Deciding upon a career within the medical field

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CHAPTER 2

Profiling the Career Conceptions of Medical Applicants: Their Study Choice Certainty and Aspired Work Environment[1]

[1] This chapter is under review as: Guntern, S., Korpershoek, H., & van der Werf, G. Profiling the Career Conceptions of Medical Applicants: Their Study Choice Certainty and Aspired Work Environment.

Abstract

Since medical education attracts more applicants than there are study places available, the question has been raised how to select the best fitting applicants. Our approach to answering this question was two-fold. First, we studied the medical applicants' personal profiles, using data of 5607 participants in a self-administered assessment. The items investigated included their vocational interests (Holland's RIASEC scales), their interest in prestigious professions and their scores on self-discipline, social activity and self-efficacy. Second, latent class analysis (a person-centered approach) was performed to identify distinct subgroups. The following 4-cluster solution best fitted our data: a social, an investigative, a prestigious and an ambitious group. Next, we related these clusters to the applicants' prior performance and their career conceptions, such as study choice certainty and aspired work environment. The results revealed that applicants from the investigative cluster were less convinced about studying medicine (31% agreed to this choice as compared to an average rate of 54% of the applicants from the other clusters) and less decided about their aspired work environment (21% were undecided as compared to an average rate of 12% of the applicants from the other clusters). Practical implications of the differences found among medical applicants are discussed.

Keywords: Career conceptions – Applicants' self-selection – Latent class analysis – Non-cognitive factors

Introduction and Problem Statement

In the medical studies, the question how to select the best fitting students has recently become more relevant. This is because at many universities there are currently more applicants for these studies than available study places (O'Neill, Hartvigsen, Wallstedt, Korsholm, & Eika, 2011; Urlings-Strop, Stijnen, Themmen, & Splinter, 2009). Therefore, most universities have introduced selection criteria for acceptance to the programs (for an overview see Benbassat & Baumal, 2007; Monroe, Quinn, Samuelson, Dunleavy, & Dowd, 2013). Mostly, these criteria are based on cognitive factors, such as students' high school grades or their performance on standardized tests. In recent years, however, the assessment of non-cognitive factors, such as personality characteristics and motivational aspects, as well as demographic data has increasingly been considered (Monroe et al., 2013; Searle & McHarg, 2003). This development is partly the result of modifications to the medical curricula, which emphasize a more patient-centered education approach with more teamwork than was the case in the past (Monroe et al., 2013). Furthermore, there is currently also a discussion in the medical field about selecting the 'best suitable' applicants in terms of future work requirements (Searle & McHarg, 2003). Becoming a family doctor, for example, requires empathic and communication skills. In general, however, the goal of the selection procedure lies in selecting those applicants who have a minimum chance of dropping out at a certain point in time, either during their studies or later on during their professional careers (Arulampalam, Naylor, & Smith, 2007).

In previous research, the selection of the most promising applicants for the medical studies has generally been based on study success criteria (Monroe et al., 2013; O'Neill et al., 2011; Searle & McHarg, 2003). Less attention has been given to the consideration that any selection depends on the composition of the pool of applicants. Benbassat and Baumal (2007) argued that an effective self-selection would improve the quality of the pool of suitable applicants. They proposed that providing applicants with appropriate information on specific issues such as the pressure of training and practice (e.g., high burn-out rate among physicians) would contribute to the selection of suitable applicants. It was therefore presumed that having realistic information available about the medical curricula would enable prospective students to make better-founded decisions regarding their study of choice.

One way of achieving this objective was to offer applicants a free and voluntary self-administered assessment. Such an assessment could give them a better impression of the medical studies. Moreover, the feedback would facilitate a comparison between the applicants and the current medical students (as reference group). In this way, study-relevant personal characteristics desirable to become a successful student and future physician could be identified. For example, the comparison might reveal that an applicant was less interested in helping others than the majority of the medical students. However, since the medical education is very broad and has many different specializations, this applicant might nevertheless be a fit to become a successful and satisfied physician. The feedback received via the self-administered assessment would enable applicants to think about their study choice in more depth and be more aware of their position relative to the average student. The actual purpose of this assessment was therefore not to select applicants, but to enable them to make well-informed study decisions. Making a wise study decision requires a realistic perception of oneself and of the preferred study. Based on the congruence hypothesis, we argue that applicants will perform better and be more satisfied with their study choice if their personal characteristics are in line with the characteristics of their preferred study and working environment (Holland, 1996).

As aforementioned, medicine offers a very broad program spectrum (combining natural sciences with practical aspects) and a variety of work environments (Stratton, Witzke, Elam, & Cheever, 2005). Our study is focused on realizing ways of obtaining a more elaborated picture of its applicants and their career conceptions. Therefore, we used the data of a self-administered assessment already implemented which, among other issues, measured applicants' non-cognitive characteristics as well as some career-related variables (e.g., performance, study choice, aspired work environment). These data allowed us to identify distinct subgroups of applicants based on their vocational interests, their interest in prestigious professions (referred to as prestige), their self-discipline, their social activity and their self-efficacy. Additionally, we aimed to describe the identified subgroups in more detail than only in terms of their non-cognitive scale values. Therefore, we also looked at their performance at high school, their study choice certainty and their aspired work environment (referred to as career-conception-related variables).

