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# Empathy, impulsiveness and tendency to risk behavior in medical university students

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**Abstract**

**Introduction:** Empathy is defined as the ability to perceive and understand the emotions and thoughts of others, and to respond with compassion. Empathy are essential in effective clinical communication.

**Aim:** Evaluation of the level of impulsivity, risk-taking behavior and empathy among students from various fields of medical faculties.

**Material and methods:** This was anonymous cross-sectional study. The study group consisted of 384 students (344 females and 40 males). The own proprietary structured questionnaire was used for evaluation socio-demographic data. The Polish version of the impulsivity questionnaire (IVE) was used for evaluation three dimensions: impulsivity, risk-taking and empathy. The non-parametric tests were used in statistic analysis.

**Results and discussion:** In study group the results on IVE questionnaire were within normal range. The highest score was observed in the empathy dimension, followed by risk-taking behavior and impulsivity. No significant differences between females and males were found. Factor analysis shows that impulsivity and risk-taking are separate dimensions associated with different explanatory patomechanisms, however empathy depends, to some extent, on both. Empathy showed a strong positive correlation with impulsivity, and negative with the risk-taking dimension. The highest level of empathy presented midwifery and medical-dentists students, while lowest level presents nursing students.

**Conclusions:** Empathy in medical students may be defined by impulsivity and risk taking behavior. The higher level of empathy presented students of midwifery and the lowest level showed nursing students. This may suggest the significance of incorporating empathy training into medical education, tailored to the specific demands of the study field.

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## 1. INTRODUCTION

Empathy is defined as the ability to understand and share the mental states of others and the ability to empathize, consisted with two components: emotional and cognitive. Emotional empathy is the ability to co-experience the feelings of others, while cognitive empathy is the ability to consciously understand and name the mental states of others.[1] Emotional and cognitive empathy are essential in proper clinical communication, which is the basis for good contact with the patient.[2] Current data shows that empathy is not genetically determined, however the key role plays education and social factors.[3] Clinical empathy is not the same as compassion or 'being nice' to the patient, but the ability to understand his emotions, the causes of his emotional state in the moment, and the skill to adapt reactions to assist the patient in activating their own resources needed to emotionally cope with a difficult situation.[1] It has also been proven that various forms of empathy, such as emotional empathy, cognitive empathy and sensitivity to people, are associated with specific neurobiological mechanisms.[4] These are arguments for the need to introduce 'empathy science' during medical studies, especially in those fields where contact with the patient is intense, and good clinical communication is essential in the process of diagnosis and treatment. Most of the researchers strongly recommended the implementation sensitizing and empathetic education in the fields of study conducted at medical universities, particularly because students are aware of their own barriers in communicating with patients and want to improve their skills in this area.[2,5] The results of Polish study conducted in 196 nursing students showed a systematic, statistically significant, reduction in the level of empathy with each subsequent year of study.[6] Another Polish publication presents a study of the level of empathy of 64 nursing students, compared to a group of 64 students of tourism and recreation. It turns out that slightly higher scores of general empathy were observed in the group of female students of tourism and recreation (70.30 points) than in nursing students (67.38 points), although the results of both studied groups were within the range of average results. These results are surprising, because a higher level of empathy could be expected in nursing students than in students of other fields of study.[7] Empathy in medical students can be conditioned by many factors, e.g. with motivation to choose a field of study, satisfaction with studying and personality traits.[8]

## 2. AIM

The aim of this study was to compare the level of impulsivity, risk-taking behavior and empathy measured by impulsivity (impulsiveness–venturesomeness–empathy – IVE) questionnaire among students from various fields of medical studies and the evaluation of the relationships between empathy dimensions.

