aspects of an overall model (Anderson and Gerbing, 1988): first, the measurement model which specifies the relations between the latent variables (i.e. the variables that form the model itself) and the observed variables (i.e. the questionnaire items used to assess each latent variable); and, second, the structural model, which specifies the direct and indirect relations among the latent variables that represent the hypotheses. Accordingly, LISREL was used first to perform confirmatory factor analyses (CFA) to test the fit of the internal medicine and surgery measurement models to the data, thus ensuring that the latent variables were well measured. Second, the fit of the structural model for internal medicine and surgery was then tested using the latent variables.

Maximum likelihood estimation was used to generate the standardized parameter estimates because it is robust in dealing with data that deviate from multivariate normality (Huba and Harlow, 1987). To determine the extent to which the models fit the observed data, we used (1) the chi-square (χ^2) statistic (Bollen, 1989), (2) the non-normed fit index (NNFI; Tucker and Lewis, 1973), and (3) the root means square error of approximation (RMSEA; Steiger, 1990). A chi-square that is not significant (Bollen, 1989) and an NNFI with a value above 0.90 and close to 1.00 indicate a good fit. An RMSEA of 0.05–0.08 indicates a reasonable fit, while a value of less than 0.05 represents a close fit (Browne and Cudeck, 1993). We analyzed the covariance matrix because the theory on which SEM is based had been developed for covariance matrices (Cudeck, 1989).

Formulation of the LISREL models. The structural equation model includes four latent constructs and one observed variable (see Fig. 1). LISREL procedures suggest that assessing latent variables is best done with no more than four observed variables, so in cases where a longer, previously validated scale is used, a small number of the most representative items are selected to measure the constructs. Thus, on the basis of our earlier research (Williams *et al.*, 1994), the exogenous construct "Autonomy Support" was measured by three observed variables (AS1–AS3). The exogenous variable "Prior Likelihood" was measured by a single indicator (P.L.). One endogenous construct (Perceived Competence) was measured by three indicators (C1–C3), and the other two endogenous

constructs (interest and career choice) were measured by two indicators each (I1–I2 and CC1–CC2, respectively). To provide a metric for the latent constructs, the first construct loading for each latent construct was set to 1.00.

After verifying the adequacy of the measurement models for internal medicine and surgery, we evaluated the full "Instructor Facilitates Interest" model for each specialty. As depicted in Fig. 1, prior likelihood was specified to predict perceived competence, interest, and career choice. Autonomy support was specified to predict perceived competence and interest. In this manner, any additional variance in interest, perceived competence, and career choice accounted for by autonomy support beyond that explained by prior likelihood would be attributable to the learning climate of the third year clerkship. Perceived competence was specified to predict interest, but not career choice directly, because our previous research indicated that perceived competence did not explain additional variance in career choice once interest was accounted for. Interest was specified to predict career choice.

Once the "Instructor Facilitates Interest" model was confirmed, we introduced age, gender, debt, and having at least one child to the models as exogenous variables predicting career choice to see if the "Instructor Facilitates Interest" model still held even after the effects of these other variables had been removed.

We then used LISREL to compare whether the relations among the latent variables within the internal medicine model and the surgery model were equally strong. To this end, one tests a hierarchy of hypotheses concerning invariance across groups (Bollen, 1989). Specifically, one tests H_{form} and then $H_{beta,gamma}$. H_{form} tests whether the model parameters fit the data between groups without restricting the non-fixed parameters. If H_{form} is a good fit, one then tests $H_{beta,gamma}$ which constrains the elements of Beta and Gamma to be the same in both groups. If the model still fits the data well, the results are consistent with the assumption that the relations between latent variables are the same for both specialty choices.

Finally, we constructed two models to test the hypothesis that interest was a significantly stronger predictor of career choice than was perceived competence. In order to make this comparison, we nearly saturated the "Instructor Facilitates Interest" model by adding paths from autonomy support to career choice, and from perceived competence to career choice to create the "Interest" model. Then, we constrained the path from perceived competence to career choice to make it equal to the path from interest to career choice and then re-ran the model. If the model significantly deteriorates under this equality constraint, it would support the hypothesis that interest is a significantly better predictor of career choice than is perceived competence.