Our research has yielded specific additional knowledge that could be used in updating the current assessments. The more elaborate feedback resulting from our adaptations may

enable upcoming applicants to make better informed decisions regarding their choice to either opt or not opt for the medical studies. For example, more socially oriented applicants may benefit from the information that natural sciences are a key aspect in the first study years, while more investigative-oriented applicants may find it useful to know that clinical clerkships form an integrative part later on in the studies. Because we linked the identified subgroups to their aspired work environment, the feedback could also address work options after graduation. For example, applicants who are more interested in investigative activities may appreciate additional information about non-clinical job possibilities. In general, the current self-administered assessments provide applicants with general objective information about the medical study programs. Providing realistic information during the admission process, however, is likely to result in a larger pool of well-suitable applicants (Benbassat & Baumal, 2007; Lambe & Bristow, 2011).

Holland's Theory of Vocational Choice

In vocational psychology, researchers and counselors often rely on the typology of Holland (1996) to describe people's vocational identity. Holland (1996, 1997) proposed the following six (personality) types (abbreviated as RIASEC): realistic (e.g., practical and technical), investigative (e.g., analytic and intellectual), artistic (e.g., creative and expressive), social (e.g., helpful and empathic), enterprising (e.g., extroverted and assertive) and conventional (e.g., conforming and conscientious). The core of this theory is based on the person-environment fit (P-E fit), assuming that people seek out those environments in which their specific (personality) traits can best be expressed (Holland, 1996, 1997). Thus, individuals within a certain environment have similar personalities. So according to the theory, a person's vocational behavior is substantially influenced by the fit between his/her personality and the characteristics of the environment. The better the fit, the higher the work satisfaction (Tranberg, Slane, & Ekeberg, 1993), work performance (Tracey & Robbins, 2006) and career stability (Donohue, 2006).

Holland (1997) argued that there are several methods to measure (personality) type and classify occupations. The (personality) type of a person, which corresponds with the highest RIASEC scores, is usually assessed via a questionnaire (e.g., vocational preference inventory or self-directed search), whereby the rank order of the scales represents the person's personality pattern. The environment assessment technique (EAT) is a method to

describe environments using a three letter code. This description reflects the ranked scales of the individuals working in a certain environment. These people have been categorized beforehand into one of the six (personality) types based on their highest RIASEC score. A more complex analysis was performed to categorize the occupations as listed in the Dictionary of Holland Occupational Codes. According to Eggerth**,** Bowles, Tunick, and Andrew (2005), however, there is 'no best method' to classify environments. Nevertheless, precise descriptions of the environments are important when using the P-E fit hypotheses (Eggerth et al., 2005; Lent & Lopez, 1996).

Personality Traits Within the Theory of Holland

As already mentioned, the theory of Holland (1996, 1997) focuses on the fit between personality types and the characteristics of preferred environments. So although the six types to describe people and environments are based on vocational interests, Holland did recognize the role of personality. "*"Interest inventories" are conceived here as personality inventories which reveal information such as the person's values, attitudes, needs, self-concept, preferred activities, and sources of threat and dissatisfaction*" (Holland, 1959, p. 36). Furthermore, Holland (1996) considered personality as a factor that stabilizes an individual's career choice. Neuroticism (one of the BIG 5 personality factors) for example, has an influence on job satisfaction independent of the P-E fit (Costa, McCrae, & Holland, 1984). It has been argued that in counseling practice, personality can be viewed as a supplementary element which can be used in combination with vocational interests (e.g., Costa et al., 1984; Furnham, 2001). Costa et al. (1984) claimed that personality measures are helpful when a profile is undifferentiated. In such a case, the person's personality scores offer additional information to take into account. Furnham (2001) indicated the usefulness of focusing on several facets of the personality factor. As he reported, a person with high scores on order and dutifulness for example, may be suited for environments other than those associated with high levels of competence- and achievement-striving (scales are facets of the BIG 5 personality factor *conscientiousness*). Hence, people with lower scores on conscientiousness may be more suitable for yet another type of environment, depending on their scores on the underlying facets.

In general, however, vocational interests and personality characteristics measure different aspects of people. Interest scores examine how much a person likes to do an

activity, whereas personality scores indicate a person's typical behavior in a specific situation. In sum, although vocational interests and personality characteristics are to some extent related, they do not substitute one another (Costa et al., 1984; Gottfredson, Jones, & Holland, 1993).

