EDITOR'S CHOICE

Personality traits of emergency physicians and paramedics

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ABSTRACT

Objective Personality influences behaviour and decision-making. This may play a particular role in emergency medical personnel (EMP) dealing with critical situations. So far very little is known about personality traits that distinguish paramedics (PM) and emergency physicians (EP) from other medical staff.

Methods A questionnaire including the ultra-short version of the Hamburg Personality Inventory (HPA) was distributed to EP, PM, medical doctors not practicing emergency medicine (MD) and medical students (MS).

Results 274 EPs, 245 PMs, 48 MDs and 60 MSs returned the questionnaire. Four personality clusters in EPs and PMs were identified and to be found largely independent from demographic and job-related variables. For both groups one cluster revealed personality characteristics that seem particularly suitable for EMP ('resilient crisis manager'). 'Anxious' and 'insecure' personality traits were found in two clusters in PMs and in one cluster in EPs. Mental health problems in the participants or their relatives or the experience of loss increased scores in the dimensions neuroticism and openness.

Conclusions The personality characteristics of EPs and PMs are not homogenous and do not differ substantially from those of MDs and MSs. 50—70% of EMP can be characterised as 'resilient and stable', up to 30—40% as 'anxious and insecure'. The presence of mental health problems in participants or their relatives or the experience of loss may lead to openness for new experiences and alternative behaviour or — on the other hand — may trigger feelings of insecurity and/or anxiety in emergency situations.

INTRODUCTION

The personality characteristics of physicians have an impact on their decision-making behaviour and their preferences with regard to treatment strategies. This has been addressed in studies focussing on issues of initiation, continuation or withdrawal of life support.[1 2] Although the results differ it was found that some personality characteristics, in particular self-directedness, cooperativeness, and self-transcendence influenced so-called end-of-life decisions.[3] Other factors were found to be race,[4] the physician's speciality,[5] and length of service in clinical practice[1]; less strong factors were age and gender[4 6] or religious affiliation.[1] Moreover, whether a physician shows empathy or sympathy appears to have a measurable effect on his behaviour and style of decision-making.[7] A low- or non-participatory decision-making style and a more aggressive treatment is associated with background, training, practice volume and longer experience in intensive care units (ICU).[1 8 9]

Other studies have addressed the potential role of risk attitudes and risk preferences on decision-making in critical care situations. The choice of a risky alternative in a 'gambling paradigm' (given as a scenario) was correlated with a greater preference for intubation and a longer duration of resuscitation efforts,[2] higher rates of admissions after emergency treatment,[10] and greater use of laboratory tests.[11] However, while a physician's risk attitude could not be predicted by specialty or gender, increasing age was associated with risk-averse behaviour.[12]

Although these studies have shown a relationship between risk preferences and decision-making in critical care situations, virtually no studies have been done on EPs or PMs and their decision-making in critical care situations. Few researchers have looked into problems of cardio-circulatory resuscitation,[7] but none of them focused on decision-making and its possible relation to personality characteristics. The use of personality inventories in medical staff is rare.

Personality characteristics of emergency medical personnel might explain the high vulnerability of their developing stress-related disorders such as depression or Post-traumatic stress disorder.[13—17] Another question of interest is whether emergency medical personnel (EMP) are more likely to exhibit risk-taking behaviour compared to medical personnel not involved in emergency medicine. To our knowledge, we conducted the first study in order to differentiate personality traits of emergency physicians and paramedics compared to medical doctors (MDs) who are not EPs and medical students (MS) in their last year.

METHODS

We designed a questionnaire including demographic characteristics (eg, gender, age, marital status and years of professional experience) and questions on mental health issues of the participant and his next of kin, or severe personal loss in the past 12 months. In order to determine a specific regional response we asked the first two digits of the participants' German post code. Anonymity was guaranteed.

