

The influence of achievement before, during and after medical school on physician job satisfaction

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Abstract In this longitudinal study, we investigated the relationship between physicians' prior achievements (before, during and after medical school) and job satisfaction, and tested the two lines of reasoning that prior achievements influence job satisfaction positively or negatively, respectively. The participants were graduates who started their medical training in 1982 ($n = 147$), 1983 ($n = 154$), 1992 ($n = 143$) and 1993 ($n = 153$). We operationalised job satisfaction as satisfaction (on a 10-point scale) with 13 cognitive, affective and instrumental aspects of the participants' jobs. The measures of achievement before, during and after medical school included pre-university grade point average, study progress and a residency position in the specialty of first choice, respectively. We included the effect of curriculum type (problem-based learning versus traditional), gender and years of experience as moderator variables. Higher achievers *before* and *during* medical school were more satisfied about their income ($\beta = .152, p < .01$ and $\beta = .149, p < .05$), but less satisfied with their opportunities for personal development ($\beta = -.159, p < .05$). High achievers *after* medical school were more satisfied with professional accomplishments ($\beta = .095, p < .05$), with appreciation from support personnel ($\beta = .154, p < .01$) and from patients ($\beta = .120, p < .05$). Effect sizes were small. Prior achievements influenced job satisfaction. The direction of the influences depended on the job satisfaction aspect in question, which indicates that it is important to distinguish between aspects of job satisfaction. To optimize job satisfaction of high achievers, it is important for graduates to obtain their preferred specialty. Furthermore, it is vital to provide them with enough opportunities for further development.

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Introduction

High job satisfaction of physicians is in the interest of the entire health care context. First of all, physicians' job satisfaction benefits their health, mental health and well-being, and relates negatively to burnout, intention to leave and job or career turnover (Williams and Skinner 2003; Kravitz 2012). Secondly, job satisfaction relates positively to quality of care and patient satisfaction. For instance, it has been found to go along with more conscientious prescription behaviours, less self-reported suboptimal patient care practices, and less self-reported likelihood of making errors (Williams et al. 2007; Williams and Skinner 2003; DeVoe et al. 2002). Patients of satisfied physicians were more satisfied, reported greater trust and confidence, rated care more highly, adhered better to treatment and their no-show rates were lower (Haas et al. 2000; Grembowski et al. 2005; Linn et al. 1985; DiMatteo et al. 1993). Last, but not least, these positive influences of job satisfaction may imply economic value for society as a whole. They may reduce costs of treating and/or replacing physicians who are ill, depressed, burned out or who withdraw from medical practice (Sibbald et al. 2003; Buchbinder et al. 1999), and costs of medical errors that cause injury or death as consequence (Williams and Skinner 2003). Considering the importance of job satisfaction to physicians' well-being and to quality of care, it is important to investigate factors that contribute to or decrease job satisfaction.

To identify variables that contribute to doctors' job satisfaction, most studies concentrated on organizational or psychological factors, while only a few focused on academic performance and choices earlier in life (McManus et al. 2003; Hojat et al. 2010). This is surprising, since prior achievements play an important role in selection procedures for admission to undergraduate as well as postgraduate medical education (Myerson 2003). Prior achievements can influence job satisfaction in two ways (McManus et al. 2003). On the one hand, high achievers may experience less difficulty in keeping up with the rapidly expanding body of medical knowledge, and—as a result—be more satisfied with their jobs (Hojat et al. 2010). If this line of reasoning is valid, prior achievements can be expected to influence job satisfaction positively. On the other hand, high achievers may experience less job or career satisfaction due to a lack of challenges. Some suggest, for instance, that physicians' patterns of work tend to be rather routine which may cause a lack of cognitive or intellectual stimulation (West 2001; Petrozzi et al. 1992). If this line of reasoning is valid, prior achievements can be expected to influence job satisfaction negatively. Studies investigating the influence of prior academic performance on job or career satisfaction (McManus et al. 2003; Hojat et al. 2010) did not provide strong evidence for either of these lines of reasoning.