Aims of the Present Study

The present study's objective has been to characterize a sample of medical applicants by applying a person-centered approach. According to McLarnon, Carswell, and Schneider (2015), this type of method "*may be a more appropriate approach to investigate the profiles and types of individuals that emerge from a vocational interest survey*" (p. 2). In our study, we used latent class analysis to identify subgroups within a sample of medical applicants. The identification was based on applicants' vocational interests, their interest in prestigious professions and their personal characteristics. Referring to the value of personality in the theory of Holland, we added self-discipline (a facet of conscientiousness) and social-activity (a facet of extraversion) as well as self-efficacy to the vocational RIASEC scales. This scale selection was based on the findings of studies demonstrating the influence of self-discipline, social activity and self-efficacy on study success, in particular that of medical students (Ferguson, James, O'Hehir, & Sanders, 2003; Lievens, Ones, & Dilchert, 2009; Robbins, Lauver, Le, Davis, Langley, & Carlstrom, 2004). We supplemented these variables with a prestige scale investigating applicant's interest in prestigious professions. Within the medical field, the impact of prestige in career decisions is well recognized (Duffy, Borges, & Hartung, 2009; Rosoff & Leone, 1991).

Our research questions aim to enhance our knowledge about medical applicants. This information can then be used to assist prospective medical students in their study choice. Since the study of medicine offers a broad range of curricula, our first aim was to examine whether different subgroups of applicants could be identified. Our second aim was to describe the identified subgroups in more details. Therefore, we subsequently investigated the associations between the subgroups and career-related variables such as prior academic performance, study choice certainty and aspired work environment. These elements were expected to provide additional information on the applicants' preferences regarding the many medical specialties, which can generally be divided into more patient-oriented and more technique-oriented professions (Borges, Savickas, & Jones, 2004). In this way, we

could – already during the admission process – see whether there were differences among the prospective 'physicians'. More specifically, we formulated the following research questions:

1) How many subgroups within the sample of medical applicants can be identified based on the applicants' scores on their vocational scales, their interest in prestigious professions, their self-discipline, their self-efficacy and their social-activity?
2) Do the identified subgroups differ with regard to the applicants' prior academic performance, their study choice certainty and their aspired work environment?

Method

Participants

High school graduates in two European countries who had applied for studying medicine were informed about the self-administered assessment. This assessment, which was voluntary, preceded the actual study selection test. It gave the applicants the opportunity to reflect on their study choice in more detail. The assessment provided knowledge in several ways. On the one hand, applicants were given the possibility to compare their scale values of study-relevant variables with the scores of medical students who had already successfully passed the admission process. On the other hand, the assessment offered information about the study's content, the study's requirements and future work options. The combination of the individualized feedback (comparison with medical students) and relevant information about the medical education was expected to enable the applicants to make a well-founded study decision.

The total sample consisted of 5670 applicants who participated in the assessment. However, 63 participants with molecular medicine as their aspired work environment were excluded from the analyses because this group was not representative of the general medical training program. The majority of the participants included in this study applied for the first time (n = 3802, 67.8%) or the second time (n = 1192, 21.3%). The remaining

participants (n = 613, 10.9%) had already applied more than five times. The average age of the participants was 21 years, with 3553 female (63.4%) and 2054 male (36.6%) applicants.

Measures

Vocational interests and personal characteristics. As indicated, our self-administered assessment measured vocational interests, interest in prestigious professions, personality characteristics and self-efficacy. The interest questionnaire was based on the theoretical framework of Holland (1996, 1997) and consisted of six scales: social interests (e.g., taking feelings from others seriously, 14 items, $\alpha = 0.89$), investigative interests (e.g., seeking new insights, 13 items, $\alpha = 0.86$), artistic interests (e.g., developing new ideas, 12 items, $\alpha = 0.88$), conventional interests (e.g., administering information, 7 items, $\alpha = 0.77$), enterprising interests (e.g., leading a company, 6 items, $\alpha = 0.79$) and realistic interests (e.g., operating technological equipment, 6 items, $\alpha = 0.79$). The items described different activities related to the medical professions. Participants had to answer on a 5-point Likert scale (1 = not interested at all to 5 = very interested). To measure the applicants' interest in prestigious professions, we included 9 items ($\alpha = 0.82$). Here, applicants were asked for example, to which degree they were interested in making influential decisions, having a leading position at work and taking on responsibility (for more details see Guntern, Korpershoek, & van der Werf, 2015). The personal characteristics added were self-discipline (e.g., finishing one task before going to the next one, 10 items, $\alpha = 0.86$), social activity (e.g., getting to know new people easily, 8 items, $\alpha = 0.87$) and self-efficacy (e.g., being convinced about one's intellectual abilities, 13 items, $\alpha = 0.83$). These scales had shown to have an impact on academic achievement (Chemers, Hu, & Garcia, 2001; Lievens, Coetsier, De Fruyt, & De Maeseneer, 2002; Lievens et al., 2009; Robbins et al., 2004; Stegers-Jager, Cohen-Schotanus, & Themmen, 2012).

