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CHAPTER 4

Distinguishing three unprofessional behaviour profiles of medical students using Latent Class Analysis

The study described in this chapter has been published as:

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Distinguishing three unprofessional behaviour profiles of medical students using
Latent Class Analysis.

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Aim

Since unprofessional behaviour of physicians is associated with unprofessional behaviour in medical school, identifying unprofessional behaviour in medical school is critical. Although teachers observe unprofessional behaviour in up to 20% of all students, they only report 3-5%, reflecting the difficulty in assessing professional behaviour. Instead of identifying *isolated behaviours* it could be more helpful to recognise *behavioural patterns* to evaluate students' professional behaviour. The authors aimed to identify patterns in the unprofessional behaviours of medical students, and to construct descriptions based on these patterns.

Methods

Content analysis of research articles yielded a template of unprofessional behaviours for coding student evaluation forms indicating unsatisfactory professional behaviour, collected from 2012 to 2014. Latent Class Analysis was used to identify classes of students with a high chance of displaying comparable unprofessional behaviours. Teachers' feedback of prototype students was summarised to generate profile descriptions.

Results

A template of 109 behaviours was used to code 232 evaluation forms of 194 students (3.9% students/year). Latent Class Analysis identified three hypothetical classes of students: class 1 (43%) was labeled as 'Poor reliability', class 2 (20%) was labeled as 'Poor reliability and poor insight' and class 3 (37%) was labelled as 'Poor reliability, poor insight and poor adaptability'.

Discussion

These profiles of unprofessional behaviour might help to improve the evaluation of unprofessional behaviour in medical school. Further research should provide evidence for confidently accepting or rejecting the profiles as an instrument to identify which students are expected to benefit from remediation trajectories.

Introduction

Promoting professional development of medical students is an important goal of medical education because unprofessional behaviour in medical school is associated with unprofessional behaviour in medical practice [1, 2]. Most students are able to develop a physician's professional identity without meeting significant difficulties, but a limited number of students encounter problems in this process [3]. Because such problems are often reflected in behaviours, medical educators should be able to identify these behaviours to define which students could benefit from extra guidance. As behavioural change takes time, it is crucial to detect students with problems early in the course of their medical school career, to start adequate remediation activities in time [4].

Unprofessional behaviours are seen in up to 20% of medical students [5]. However, formal unsatisfactory professional behaviour evaluations only report 3-5% of all students, reflecting the difficulty educators experience in identifying medical students with lapses in professionalism [6, 7], despite the availability of guidelines for the evaluation of students' professional behaviour provided by several physician organisations [8-10]. These guidelines often describe behaviours *categorically*, using descriptions of isolated behaviours, but behaviours could also be described *dimensionally*, using combinations of behaviours, i.e. behavioural patterns [11].

Preliminary evidence of studies performed among residents suggests that educators show more consistency in defining problematic professional performance in residents when using narrative descriptions of behavioural patterns than when using traditional ways of evaluation based on descriptions of isolated behaviours [12]. Like in residency training, descriptions based on behavioural patterns could also benefit educators in undergraduate education. However, it has not yet been investigated if distinct unprofessional behaviours of medical students cluster into patterns. The aim of this study was to identify patterns in behaviours of medical students who received an unsatisfactory professional behaviour evaluation in medical school.

Individual, interpersonal and social/institutional factors are vital for the professional development of students [13], but the latter two are unfortunately difficult for individual teachers to influence. The present study focused on students' individual behaviours in order to determine which students are expected to benefit from early remediation interventions and additional guidance from their teachers to improve their professional behaviour.

Methods

Design

This study comprised three parts. Firstly, we conducted a review of the medical education literature to provide an overview of medical students' unprofessional behaviours reported in the literature. Next, we used these results to retrospectively examine professional behaviour evaluation forms of students in undergraduate preclinical and clinical medical education. Finally, we identified patterns in these behaviours, and drafted profile descriptions for frequently occurring patterns. For this study the researchers chose a post-positivist view, in which quantitative and qualitative methods can be combined to systematically gather and analyse data from representative samples to seek to establish a probable truth [14]. The Ethical Review Board of the Netherlands Association for Medical Education (NVMO-ERB) approved the study (dossier number 390).