The fact that the previous studies did not find a clear influence of prior achievements on job satisfaction may be attributed to the satisfaction measures used. Job satisfaction was measured by only one (Hojat et al. 2010) or some rather general satisfaction questions (McManus et al. 2003; Borges et al. 2005). Job satisfaction, however, covers multiple aspects like autonomy, contact with colleagues, and the way in which the work is organized. Not distinguishing between aspects, but fusing satisfaction with separate aspects of the job in an overall measure of job satisfaction may imply cancelling out positive and negative ratings of different job satisfaction aspects. To avoid such an intermingling of

judgments, we distinguished between aspects of job satisfaction in our longitudinal study of the influence of prior achievements on job satisfaction. We investigated whether one of the two lines of reasoning, i.e. a positive or a negative influence of prior achievements on job satisfaction, was supported when distinguishing between different aspects of job satisfaction.

To obtain an adequate and refined picture of physicians' job satisfaction, Ostroff's taxonomy of organizational climate perceptions can be used (Ostroff 1993). Ostroff's taxonomy has been commended as a comprehensive classification that reflects the integration of existing literature (Carr et al. 2003) and it seems suitable as a conceptual framework for measuring job satisfaction. It distinguishes three broad sets of satisfaction dimensions or 'satisfaction domains': satisfaction with cognitive, affective and instrumental aspects of the organizational climate. The *cognitive* domain pertains to aspects like self-development and autonomy, the *affective* domain to interpersonal and social relations among workers, and the *instrumental* domain to getting things done in the organization. We investigated the influence of achievement before, during and after medical school on satisfaction with the cognitive, affective and instrumental aspects of job satisfaction.

To investigate the influence of achievements *before*, *during* and *after* medical school on job satisfaction, several indicators of study success can be used. For the achievement *before* medical school, *pre-university GPA* seems to be a relevant proxy. Pre-university GPA has predictive value for later achievement levels and is an important parameter for admission to medical schools (Myerson 2003). For achievement *during* medical school, *study progress* in terms of (inverse) study duration is an indicator of study success (Cohen-Schotanus 1994; Cohen-Schotanus et al. 2006). Attaining a residency position in the preferred specialty after graduation can be considered as an indicator of achievement *after* medical school (Cohen-Schotanus et al. 2006). Around 25 % of the physicians are not admitted to their preferred specialty (Cohen-Schotanus et al. 2006; Goldacre et al. 2010; Keeton et al. 2007; Spiegel et al. 2004), which may negatively affect job satisfaction. We examined whether and how pre-university GPA, study progress and obtaining the residency position of first choice influenced physicians' satisfaction with the cognitive, affective and instrumental aspects of their jobs. In addition, we related our outcomes to the two lines of reasoning, that prior achievements influence job satisfaction positively or negatively, respectively.

Methods

Respondents and procedure

This study was part of a larger, longitudinal study of the Groningen Center for Research and Innovation in Medical Education, during which the respondents were interviewed regularly since 1993 (cohorts 1982 and 1983) and 2003 (cohorts 1992 and 1993). During the recurrent interviews, which were strongly structured, respondents were inquired each time about aspects such as where they work, in what kind of discipline they work, and their actual and preferred job size. At each data collection moment, one additional subject was inquired in-depth, for instance, their satisfaction with the curriculum they followed or their desire to have children. During the most recent data collection moment (in 2009/2010), their job satisfaction was inquired in-depth.

The current study only included data from the 'discontinuous' part of the larger, longitudinal study, that is, data that were not gathered periodically. Besides job satisfaction,

we included the following achievement data in our study: (1) pre-university GPA, which was used as an indicator of achievement before medical school, (2) study progress in terms of (inverse) study duration, used as an indicator of achievement during medical school, and (3) a residency position in the preferred specialty, an indicator of achievement after medical school.

Our respondents were 678 graduates who started medical training at the University of Groningen in 1982 ($n = 166$), 1983 ($n = 167$), 1992 ($n = 171$), and 1993 ($n = 174$). Of the initial 678 graduates, 81 (12 %) dropped out of our longitudinal study because they had emigrated, did not practise medicine anymore, were chronically ill, or had passed away (Table 1). Therefore, the remaining study population for the 2009/2010 interviews comprised of 597 graduates (147 graduates from cohort 1982, 154 from cohort 1983, 143 from cohort 1992, and 153 from cohort 1993). Participation was voluntary and confidentiality was guaranteed. All respondents were informed about the study and gave their consent. Two experienced interviewers interviewed the respondents. On average, an interview took 15–20 min.