Prior academic performance. The applicants' prior academic performance was investigated by asking them about their performance in their high school examinations so far. They had to choose among the options in the upper performance third, in the middle performance third and in the lower performance third. Most applicants chose either the upper performance third (n = 3198, 57%) or the middle performance third (n = 2270, 40.5%). Only a minority indicated to be in the lower performance third (n = 139, 2.5%).

Study choice certainty and aspired work environment. Two questions were added to find out more about the applicants' attitude toward the medical studies and their career conceptions. First, they were asked to indicate how certain they were about their study choice in case of admission (passing the selection test). For 2735 applicants (48.8%) medicine was the only study choice in mind, for 953 applicants (17%) also a natural science-oriented study would be an option, for 827 applicants (14.7%) also another socially oriented study would be an option, for 775 applicants (13.8%) also a completely different study would be an option and for 314 applicants (5.6%) also a non-university education would be an option.

Second, they were asked about their aspired work environment after graduating from university. They had to choose among one of the following work environments: family doctor (n = 428, 7.6%), specialist in a private practice (n = 1366, 24.4%), specialist in a hospital (n = 2449, 43.7%), scientific researcher (n = 252, 4.5%) or dentist (n = 325, 5.8%). 787 applicants (14%) were still undecided.

Data Analyses

Recently, several scholars (Borges & Savickas, 2002; McLarnon et al., 2015) have proposed using a person-centered approach to the identification of groups within a sample. Latent class analysis (LCA) is a person-centered method for identifying groups of individuals (often called clusters) with similar response patterns (Pastor, Barron, Miller, & Davis, 2007). A major difference between traditional analyses such as discriminant analysis or logistic regression analysis and LCA is that in the latter the individuals' group membership is unknown (Magidson & Vermunt, 2002). The clusters represent a latent variable. Thus, people in the same cluster are more alike than people in other clusters (Marsh, Lüdtke, Trautwein, & Morin, 2009). The advantage of LCA as compared to more traditional approaches is that it provides criteria for model selection (Magidson & Vermunt, 2002; Marsh et al., 2009). However, although several rules of thumb are suggested in the literature, there is no real consensus about the best selection criteria (Nylund, Asparouhov, & Muthen, 2007).

The LCA analysis in the current study was performed using LatentGOLD (version 4.5.0.10239). The model fit evaluation of the 1- to 6-cluster solutions was based on the following criteria: the Bayesian Information Criterion (BIC), the BIC reduction, the

classification error and the parsimony of the model. In addition, cluster size and the interpretability of the cluster solutions were taken into account as proposed in the literature (Rindskopf, 2003). In a next step, the selected model was linked to career-related variables, such as prior academic performance, study choice certainty and aspired work environment. Furthermore, we used crosstabs to show the proportions of these variables (specified in rows) and the clusters (specified in columns). Next, applying simple *Z*-tests with Bonferroni correction, we tested the significance of the pairwise column proportions.

Results

Descriptive Results

Table 1 reports the inter-correlations of the scales. The results show that the medical applicants' vocational interests were correlated at a weak level (below $r = 0.40$). The highest correlations were found between realistic interests and investigative interests ($r = 0.33$, $p < 0.01$), between realistic interests and enterprising interests ($r = 0.31$, $p < 0.01$) and between enterprising interests and conventional interests ($r = 0.30$, $p < 0.01$). Medium correlations (over $r = 0.40$) were observed for enterprising interests and prestige ($r = 0.53$, $p < 0.01$) as well as for self-discipline and self-efficacy ($r = 0.41$, $p < 0.01$). The correlations between vocational interests and personal characteristics were mainly weak (below $r = 0.40$).

Table 1: Correlations among the scales (N = 5607)

Vocational interests and personal characteristics	**1)**	**2)**	**3)**	**4)**	**5)**	**6)**	**7)**	**8)**	**9)**
1) Social	–								
2) Investigative	0.20**	–							
3) Artistic	0.29**	0.28**	–						
4) Conventional	0.27**	0.25**	0.06**	–					
5) Enterprising	0.06**	0.14**	0.15**	0.30**	–				
6) Realistic	0.03*	0.33**	0.22**	0.25**	0.31**	–			
7) Prestige	0.05**	0.10**	0.04**	0.16**	0.53**	0.13**	–		
8) Self-discipline	0.28**	0.26**	0.10**	0.36**	0.10**	0.10**	0.04**	–	
9) Self-efficacy	0.22**	0.35**	0.20**	0.15**	0.25**	0.18**	0.27**	0.41**	–
10) Social activity	0.38**	0.09**	0.22**	0.11**	0.22**	0.08**	0.15**	0.19**	0.35**

* $p < 0.05$; ** $p < 0.01$.