Table 1. Means and standard deviations (in parentheses) of the variables for the three groups of students: those choosing internal medicine, those choosing surgery, and those choosing some other specialties

	Internal medicine (n = 67)	Surgery (n = 51)	Other (n = 94)
Autonomy support, medicine	61.3	54.2	55.0
	(10.2)	(11.4)	(13.4)
Autonomy support, surgery	42.0	52.4	44.5
	(14.3)	(12.2)	(15.0)
Perceived competence, medicine	17.5	14.7	15.4
	(2.0)	(3.0)	(2.8)
Perceived competence, surgery	13.9	16.2	14.3
	(3.6)	(2.9)	(3.3)
Interest, medicine	14.0	10.2	11.5
	(1.3)	(2.6)	(2.5)
Interest, surgery	9.7	13.6	9.6
	(2.9)	(1.8)	(3.0)
Retrospective likelihood, medicine	63.7	46.8	43.5
	(23.1)	(19.6)	(24.7)
Retrospective likelihood, surgery	26.7	57.5	28.1
	(27.2)	(32.2)	(29.8)
Current likelihood, medicine	95.1	22.3	27.4
	(9.7)	(20.1)	(29.4)
Current likelihood, surgery	17.1	86.4	11.8
	(23.8)	(28.0)	(19.5)

RESULTS

Table 1 presents the means and standard deviations for each motivation-relevant variable for three groups of students: those who selected internal medicine residencies, those who selected surgical residencies, and those who selected some other residency. As can be seen, the mean for each variable as it relates to internal medicine is higher for the group of students who selected internal medicine than for the other two groups, and the mean for each variable as it relates to surgery is higher for the group of students who selected surgery than for the other two groups.

Correlations were then performed to relate background variables to the selection of internal medicine and to surgery. Only three correlations were significant. Students with more debt and at least one child were less likely to choose internal medicine ($r = -.15$, $P < .05$ for each of these two correlations). Males were more likely to choose surgery than were females ($r = .21$, $P < .01$).

The intercorrelations of the primary study variables are presented in Table 2 (for the entire sample) and Table 3 (for the subsample of 64 who provided actual prior likelihoods). Choice of internal medicine and surgery were significantly correlated with the students' experience of autonomy support on their corresponding clerkships ($r = .29$, $P < .001$, and $r = .34$, $P < .001$, respectively). Pairs of variables that were expected to be significantly correlated for the "Instructor Facilitates Interest" model were all significantly correlated in the predicted direction.

Estimation of the LISREL models. The confirmatory factor analyses for internal medicine and surgery indicated that the hypothesized models fit the data well. The parameter estimates for the measurement models were significant ($\alpha < .001$) for each construct. The completely standardized $lambda_x$ and $lambda_y$ coefficients are shown in Fig. 2 and Fig. 3. The overall indicators of goodness of fit for both internal medicine, χ^2 [29, $N = 207$] = 23.79,

Table 2. (a) Correlations of motivational variables: internal medicine (n = 207)

	2	3	4	5
1. Autonomy support	.30***	.35***	.29***	.11
2. Competence	—	.56***	.44***	.24***
3. Interest		—	.61***	.28***
4. Choice of IM			—	.41***
5. Retrospective prior likelihood				—
(b) Correlations of motivational variables: surgery (n = 210)				
1. Autonomy support	.35***	.48***	.34***	.30***
2. Competence	—	.46***	.36**	.43***
3. Interest		—	.62***	.48***
4. Choice of surgery			—	.49***
5. Retrospective prior likelihood				—

**$P < .01$.
***$P < .001$.

Table 3. (a) Correlations of motivational variables: internal medicine subsample ($n = 64$)

	2	3	4	5	6
1. Autonomy support	.18 +	.50***	.27*	.07	.22†
2. Competence	—	.45***	.43***	.20	.25*
3. Interest		—	.58***	.26*	.50***
4. Choice of IM			—	.42***	.44***
5. Actual prior likelihood				—	.62***
6. Retrospective prior likelihood					—

(b) Correlations of motivational variables: surgery subsample ($n = 64$)

1. Autonomy support	.48***	.61***	.26*	.29*	.28*
2. Perceived Competence	—	.59***	.47***	.46***	.51***
3. Interest		—	.61***	.49***	.39**
4. Choice of surgery			—	.53***	.44***
5. Actual prior likelihood				—	.83***
6. Retrospective prior					—

†$P < .10$.
*$P < .05$.
**$P < .01$.
***$P < .001$.