Part 1: Content analysis of medical education research papers

Selection of the papers

This study included a focused literature review to investigate which actual unprofessional behaviours of medical students have been described in the literature. The researchers searched PubMed to identify relevant articles by using combinations and alternative descriptions of the search terms 'professional misconduct' and 'medical education'. Quantitative and qualitative studies describing unprofessional behaviours of medical students were eligible for inclusion. Reference lists of retrieved articles were manually searched to identify additional articles. Articles reporting desired professional behaviours, perceptions of professional behaviour, unprofessional behaviours of students other than medical students, or behaviours of residents or practitioners were excluded.

Data extraction from papers

Three researchers (MM, WM and RAK) independently screened the articles for descriptions of unprofessional behaviours using content analysis, a qualitative method to analyse text-based data.

We established results by assigning codes (e.g. descriptions of unprofessional behaviours of medical students). During data collection and analysis the researchers drafted written notations about the data, the so-called 'memos', in which they acknowledged their roles in the interpretation of the findings. Subsequently the researchers reflected on these memos and on the identified codes in the research team [15]. A constant comparative approach was used and emerging themes were discussed until consensus was reached. Based on this review we constructed an initial template for use in part two of this study.

Part 2: Latent Class Analysis of behaviours mentioned in professional behaviour evaluation forms

Setting

The study was conducted at VUmc School of Medical Sciences Amsterdam, the Netherlands. This school has a bachelor-master curriculum consisting of three years of preclinical undergraduate education (bachelor), followed by three years of clinical undergraduate education (master) [16]. The curriculum consists of three educational domains: medical knowledge, practical skills, and professional development. Within the longitudinal domain of professional development professional behaviour is taught explicitly [6]. Professionalism is defined as: *‘Having specialised knowledge and skills, acquired through extensive study, training and experience, being able to apply this within the rules that have been drafted by the profession itself, the organisation and the government, in which one can be held accountable for actions by all parties involved. This needs to be placed within the cultural context and time frame in which the term is used’*. Professional behaviour is defined as *‘the observable aspects of practicing professionalism’*. This definition of professional behaviour has been translated into a set of observable practical skills, described in the Dutch national guideline on professionalism as a tool for evaluating professionalism. In this guideline professional behaviour is defined as *‘Having the skills to deal with tasks, deal with others and deal with oneself’* [17]. At VUmc School of Medical Sciences students’ professional behaviour is evaluated using In Training Evaluation Reports (ITERs) based on directly observed behaviours. These evaluations take place in formative (not included in the formal grade) and summative (included in the final grade) evaluations in bachelor study groups and in bachelor and master clerkships. Teachers provide all students with evaluation forms that contain a pass/fail decision for professional behaviour in terms of satisfactory and unsatisfactory grades, and include a narrative description of the observed (un)professional behaviour [6]. Besides these formal evaluations, faculty can report critical incidents of unprofessional behaviour. Teachers are trained intensively and guided in teaching and evaluating professional behaviour [18]. After an unsatisfactory professional behaviour evaluation students are referred to the progress committee on professional behaviour to define remediation options.

Sample

We analysed professional behaviour evaluation forms describing an unsatisfactory outcome, and critical incident reports from the preclinical and the clinical phase of undergraduate medical education, from September 2012-September 2014. These evaluation forms and reports had been collected as part of the standard students’ individual progress administration. A research assistant anonymised all forms for analysis, and collected information about study phase and number of unsatisfactory evaluations for each student.

Data extraction from evaluation forms

Using the list derived from the literature review as an initial template, two independent researchers (MM and JMK) coded the anonymised evaluation forms and critical incident reports for ‘unprofessional behaviours’. They documented the behaviours per student, sometimes coming from more than one evaluation form, as binary response data (present/absent). In an iterative manner, they added behaviours to the initial template and ultimately scored all forms using the final template. Finally, the researchers independently categorised the behaviours to obtain a meaningful set of behavioural themes for further statistical analysis. These behavioural themes were finalised through discussion and consensus in the full research team.

