

## Factors Associated with Academic Success at Vienna Medical School: Prospective Survey

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<b>Aim</b>	To identify factors relating to students' success in the study of medicine at the Medical University of Vienna. In view of Austria's tradition of open access to higher education, which results large number of students, high dropout rate, long duration of studies, factors predicting success could be helpful for student counseling.
<b>Methods</b>	In a prospective study, 674 freshmen (50.8% of students enrolled that year) responded to a questionnaire on their sociodemographic data, family background, performance in school, economic situation, living conditions, social integration and health, learning capacity, motivations related to studies and future profession, attitudes, and the ability to cope with stress. We used the results of the compulsory test of knowledge after the first year as an outcome measure of their success.
<b>Results</b>	By comparing two extremes of academic success, very successful students and students who twice failed the challenging first-year exam, we were able to identify three factors relevant in predicting academic success: male sex, German as mother tongue, and good performance in secondary school. Moreover, there is evidence that maturity and intrinsic motivational structure are linked to superior academic performance.
<b>Conclusion</b>	The results of this study differ from or even contradict the findings of previous retrospective studies in Austria. We suggest that a more thorough examination of the effect of gender should be undertaken in future studies. We also hope that our work will lead to the improvement in the efficiency of the German courses for foreign students. Our findings confirm the importance of success in secondary school, but also clearly indicate that it should not be the only criterion for university admission.

In the 2002/03 academic year, the Medical University of Vienna admitted about 1,300 freshmen, and more than 1,400 in 2003/4. The problems of large number of students and logistic, organizational, and financial expenditures it entails, have been aggravated by the reform of the curriculum and the accompanying increase of teaching in small groups. This has led us to examine the factors which most markedly influence the duration of an individual's medical studies and determine their academic success. Our aim was to discover and quantify possible latent mechanisms of selection. Furthermore, a possible new prognos-

tic model could find its use in counseling new students. The literature in this field of research is sparse (1); to our knowledge there have been no other prospective trials until now in Austria.

The National Statistical Data on the Study of Medicine in Austria (2) should be viewed by taking into account Austria's traditional system of "open access" to universities (no restrictions to the number of students admitted, free choice of the subject, no restrictions in the duration of studies). On average, 10.2% of high school graduates started medical studies during the years 1973-1997. In the seventies, this proportion was espe-

cially high (17% in 1977), whereas in 1988 it was relatively low (5%). The percentage of female students rose from 44% to more than 66% in 1997. In Vienna, the absolute number of freshmen ranged between 940 in 1988 and 2,300 in 1981.

Study success is measured by the graduation rate, ie the percentage of those who earn a degree among all the students who enrolled at the university (including the students who have switched to and completed another course of study). The graduation rate for medicine during the years 1980-1996 was 66% (men: 71%; women: 61%). In this period, the overall rate for all courses of study rose from 49% (men: 53%; women: 44%) to 52% (men: 55%; women: 49%). In comparison to other European countries, Austria has very poor academic parameters (rate of university graduates, study success, age of graduates); a worldwide comparison showed a similar outcome (3).

Each curriculum has specific requirements, favoring students with specific capacities related to motivation, competence, and sociodemographic factors, and hindering students with other characteristics. Through the "open access" to higher education granted by Austrian universities, study success is not influenced by pre-study-selection but mainly depends on the individual's responsibility. The aim of our study was to identify predictive factors for study-success in the context of a new curriculum.

## Material and Methods

### Study Sample

After a pilot phase including 150 students who began their studies in the academic year 2001/02, an entirely restructured curriculum was established at the Medical University of Vienna in 2002/03. Content is taught in blocks which integrate relevant medical subjects. Precisely defined learning material is examined by a written test (multiple-choice questions) at the end of the first year, with students having the right to take the test three times. The test is a prerequisite for enrolling into the second year. In contrast to the old curriculum, where students to a large extent were able to set the speed of learning and study progress themselves, the new regimen demands from students to start learning early and to learn relatively continuously. This leaves little space for orientation, adaptation, and maturation of students' personality. Higher education re-

search in Austria has shown that the dropout rate peaks after the first year (2). This makes it feasible to use the results of the first year test as a criterion for study success.