$P = 0.74$, NNFI = 1.01, and RMSEA = 0.000, and surgery χ^2 [29, $N = 210$] = 32.58, $P = .30$, NNFI = 1.00, RMSEA = .02, were very good. Because both of the measurement models were accepted, the hypothesized structural models for internal medicine and surgery were tested.

The results of the LISREL test of the hypothesized structural models for internal medicine and surgery are shown in Fig. 2 and Fig. 3, respectively. All of the hypothesized paths in both "Instructor Facilitates Interest" models were significant (for all $P < .05$). Notably, the indirect effects of autonomy support on choice of internal medicine (standardized coefficient = .21, $P < .001$) and surgery (coefficient = .17, $P < .001$) were significant, as were the indirect effects of perceived competence on choice of internal medicine (coefficient = .18, $P < .001$), and on surgery (coefficient = .16, $P < .001$).

The overall fits of the full model to the data for both internal medicine and surgery were excellent.

For internal medicine χ^2 [37, $N = 207$] = 29.45, $P = .81$, NNFI = 1.01, RMSEA = .00; and for surgery, χ^2 [37, $N = 210$] = 38.04, NNFI = 1.00, RMSEA = .01, indicating that the "Instructor Facilitates Interest" models were confirmed.

Because debt was correlated significantly with choice of internal medicine, it was added as a third exogenous variable to predict choice of medicine. The results indicated that debt significantly negatively predicted choice of internal medicine (standardized coefficient = −.16, $P < .01$) and the overall fit remained good χ^2 [45, $N = 207$] = 35.09, $P = .86$, NNFI = 1.01, RMSEA = .00. All other parameter estimates remained virtually unchanged, indicating that the "Instructor Facilitates Interest" model holds even when the effects of debt are considered. Similar additions to the medicine and surgery models for the other demographic variables failed to predict additional variance in career choice.
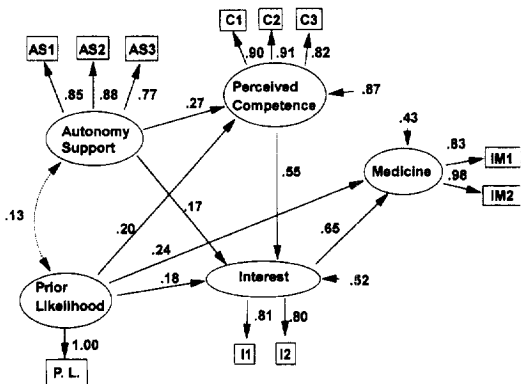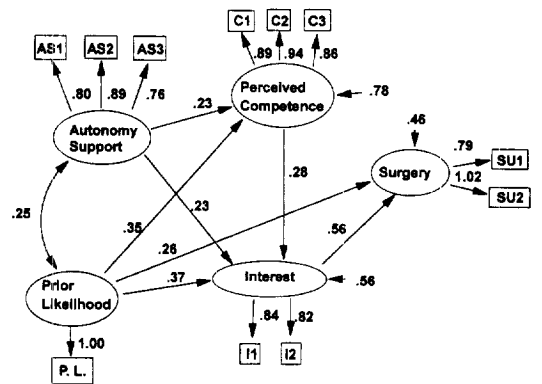

Fig. 2. Results of the LISREL test of the structural equation and measurement models representing the "Instructor Facilitates Interest" hypotheses for choice of medicine χ^2 [37, $N = 207$] = 29.45, $P = .81$. All parameter estimates are significant at $P < .05$. Latent constructs are shown in ellipses, and observed variables are shown in rectangles.

Fig. 3. Results of the LISREL test of the structural equation and measurement models representing the "Instructor Facilitates Interest" hypotheses for choice of surgery χ^2 [37, $N = 210$] = 38.04, $P = .42$. All parameter estimates are significant at $P < .05$. Latent constructs are shown in ellipses, and observed variables are shown in rectangles.