Latent Class Analysis

Table 2 provides a summary of the LCA which successively added clusters to the solution. If a selected model has too few clusters, class differences are ignored, while a model with too many clusters may generate instability, which means that the information added is no longer relevant or substantial (Vermunt & Magidson, 2005). The BIC statistic indicates the amount of unexplained associations among the variables (lower values depict better solutions). Addressing research question 1, we chose the 4 cluster model as the best solution for our data, given the substantial information gain (BIC reduction of 1167.70). The BIC reduction of the 5 cluster model was almost half as big (BIC reduction of 623.72). Furthermore, the classification error of the 4 cluster model was acceptable considering the exploratory nature of the study with a reasonable smallest cluster size (17%). Any further division of the clusters would have resulted in undifferentiated groups, that are with no clear response patterns across the scales.

Table 2: Model specifications of LCA

# Clusters	BIC	Diff BIC	# PAR	Class. error (%)	SM cluster SIZ
1 Cluster	99789.12	–	20	0	–
2 Cluster	94296.56	5492.57	41	0.08	35%
3 Cluster	92928.93	1367.64	62	0.15	16%
4 Cluster	91761.22	1167.70	83	0.17	17%
5 Cluster	91137.51	623.72	104	0.20	14%
6 Cluster	90697.01	440.49	125	0.22	7%

BIC = Bayesian Information Criterion; Diff BIC = BIC reduction from one to the next model; # PAR = Number of parameters; Class. error = Classification error; SM cluster SIZ = Smallest cluster size.

Figure 1, Table 3 and Table 4 show the main characteristics of the 4 cluster solution. 44% of the applicants (n = 2483) were grouped in cluster 1, 20% (n = 1128) in cluster 2, 18% (n = 1035) in cluster 3 and 17% (n = 961) in cluster 4. Cluster 1 comprised applicants whose profile included high social interests (M = 4.44, SD = 0.34), followed by relatively high self-efficacy (M = 4.09, SD = 0.35) and social activity scores (M = 4.05, SD = 0.54). The majority of the applicants in cluster 1 were female (female = 70.6%, male = 29.4%). The members of cluster 2 had the highest scores in prestige (M = 4.55, SD = 0.29). These

applicants were convinced about themselves (self-efficacy: $M = 4.27$, $SD = 0.37$) and also interested in social activities ($M = 4.26$, $SD = 0.46$). Compared to the applicants in the other clusters, those in cluster 2 had the highest enterprising interest scores ($M = 3.82$, $SD = 0.45$). It was the only cluster that was male-dominated (male = 54.3%, female = 45.7%). Cluster 3 included applicants whose social interests were relatively dominant ($M = 4.06$, $SD = 0.53$), followed by investigative interests ($M = 3.70$, $SD = 0.55$), prestige ($M = 3.66$, $SD = 0.58$) and self-efficacy ($M = 3.65$, $SD = 0.48$). There were more female (62.3%) than male applicants (37.7%) in cluster 3. The applicants in cluster 4 yielded the highest scores on all of the scales, except for enterprising interests and prestige. The highest scores on these two scales were earned by applicants in the prestigious cluster. Furthermore, the profile shape of cluster 4 applicants was similar to that of cluster 1 applicants. Again, the majority of applicants were female (66.6% compared to 33.4% male).

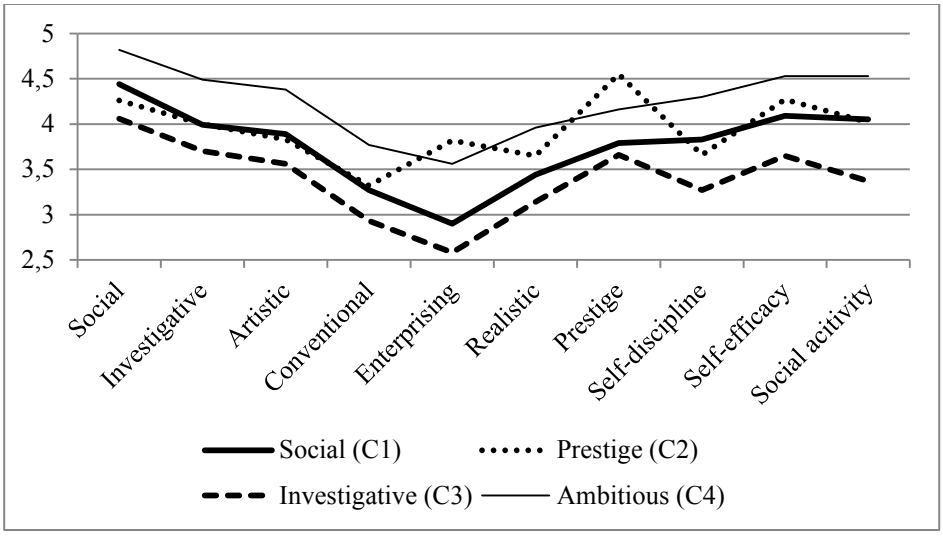

Figure 1: Profiles of the 4 cluster solution (N = 5607) including the mean values for vocational interests, prestige and personal characteristics.