### Setting

In the first days of the new academic year (October 2002), all students were asked to fill out a structured questionnaire during a lecture (simultaneously held in four lecture halls). The questionnaire contained 67 items on 11 issues.

### Outcome Measures

The following variables were collected: sociodemographic data (age, sex, mother language, employment status, education and parents' social status, 10 items); performance in school (2 items); economic situation (5 items); living conditions (6 items); social integration (5 items); study motivation (16 items); ideas about future profession (3 items); learning capacity and styles (9 items); health impairment (3 items); contentment and ability to cope with stress (7 items); access to information (1 item); date of enrollment (by registration number). Some of these factors were measured subjectively by linear analogue scales (LAS) of 100 mm.

In constructing the questionnaire we relied on the two most prominent Austrian studies (1,4). Furthermore, we defined four categories of variables that would be of interest in creating new hypotheses: social integration, learning capacity and learning habits, health impairment, and contentment and ability to cope with stress.

The students who filled out the questionnaire (n=674), correspond to 50.8% of the year's freshmen (n=1,327).

The data from the questionnaire was correlated to the results of the compulsory test after the first study year, which were available on the Internet. After merging the two databases, a comparison of the two most extreme groups was made. In the Austrian grading system, marks range between 1, which stands for excellent, and 5, which stands for insufficient/fail. Students were defined as "very successful" (mark 1, 2, or 3 on the first attempt at the test; n=115) and "unsuccessful" (those who failed twice, ie mark 5 on the first and second attempt at the test; n=130).

### Statistical Analysis

Depending on the form of the data (yes/no, multiple answers, linear-analogue scales in

millimeters, percentages), t-tests, analysis of variance, chi-square tests, and U tests were applied. If tests demanded special data prerequisites these were respected and met (e.g. homogeneity of variance for t-tests). *P* values lower than 0.05 were considered significant. The data were analyzed using SPSS for Windows version 11.5.1 (SPSS, Chicago, IL, USA). Odds ratios were calculated using Epi Info, version 6.04d (CDC, Atlanta, GA, USA).

## Results

### Sociodemographic Data

Male students ( $P=0.018$ ) and students with German as their mother tongue ( $P<0.001$ ) were significantly more successful than others (Table 1). The odds ratio (OR) for male gender was 0.51 (95% confidence limits: 0.28-0.92) and 0.09 (95% confidence limits: 0.02-0.32) for German as mother tongue.

The freshmen's age ( $P=0.633$ ), their age at high school graduation (corrected for possible school attendance abroad;  $P=0.703$ ), and their

employment status at the beginning of their studies ( $P=0.820$ ) or before beginning their studies ( $P=0.066$ ) had no significant influence on the study success. Furthermore, the parents' education (mother:  $P=0.693$ ; father:  $P=0.210$ ) and their monthly income ( $P=0.141$ ) had no influence on students' success.

### High School Performance

Students' performance in high school, ie their marks in mathematics ( $P<0.001$ ), physics ( $P<0.001$ ), chemistry ( $P<0.001$ ), and English ( $P<0.001$ ), significantly influenced their success in the first year of medical studies. Table 1 presents medians and means of the grades in the above-mentioned subjects, both for the "very successful" and for the "unsuccessful" groups. If the school marks served as a predictor for study success, 85% of the very successful but only 50% of the unsuccessful students would be assigned to the accurate group. In total, 66% of the freshmen would be allocated properly.