Comparing the internal medicine and surgery models

To determine whether the strengths of relations among the latent variables in the models for internal medicine and surgery were equal, we first tested H_{form} to compare the medicine and surgery models without restricting any non-fixed parameters. There was a very good fit of the model to the data, χ^2 [74, $N = 207$] = 67.49, $P = .69$, NNFI = 1.00, RMSEA = .00. Therefore, $H_{beta,gamma}$ was tested by constraining these parameters to be equal between the two groups. Results indicate no significant deterioration of the fit of the model to the data, χ^2 [81, $N = 207$] = 85.45, $P = .35$, NNFI = 1.00, RMSEA = .01. Thus, the parameter estimates representing the relations between latent variables in the internal medicine and surgery models revealed that these relations in the two models were equally strong, thereby further supporting the validity and generalizability of the "Instructor Facilitates Interest" model.

Comparing interest and competence

The LISREL analyses of the more saturated models (paths added from both autonomy support and perceived competence to career choice) revealed good fits of the models to the data both for internal medicine, χ^2 [35, $N = 207$] = 29.27, $P = .74$, and for surgery, χ^2 [35, $N = 210$] = 37.15, $P = .37$. However, neither the paths to career choice from autonomy support (standardized coefficient = .00 for internal medicine, and .03 for surgery), nor from perceived competence (coefficient = .03 for internal medicine, and .05 surgery) were significant. The remaining paths were essentially unchanged from the respective "Instructor Facilitates Interest" models previously tested for medicine and surgery.

In the next step, when the perceived competence to career choice paths were constrained to be equal, the chi-square significantly deteriorated for medicine, $\Delta\chi^2$[1, $N = 207$] = 13.39, $P < .001$, and for surgery $\Delta\chi^2$ [1, $N = 210$] = 13.70, $P < .001$. Thus, interest was demonstrated to be a significantly better predictor of career choice than was perceived competence.

Actual prior likelihood analyses

Internal medicine. At the end of their second year, a subset of the students in the study ($n = 64$) had indicated the likelihood that they would select internal medicine as a career. This variable, referred to as actual prior likelihood, was strongly correlated ($r = .62$, $P < .001$) with retrospectively recalled prior likelihood, thus indicating that the retrospective recall was reasonably accurate. Because this subsample was too small for LISREL analyses, regressions procedures were used to do path analyses to test the "Instructor Facilitates Interest" model with actual prior likelihood that

had been confirmed by LISREL using retrospective prior likelihood. Choice of internal medicine was regressed onto actual prior likelihood ($\beta = .28$, $P < .01$), and interest ($\beta = .50$, $P < .001$), and the equation was found to be significant $F(2, 60) = 20.6$, $P < .001$. Thus, this analysis replicated the previous analysis in terms of the variables that predict choice of internal medicine. Interest was then regressed onto autonomy support ($\beta = .42$, $P < .001$), perceived competence ($\beta = .34$, $P < .001$), and actual prior likelihood ($\beta = .16$, ns). Although the equation was significant, $F(3, 60) = 13.5$, $P < .001$, only autonomy support and perceived competence, but not prior likelihood, predicted interest, thus supporting the model's hypotheses concerning motivational predictors of interest. Perceived competence was then regressed onto autonomy support and actual prior likelihood $F(2, 61) = 2.2$, ns, thus indicating that neither variable predicted perceived competence. In summary, each of the predicted relationships was again supported, with the exception that autonomy support did not account for significant variance in perceived competence. Thus, the present analysis, to a large extent, replicated the LISREL analysis using recalled prior likelihood with the larger sample.

Surgery. For the 64 students, actual prior likelihood for surgery was very highly correlated with retrospectively recalled prior likelihood ($r = .83$, $P < .001$), providing even stronger evidence that the retrospective recall procedure is valid. Choice of surgery was regressed onto actual prior likelihood ($\beta = .34$, $P < .001$) and interest ($\beta = .44$, $P < .001$), $F(2, 61) = 24.8$, $P < .001$, with both being significant. Interest was then regressed onto autonomy support ($\beta = .39$, $P < .001$), perceived competence ($\beta = .29$, $P < .01$), and actual prior likelihood ($\beta = .24$, $P < .05$), $F(3, 60) = 22.46$, $P < .001$, with all three being significant. Finally, perceived competence was regressed onto autonomy support ($\beta = .38$, $P < .001$) and actual prior likelihood ($\beta = .34$, $P < .01$), $F(2, 61) = 16.01$, $P < .001$, with both being significant. This analysis therefore fully replicated the LISREL analyses for surgery which had used retrospective prior likelihood with the larger sample. As in the LISREL analysis, all of the hypothesized relations were significant.