We used the ultra-short version (HPA) of the Hamburg Personality Inventory (HPI).[18 19] The HPI is based on a factor-analytical approach utilising the Five-Factor Model (FFM) of personality. It depicts an empirically invariable and inter-culturally representative range of basic factors of personality, which

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Table 1 Structure of the hamburg personality inventory (HPI)

Subsystem	Complemantary HPI scales	System specification
I Emotions, Temperament, Mood	E 'Extroversion, liveliness and being sociable'	Positive emotions (habitual condition and mood), 'happy disposition', optimism
	N 'Nervousness, sensitiveness, and emotional instability'	Negative emotions (habitual condition and mood), 'sad disposition', pessimism, suffering
II Cognitions, View of the world, Way of thinking	C 'Restraint and orientation towards norms'	Normative orientation; conventionality, conformity, reality-driven, objectivity, rigidity, closed-mindedness, compulsiveness
	O 'Openness and experience'	Non-normative orientation, non-conformity, fantasy-driven, subjectivity, originality, open-mindedness, dissociation, absorption
III Motivation, Behaviour, Readiness	R 'Readiness to take risks, active competitiveness'	Pugnacious and dominant morale, 'masculine' roles and interests, competitive, adventure-seeking, tough-mindedness
	A 'Altruism, considerateness and helpfulness'	Defencive-submissive morale, 'feminine' roles and interests, co-operative, search for security and comfort, tender-mindedness

comprise all those central personality characteristics that can be homogenously explained by statistical analyses.[19] It complements the five dimensions — neuroticism/nervousness (N), extroversion (E), openness to experience (O), restraint/orientation towards norms/control (C), altruism/helpfulness (A) — by a sixth dimension, 'readiness to take risks/search for competition' (R).[20] These six dimensions form three sub-systems with two complementary dimensions each (see table 1).

Since EMP are supposed to be a group with particularly high levels of tolerance for hazards and frightening stimuli as well as showing a willingness to compete (eg, against time or death) the sixth factor (R) of the HPI appears particularly suitable for a description of personality features of this group. The HPI uses whole-sentence statements and not only adjectives as the latter does not permit the necessary fine-tuning of personal self-statements.

The ultra-short form (HPA) of the HPI contains 84 items that were reduced to 42 (correlation of the dimensions between HPI and HPA are each above 0.90) with no significant loss of reliability (all scales above 0.70). In effect the HPA is virtually equivalent to the HPI.

550 EP and PM were recruited from participants of a national German conference on emergency medicine. They received the questionnaire along with the conference proceedings and an announcement asking to participate was made during a plenary lecture. In addition the members of the Institute of Emergency Medicine (Hamburg) were sent questionnaires by mail. Questionnaire was also added as a supplement to part of the edition of the German Interdisciplinary Journal of Emergency Medicine ('Notfall & Rettungsmedizin'). MD of various specialities with no training in, and not practicing emergency medicine and MS were recruited from the Medical School of the Saarland University Hospital, Germany.

In Germany emergency medicine is not a medical specialty but a facultative specialist training, in most cases added to the specialty of anaesthesiology. In order to be eligible for the study EPs must have completed specialist training in emergency medicine ('emergency physicians') as approved by the Federal Medical Chamber and the Medical Chambers of the 16 German states.

At the time of the study, in Germany no ethical review board statement was necessary.

Statistical analyses were performed using SPSS 16.0 software. Data are presented as mean and SD. The groups were compared for demographic variables such as gender, age, marital status, or specialty. According to central limit theorem and our large group size the use of parametric tests was justified. The independent variable was group of participants, the dependent variables were HPA scores of nervousness, extroversion, openness, control,

Table 2 Demographic characteristics of the four groups

	EP n=274	PM n=245	MD n=48	MS n=60
Gender (male/female, %)	74/26	82/18	60/40	32/68
Age (mean±SD, years)	39.8±7.4	32.3±8.5	36.3±6.6	26.2±4.8
Professional experience (mean±SD, years)	11.1±7.6	6.5±4.8	9.0±6.8	4.5±0.7*
Marital status (%)				
single	24	43	35	52
married	70	51	65	43
separated/divorced	5	6	0	5
widowed	1	0	0	0
Mental health problems present (%)	3	4	0	5
Mental health problems present in next of kin (%)	25	19	10	23
Experience of loss within the past 12 months (%)	13	16	6	18