**Table 1.** Sociodemographic data and secondary school success of successful and unsuccessful medical students in 2002/03 academic year

Sociodemographic data	No. (%) of students		<i>P</i> *
	successful (n=115, 47%)	unsuccessful (n=130, 53%)	
Gender:			
women	67 (43)	89 (57)	0.018
men	46 (60)	31 (40)	
German as mother tongue	112 (53)	101 (47)	<0.001
Employed at the beginning of studies	9 (43)	12 (57)	0.820
Employed before beginning of studies			
Mother's level of education:			
elementary school	12 (44)	15 (56)	0.693
apprenticeship	27 (44)	35 (56)	
academic secondary school	16 (50)	16 (50)	
vocational secondary school	11 (38)	18 (62)	
university	48 (52)	45 (48)	
Father's level of education:			
elementary schooling	2 (25)	6 (75)	0.210
apprenticeship	27 (46)	32 (54)	
academic secondary school	12 (36)	21 (64)	
vocational secondary school	9 (39)	14 (61)	
university	64 (54)	55 (46)	
Average family income per month (Euros after taxes):			
<2,000	27 (47)	30 (53)	0.141
<5,000	47 (43)	62 (57)	
>5,000	24 (62)	15 (38)	
Secondary school performance (mean±SD):†			
age	19.3±2.4 (n=73)	19.1±1.9 (n=61)	0.633
age at secondary school graduation	18.2±1.2 (n=114)	18.2±0.9 (n=130)	0.703
School marks (scale of 1 to 5; 1=best, 5=worst):†			
mathematics	1.9±0.9 (n=111)	2.8±1.0 (n=125)	<0.001
physics	1.5±0.7 (n=106)	2.2±1.0 (n=118)	<0.001
chemistry	1.5±0.7 (n=108)	2.0±0.9 (n=117)	<0.001
English	1.9±0.9 (n=111)	2.5±1.1 (n=123)	<0.001
total	6.8±2.4 (n=106)	9.5±2.6 (n=116)	<0.001
Number of class repetitions	0.04±0.20 (n=114)	0.10±0.40 (n=129)	0.053

\* $\chi^2$ -test for differences between successful and unsuccessful students.

†t-test for differences of means of successful and unsuccessful students.

In Austria, pupils are obliged to repeat the whole school year under certain circumstances (e.g. "5 = insufficient" in two subjects). The mean of class repetitions was 0.04 in the group of the very successful, and 0.12 in the group of the unsuccessful students ( $P=0.047$ ).

### Economic Situation

Very successful students saw their financial status more optimistically ( $P=0.003$ ). Moreover, very successful male students seemed to be more content with the money that they had at their disposal than the unsuccessful ones ( $P=0.030$ ) and they were more confident with regard to their financial situation ( $P=0.002$ ). All of the other vari-

ables used to assess the students' economic situation did not show significant influence on study success (Table 2).

### Living Conditions (including Residence and Family Status)

The two groups analyzed showed no differences in their place of residence (including having an apartment of their own) or the distance of their residence from that of their family. Significant differences between groups in having children or other family commitments were not established (Table 2). Also, differences in social integration between groups could not be observed in any of the analyzed variables (Table 2).

**Table 2.** Living conditions and social integration of academically successful and unsuccessful medical students in 2002/03 academic year