Variables

Dependent variables: aspects of job satisfaction

In line with Ostroff's taxonomy (Ostroff 1993), we measured job satisfaction with the cognitive, affective, and instrumental aspects of the job. The job satisfaction aspects included were all based on literature and relate to the medical context. The *cognitive* domain, which relates to the self and individuals' involvement in work activities, includes job satisfaction with growth, innovation, autonomy (e.g. control over own work), and intrinsic rewards (e.g. formal recognition and awards based on ability and effort). We operationalized this domain as *opportunities for personal development* (Hojat et al. 2010; Locke 1976; Moos 1973, 1974), *satisfaction with professional accomplishments* (McManus et al. 2003; Hojat et al. 2010; McMurray et al. 2005), *control over work planning*, *control over work content* (Locke 1976; SHM Career Satisfaction Task Force 2006; McMurray et al. 2005) and *administrative work* (McMurray et al. 2005; Van Ham et al. 2006). The *affective* domain, which encompasses satisfaction with interpersonal and social relations among workers, includes participation (e.g. perceived influence in joint decision making), cooperation, warmth, and social rewards. We operationalized the

Table 1 Number of graduates, study population and participants per cohort

Cohort*	1982	1983	1992	1993
Graduated	166	167	171	174
Dropout**	7	5	13	10
Emigrated	12	8	15	11
Study population	147	154	143	153
Missing	7	2	7	13
Refused to participate	7	12	15	11
Willing to participate (response rate)	133 (90 %)	140 (91 %)	121 (85 %)	129 (84 %)

* year entering medical school

** due to personal reasons (chronically ill, death or notification in previous interviews that the respondent left the field of medicine)

affective domain as *cooperation with colleagues*, *cooperation with supporting personnel*, *appreciation from colleagues*, and *appreciation from supporting personnel* (Locke 1976; SHM Career Satisfaction Task Force 2006; Moos 1973, 1974; McMurray et al. 2005; Van Ham et al. 2006). The *instrumental* domain, which pertains to getting things done in the organization, includes satisfaction with hierarchy, structure, and extrinsic rewards (e.g. pay, assignments). We operationalized the instrumental domain as *cooperation with management* (Locke 1976; McMurray et al. 2005), *balance work-life* (SHM Career Satisfaction Task Force 2006; Van Ham et al. 2006), *income* (Locke 1976; Van Ham et al. 2006), and *appreciation from patients* (SHM Career Satisfaction Task Force 2006; McMurray et al. 2005; Van Ham et al. 2006). The job satisfaction data were collected verbally. Respondents rated each aspect on a 10-point scale (1 = not satisfied at all, 10 = extremely satisfied).

Independent variables

Pre-university GPA (Pu-GPA) is the mean of marks on seven secondary school examination subjects, four of which are required for admission to medical school. The marks are given on a 10-point scale, with 5.5 as the cut-off score. Because Pu-GPA represents the average of seven scores on a 10-point scale, it can be considered a continuous 1–10 variable.

Study progress served as an indicator of achievements during medical school. It was operationalized as the time (in months) that students took to complete medical school. In our country, study duration is a useful proxy of (inverse) study success, because successful students need less time to graduate (Cohen-Schotanus et al. 2006). After reversing study duration scores, higher scores indicated better study progress or more study success. Pu-GPA and study duration were derived from student records.

A residency position in the specialty of first choice refers to whether the graduate had obtained the residency position of preference (First Choice, FC).

Moderator variables

The cohorts 1982/83/92 participated in a traditional discipline-based curriculum, whereas the cohort 1993 completed a problem-based learning curriculum. Since students in PBL curricula have been shown to be more satisfied with their program than students from traditional curricula (Cohen-Schotanus et al. 2008; Mennin et al. 1996; Kaufman and Mann 1996), *curriculum type* might be a potential confounder. Therefore, we included *curriculum type* (Curr) as a moderator variable in our study.