*mean duration of medical studies.
EP, Emergency physician; PM, Paramedic; MD, Medical doctor, not emergency physician; MS, Medical student

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Table 3 Specialities of EPs and MDs

Specialities (%)	EP (n=274)	MD (n=48)
Anaesthesiology	69.1	0
Internal Medicine	12.0	52.2
Surgery	11.2	30.4
General Practice	6.6	0
Gynaecology	0.4	0
Neurology	0.4	15.2
Psychiatry	0.4	2.2

EP, Emergency physician; MD, Medical doctor, not emergency physician.

altruism and risk taking. In order to compare the means in the four groups One-way ANOVA was used on HPA scores. Once significant group differences were found, this was followed by subgroup comparisons using Bonferroni corrections. Since there were no non-linear relations, we intercorrelated HPA scores using Pearson correlation coefficients. For clustering we used Ward's method on the squared Euclidean distance matrix derived from standardised HPA scores. Cluster analysis was performed separately for EPs and PMs. In order to identify predictive variables for HPA scores stepwise linear regressions with the independent variables age, gender, length of professional experience in years, mental health problems in EPs and next of kin, and experience of loss were calculated. Results were aligned with T-tests (for categorical variables) or Pearson correlations (for continuous variables). For all tests levels of significance were defined as $p<0.05$.

RESULTS

Data were obtained from 627 participants (EP: n=274; PM: n=245; MD: n=48; MS: n=60). The returns were homogenously distributed all over Germany. The demographic characteristics of the participants are summarised in table 2.

Demographic variables of medical students differed considerably from those of the other three groups (see table 2).

Table 4 Intercorrelation of the six HPA personality scales in EPs and PMs

	Score N	Score E	Score O	Score C	Score A	Score R
Score N		r = -.19 p<0.01	n.s.	n.s.	n.s.	r = -.17 p<0.01
Score E	r = -.30 p<0.001		r = .26 p<0.001	n.s.	r = .17 p<0.01	r = .27 p<0.001
Score O	n.s.	n.s.		r = .13 p<0.05	n.s.	r = .23 p<0.001
Score C	r = -.19 p<0.01	R = .21 p=0.001	n.s.		n.s.	r = .20 p=0.001
Score A	r = -.17 p<0.01	R = .28 p<0.001	r = .19 p<0.01	r = .35 p<0.001		n.s.
Score R	r = -.21 p=0.001	R = .29 p<0.001	r = .29 p<0.001	r = .35 p<0.001	r = .13 p<0.05	

= Paramedics (PM)

= Emergency physicians (EP)

Subscores of the hamburg personality inventory ultra-short form (HPA): Score N: nervousness, Score E: extroversion, Score O: openness, Score C: control, Score A: altruism, Score R: risk-taking.

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Table 5 Personality clusters of paramedics

Cluster	Description of personality characteristics	N (%)	Score N	Score E	Score O	Score C	Score A	Score R
1 Stable type	calm, confident, unexcited	105 (44.1)	−0.56	0.31	−0.21	−0.03	−0.01	−0.17
2 Flexible crisis manager	resilient, controlled, communicative, outgoing, thoughtful, willing to take risks - but in a conscientious way	40 (16.8)	−0.49	0.76	0.67	1.05	0.75	1.21
3 Anxious-reluctant type	anxious, nervous, shy, less communicative	73 (30.7)	0.77	−0.66	0.28	−0.23	−0.15	−0.14
4 Incapable of action	Over-anxious, half-hearted, reluctant, discouraged, uncommunicative	20 (8.4)	1.10	−0.73	−1.27	−1.13	−0.92	−1.00

Subscores of the Hamburg Personality Inventory ultra-short form (HPA): Score N, Nervousness; Score E, Extroversion; Score O, Openness; Score C, Control; Score A, Altruism; Score R, Risk-taking.
Euclidean matrix, squared distance derived from standardized HPA (z-) scores.
Only z-values of more than 0.30 or less than −0.30 were used for the description of personality characteristics.