DISCUSSION

The current study was designed to further test the "Instructor Facilitates Interest" model of career choice for internal medicine (Williams et al., 1994) and also to apply it to selection of surgery. This is important because it would suggest that clerkship instructors' being autonomy supportive can increase interest in and choice of any residency. The current study also assessed the relevance of students' debt to career choice and the relative importance of per-

ceived competence and interest in predicting career choice.

Support was again found for the "Instructor Facilitates Interest" model derived from self-determination theory (Deci and Ryan, 1985), thus indicating that a clerkship learning climate that students perceive to be rich in autonomy support will be associated with increased student interest in and likelihood of selecting a residency in the corresponding specialty. We chose internal medicine and surgery to test the hypothesis that there would be a relation between students' clerkship experiences and their career choices across specialties because these two specialties are so different (internal medicine emphasizes clinical reasoning, whereas surgery emphasizes technical skill and perseverance). The fact that the strength of relations among the variables in the model were the same for selection of the two specialties provides particularly good support for the model, although the model remains to be tested for other specialties.

Stimulation of students' interest in the types of problems facing each discipline proved to be the strongest motivator of career choice. The magnitude of the size of the effects of interest on career choice for internal medicine and for surgery is worthy of note in that no other variable predicted career choice with anywhere near the strength that interest did.

Although perceived competence was correlated with career choice it did not predict significant variance in career choice when entered in an analysis with interest. It is often said, both theoretically and practically, that feeling competent at an activity is a crucial predictor of being motivated for it (Bandura, 1977). Although, obviously, being and feeling competent at a medical specialty is important for choosing it as a career, the data indicate that interest is the stronger predictor. Promoting perceived competence, without promoting interest, is not as likely to facilitate career choice. Fortunately, however, the data indicate that perceived autonomy support not only tends to promote interest (which in turn promotes career choice), but also promotes perceived competence.

Equally as important as the fact that learning stimulated through interest seems to promote students' choosing a residency in that field is the evidence from previous studies that learning through interest enhances personal and professional growth, conceptual understanding, and personal satisfaction (Deci *et al.*, 1991). Therefore, learning environments that students perceive as autonomy supportive not only tend to increase the number of students choosing a particular specialty and their perceived competence at that specialty, but they also tend to improve the quality of the students' learning and their long-term professional growth and satisfaction in that career.

Other factors such as student debt and gender were explored, and debt significantly negatively predicted choice of internal medicine. However, it is noteworthy that perceived autonomy support in the internal medicine clerkships contributed to career choice beyond the effects of debt.

Limitations to this study include the following. First, the data are largely cross-sectional, so future studies would do well to use fuller longitudinal designs. Second, the autonomy support of the clerkship learning climates was assessed with reports of the students' perceptions, which means that individual differences in the students could have influenced these assessments. More objective measures of the instructors' autonomy support would be an important addition to future studies. Third, indicators of key student variables that were not self-reports would be useful for further validation of the model. Fourth, the return rate of 55% is a limitation, because it is likely that the students who did not return the questionnaires were either unmotivated or had not made a career choice. However, including them would likely have strengthened, rather than weakened, the results. And finally, the most definitive causal test of the "Instructor Facilitates Interest" model would come from evaluation of students' career choices after random assignment of students to instructors trained to be more autonomy supportive versus those not trained.

In summary, clerkship learning climates that are perceived by medical students as supporting their autonomy facilitate students' feeling competent at and being interested in the corresponding medical specialty, which in turn predicts students' being more likely to choose a career in that specialty. It seems likely that if clerkship directors and instructors make the learning climates more autonomy supportive, which will promote students' interest, they may be able to enhance students' motivation to select a residency in that field of medicine.

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