Table 3: Descriptive statistics and analyses of variance

Vocational interests and personal characteristics	**Social (C1)**		**Prestige (C2)**		**Investigative (C3)**		**Ambitious (C4)**		**Total**		**ANOVA[a]**			**ES**
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	*df*1	*df*2	η^2
Social	4.44	0.34	4.26	0.46	4.06	0.53	4.82	0.16	4.40	0.45	659.18**	3	2983.41	0.28
Investigative	3.99	0.43	4.00	0.53	3.70	0.55	4.49	0.33	4.02	0.52	481.17**	3	3771.67	0.21
Artistic	3.89	0.56	3.83	0.64	3.56	0.67	4.38	0.46	3.90	0.63	328.31**	3	4055.61	0.15
Conventional	3.27	0.48	3.32	0.62	2.93	0.60	3.77	0.55	3.30	0.60	364.48**	3	4033.80	0.18
Enterprising	2.90	0.53	3.82	0.45	2.58	0.70	3.56	0.65	3.14	0.73	1082.84**	3	3632.60	0.39
Realistic	3.44	0.62	3.65	0.75	3.14	0.75	3.96	0.64	3.52	0.72	253.16**	3	4114.58	0.13
Prestige	3.79	0.39	4.55	0.29	3.66	0.58	4.16	0.51	3.98	0.54	930.40**	3	3226.74	0.36
Self-discipline	3.83	0.48	3.66	0.60	3.27	0.66	4.30	0.41	3.77	0.62	605.98**	3	3738.08	0.26
Self-efficacy	4.09	0.35	4.27	0.37	3.65	0.48	4.53	0.28	4.12	0.46	960.90**	3	3596.94	0.35
Social activity	4.05	0.54	4.02	0.64	3.37	0.75	4.53	0.38	4.00	0.68	643.76**	3	3520.44	0.27

ES = Effect size.
Sample sizes: *n* for the social cluster = 2483; *n* for the prestigious cluster = 1128; *n* for the investigative cluster = 1035; *n* for the ambitious cluster = 961; *N* for the total sample = 5607.
[a]. The Brown-Forsythe *F*-ratios are reported because the assumption of homogeneity of variance was violated for all variables. ** $p < 0.01$.

In summary, the clusters were labeled based on the scale scores within the profiles: the social cluster (cluster 1), the prestigious cluster (cluster 2), the investigative cluster (cluster 3) and the ambitious cluster (cluster 4). In addition, analyses of variance were performed to investigate the mean scale differences among these four clusters. Table 3 shows that vocational interests, prestige and personal characteristics significantly differed across the clusters, with effect sizes (partial eta-squared) ranging from $\eta^2 = 0.39$ (enterprising interests) to $\eta^2 = 0.15$ (artistic interests).

Associations Between the Four Cluster Solution and Career-Conception-Related Variables

Addressing research question 2, the applicants were asked to indicate their prior academic performance so far (performance group), their study choice certainty and their aspired work environment (Table 4). With respect to prior performance, the ambitious cluster contained the largest percentage of applicants (66.9%) who had reported to belong to the highest performance group compared to the social cluster (57.5%), the prestigious cluster (55.3%) and the investigative cluster (48.6%). As regards study choice certainty, the investigative cluster members indicated more often than the other cluster applicants that they were also willing to consider other study options, such as natural sciences (22.6%) or a socially oriented study (18.9%). Applicants from the prestigious cluster stated most frequently (23.8%) that a completely different study choice would also be possible. The majority of the ambitious cluster (61.3%) reported that studying medicine was the only option for them. In general, a non-university study was seldom an option; only 5.6% of the total sample selected this possibility. Furthermore, the applicants differed as regards their aspired work environment. The prestigious cluster members mentioned more frequently than the other cluster applicants the aspiration to work in a private practice (31.2%) or in a dentist surgery (8.9%). The applicants from the ambitious cluster (49.2%) and the social cluster (45.9%) favored working in a hospital. Finally, the investigative cluster included the highest percentage of undecided applicants (20.9%).