Participating EPs were older than MDs (p=0.003) and PMs (p<0.001). Most of the PMs were male, significantly more than in the EPs or MDs group (each p<0.001). EPs were more likely to be married than MDs (p=0.04) or PMs (p<0.001). Mental health problems were more prevalent in next of kin of EPs than MDs (p=0.02). No other differences were found within these three groups. 69% of the EPs were anaesthesiologists. In the control group of MDs there were no anaesthetists, but mainly specialist in internal medicine. (table 3).

Raw scores of the six personality dimensions differed between groups. One-way ANOVA revealed differences for nervousness (F=11.8, df=3, 611, p<0.001), extroversion (F=2.9, df=3, 611, p=0.04); control (F=4.2, df=3, 611, p=0.006); altruism (F=3.5, df=3, 611, p=0.02) but not for openness and risk taking. After applying the Bonferroni correction the groups of EPs and PMs as compared to MSs showed significantly less nervousness (each p<0.001) and more control (p_{EP}=0.01; p_{PM}=0.005; p_{MD}=0.03). Altruism was highest in paramedics, the difference being significant only in comparison with MDs (p=0.02). On comparing EPs and MDs, the only significant mean difference, and only when Bonferroni correction was not applied, was a lower score in altruism in MDs (p=0.04).

In the groups of EPs and PMs intercorrelations between the six HPA subscales were generally low (see table 4). Age was slightly but significantly correlated to risk taking (r=−0.26; p<0.001), openness (r=−0.18; p=0.008), extroversion (r=−0.15; p=0.02) and altruism (r=0.16; p=0.02). Using stepwise linear regression the following predictor variables were identified: For EPs experience of loss had an influence on nervousness (p=0.01; mean score nervousness with experience of loss: 20.3±4.5, no experience of loss: 18.1±4.5) and on openness (p=0.04; mean score openness with experience of loss: 25.1±4.0, no experience of loss: 23.5±3.7). Mental health problems in the participants also predicted openness (p=0.02; mean score openness with mental health problems: 26.7±5.3, no mental health problems: 23.6±3.7). For PMs gender had an influence on extroversion (p=0.001; mean score extroversion males: 25.6±4.3, females: 28.2±3.7). Mental health problems in next of kin predicted nervousness (p=0.006; mean score nervousness with mental health problems: 19.1±4.6, no mental health problems: 17.2±4.0). No influence on personality dimensions was found for medical specialty (EP) or medical qualification/education (EP and PM).

For each group of EMP cluster analysis revealed four types of personality clusters (see tables 5 and 6). However, between EPs and PMs the clusters differed to some extent. In EPs fewer extreme values were found, indicating that the group of EPs may be more homogenous. One cluster showing personality characteristics particularly suitable for working in emergency medicine could be revealed for PMs and EPs: Cluster 2, ‚resilient and flexible crisis manager'. Anxious and insecure personality traits were found in two clusters of PMs and in one cluster of EPs. In PMs, participants of cluster 3 were significantly younger than of cluster 1 (29.6±7.1 vs 36.8±6.5 years; p<0.0005). Neither in EPs nor in PMs there were significant influences of age, gender, years of professional experience, mental health problem, mental health problem in next of kin, and experience of loss on personality clusters.

DISCUSSION

This study investigates the personality characteristics of medical emergency personnel. A challenge of the study was to choose a personality inventory that was short enough, applicable, valid, and usable in an emergency care setting. We decided to use the HPA, an ultra-short version of the HPI, adding a sixth dimension 'readiness to take risks' to the personality profile.[18 19]

Table 6 Personality clusters of emergency physicians

Cluster	Description of personality characteristics	N (%)	Score N	Score E	Score O	Score C	Score A	Score R
1 Unsociable type	unsociable, unapproachable, little caring, risk taking	42 (15.8)	0.29	−0.60	−0.13	−0.19	−1.20	0.71
2 Flexible crisis manager	resilient, controlled, communicative, caring, willing to take risks - but in a conscientious way	136 (51.3)	−0.29	0.44	0.36	0.32	0.33	0.34
3 Anxious type	anxious, nervous, empathic rather than straight to the point	44 (16.6)	0.42	0.25	−0.24	−1.15	0.44	−0.82
4 Sober type	introverted, sober, reasonable, conventional	43 (16.2)	0.26	−1.00	−0.80	0.40	−0.31	−0.94