Gender (G) was included as a moderator variable, because females have been found to consistently outperform their male peers during undergraduate medical training and clinical assessments (Ferguson et al. 2002).

Years in practice (YP) was also included as a moderator variable, because at the time of the interview, physicians from the 1982/83 cohorts had around 20 years in practice and physicians from cohorts 1992/93 around 10 years.

Research design and data analysis

The data used in the current study were collected in the temporal order of their occurrence in time: pre-university GPA and study progress in terms of (inverse) study duration were—

with permission of the respondents—retrieved from the administration records in the begin stage of the longitudinal study. Whether respondents attained a residency position in the preferred specialty after graduation was asked halfway the longitudinal study. The job satisfaction data were collected during the most recent series of interviews in 2009/2010. Our lines of reasoning in the introduction—that prior achievements may influence job satisfaction positively as well as negatively—required regression analysis. In accordance with the lines of reasoning and the temporal order of events, we used multiple linear regression analysis to assess the influence of the prior achievements on job satisfaction. We included ‘Pu-GPA’, ‘study progress’ and ‘residency position in the specialty of first choice’ as independent variables in the analysis and the 13 aspects of job satisfaction as the dependent variables. We also included the moderator variables ‘curriculum type’, ‘gender’ and ‘years in practice’, and the interactions between the independent variables and the moderator variables. However, interactions between ‘curriculum type’ and ‘years in practice’ were excluded because of multicollinearity. We also included interactions between the moderator variables. We used effect coding (unweighted) to estimate the effect of the predictor ‘residency position in the specialty of first choice’ and the moderator variables ‘curriculum type’, ‘gender’ and ‘years in practice’ (see Table 2 for coding scheme). We centred the variables ‘pu-GPA’ and ‘study progress’ around their grand means. We considered P-values of less than .05 statistically significant. The beta coefficients (standardized regression coefficients) serve as effect-size metrics, with effect sizes of 0.10, 0.30 and 0.50 being considered as small, moderate and large effect sizes respectively (Cohen 1992). We decided not to report interaction variables that did not contribute significantly to the explanation of job satisfaction.

Results

The response rate was, on average, 88 % (90 % in cohort 1982, 91 % in cohort 1983, 85 % in cohort 1992, and 84 % in cohort 1993; see Table 1). Of the 523 respondents, 265 were male (51 %) and 258 female (49 %). With respect to the position of the respondents, 271 were clinical specialists (52 %), 125 general physicians (24 %), 47 residents (9 %), and 80 had another medical profession (15 %). The average scores on the job satisfaction aspects ranged from 5.4 for satisfaction with *administrative work* to 7.8 for satisfaction with *professional accomplishments*, with the majority of the average scores being around 7.5.

Relation between achievements before medical school and job satisfaction

Physicians with higher pu-GPA scores were more satisfied with their *income* ($\beta = .152$). Interaction effects between pu-GPA and years of practice were found for *opportunities for personal development* ($\beta = -.119$) and *appreciation from colleagues* ($\beta = -.123$). On average, physicians 10 years in practice were more satisfied with their *opportunities for personal development* than those already 20 years in practice. When pu-GPA was taken into account, satisfaction of physicians 10 years in practice with *opportunities for personal development* related slightly negatively to pu-GPA scores, whereas for physicians 20 years in practice satisfaction with this aspect related positively to pu-GPA scores. Physicians 10 years in practice with low pu-GPA were more satisfied with their *appreciation from colleagues* than those with low pu-GPA already 20 years in practice. For physicians 10 years in practice, pu-GPA related negatively to satisfaction with *appreciation from*

Table 2 Variables and scales

Variable	Scale
Independent variables	
pu-GPA (GPA)	pu-GPA minus average pu-GPA (mean = 0)
Study progress	The inverse of (study duration in months minus average study duration in months) (mean = 0)
Residency position in the specialty of first choice (FC)	-1 = no 1 = yes
Curriculum type (Curr)	-1 = Traditional curriculum (cohorts 1982, 1983, 1992) 1 = Problem Based Learning (cohort 1993)
Moderator variables	
Gender (G)	-1 = female 1 = male
Years in practice (YP)	-1 = 20 years (cohorts 1982 and 1983) 1 = 10 years (cohorts 1992 and 1993)
Dependent variables	
13 facets of job satisfaction (see Table 3)	10-point (1–10)

colleagues, whereas for those 20 years in practice, it related positively to satisfaction with *appreciation from colleagues*.