Table 4: Associations of the 4 cluster solution

Gender and career conception related variables	**Social (C1)**		**Prestigious (C2)**		**Investigative (C3)**		**Ambitious (C4)**		**Total**	
Gender	*n*	%	*n*	%	*n*	%	*n*	%	*N*	%
Female	1753	70.6	515	45.7	645	62.3	640	66.6	3553	63.4
Male	730	29.4	613	54.3	390	37.7	321	33.4	2054	36.6
Prior academic performance										
Upper performance group	1428_{a}	57.5	624_{a}	55.3	503_{b}	48.6	643_{c}	66.9	3198	57.0
Middle performance group	1014_{a}	40.8	$468_{a, b}$	41.5	484_{b}	46.8	304_{c}	31.6	2270	40.5
Lower performance group	41_{a}	1.7	$36_{b, c}$	3.2	48_{b}	4.6	$14_{a, c}$	1.5	139	2.5
Study choice certainty										
Medical study	1263_{a}	50.9	565_{a}	50.1	321_{b}	31.1	589_{c}	61.3	2735	48.8
another natural science	423_{a}	17.0	155_{a}	13.7	234_{b}	22.6	141_{a}	14.7	953	17.1
another socially oriented study	421_{a}	17.0	109_{b}	9.7	196_{a}	18.9	101_{b}	10.5	827	14.7
completely different study	217_{a}	8.7	269_{b}	23.8	206_{b}	19.9	83_{a}	8.6	775	13.8
Non-university study	159_{a}	6.4	30_{b}	2.7	78_{a}	7.5	47_{a}	4.9	314	5.6
Aspired work environment										
Family doctor	204_{a}	8.2	69_{a}	6.1	86_{a}	8.3	69_{a}	7.2	428	7.6
Specialist in practice	560_{a}	22.6	352_{b}	31.2	222_{a}	21.4	232_{a}	24.1	1366	24.4
Specialist in hospital	1140_{a}	45.9	433_{b}	38.4	403_{b}	38.9	473_{a}	49.2	2449	43.7
Scientific researcher	97_{a}	3.9	53_{a}	4.7	57_{a}	5.5	45_{a}	4.7	252	4.5
Dentist	121_{a}	4.9	100_{b}	8.9	51_{a}	4.9	53_{a}	5.5	325	5.8
Undecided applicants	361_{a}	14.5	121_{b}	10.7	216_{c}	20.9	89_{b}	9.3	787	14

Any significant differences at the 0.05 level are marked by separate subscripted letters (a, b, c). The *Z*-tests were adjusted for all pairwise comparisons within a row using the Bonferroni correction.

Discussion

In this study we used LCA, a person-centered approach, to identify subgroups and characterize them based on their career conceptions. Rather than assuming that medical applicants represent a relatively homogeneous group, LCA approach focused on the differences among the individuals (von Eye, Bogat, & Rhodes, 2006). Without applying LCA, the average applicant would at best have been described as socially interested ($M = 4.40$, $SD = 0.45$), self-efficient ($M = 4.12$, $SD = 0.46$), interested in investigative activities ($M = 4.02$, $SD = 0.52$), socially active ($M = 4.00$, $SD = 0.68$) and interested in prestigious professions ($M = 3.98$, $SD = 0.54$). Here, the scale differences were rather small, with the exception of social interests. Applying LCA, however, resulted in a much more differentiated set of scale profiles, ultimately producing four clusters: a social, an investigative, a prestigious and an ambitious group.

The identification of the subgroups, which were either more socially- or more investigative-oriented, was in line with the findings of other authors. Their studies have also showed that social and investigative interests were the most prominent interests in medical samples (Borges et al., 2004; Duffy et al., 2009). Identifying the prestigious subgroup is likely to be a reflection of an important focus of medical students on prestigious professions (Creed, Searle, & Rogers, 2010; Rosoff & Leone, 1991). In our study, prestige incorporated aspects of social status (e.g., being appreciated by others) and socio-economic factors (e.g., earning a lot of money). Thus, the emphasis on socially and economically prestigious professions was an influential aspect for approximately one fifth of the applicants. These results corresponded with the aspired work environments of the prestigious cluster applicants, who generally chose on a more frequent basis than the other cluster members to become specialists in a private practice or dental surgeons. Furthermore, prestige was the only male-dominated cluster in our sample. This finding may be explained by the situation that in the medical field, men are more willing to invest much time in their careers than women. Prestigious jobs usually require a large investment in terms of time and resources (Hinze, 1999). However, more research is needed to expand the knowledge about gender differences in medical career decisions.

In the social and ambitious clusters, social activity was one of the most pronounced scales. A relatively large group of medical applicants (61% of all applicants) seemed to

enjoy meeting and communicating with new people. For these groups the work environment of family doctors was expected to represent the best fit choice, since this setting requires more patient contact than the other work options. However, according to our data only a relatively small percentage of the applicants actually aspired to become a family doctor (for the social cluster: 8.2%; for the ambitious cluster: 7.2%). Further research is required to gain more insight into these dynamics. In the literature, recruitment problems for students who want to work as family doctors are well recognized (Deutsch, Hönigschmid, Frese, & Sandholzer, 2013; Green, Jones, Fetter, & Pugno, 2007).

Some other issues concerned the medical applicants' career conceptions. One would expect that applicants for the medical studies thoroughly consider their career plans prior to making an informed enrolment decision. However, this often does not seem to be the case at all. Kassebaum & Szenas (1995) reported that approximately one fifth of the medical students were still undecided about their career choice at the time of their enrolment and remained so until their graduation. Another study showed an even more remarkable result, namely that approximately one third of the young physicians would not choose a medical study again (Cohen, Cantor, Barker, & Hughes, 1990). In our research, a total of 51.2% of the applicants were willing to consider another university or even a non-university study, while 14% were not sure about their aspired work environment. Again, it can be concluded that there were significant differences among the subgroups. In this context, the applicants from the investigative cluster conveyed a larger degree of indecisiveness as regards their career conceptions than the members of the other clusters. The percentage of investigative cluster members to whom medicine was the only possible study choice was smaller than the averaged percentage of the applicants in the other clusters (31.1% to 54.1%). As regards work aspirations, 20.9% of the investigative applicants were undecided compared to an averaged percentage of 11.5% of the other cluster applicants. We consider the awareness of these differences in the career conceptions of medical subgroups to be useful for counseling purposes.