Analysis

We conducted Latent Class Analysis (LCA) to search for patterns in the data, using the software program ‘R’ [19]. LCA is an exploratory statistical technique that aims at forming of subgroups (classes) of individuals in a population, based on the observed categorical variables of these individuals. In the current study this means that students are clustered based on the chance that they display a combination of behaviours. LCA is a probabilistic method, which means that there is no one-to-one relationship between a class and the occurrence of a variable in an individual within that class, but that each class is composed of individuals that are more likely to display a certain combination of variables than individuals in a different class [20]. A similar classification process is applied in diagnosing a disease: the presence or absence of a certain symptom (variable) does not always lead to one specific diagnosis (class), but a certain pattern of symptoms makes this diagnosis more likely.

LCA can be used when it is assumed that there exists a still unknown, so-called ‘latent’ variable that can be used to make categories in the population under investigation. This newly emerging variable can be identified as a distinguishing factor regarding the content of the subgroups. Ultimately, the researchers have to determine whether the distinguishing factor has practical relevance, and attribute a meaningful description and name. The properties and the number of the subgroups are determined through consensus clustering, which evaluates the stability of clusters found for a specified number of groups [21]. (A supplemental appendix explaining this process can be provided on request).

LCA is a more subtle method than other clustering methods, as certain variables can occur in more than one class, albeit with a different chance of occurrence. This makes LCA especially applicable to the research of human behaviour, as it can reveal hypothetical patterns that cannot easily be detected by other clustering methods. The method could therefore be very useful in medical education research, but is unfortunately not often applied [22, 23].

A regular latent class model, with various choices for the number of latent groups, was fitted to the binary response data. A latent class model is usually fitted by means of an Expectation-Maximization (EM) algorithm. Since the large number of traits in this study (in comparison to the number of individuals) caused instabilities in the estimation procedure – technically hampering the definition of the appropriate cluster –, the researchers used an adaptation of the EM-algorithm, in which the parameters are estimated in a penalised fashion.

Part 3: Profile descriptions

The researchers provided each class with a narrative description based on the narrative feedback provided on the forms, for which reports of representatives or ‘prototypes’ (the top ten students with the highest probability to belong to that class) were used [20]. Two researchers (MM and JMK) independently summarized teachers’ feedback to these students and finalised profile descriptions through discussion and consensus.

Results

Part 1: Content analysis of medical education research papers

Based on 23 papers describing actual unprofessional behaviours of students we constructed an initial template, containing 93 descriptions. Using an iterative approach we completed the template by adding 16 more behaviours that were derived from the evaluation forms during the coding process. (Detailed search terms and a supplemental appendix that gives an overview of papers included in the literature review are available on request.)

Part 2: Latent Class Analysis of behaviours mentioned in professional behaviour evaluation forms

The derived sample consisted of 232 evaluation forms from students with unsatisfactory professional behaviour (120 forms of 89 preclinical undergraduate students and 112 forms of 105 clinical undergraduate students), representing 7.9% of 2460 students (3.9% per year). Twenty seven students (1.1% of total student population) received multiple unsatisfactory professional behaviour evaluations.

We did not find all behaviours from the template in the evaluation forms. Ultimately, thirty seven behavioural themes were identified and formed the basis for the LCA. The initial and final template, and behavioural themes are displayed in Table 4.1.

Behaviours from the literature Initial (n=93) Added during coding (n=16)	Behavioural themes described in evaluation forms (n=37)
Drug abuse Alcohol abuse Physical health problems Mental health problems <i>Other personal circumstances</i>	Student mentioned personal circumstances to teacher
<i>Insecurity</i> <i>Cannot work independently</i>	Insecurity and inability to work independently
<i>Working pace too low</i> <i>Work is too detailed</i>	Work too detailed and working pace too low
Inadequate relationships with patients Inadequate relationships with peers Inadequate relationships with faculty Inadequate relationships with other health professionals	Inadequate relationships
Poor collaboration with patients Poor collaboration with peers Poor collaboration with faculty Poor collaboration with other health professionals Hiding behind student role	Poor collaboration
No self-improvement	No self-improvement
Lack of commitment Lack of motivation	Lack of commitment
Late or absent for assigned activities	Late or absent for assigned activities
Unprepared for activities	Unprepared for activities
No accountability to patients No accountability to peers No accountability to faculty No accountability to other health professionals	No accountability
Not keeping their word Not meeting deadlines	Not meeting deadlines
Not following up on activities related to patient care	Not following up on activities related to patient care
Poor initiative	Poor initiative
Avoiding feedback	Avoiding feedback
Casual behaviour Sloppy dress Sloppy work <i>Other failure to engage</i>	Failure to engage
General disorganisation Poor planning Illegible writing	General disorganisation