Parameter	Academic success of students (No., %)		P*
	successful	unsuccessful	
Not self-financed; source of support:			
parents	96 (48)	106 (52)	0.291
father	10 (63)	6 (37)	
mother	2 (22)	7 (78)	
government	3 (38)	5 (62)	
grandparents	0 (0)	1 (100)	
Forced to earn additional income	7 (41)	10 (59)	0.621
Other employment (aside from urgent need)	21 (50)	21 (50)	0.865
The skills I acquired before beginning my studies would enable me to find employment	61 (44)	79 (56)	0.224
The skills I acquired before beginning my studies would be sufficient for making a living (without getting my medical degree)	54 (47)	62 (53)	1.000
I live:			
alone	15 (47)	17 (53)	0.173
with partner	9 (45)	11 (55)	
shared flat	21 (54)	18 (46)	
with parents	47 (40)	70 (60)	
dormitory	23 (62)	14 (38)	
I have my own apartment	38 (50)	38 (50)	0.581
My family lives:			
in Vienna	37 (40)	56 (60)	0.066
outside Vienna	78 (52)	72 (48)	
I see my family:			
daily	48 (40)	73 (60)	0.061
weekly	39 (52)	36 (48)	
monthly	19 (66)	10 (34)	
less often	9 (45)	11 (55)	
I have dependents	1 (20)	4 (80)	0.373
I already have children	1 (50)	1 (50)	1.000
Social integration:†			
percentage of living costs that are self-financed (in %)	7±16 (n=115)	9±19 (n=129)	0.381
secure financial situation for the normal duration of studies (mm):			
total	13±18 (n=114)	21±24 (n=129)	0.003
female	16±21 (n=66)	21±25 (n=89)	0.142
male	9±12 (n=46)	22±23 (n=31)	0.002
I feel that my financial resources are sufficient/insufficient (mm):			
total	16±20 (n=115)	20±21 (n=127)	0.082
female	18±21 (n=67)	20±21 (n=86)	0.529
male	12±16 (n=46)	22±23 (n=31)	0.030
number of working hours per week	1.2±3.1 (n=113)	1.4±3.6 (n=127)	0.645
I am used to talking to my friends about everything that occupies my attention (mm)	19±20 (n=115)	21±24 (n=130)	0.616
I am informed about everything that affects my friends' lives (mm)	16±17 (n=115)	12±15 (n=129)	0.079
I prefer to solve my problems alone/with others (mm)	57±26 (n=115)	58±28 (n=130)	0.844
I tend to be an introverted/extroverted person (mm)	30±24 (n=115)	29±26 (n=130)	0.583
I make contact with others easily/with difficulty (mm)	28±21 (n=115)	24±20 (n=130)	0.126

\* $\chi^2$ -test for differences between successful and unsuccessful students.

†Measured on a linear analogue scale (LAS) from 0 to 100 mm. Data are expressed as mean±standard deviation. Statistics: t-test for differences of means.

### Study Motivation and Ideas about Future Profession

In the group of very successful students, the wish to study medicine was distinctly of shorter duration in comparison with unsuccessful students ( $P=0.023$ ). These students also were less frequently advised to study medicine ( $P=0.011$ ). Successful students stated more often that they "enjoy acquiring knowledge" ( $P=0.014$ ), that they tended to study other subjects ( $P=0.015$ ), and that they considered study success as important ( $P=0.009$ ). All other items (Table 3) showed no significant influence.

Regarding the perception of future studies, successful students were more confident than unsuccessful students that they would be able to complete their studies ( $P<0.001$ ). Other related questions (readiness to sacrifice personally important activities for study success, how much life is centered around studies, how challenging the

study of medicine is, substantial ideas about progress in studies) did not show significant differences. Students were also asked to name the three most important factors for success and this question also produced no significant findings.

The items concerning future profession showed that the successful students had fewer ideas about their future specialization ( $P=0.020$ ). The questions concerning chances for higher income, first choice of profession, academic title, optimization of future career, doctors' social status, precision of ideas concerning the future medical profession, as well as the importance of family, career, income, and fascination with the job did not show any significant differences (Table 3).

### Learning Capacity and Learning Styles

Despite no differences in study load and daily time spent on learning, successful students reported more often that they learn easily

**Table 3.** Study motivation of academically successful and unsuccessful medical students in the 2002/03 academic year (unsuccessful not shown)