Implications

This study has several implications. First, we added a number of personal characteristics (self-discipline, social activity and self-efficacy) and the variable interest in prestigious professions to the RIASEC scales. Our data indicated that the applicants' personal

characteristics did not substantially correlate with their vocational interests and interest in prestigious professions. Thus, added variables provided additional information that could be used for the description of medical applicants. In compliance with the congruence hypothesis, it appeared that seeking out environments similar to those associated with people who have similar interests enabled the applicants to make good interest-environment fits. Furthermore, since personality also influences the interactions among people within an environment, a personality-environment fit may be relevant as well (Costa et al., 1984; Furnham, 2001). With regard to performance in the medical context, the majority of the medical applicants had relatively high scores on self-efficacy. Previous studies have shown that high self-efficacy scores are beneficial for students' academic achievements (Chemers et al., 2001; Robbins et al., 2004). Applicants with relatively high self-efficacy scores – using medical students as reference group – can therefore be expected to experience less performance problems during their study. We also propose that self-confidence has a positive impact on work performance, both in the medical curricula, for example during practical clerkships, and in their work as physicians after university graduation.

An aspect which in our opinion has received far too less attention among scholars is the issue of self-selection during the admission process. Currently, the decision to participate in the medical studies' admission process seems to be based on more or less general information. And although some applicants may seek out information in a more active manner by discussing their study choice with medical students, teachers and physicians, others presumably spend much less time on this, and just follow the advice of significant others (e.g., family member or teachers). Literature has provided guidelines as regards a step-wise study admission process, in which the provision of relevant information about the medical studies is central (Benbassat & Baumal, 2007; Lambe & Bristow, 2011). Disseminating this information is considered to enable applicants to make informed study decisions and also to increase the rate of well-fitting applicants.

We, however, stress the value of offering medical applicants a possibility to compare themselves with those who already are in the medical curricula. The updated self-administered assessment can play a central role here. The benefits of this approach far exceed those of an admission system mainly based on transferring standard general information. Personalized feedback plus a comparison between the applicant's values and those of the medical students via study-relevant scales facilitates a more realistic self-

evaluation. It may help applicants to better recognize their strengths/weaknesses and promote their self-awareness. If not for anything else, this self-evaluation may teach them more about themselves and the requirements of the medical education. The findings of the current study have offered the opportunity to update the current assessments by adding more specific information about the interests and career conceptions of different 'medical subgroups'. The assessment's feedback, which includes a personalized report and some relevant information about the curricula, is believed to enable prospective students to reflect on their study choice and future career in more depth and at an earlier point in time than usually is the case now.

Limitations and Future Research

The main limitation of the current study concerned the selection bias due to a participation rate of approximately 30%. The reasons for non-participation as indicated in a follow-up evaluation were manifold. Some said that they had already participated in other assessments, others did not have the time to participate, and a number of people were not sufficiently interested to participate. Given this limited participation rate, it could have been the case that the vocational interests and personal characteristics of the non-responders differed to some extent from those of the participants in our study. Second, it was not known whether the applicants would continue the selection procedure to finally enter the medical studies. To obtain this information and gain more insight into medical applicants' study choice processes, future research is certainly required.

In this context, longitudinal studies are suggested, focusing on – among other topics – applicants' participation in the assessment (yes, I did participate; no, I did not participate), which would provide useful information about the actual effect of this instrument and about the actual drop-out rates of the different cluster applicants. Moreover, longitudinal data collection which continues also after the medical study would increase our knowledge of both the academic and the clinical performance of the various clusters of students, and their work environments after graduation. Obtaining this information is of course only possible if the applicants are admitted to the studies of their choice and participate in follow-up assessments.

Before we can draw any obvious conclusions based on the measurements used in this research, however, a replication study is the first step required. This is advisable, even

though the correlations among the scales have shown to be comparable to those of other studies (e.g., Duffy et al., 2009) and the scale constructions have been based on well-investigated constructs. Finally, a replication study would also be desirable given the explorative character of the LCA method. In this respect, a comparable cluster solution identified in a different sample of applicants would strengthen our results.

Conclusion

The application of LCA has led to the identification of four groups among medical applicants who could be distinguished on the basis of their vocational interests, interest in prestigious professions, self-discipline, social activity and self-efficacy. Moreover, the subgroups of applicants appeared to differ in terms of prior performance, study choice certainty and aspired work environment. This finding underscores the view that medical applicants cannot be considered as one homogeneous group. Again, the medical education represents a broad education, combining social and scientific aspects. Therefore, medical applicants should be communicated a differentiated picture of the medical education to support them making a well-informed study decision.