## 3. MATERIAL AND METHODS

### 3.1. SUBJECTS

The study group consisted of 384 students aged 18–40 years (344 females and 40 males) representing various fields of medical studies. Subjects are divided into 6 groups according to the study type:

- group 1 – 95 medicine and dentistry students,
- group 2 – 68 nursing students,
- group 3 – 46 midwifery students,
- group 4 – 31 physiotherapy students,
- group 5 – 81 paramedic, nutrition science, public health students,
- group 6 – 63 students of other medical fields of education: audiophonology, electroradiology, biomedical engineering, laboratory medicine, biotechnology, pharmacy.

### 3.2. STUDY DESIGN

This was anonymous online cross-sectional study, performed in students of various fields of medical studies. The questionnaires were placed on the Internet. In total, 400 sets of questionnaires were obtained, 16 sets were excluded from analysis due to incomplete data. Finally 384 students aged 18–30 years (344 females and 40 males) were included in the study.

### 3.3. RESEARCH METHODS

The own proprietary structured questionnaire was used for evaluation socio-demographic data (age, gender, place of residence, field of medical study). The subject was asked to check the appropriate age range: (1) age 18–20, (2) age 21–25, (3) age 26–30. Gender was coded 0 (female), 1 (male), 2 (other). Place of residence was marked as: 1 (willage), 2 (city up to 100,000 inhabitants), 3 (city with over than 100,000 inhabitants) and state what field they are studying.

The Polish version of the IVE introduced by Eysenck.[9] The tool allows to assess 3 personality dimensions: impulsivity, risk-taking and empathy. It consist of 54 questions, to which the responder answers 'YES' or 'NO.' Each compliant answer receives 1 point, while non-compliant answers receive 0 points. The result in

each category was the sum of points obtained. Impulsivity was assessed by 19 items, risk-taking 16 items, empathy 19 items. The scores obtained were converted into sten values: in each of categories checked sten 1–3 means low results, 4–7 average results, 8–10 high results.

### 3.4. Statistical analysis

The variable distribution was checked using Shapiro–Wilk test. Because of nonparametric variable distribution in further analyses nonparametric tests were consistently used. For evaluation statistical significance of differences between two groups the Mann–Whitney Test, and between more than two groups the Kruskal–Wallis ANOVA test were applied. The correlation analysis was performed using *R* Spearman test. Factor analysis of the main components of the IVE questionnaire was carried out. Statistica v. 13.3 program was used for the data analysis.

## 4. Results

On the first step of data analysis the intercorrelation between three components if IVE questionnaire was done (Table 1). Factor analysis identified 2 main factors that may explain the mechanisms may underlying the dimensions studied (Table 2).

The results shows, that impulsivity and risk-taking are separate dimensions. This may indicate different explanatory patomechanism of these 2 dimensions, while empathy depends to some extent on both. The results of correlation analysis show that empathy is more strongly associated with impulsivity, which may mean that people with high impulsivity may present high empathy. Empathy, on the other hand, was negatively correlated with the risk-taking dimension, which indicate that the higher the risk-taking behavior the lower empathy.

Table 3 shows the results obtained by investigated students on IVE questionnaire. As was shown, the results were within normal range. The highest value was noted in empathy dimension, followed on risk-taking and impulsivity. Therefore, it can be concluded that empathy, was the most strongly expressed among the surveyed medical students. No significant differences in IVE questionnaire dimensions between the results obtained by female and male were observed. Age and place of residence also did not differentiate the investigated subjects.

Table 4 presents the comparisons of the results on IVE questionnaires obtained by students representing various fields of medical studies. No significant difference on impulsivity and risk-taking behavior was observed, and significant difference between students subgroups on empathy dimension was found. Midwifery students scored higher on empathy dimensions in comparison to the remaining groups. The results obtained by medicine and dentistry students were on second place and were higher than the results presented by nursing, physiotherapy and groups of students with limited contact with patients. Students representing fields of study

**Table 1. The intercorrelation between three components of IVE questionnaire.**

| Sten | Impulsivity | Risk-taking | Empathy |
|---|---|---|---|
| Impusivity | 1.00000 | 0.212644 | 0.106711 |
| Risk-taking | – | 1.000000 | -0.246771 |
| Empathy | – | – | 1.000000 |

**Table 2. Factor analysis of the IVE questionnaire dimensions.**

| Variable | Factor 1 | Factor 2 |
|---|---|---|
| Impulsivity | -0.40 | 0.82 |
| Risk-taking | -0.86 | 0.09 |
| Empathy | 0.60 | 0.66 |
| Initial variance | 1.26 | 1.12 |
| Share | 0.42 | 0.37 |

Comments: Marked loads are more than 0.7.