Study motivation	Academic success of students (No., %)		P*
	successful	unsuccessful	
Reasons for choosing medicine:			
I was advised to study medicine	19 (32)	40 (68)	0.011
enjoy acquiring knowledge/learning	97 (51)	92 (49)	0.014
for a time I considered pursuing a different course of study	69 (55)	57 (45)	0.015
meeting people/making contacts	47 (45)	57 (55)	0.698
parents	11 (42)	15 (58)	0.681
helping/healing	96 (46)	112 (54)	0.595
there are physicians in my immediate personal surroundings	57 (49)	59 (51)	0.520
I have enrolled in a second course of study	8 (57)	6 (43)	0.583
secure job opportunity awaits me at the end of my studies	14 (39)	22 (61)	0.366
I already have clear ideas about my future specialization	51 (40)	77 (60)	0.020
to improve my possibilities for earning money	27 (48)	29 (52)	0.879
desired profession	85 (44)	108 (56)	0.087
to obtain an academic title	24 (49)	25 (51)	0.752
to optimize my chances of finding a good job	20 (43)	26 (57)	0.627
the status of a physician is desirable	34 (55)	28 (45)	0.185
Study motivation: <sup>†</sup>			
desire to study medicine for (No. of years)	5.7±4.8 (n=110)	7.1±4.7 (n=125)	0.023
academic success is very important to me (mm)	9±9 (n=114)	13±15 (n=130)	0.009
I would be very/not at all upset if I did not complete my medical studies (mm)	14±15 (n=115)	15±19 (n=129)	0.655
my wish to become a physician is sure/unsure (mm)	13±15 (n=115)	12±14 (n=129)	0.607
my parents, friends or others support my decision to study medicine (mm)	12±17 (n=115)	10±15 (n=129)	0.268
I feel that my course of studies is doable (mm)	16±14 (n=114)	25±20 (n=129)	<0.001
I am ready/not ready to give up a lot in order to succeed in my studies (mm)	28±20 (n=115)	28±20 (n=129)	0.963
the study of medicine will be the centre of my life (mm)	31±21 (n=115)	33±21 (n=129)	0.604
generally the course of study seems difficult/not difficult at all to me (mm)	28±17 (n=114)	29±20 (n=130)	0.776
I already have a clear/not at all clear conception of the course of study (mm)	31±18 (n=115)	33±22 (n=130)	0.558
factor 1 <sup>‡</sup> very/not at all present (mm)	16±17 (n=111)	18±17 (n=121)	0.363
factor 2 <sup>‡</sup> very/not at all present (mm)	19±18 (n=109)	23±22 (n=117)	0.156
factor 3 <sup>‡</sup> very/not at all present (mm)	19±17 (n=95)	20±19 (n=103)	0.500
I have clear ideas concerning a physician's job (mm)	24±18 (n=115)	22±21 (n=129)	0.430
family is important/not important to me in my life (mm)	8±12 (n=115)	8±14 (n=129)	0.616
income is important/not important to me in my life (mm)	36±23 (n=115)	40±24 (n=129)	0.189
professional advancement is important/not important to me in my life (mm)	34±23 (n=115)	33±21 (n=128)	0.948
an interesting job is important/not important to me in my life (mm)	6±8 (n=115)	7±11 (n=129)	0.485

\* $\chi^2$ -test for differences between successful and unsuccessful students.

<sup>†</sup>Measured on a linear analogue scale (LAS) from 0 to 100 mm. Data are expressed as mean±standard deviation. Statistics: t-test for differences of means.

<sup>‡</sup>Students' ranking of the most important factors that determined their study motivation.

( $P < 0.001$ ), prefer autonomy over guidance ( $P = 0.044$ ), and are less impaired by nervousness at the exams ( $P < 0.001$ ). Five further items on the style of learning did not bring significant results (Table 4).

### Health Impairment

Unsuccessful students more often reported that their learning capacity is affected by poor health ( $P = 0.002$ ). Nevertheless, no differences were found in the actual state of health or in the possible influence of poor health on students' economic situation (Table 4).

### Ability to Cope with Stress

Successful students felt that they had to overcome some sort of obstacles less frequently ( $P = 0.003$ ), but there were no differences in answers to the question whether these obstacles were hard or easy to bear. Furthermore, there were no differences between groups regarding the answers to the question whether it was easy to get help in demanding situations, and if they experienced psychological strain. There were also no differences in the satisfaction with life and confidence of achieving aims in life (Table 4).

### Access to Information

The question regarding the sources of study-related information (other students, school, helpdesk, brochures, Internet) did not show relevant differences between groups (Table 4).

### Date of Enrollment (by Registration Number)

The date of enrollment had significant ( $P = 0.013$ ) influence on study success. Students who enrolled earlier were more successful (Table 4).