Table 4.1 Initial and final template, and behavioural themes reported in evaluation forms

Behaviours from the literature Initial (n=93) Added during coding (n=16)	Behavioural themes described in evaluation forms (n=37)
Poor academic skills Poor note keeping	Poor academic skills
Lying Does not act in a truthful and trustworthy manner	Does not act in a truthful and trustworthy manner
Plagiarism Self-plagiarism	Plagiarism
Does not obey rules and regulations No compliance to values	Does not obey rules and regulations
Writing a piece of work for another student Lending work to other students to copy Buying or selling hospital shifts Forging signatures Fraud in attendance list Cheating in an examination Helping others to cheat in examinations Gaining (illegal) access to examination questions Copying from another in an exam Not reported witnessed copying Influencing the teacher to get better marks Data fabrication/falsification in research Data fabrication/falsification in clinical context Misrepresentation Other unlicensed activities	Cheating and fraud
Brusque-hostile or argumentative communication to patients Brusque-hostile or argumentative communication to peers Brusque-hostile or argumentative communication to faculty Brusque-hostile or argumentative communication other health professionals	Brusque-hostile or argumentative communication
Unprofessional non-verbal communication	Unprofessional non-verbal communication
Not listening	Not listening
Ignoring emails or other contacts from teaching or administrative staff	Ignoring emails or other contacts from teaching or administrative staff
Inadequate communication with patients Inadequate communication with peers Inadequate communication with faculty Inadequate communication with other health professionals <i>Gossiping</i>	Inadequate communication

Table 4.1 continued

Behaviours from the literature Initial (n=93) Added during coding (n=16)	Behavioural themes described in evaluation forms (n=37)
<i>Inadequate mastery of Dutch language</i>	Inadequate mastery of Dutch language
<i>Inadequate written communication (including email) Inappropriate use of social media</i>	Inadequate written communication (including email and social media)
Not acknowledging mistakes Inability to accept feedback	Does not accept feedback
Does not incorporate feedback	Does not incorporate feedback
<i>Does not share emotional experiences Does not ask for help</i>	Does not share emotional experiences and does not ask for help
<i>No insight in own behaviours Other lack of insight into behaviour</i>	No insight in own behaviours
<i>No insight in emotions of others No insight in provoked emotions in others</i>	No insight in emotions of others
No empathy Does not show sensitivity to patients needs	Does not show sensitivity to patients needs
Does not show respect for patients Does not show respect for peers Does not show respect for faculty Does not show respect for other health professionals	Does not show respect
Self-driven behaviour Offensive display of superiority and self-importance	Self-driven behaviour
Not respecting professional boundaries Privacy and confidentiality violations Conducting patient care beyond own skill level	Not respecting professional boundaries
Immaturity Inappropriate or unnecessary pain or harm to patients Failing to contribute to patient care Writing rude/inappropriate comments on exam script Failing to establish rapport Not reporting unprofessional behaviour of colleagues Reporting an impaired colleague to faculty before approaching the individual Not aware of doctors privileges Sexual misconduct Discrimination No positive interest in cultural differences Does not balance multiple perspectives Does not balance ethical dilemmas	These behaviours were not found in the evaluation forms

Table 4.1 continued

Latent Class Analysis of the data yielded 3 classes of students who received unsatisfactory professional behaviour reports: class 1 (43%), class 2 (20%) and class 3 (37%). Based on the relevance of the content of the classes a 2-class solution was rejected in favour of the 3-class solution. Solutions with 4 or more classes were rejected because the chances that behaviours occurred in classes 4 or higher were very low.

Table 4.2 shows that students in all three classes have similar chances to display certain behaviours that thus are not distinctive for the classes: *being late or absent for assigned activities, not keeping deadlines and inadequate communication*. Specific behaviours for a student in class 1 are marked light grey, and specific behaviours for a student in class 2 are marked medium grey in Table 4.2. A student in class 3 has the same chance to display several similar unprofessional behaviours as a student in class 2, but the class 3 student has a higher chance to display these behaviours combined with certain distinctive behaviours, which are thus specific for class 3 (marked dark grey in Table 4.2). Many of the behaviours of students in class 2 and 3 have far lower chances to occur in a class 1 student.