Relation between achievements during medical school and job satisfaction

Physicians who had more study success during medical school were less satisfied with their *opportunities for personal development* ($\beta = -.159$) and more satisfied with their *income* ($\beta = .149$).

Relation between achievements after medical school and job satisfaction

Physicians who had obtained their preferred residency position were more satisfied with their *professional accomplishments* ($\beta = .095$), the *appreciation from support personnel* ($\beta = .154$), and the *appreciation from patients* ($\beta = .120$). We also found a FC/YP interaction effect for *appreciation from colleagues* ($\beta = .162$). After 10 years in practice, physicians working in their discipline of first choice were more satisfied with *appreciation from colleagues* than physicians not working in their discipline of first choice. After 20 years in practice, however, the outcomes were reversed: physicians working in their discipline of first choice were *less* satisfied with *appreciation from colleagues* than those *not* working in their discipline of first choice.

Relation of the moderator variables with job satisfaction

Males were more satisfied with *professional accomplishments* ($\beta = .191$) and *cooperation with support personnel* ($\beta = .143$) than female physicians. Physicians practicing for 20 years were less satisfied with their *opportunities for personal development* ($\beta = .230$) than physicians practicing for 10 years and more satisfied with the balance between work and private hours ($\beta = -.219$). We also found an interaction effect between gender and

Table 3 Results of the multiple linear regression analysis: aspects of job satisfaction

Domain	Dependent variables: Aspects of job satisfaction	Independent variables				Moderators			Interactions			
		Constant	GPA	Study progress	First Choice (FC)	Curr.	Gender (G)	Years Pract. (YP)	G/YP	GPA/YP	FC/YP	
The cognitive domain	Opportunities for personal development	p	<.001	.934	.030	.210	.115	.541	.002	.753	.014	.844
		B	7.540	-.006	-.013	.063	.105	-.037	.227	-.021	-.168	-.010
		β		-.004	-.159	.059	.092	-.038	.230	-.022	-.119	-.010
	Satisfaction with professional accomplishments	p	<.001	.099	.357	.043	.452	.002	.658	.734	.944	.325
		B	7.758	.093	.005	.084	.041	.155	-.027	-.019	.004	.041
		β		.080	.069	.095	.044	.191	-.034	-.023	.003	.050
	Control over work planning	p	<.001	.899	.787	.828	.199	.103	.135	.583	.407	.464
		B	6.569	.013	-.002	-.016	-.124	.143	-.162	.054	-.083	.053
		β		.006	-.020	-.010	-.075	.101	-.114	.038	-.040	.038
	Control over work content	p	<.001	.773	.564	.861	.253	.100	.646	.794	.148	.138
B		6.963	-.024	-.004	-.011	-.094	.122	-.042	-.022	-.123	.092	
	β		-.014	-.044	-.008	-.068	.102	-.035	-.018	-.071	.077	
Administrative work	p	<.001	.067	.177	.392	.149	.247	.198	.031	.965	.720	
	B	5.414	.195	-.013	-.067	-.149	-.108	.150	.230	.005	-.028	
	β		.091	-.103	-.041	-.086	-.073	.100	.154	.002	-.019	
Cooperation with colleagues	p	<.001	.092	.152	.843	.715	.223	.175	.540	.497	.261	
	B	7.659	.106	-.008	.009	-.022	.068	.093	.038	-.043	.052	
	β		.083	-.108	.009	-.022	.076	.105	.043	-.033	.059	
Cooperation with support personnel	p	<.001	.561	.616	.935	.232	.024	.824	.455	.553	.077	
	B	7.352	.032	.002	.003	-.063	.108	-.013	-.040	-.032	.072	
	β		.029	.038	.004	-.072	.143	-.018	-.053	-.029	.094	