Subscores of the Hamburg Personality Inventory ultra-short form (HPA): Score N, Nervousness; Score E, Extroversion; Score O, Openness; Score C, Controll; Score A, Altruism; Score R, Risk-taking.
Euclidean matrix, squared distance derived from standardized HPA (z-) scores
Only z-values of more than 0.30 or less than −0.30 were used for the description of personality characteristics

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Zuckerman describes the latter as 'sensation seeking'[21] and defines it as an affinity towards competition, curiosity, leadership, fighting spirit, readiness to give one's best and dedication.[20] Some authors describe this personality dimension to be associated with a longing for stimuli, towards high-adrenaline sports, high readiness to take risks, pleasure in gambling, tendency towards drug use and even higher rates of delinquency.[22]

To investigate whether a more pronounced risk-taking behaviour as a personal characteristic might influence a vocational decision the HPI was given to medical students.[23] It is known that the choice of education is influenced by expectations of the future profession[24] and relationship styles.[25] Medical students with an interest in emergency medicine showed to have a higher tolerance towards physical and psychological stress, a more positive attitude towards the medical profession and significantly higher scores in the dimension 'readiness to take risks'. Moreover, they were characterised by a preference for difficult tasks, a greater capacity to deal with conflicts, a willingness to accept criticism and a tenacity and strength of will. Some argue that they thus 'posses an ideal profile for becoming emergency physicians'.[23]

Orner *et al* stated, that EMP are usually resilient against stress or trauma.[26] On the other hand prevalence rates of burn-out, drug-abuse, divorce and suicide are particularly high in EMP.[13–17] Possibly, this discrepancy might be due to a difference between desired perception of the self and factual self-esteem. Anxieties and insecurities may be split off and replaced by the 'unconscious' motive of competition and 'trying harder'.[23] Due to the fact that they are not prepared for 'the shock of factual practice' many future EP seem to be particularly vulnerable. Professional experience, confrontation with reality, and disappointments may particularly challenge the attributes related to the dimension 'readiness to take risks'. On the other hand, personality characteristics only explain a portion of the variance of behaviour. In order to explain behaviour interactions between individuals, the environment, cultural and social factors have to be taken into account.

We can confirm some results of former studies addressing risk preferences on decision-making in critical care situations: In our sample neither specialty nor gender predicted risk attitudes, but older age was associated with lower scores of the dimension 'readiness to take risks'.[12] In general the personality structure did not appear to differ much between emergency physicians and paramedics, and some personality clusters were similar. Demographic variables (eg, gender, age) had a low influence on the results of the HPA-subscales. It became evident, however, that certain factors such as mental health problems in the participants or in their next of kin, or experience of loss were associated with an increase in the subscales 'neuroticism/nervousness' and 'openness'. We can hypothesise that these events could have unsettled and questioned long-term attitudes and perspectives of life. As a consequence this might have led to openness for new experiences and alternative behaviour or – on the other hand – triggered feelings of insecurity and/or anxiety in emergency situations.

The personality characteristics of emergency physicians and paramedics are not homogenous. 50–70% of EMP can be characterised as 'resilient and stable', whereas 30–40%, at least in the PM group, presented with a personality profile that shows 'traits of emotional instability', feelings of anxiety or fear of excessive demands. In PMs one, and EPs two clusters respectively, were characterised by high scores in the subscale 'readiness to take risks'. In PMs and one cluster of EPs this was combined with high scores in the subscales 'control' and 'altruism' indicating that in these subjects 'readiness to take risks' might be embedded in a personality profile that too is characterised by responsibility and security. In contrast to our hypothesis, no difference between the four groups of participants were found regarding 'readiness to take risks'. This might indicate a general attitude of 'responsibility' rather than 'adventure-seeking' behaviour in emergency medical personnel.