**Table 3. The results of IVE questionnaire dimensions in investigated subjects.**

| Variable (sten) | N | Mean ± SD | Min–max |
|---|---|---|---|
| Impusivity | 384 | 4.42 ± 1.98 | 1.00–10.00 |
| Risk-taking | 384 | 4.99 ± 1.90 | 1.00–10.00 |
| Empathy | 384 | 6.45 ± 2.14 | 1.00–10.00 |

**Table 4. Comparison of the IVE results obtained by students representing various fields of medical studies.**

| Variable | Impulsivity | Risk-taking | Empathy |
|---|---|---|---|
| Group 1, *n* = 95 | 4.32 ± 2.05<br>1–10 | 5.04 ± 1.77<br>1–9 | 6.96 ± 1.95<br>2–10 |
| Group 2, *n* = 68 | 4.25 ± 2.16<br>1–9 | 5.13 ± 1.81<br>1–9 | 5.31 ± 1.96<br>2–10 |
| Group 3, *n* = 46 | 4.80 ± 1.92<br>1–9 | 4.61 ± 1.69<br>2–9 | 8.09 ± 2.25<br>2–10 |
| Group 4, *n* = 31 | 4.13 ± 1.31<br>2–7 | 5.03 ± 2.01<br>1–9 | 5.74 ± 1.95<br>2–9 |
| Group 5, *n* = 81 | 4.4 ± 2.05<br>1–10 | 4.82 ± 2.05<br>1–10 | 6.53 ± 2.01<br>1–10 |
| Group 6, *n* = 63 | 4.68 ± 1.89<br>1–9 | 5.24 ± 2.05<br>2–10 | 5.94 ± 1.83<br>2–10 |
| Significance of differences ANOVA Kruskal–Wallis | 0.4268 | 0.4283 | 0.0000 |

Comments: Numbers are given as mean values + SD, min–max

**Table 5. The comparison of the results on empathy dimensions (IVE questionarire) between 6 investigated group. The *U* Mann–Whitney test.**

| Comparison groups | *z* | *P** |
|---|---|---|
| Group 1 vs group 2 | 4.80 | 0.000 |
| vs group 3 | -3.41 | 0.001 |
| vs group 4 | 2.76 | 0.006 |
| vs group 5 | 1.25 | 0.500 |
| vs group 6 | 3.15 | 0.002 |
| Group 2 vs group 3 | -5.89 | 0.000 |
| vs group 4 | -1.02 | 0.308 |
| vs group 5 | -3.62 | 0.000 |
| vs group 6 | -1.78 | 0.075 |
| Group 3 vs group 4 | 4.46 | 0.000 |
| vs group 5 | 4.30 | 0.000 |
| vs group 6 | 5.04 | 0.000 |
| Group 4 vs group 5 | -1.98 | 0.061 |
| vs group 6 | -0.36 | 0.717 |
| Group 5 vs group 6 | 1.94 | 0.052 |

Comments: $n_1$ = 95; $n_2$ = 68; $n_3$ = 46; $n_4$ = 31; $n_5$ = 81; $n_6$ = 63; * two tailed test.

required limited contact with patients presented lower level of empathy compared to midwifery and dentistry students, which is similar to physiotherapy students, however significantly higher in comparison to nursing students. Surprisingly, nursing students achieved the lower level of empathy on IVE questionnaire, however their results were not significantly differ from the results of physiotherapy and students representing fields of study requiring limited contact with patients.

