Does medical students' admission based on an end-of-first-year knowledge test select unsuitable non-cognitive qualities?

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Background

- Using reliable and valid methods is essential to select medical students for undergraduate training, with the greatest potential to become efficient, professional and caring future doctors

- Admission process of students to medical schools varies among and within countries

- GPA, MCAT, MMI, SJT and some psychological traits (conscientiousness and extraversion) are good predictors of students' performance during undergraduate training.

- In the French-speaking part of Switzerland, political constraints oblige medical schools to select their students during the first study year. The Geneva Faculty of Medicine admits 160 students from about 500 on the basis of students' scores on 2 knowledge MCQ tests.

Research question

- Could a medical students' selection process based on knowledge tests disadvantage students with suitable non-cognitive qualities?

Aims

- Establish the profile of first year medical school aspirants using cognitive and non-cognitive features
- Investigate models predicting whether and how cognitive and non-cognitive features influence selection (=admission to 2nd year)

Student population
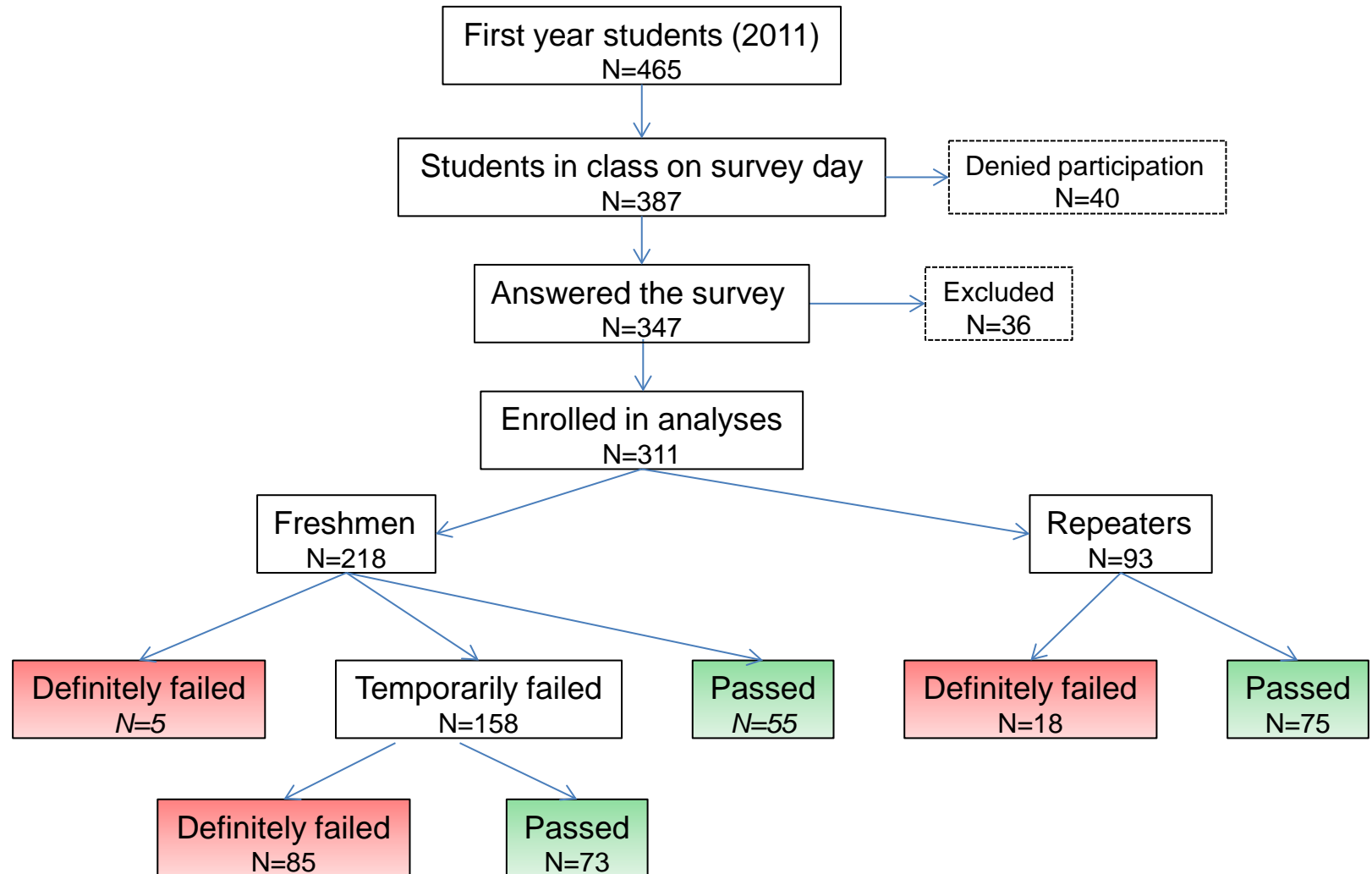
Features

		measure	tool	features
Profile	Cognitive	Aptitude Test	EMS	Global score ≈ cognitive competences
		Learning Approach	SPQ	Deep Approach Surface Approach
	Non-cognitive	Personality	NEO-FFI-R	Openness Conscientiousness Extraversion Agreeableness Neuroticism
		Empathy	JSE	Global score ≈ empathic perception
		Stress coping	CISS	Task-oriented Emotional Avoidant
	Motivation	Motivation Type	Home-made scale	Care (patient, illness, life) Extrinsic (prestige, income, independant activity, academic interest) Intrinsic (mission, vocation, altruism)
Selection for undergraduate training		Admitted to 2nd year		*Freshman vs repeater* *Gender* Score on exams (2 exams/yr) Selected vs not-selected

Analyses

Profile
- ✓ Principal component analysis to reduce the 15 markers to a limited number of facets (6)

Models predicting selection (= admission to 2nd study year)
- ✓ Linear regression analysis of students' profile facets (6 facets + gender and repeater) on their scores on 1st-yr exams