Table 3 continued

Domain	Dependent variables: Aspects of job satisfaction		Independent variables					Moderators			Interactions		
			Constant	GPA	Study progress	First Choice (FC)	Curr.	Gender (G)	Years Pract. (YP)	G/YP	GPA/YP	FC/YP	
The instrumental domain	Appreciation from colleagues	p	<.001	.435	.485	.491	.632	.150	.965	.159	.011	.002	
		B	7.742	.039	-.003	.025	-.023	.064	.002	-.070	-.127	.116	
	Appreciation from support personnel	p	<.001	.216	.360	.001	.147	.069	.388	.818	.857	.800	
		B	7.586	.066	-.004	.127	.075	.086	.051	.012	.010	.010	
	Cooperation with management	p	<.001	.484	.089	.154	.086	.114	.067	.016	.009	.013	
		B	6.378	.075	-.016	-.085	-.101	.027	.136	.084	-.008	.063	
Balance work—private hours	p	<.001	.940	.201	.228	.743	.844	.004	.113	.860	.174		
	B	6.981	-.007	.010	-.079	.029	-.015	-.280	.141	-.016	.089		
Income	p	<.001	.003	.050	.255	.608	.797	.065	.926	.850	.590		
	B	7.599	.259	.015	.070	.041	-.019	-.168	-.008	-.016	-.033		
Appreciation from patients	p	<.001	.178	.692	.014	.604	.481	.972	.382	.921	.310		
	B	7.606	.068	.002	.092	-.025	-.032	-.002	.044	-.005	-.038		
		β	.068	.030	.120	-.031	-.045	-.003	.062	-.005	-.054		

GPA = pre-university grade point average, First choice (FC) = residency position in specialty of first choice, Curr = curriculum, G = gender, Years Pract. (YP) = years of practice

G/YP, FC/YP and GPA/YP reflect the interactions between G and YP, FC and YP, and GPA and YP, respectively, within the particular facets. The statistical significance (p), regression coefficients (B) and standardized coefficients (β) are shown. The bolditalic values represent statistical significance (p < 0.05). Interaction variables were included in the model, but not presented in the table if they did not contribute significantly (p < 0.05) to any of the job satisfaction aspects

years in practice: male physicians who were 20 years in practice were less satisfied with *administrative work* than their female colleagues 20 years in practice and their male and female colleagues 10 years in practice ($\beta = .154$). Curriculum type did not influence any aspect of job satisfaction. All effect sizes were small.

Discussion

The main purpose of our longitudinal study was to find out whether and how physicians' achievements *before*, *during* and *after* medical school influence job satisfaction with the cognitive, affective, and instrumental aspects of the job. In addition, we investigated whether either of the two lines of reasoning was supported that prior achievements influence job satisfaction positively or negatively. Our outcomes provided support for both lines of reasoning, dependent on the aspect of job satisfaction in question. Higher achievements went along with increased satisfaction with the instrumental aspects of the job. However, the outcomes for the cognitive and affective domains of job satisfaction contained both positive and negative relationships between prior achievements and job satisfaction.

High achievers *before* and *during* medical school tended to be more satisfied with *income*. The higher the GPA's before medical school and the better the achievements of physicians during medical school—i.e. the faster they progressed through medical school—the more satisfied they were with *income*. This finding cannot be explained from higher incomes: the higher achievers in our study did not report higher incomes (data not published). Possibly, high academic achievement reflects high intrinsic motivation (Kusurkar et al. 2013), which has been found to correlate positively with satisfaction with income (Stringer et al. 2011). It may be that highly intrinsically motivated persons are more easily satisfied with income because they view income as less important than personal and professional fulfillment.