### Discussion

We found at least three factors of key importance in determining students' success in the study of medicine: male sex, German as mother tongue, and superior performance in secondary school. Furthermore, there is evidence that maturity, and intrinsic motivational structure had significant influence. The fact that a primarily unselected student sample was investigated prospectively renders our study unique in an international context, because most studies have been done retrospectively. This approach was made possible by the tradition of open access to higher education in Austria and the size of the Medical University, which allows one to draw large samples of students from one enrollment year. We are aware of

**Table 4.** Learning capacity, health, information access and date of enrollment of academically successful and unsuccessful medical students in the 2002/03 academic year

	Academic success of students (No., %)		P*
	successful	unsuccessful	
Health-information access			
Health impairment	4 (33)	8 (67)	0.383
I have already been in a situation that was very stressful personally	76 (43)	101 (57)	0.083
Have used the information source "other students/friends"	102 (45)	123 (55)	0.156
Have used the information source "school"	43 (52)	40 (48)	0.280
Have used the information source "counseling facilities/brochures"	69 (47)	78 (53)	1.000
Have used Internet as the information source	110 (47)	126 (53)	1.000
Learning capacity (mean±SD)†:			
It has always been easy/difficult for me to learn (mm, range 1-100)	17±17 (n=115)	30±21 (n=129)	<0.001
I am able to study several hours a day (mm)	4±1 (n=115)	3±1 (n=129)	0.306
In order for me to master the material I have to learn, I need to understand it completely/learn it by rote (mm)	15±14 (n=115)	17±17 (n=129)	0.323
I am not bothered/am very bothered by having to learn large amounts of material (mm)	31±17 (n=115)	35±20 (n=128)	0.065
I prefer to learn of my own motivation/for exams (mm)	41±24 (n=115)	41±27 (n=128)	0.997
I prefer to learn under a strict schedule/at my own pace (mm)	54±29 (n=115)	48±30 (n=129)	0.137
I am very nervous/not at all nervous before exams (mm)	37±27 (n=115)	32±28 (n=129)	0.134
The curriculum should provide more orientation and structure/freedom (mm)	38±27 (n=115)	31±25 (n=129)	0.044
I am impaired/not impaired by nervousness at exams (mm)	67±27 (n=115)	52±30 (n=129)	<0.001
Impairment of learning capacity due to health problems (very much/not at all) (mm)	85±23 (n=115)	74±31 (n=127)	0.002
Impairment of my financial situation due to health problems (very much/not at all) (mm)	94±16 (n=114)	91±15 (n=128)	0.258
I have/have not already had experience with overcoming difficulties (mm)	28±24 (n=114)	19±21 (n=129)	0.003
Ability to deal with the stress (very good/very poor) (mm)	56±18 (n=110)	56±19 (n=128)	0.842
It is easy/difficult for me to organize help and support in stressful situations (mm)	37±23 (n=114)	34±22 (n=130)	0.340
Current level of stress (very much/not at all) (mm)	72±21 (n=114)	67±25 (n=130)	0.083
General satisfaction with life (high/very low) (mm)	17±15 (n=114)	17±16 (n=130)	0.928
I am sure/not at all sure that I will achieve my goals in life (mm)	20±17 (n=114)	18±17 (n=129)	0.373
Date of enrollment (mean rank)	111 (115)	134 (130)	0.013

\* $\chi^2$ -test.

†Measured on a linear analogue scale (LAS) from 0 to 100 mm. Data are expressed as mean±standard deviation. Statistics: t-test for differences of means.

the fact that our sample formation may have resulted in another selection bias by unintentionally including only students who attended lectures.

The comparison of our results with similar studies in the national literature is not easy, because the samples are often not comparable: whereas dropout studies compared graduates with students who gave up, the unsuccessful students in our study proved their motivation by taking the exam the second time.

Our study showed that female students were less successful. This finding is partly in accordance with enduring trends in the study of medicine (2). Overall, women at Austrian universities have been reported to be somewhat less successful than men (49% vs 55% complete a degree program), but there are studies which showed opposite trends, e.g. in graduates of the Vienna University of Economics and Business Administration (4). Internationally, a meta-analysis showed marginally higher success rates for female students (5). These discrepancies require further studying.