A limitation of the study is that we do not know how many EPs and PMs received the questionnaire and that we therefore have no exact return rates. It could be that only EMP interested in the problems responded. Therefore, we cannot exclude a self-selection bias.

Another limitation is that we did not collect data from a representative population-based sample for comparison. Previous studies showing results from representative HPA samples matched for age, could demonstrate that personality profiles are largely age-independent.[20] Considering the results of these population-based samples neither of our EP or PM sample showed a different personality profile. The greatest deviations were found in the dimensions 'nervousness' (0.5 SD below representative samples) and 'readiness to take risks' (0.5 SD above representative samples).[20]

Additionally we studied comparisons between four groups of medical personnel. The MD and MS group were merely collected to identify possible major differences and we did not plan to investigate them further. This is why in these two groups the number of participants is smaller.

In summary, EPs and PMs are not a homogeneous group of individuals. Our study concludes that there are subgroups among emergency medical personnel with personality characteristics that may predispose them to develop disorders associated with psychological distress such as burnout, depression, or Post-traumatic stress disorder. Another question which deserves further investigation is whether and how personality profiles may predict treatment habits or decision-making in emergency medicine. Both questions are currently being investigated by our group.

Competing interests None.

Contributors All authors have participated sufficiently in the work to take public responsibility for the whole content. Substantial contribution to conception and design: Pajonk, Gärtner, Lubda, Moecke, von Knobelsdorff. Substantial contribution to acquisition of data: Pajonk, Gärnter, Lubda. Substantial contribution to analysis and interpretation of data: Pajonk, Andresen, Schneider-Axmann, Teichmann. Substantial contribution to drafting of the manuscript: Pajonk. Substantial contribution to critical revision of the manuscript for important intellectual content: Andresen, Schneider-Axmann, Gärtner, Lubda, Moecke, von Knobelsdorff. Substantial contribution to statistical expertise: Pajonk, Andresen, Teichmann, Schneider-Axmann. Substantial contribution to administrative, technical or material support: Pajonk, Andresen, Gärtner, Lubda, Moecke, von Knobelsdorff. Substantial contribution to supervision: Pajonk, Andresen, Moecke, von Knobelsdorff.

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An early diagnosis of inferior vena cava thrombosis

A 48-year-old man presented to the emergency department with 6 days of constant central abdominal pain.

We performed a focused bedside emergency department ultrasound scan (figure 1) to exclude an abdominal aortic aneurysm. Although the aorta was of normal calibre, we identified thrombosis of the infrahepatic inferior vena cava (IVC) extending to the common iliac veins. This was then confirmed on CT.

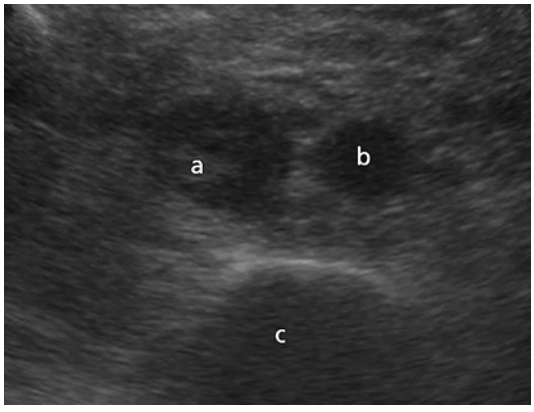

Figure 1 Ultrasound scan of the abdomen showing echogenic thrombus within a dilated non-compressible IVC (A), a normal calibre aorta (B) and a vertebral body (C).

Ultrasound is a rapidly evolving tool, which has potential beyond the focused assessment with sonography for trauma and abdominal aortic aneurysm scans covered in basic ultrasound courses. Abnormalities seen may be followed up with imaging such as CT, leading to earlier diagnosis of less common conditions such as IVC thrombosis.

IVC thrombosis has a varied presentation with symptoms including bilateral leg oedema, generalised abdominal pain, vomiting and dilated superficial abdominal veins.

Management involves anticoagulation and investigations to identify a cause, which can include an underlying coagulopathy, local tumour extension and retroperitoneal fibrosis.[1]

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