	BEHAVIOURAL THEMES	CLASS 1	CLASS 2	CLASS 3
Common behaviours	Personal circumstances	16	16	16
	Late or absent for assigned activities	17	17	17
	Not meeting deadlines	17	16	16
	Inadequate communication	17	17	17
	Lack of motivation and commitment	3	16	17
	Poor planning and disorganisation	9	15	16
	No insight in own behaviour	1	16	17
	Poor initiative	4	16	17
	Poor collaboration	3	13	16
	No self-improvement	1	14	17
	Does not incorporate feedback	1	14	16
	Does not accept feedback	2	15	17
	No accountability	2	15	12
	Unprepared for activities	1	12	16
	Failure to engage	1	15	16
	Insecurity and inability to work independently	2	6	12
	Does not share emotional experiences and does not ask for help	1	6	11
	Dutch language unsatisfactory	1	7	11
	Does not show sensitivity to patients needs	1	5	9
	Plagiarism	1	7	5
Ignoring emails or other contacts from teachers/faculty	13	15	7	
Distinctive behaviours	Does not obey rules and regulations	15	7	7
	Does not show respect	3	7	17
	No insight in others emotions	1	2	16
	Inadequate relationships	2	3	16
	Self-driven behaviour	2	2	14
	Brusque-hostile or argumentative communication	1	2	15
	Poor academic skills	1	3	16
	Not listening	1	1	12
	Avoiding feedback	3	3	11
	Unprofessional non-verbal communication	1	2	9
	Not following up on activities related to patient care	2	3	9
	Work too detailed and working pace too low	3	1	9
	Not respecting professional boundaries	1	1	5

Table 4.2 Class-specific rates (%) for each behavioural theme
(Light grey: behaviours for profile 1, medium grey: behaviours profile 2, dark grey: behaviours profile 3)

Based on the content of the three classes the latent variable was described as ‘capacity for self-improvement and adaptability’. Consequently, the classes were labeled as profiles: class 1 was labeled as ‘Poor reliability’, class 2 as ‘Poor reliability and no insight’, and class 3 as ‘Poor reliability, no insight and poor adaptability’.

We explored the data for differences between the profiles in terms of number of unsatisfactory evaluations. Students in profile 3 more often received *multiple* unsatisfactory professional behaviour evaluation than students in profile 1 and 2. See Table 4.3.

Number of unsatisfactory behaviour evaluations and/or critical incident reports that the student received	Number of students			
	CLASS 1 n=83 (43%)	CLASS 2 n=39 (20%)	CLASS 3 n=72 (37%)	Total n=194 (100%)
1	80	32	55	167
2	2	7	10	19
3	1	0	4	5
4	0	0	3	3

Table 4.3 Occurrence of unsatisfactory professional behaviour evaluations and/or critical incident reports (n=232) per student (n=194) and per class

Part 3: Profile descriptions

We summarized teachers' feedback of 10 prototype students per class to yield profile descriptions. See Table 4.4.

Class	1	2	3
Capacity for self-improvement and adaptability	<p>HIGHEST ←—————→ LOWEST</p>		
Difficulty of remediation	<p>LOWEST —————→ HIGHEST</p>		
Profile	poor reliability	poor reliability + poor insight	poor reliability + poor insight + poor adaptability
Profile description	A student from class 1 does not obey rules and regulations of the school. The student does not inform teachers and peers about his/her activities. When receiving feedback the student admits that his behaviour was unprofessional. The student often asks for help to improve.	A student from class 2 does not actively participate in study groups or clerkships, and is often late or absent. Communication with peers and teachers is inadequate. The student relies on peers, sometimes resulting in plagiarism. When this behaviour is addressed this student does not recognise the feedback, but is willing to accept a different viewpoint. In coaching conversations a student from class 2 exhibits good intentions and willingness to change.	A student from class 3 seems to have problems in interpersonal communication and teamwork. This student often does not understand information given by others, which leads to misunderstandings. Peers and teachers — sometimes patients — feel that they are not always treated respectfully by this student, but the student does not recognise their feelings. A student from class 3 does not accept the teachers' feedback and does not improve. The student is not able to formulate learning goals and often does not accept an offered coaching trajectory.