The students' secondary school performance can predict their study subsequent success. The mean of the sum of the marks of the four school subjects examined (mathematics, physics, chemistry, and English) was 6.8 for successful students, whereas it was 9.5 for those who failed (the scores ranged from 4 to 16).

Internationally, school performance has been found to be an important prognostic factor for study success (6-10) and for a successful medical career (11). Similarly, admission tests seem to be a valid selection criterion (12). In Germany, additional tests were withdrawn from the selection process („*numerus clausus*“) because they only minimally enhanced the prognostic capability of the tests, and because the overall score of the high school diploma outmatched the relevance of single marks (13). In Austria, these results were confirmed in retrospective studies (1,4).

A further prominent factor of failure was native language. Students whose mother tongue was not German had difficulties in studying and completing exams. Our findings suggest that the official proof of German proficiency that is currently required for enrollment is not sufficient to ensure success in the student's later academic career.

Social background, here measured by the parents' level of education, also seemed to

play a minor role. As in the publications by Kolland (1) and Hackl and Sedlacek (4) from Austria, we were not able to detect significant influences. Studies from Switzerland (14) and Germany (15) also did not detect influences of the parents' education on dropout rates. In our sample we found a high percentage of parents with university degree (fathers 49%, mothers 38%, compared to 24% of fathers for all students in Austria in 1997/98, ref. 16), but we were not able to detect a significant influence exerted by this factor. In addition, Farthofer (17) also did not find any correlation between study success and parents' socioeconomic status. We believe that this is a consequence of long period of prosperity in Central Europe and cannot be applied to countries suffering from instability and war (18).

Students' employment status also had no influence on their academic performance. Kolland (1) found correlation between social background and employment, but the fact that we could not find an association may lie in the specific requirements of the new curriculum: the students' week consists of at least 22 hours of lectures and seminars requiring attendance plus almost continuous studying at home. Thus, students have very little time left for other (occupational) activities. Students seem to be aware of the special demands of medical studies; only 9% of freshmen had a job during their first year. In contrast, 35% of all students in Austria have a job continuously, and a further 35% work occasionally, (16). In our sample, we found a distinct difference from overall data with regard to the very small percentage of medical students (8%) who pay by themselves for their studies (overall, 16% of Austrian students work their way through university, whereas 50% work to supplement parental assistance, ref. 16).

Social integration is a well established factor in many areas (preservation of health, psychophysical balance), which prompted us to hypothesize that successful persons are better socially integrated. Our findings did not support this hypothesis, as well as the assumption that unsuccessful students are socially less integrated.

Successful students more often thought about studying other subjects (before deciding in favor of medicine); they had the wish to study medicine for a shorter period of time; they more often expressed that they enjoy acquiring knowledge; they considered themselves able to meet future de-

mands; and they more often considered academic success to be important. Moreover, less frequently they were advised to study medicine. In our opinion, these items indicate a more mature and intrinsic motivation. However, our results are not sufficient to outline a specific motivational factor.

With regard to their perception of the future academic career, successful students were more confident of being able to complete their studies. To test the hypothesis that previous success leads to higher self-esteem, we cross-checked this finding with the marks in school, but did not find significant differences. The fact that male students were significantly more optimistic could be used for pre-study counseling.

In view of the highly structured nature of the new curriculum, the observation that successful students preferred autonomy over guidance (e.g. a thoroughly structured course schedule) is worthy information.

The analysis of a possible influence of the date of enrollment supports the results of Hackl and Sedlacek (4), who found that latecomers, ie students who settle administrative enrollment procedures later (and thus perhaps reluctantly) than others, were less successful. We believe that there is also an association of this finding with the individual's personal organization and motivation.

In conclusion, the causes of the unexpected disadvantage faced by female students should be investigated in future studies. With regard to the advantage of having German as a native language, the efficiency of German courses for foreign students should be improved. More attention should also be given to the importance of language mastery for academic success. In evaluating the highly complex factor of motivation, we regard our findings as a first step towards more highly differentiated investigations. Our general assumption is that the repetition of our study involving other university disciplines would produce valuable data for comparison.

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