- ✓ Logistic regression analysis of students' profile facets (idem) on their odds of being selected

Profile

	Students' features	Higher component loadings	Facets (% variance explained)
Factor 1	Deep approach	0.798	Diligent
	Conscientiousness	0.757	(19)
	Task coping	0.663	
	Surface approach	-0.585	
Factor 2	Neuroticism	0.854	Emotional
	Emotional coping	0.851	(14)
Factor 3	Intrinsic motivation	0.843	Self- determined
	Motivation to care	0.834	(11)
Factor 4	Agreeableness	0.836	Sociable
	Extraversion	0.515	(8)
	Empathy	*0.397*	
Factor 5	Cognitive ability	0.688	Intellectually flexible
	Openness	0.672	(7)
Factor 6	Avoidant coping	0.716	Externally driven
	Extrinsic motivation	0.613	(7)

Principal component analysis; N=347; KMO=0.654; p<0.001; 66% variance explained

Model 1: Linear regression analysis of students scores on exams

Profile facets	Estimate	p
(intercept)	59.3	<0.001
Diligent	3.51	<0.001
Emotional	-1.03	0.345
Self- determined	-0.38	0.711
Sociable	-1.03	0.302
Intellectually flexible	3.38	<0.001
Externally driven	-0.88	0.364
Gender (male)	1.31	0.578
Repeater	15.09	<0.001

n=242; 26 % variance explained; p<0.001

Model 2: Logistic regression analysis on students' odds of being selected

Profile facets	OR	p
Diligent	1.44	0.015
Emotional	0.85	0.031
Self- determined	1.04	0.976
Sociable	0.91	0.278
Intellectually flexible	1.37	0.023
Externally driven	0.89	0.352
Gender (male)	1.59	0.173
Repeater	2.19	0.025

n=233; goodness-of-fit p=0.524; 14% variance explained

Discussion

- Aspirants' profile can be described by 6 facets: diligent, emotional, self-determined, sociable, intellectually flexible and externally-driven

- The students showing themselves more diligent and intellectually flexible yield higher scores on the exams, and consequently increase their odds of being selected.

- By scoring better than freshmen on exams, repeaters increase by 2 their odds of being selected.

- Although not acting upon students' scores, emotionality seems to decrease odds of being selected.

Conclusion

Question: Could a medical students' selection process based on knowledge tests disadvantage students with suitable non-cognitive qualities?

Based on this study, students with qualities presumably important for caring doctors such as being sociable and self-determined do not seem to be disadvantaged.