The comparison of the results obtained in IVE questionnaires between investigated groups of students are presented in Table 5. Significantly higher empathy scores were observed among medical students compared to other fields of study, except for the group of students of medical studies working in direct contact with patients. Nursing students scored significantly lower than midwifery students and medical students working in direct contact with patients. Midwifery students scored significantly higher on empathy than physiotherapy students and medical school students working in direct and limited contact with patients. Physiotherapy students demonstrated lower empathy levels compared to students in medical fields that involve both direct and limited patient contact. Conversely, students in disciplines requiring direct patient interaction exhibited higher empathy scores than those whose future professions do not necessitate direct patient engagement.

## 5. DISCUSSION

This study involved 384 students representing several fields of study offered by medical universities. The largest number of students in the study were students of medicine, nursing, midwifery, physiotherapy and pharmacy. A smaller number of respondents studied other faculties. Women were much more likely to take part in the study, accounting for about 3/4 of the respondents, maybe it's the result of more women studying medical faculties, especially nursing and midwifery. In other studies, a slightly higher proportion of women participated, as observed in the study by Iqbal et al., where, out of 391 students, 251 (64.19%) were female.[10]

In the years 2008–2010, an empathy study was conducted among 948 first, second and third year students of the faculties of emergency medicine, nursing and midwifery at Monash University in Australia.[11] A significantly higher level of empathy was found in midwifery students compared to students of other fields of study. They also found that second- and third-year students presented higher levels of empathy than first-year students. This may be due to a different system of education in medical faculties than in Poland. Therefore, the question arises whether individuals with high empathy choose medical fields of study due to their professional predispositions, as well as whether the education system in various countries foster the development of empathetic traits in students.

The results of our study show, that all students representing medical faculties exhibited high empathy and their results on other IVE dimensions are within normal range. Investigated subjects with high scores of impulsivity presents also high empathy, however lower scores on empathy correlated with higher scores on the risk-taking behavior.

There may probably be an explanation for this relationship, that people with a high propensity for risky behaviors are unable to focus on other people's emotions, do not understand those emotions, and focus more on their own emotional experiences and goals. On the other hand, people with a high level of impulsivity may develop strong empathic traits and exhibit strong altruistic behaviors, as well as engage in prosocial activities. Therefore, impulsivity should be considered as a separate dimension, perhaps more strongly related to the properties of the central nervous system, while the propensity to risk and empathy are conditioned by environmental and social factors and individual experiences as well. Similar observations regarding the relationship between impulsivity and the tendency to risky behaviors were made by a researcher from the University of Portland, USA, who points out that these two dimensions may show a strong relationship in the development of neurodevelopmental disorders characterized by a higher risk of risky behaviors.[12] In this model, however, it was noted that mediating variables,

such as individual experiences and neurocognitive functions, are important. The cognitive aspect seems to be an important variable mediating the relationship between these two characteristics. In addition, impulsivity and risk behavior may be important variables in the formation of self-control processes, particularly in the etiology of impulse control disorders.[12] This is also confirmed by clinical observations, where there is a clear relationship between impulsivity and engaging in risky behaviors associated with cognitive difficulties, such as the ability to plan and predict the effects of actions. A study in this area was carried out by Brazilian authors studying patients with hepatitis C (HCV).[13]

Such studies have also been conducted among healthy young adults, where a close relationship has been shown between the severity of impulsivity and risk behavior traits and behavioral addictions, such as gambling tendencies. It also turned out that the mediator was the efficiency of executive functions related to the functioning of the prefrontal cortex of the brain, as measured by the Wisconsin Card Sorting test, commonly used in neuropsychological diagnostics.[14]