Table 4.4 Profile descriptions based on behaviours of student prototypes for each class

Discussion

The main purpose of this study was to identify patterns in the behaviours of medical students who received an unsatisfactory professional behaviour evaluation or critical incident report in medical school, and to define a variable that could be used for the categorisation of these patterns. The results suggest that students might be distributed among three classes of distinctive behavioural patterns: 'Poor reliability' (profile 1), 'Poor reliability and poor insight' (profile 2), and 'Poor reliability, poor insight and poor adaptability' (profile 3). The variable for categorisation of unprofessional behaviours into these three student profiles appeared to be 'Capacity for self-reflection and adaptability'.

Papadakis identified a diminished capacity for self-reflection and adaptability during medical school as crucial, since it tends to continue in residency and medical practice, with consequences for future patients [1]. The present study relates this factor to *patterns* of observable behaviours of medical students. These patterns of behaviours seem to indicate to what extent the students' capacity for self-reflection and adaptability is diminished.

The most frequently observed behaviours reported by supervisors in this study were *poor communication, not meeting deadlines and being late or absent*. All students displayed these behaviours, which are thus non-distinctive for the profiles. Students with profile 3 ('Poor reliability, poor insight and poor adaptability') displayed distinctive behaviours, such as *not showing respect, not showing insight in the emotions of others, not maintaining adequate relationships or showing too much self-driven behaviour*. Furthermore, students with this profile more often received *multiple* unsatisfactory professional behaviour evaluations than students with the other profiles, perhaps indicating that they had not benefited from remediation trajectories. The findings of this study could imply that profile 3 behaviours predict the future professionalism of the students more accurately than the common, non-distinctive behaviours most supervisors seem to note and report, which is consistent with Ainsworth's findings [47].

Since not all unprofessional behaviours reported in the literature occurred in our study, it is unknown whether these behaviours would also result in the patterns that we found. Replication of this research could determine if the same profiles are found in other settings, and if the profiles might be useful to determine the intensity, duration and likelihood of success of remediation activities. We hypothesize that students with profile 1 ('Poor reliability') are likely to improve with help from their teachers in the regular course of the curriculum and that students with profile 2 ('Poor reliability and poor insight') are likely to need extra individual guidance by specialised supervisors within the medical school. Out of all students in this study, students with profile 3 ('Poor reliability, poor insight and poor adaptability') seem least likely to improve, in spite of remediation activities. Hypothetically, profile 3 behaviours could

be ‘symptoms’ of underlying personal problems, which – besides remediation in medical school – require psychological treatment outside medical school.

Future research focused on our hypotheses could not only lead to specific remediation methods for students from each profile, but also reveal the possibility of screening students during selection for medical school [48]. Since professional behaviour tends to be precipitated in pressure situations, the development of selection methods that make the behavioural pattern visible could be valuable, for example having one station during Multiple Mini Interviews (MMIs) where students are subjected to pressure [49].

Strengths and limitations

The use of LCA is a strength of this study, because the subtlety of the method made it possible to identify behavioural patterns. Transferability is positively influenced by the use of a template based on findings from the medical education literature, since this enabled the researchers to code behaviours that already had been defined as unprofessional in different settings. A disadvantage is the limited sample size and that the study was conducted in only one medical school. Rare behaviours may have occurred too infrequently to allow for analysis, which limits the generalisability of the findings. Furthermore, the cross-sectional design may have led to an underestimation of the number of students that received more than one unsatisfactory professional behaviour evaluation. The relatively high number of behaviours identified in a limited number of students made it difficult to get good estimations of all behaviours. This limitation was partly overcome by theming behaviours before analysis, and by using a modified form of the EM algorithm (which did not influence the outcomes).

Conclusions

A considerable body of evidence now exists that medical professionalism can be evaluated by observing behaviours. Supervisors need to recognise, acknowledge, and address students’ unprofessional behaviours [50]. Although addressing unprofessional behaviours remains difficult, the results of the present study offer a first step by making it easier to recognise and acknowledge behavioural patterns that indicate a diminished capacity for self-reflection. These profiles of unprofessional behaviour might help to improve the evaluation of unprofessional behaviour in medical school. Further research should provide evidence for confidently accepting or rejecting the profiles as an instrument to identify which students are expected to benefit from individual guidance.

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