If personal and professional fulfillment is indeed more important to high achievers, our finding that high achievers *during* medical school tended to be less satisfied with their *opportunities for personal development* is alarming. A commentary (West 2001) on the BMJ editorial 'Why are doctors so unhappy?' (Smith 2001) already acknowledged the difficulty of advancing through a career in the medical professions since physicians' work days look very much the same, year in, year out. This lack of challenges may cause boredom and unhappiness. Such a phenomenon may especially be true for high achievers as they may have more difficulties finding job enrichment and need more challenges than their professional careers provide (West 2001). This outcome corresponds with the second line of reasoning in our introduction, that successful physicians may have lower job or career satisfaction due to a lack of challenges.

High achievers *after* medical school (i.e. physicians who had obtained their preferred residency) were more satisfied with their *professional accomplishments*, *appreciation from support personnel* and *appreciation from patients* than physicians with a career in a non-first choice discipline. Their higher satisfaction with *professional accomplishments* may be explained from the fact that obtaining the residency of first choice can be seen as an early professional accomplishment and thus as a step towards professional fulfilment, which seems to be an indicator of job satisfaction (Brown and Gunderman 2006; Locke 1976). An explanation for their higher satisfaction with the *appreciation from support personnel* and *patients* may lie in 'occupational specialty congruence' (Meir and Melamed 2005), which refers to the match between one's vocational interests and the specialty in which one

works. Research has shown a positive relation between such a match and job satisfaction (Meir and Melamed 2005). Congruence between preferred and obtained specialty may benefit satisfaction in two ways. First, physicians in preferred specialty positions may thrive more than those in non-preferred positions, which may increase their well-being and benefit their behaviour towards co-workers and patients and the appreciation that they get in return. Second, physicians working in a first choice discipline may match better with their colleagues. It may be that similarity to the members of the selection committee played a role in the selection procedure. In psychological theory, this is known as the “similarity principle” (Byrne et al. 1986). It refers to how closely personality, interests, attitudes, and values match between people. Similarity (a close match) has been found to go along with more interpersonal attraction and positive views of the people belonging to the same group, also known as “in group bias” (Brewer 2007). Employing physicians with a preference for the specialty for which they apply may result in a congenial or homogeneous group of co-workers, which may benefit the mutual relationships and increase satisfaction with *appreciation from support personnel*. As a result, their well-being may increase and positively influence how they treat their patients and the appreciation that they get in return. An explanation for the finding that higher achievers after medical school were more satisfied with the *appreciation from patients* may be that they simply performed better, which may have resulted in more appreciation from their patients (Grol et al. 1985). Our finding may also be attributable to increased well-being of physicians working in their preferred discipline, which may have positively affected their approach of patients and the appreciation they received in return (Grol et al. 1985).

In our introduction, we presented two lines of reasoning: prior achievements can be argued to influence job satisfaction positively as well as negatively (McManus et al. 2003). Our outcomes did not provide consistent evidence for just one line of reasoning: both lines of reasoning found support. The direction of the relationship depended on the specific job satisfaction aspect involved. The fact that achievements and job satisfaction related both positively and negatively provides support for our decision to distinguish between different aspects of job satisfaction: obviously, such a distinction adds to the understanding of the relationship between previous achievements and the broad concept of job satisfaction. Therefore, we recommend applying Ostroff’s (1993) conceptual framework in future job satisfaction research.

Strengths and limitations

The strengths of this study are the inclusion of four cohorts of graduates, the high response rates, and the broad coverage of the concept of job satisfaction by focusing on all three essential domains. The high response rates reduce the risk that a ‘healthy worker effect’ occurs by satisfied physicians being more likely to respond.

A first limitation of this study was that all graduates attended the same medical school. However, our cohorts can be considered representative of Dutch medical physicians. Curricula in the eight medical schools in the Netherlands are very similar, with all of them using the Dutch National Blueprint for medical education (Metz et al. 1994). The entrance levels of the Dutch medical students were also comparable as they were all admitted to one of the medical schools by a national lottery system. **Second, we limited the measurement of job satisfaction to 13 aspects that we encountered most often in the literature. Although we acknowledge that there may be more job satisfaction aspects that could be included in the job satisfaction measure, we addressed all 3 domains of Ostroff’s taxonomy with our job satisfaction aspects and the job satisfaction aspects included seem relevant for the medical**

context. Third, we did not intend to develop an extensive job satisfaction instrument. Each of the three job satisfaction domains covers a variety of job satisfaction aspects. The fact that respondents may be satisfied with some aspects, but dissatisfied with others, and that these satisfaction patterns may differ across respondents implies that the internal consistency within a domain will be low. For instance, some respondents may be satisfied with their opportunities for personal development and dissatisfied with the amount of administrative work that their work includes, whereas other respondents may not only be dissatisfied with their opportunities for personal development, but also with the amount of administrative work that their work includes. However, the value of our measurement instrument does not lie in the internal structure or its construct validity, but in the relevance of the individual items. In other words, each aspect of job satisfaction measured must be taken as meaningful in itself (cf Schuwirth 2009). A fourth possible limitation of our study is the use of self-reports. However, using self-reports is inevitable when investigating job satisfaction: job satisfaction by definition takes place within the heads of individuals. Nevertheless, our findings can be readily explained, which supports the reliability of our outcomes. Fifth, we limited this study to three independent variables that may affect different aspects of job satisfaction, and three potential moderator variables. We did not take into account other intrinsic and extrinsic factors, that have been found to affect job satisfaction, for instance motivation (Lambrou et al. 2010) or emotional intelligence (Psilopanagioti et al. 2012). We realize that, after so many years, interference from several organizational, psychological and personal factors may have blurred the relations between prior achievement levels and job satisfaction. This might explain why we only found small effect sizes. It may be that the effects would have been stronger if we would have been able to control for abovementioned factors.

Practical implications

Considering that physicians' high job satisfaction positively affects their personal lives, patient outcomes and society as a whole (Williams et al. 2007; Williams and Skinner 2003; DeVoe et al. 2002; Haas et al. 2000; Grembowski et al. 2005; Linn et al. 1985; DiMatteo et al. 1993; Sibbald et al. 2003; Buchbinder et al. 1999; Wallace et al. 2009), the question arises: what are the implications of our findings for physicians or medical policymakers? First, physicians who were successful during their study should have enough challenges in order to avoid boredom. Challenges may include giving physicians the possibility to train residents, conduct research or create a distinct profile for themselves (Van Ham et al. 2006). Second, our results indicate that to optimize physicians' job satisfaction, it is important that they gain the residency position they prefer. The fact that about a quarter of the physicians has been found to work in a non-first choice discipline (Cohen-Schotanus et al. 2006; Goldacre et al. 2010; Keeton et al. 2007; Spiegel et al. 2004) is worrisome—since insufficient job satisfaction or even dissatisfaction can affect the quality of health care negatively (Dyrbye and Shanafelt 2011; Motowidlo et al. 1986; Landon et al. 2006)—and increases the importance of our findings. In general, the more popular specialties are, the harder it is for applicants to attain the preferred position: some specialties are faced with a redundancy of applicants with competition ratios of up to 40:1 applicants to posts (Hamilton 2009) or even more (Raine et al. 2011). Less popular specialties, on the other hand, have a hard time to find enough graduates to fill vacancies (Bautista 2012) and are less in the position to select on criteria beyond that of meeting the minimum requirements (Raine et al. 2011). Consequently, less popular specialties may employ more “non-first choice” physicians. Including career choice in admission procedures may help to achieve a

better match between supply and demand of suitable applicants and warrant that more applicants obtain their preferred residency. The approach of the Faculty of Veterinary Medicine in the Netherlands might serve as an example (Haarhuis et al. 2009). This faculty admits eligible candidates with an interest in less popular veterinary sectors in any case, in order to meet societal needs and prevent shortages in less popular veterinary sectors. Likewise, immediately admitting medical students who meet all selection criteria and prefer less popular disciplines may help to meet the needs of these specialties and of society better, and increase the numbers of physicians that obtain their preferred residency.

To conclude, physicians' prior achievements influenced job satisfaction. The direction of these influences differed from one aspect of job satisfaction to another. Our study shows that it is important to distinguish between aspects of job satisfaction rather than treat job satisfaction as a general concept. To optimize job satisfaction of high achievers, it is vital to provide them with enough opportunities for further development. In addition, it is important for graduates to obtain the specialty of first choice.

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