However, the mechanism of linking impulsivity with empathy is interesting, which has been shown in this study of medical students. In many studies, impulsivity is perceived as a factor conducive to aggression and committing prohibited acts, however, it is pointed out that empathy in impulsive individuals may play a protective role towards aggressive behavior of various nature. Such a relationship was found in young women – students of the University of Mostar, from Bosnia and Herzegovina. It has been shown that in order to prevent acts of aggression and self-harm among female students who have experienced violence during the civil war, it is necessary to create a prevention program based on building satisfying relationships with others and promoting empathy.[15]

Thus, it seems that impulsivity in itself can promote both risky behavior and the building of relationships based on empathy, which is consistent with the observations made in this paper. Moreover, this problem deserves further research, especially among medical students and healthcare professionals.

Many studies point to differences in impulsivity and risk propensity between women and men, as well as the severity of risky behaviors. Some studies indicate that this intensity decreases with age. For instance, a study conducted among adolescents on the campus of a New York University found minimal difference in the severity of impulsivity between men and women, particularly when examining impulsivity as a factor conducive to alcohol consumption. Of course, there was a correlation between the tendency to drink alcohol and impulsivity, but when it comes to signal-induced drinking (the so-called signal-induced thirst), it was associated with impulsivity only in the group of women. These findings suggest distinct etiologies of risky behavior in women and men.[16]

Another study, conducted in a group of medical students, found that gender may play a role in the development of different types of empathy – emotional and cognitive. At the same time, it has been noted that other personality traits, such as neuroticism and agreeableness, as well as the type of specialization, are important factors in the development of empathic traits in medical students.[17] This corresponds with the results obtained in this study, where differences were found in the range of personality dimensions examined by means of the IVE questionnaire in students from various fields of study. It is possible that people who choose different medical fields differ in terms of some characteristics, including empathy. In the study, no significant differences were found between students from different fields of study in terms of impulsivity and risk behavior, but highly statistically significant differences were found in the dimension of empathy.

As previously indicated, the scores of all students were within the normal range, with empathy scores in the top quartile, suggested that overall, all subjects demonstrated high levels of empathy. Significantly lower scores, falling within the lower limits, were obtained by students of medical analysts and nursing. This is an unexpected result in case of nursing students, given that their profession requires special interpersonal abilities in clinical communication based on empathy. Previous studies have indicated that high empathy in nurses is not only their main trait, but also that empathetic people choose this field of study. On the other hand, work-related stress in empathetic nurses is a major factor contributing to the development of burnout syndrome.[18,19] The results of our study may indicate necessity of implementation empathy in education during medical studies to improve empathy abilities, necessary in clinical communication with patients and therapeutic team, to improve their professional abilities and to prevent empathy loss. Interesting teaching project was provided in University of Manchester Medical School, where students attended in an empathy workshop focused on the affective domain of empathy. The results of this experiment show the usefulness of the short term teaching workshop in improving different kinds of empathy in students.[20]

### Limitation of the study

This cross-sectional study was anonymous and was conducted using the IVE questionnaire, completed by the respondents. Studies of this nature are inherently influenced by subjectivity, and as a result, their findings should be interpreted with careful consideration. In addition, in the study, 3/4 of the group were women, who choose more frequently than men certain fields of study, such as nursing and midwifery. This complicates the interpretation of study results obtained by men. Additionally, no information was collected about the year of study, which did not allow the assessment of changes in the level of empathy during the study.

## 6. Conclusions

Students from the fields of study at the medical schools obtained results within the normal range in the IVE questionnaire. They present a high level of empathy, which is essential when working with patients. The highest empathy scores are presented by students of medicine and dentistry, while nursing students show the lowest scores. Students with high impulsivity also present a high level of empathy, while a higher propensity for risky behavior is associated with lower empathy. This may be implicative for the education of medical students in the field of empathy and clinical communication in order to shape the desired personal qualities necessary in working with patients.

### CONFLICT OF INTEREST

None declared.

### FUNDING

None declared.

### ETHICS

The project was approved by Bioethical Committee of Collegium Medicum in Bydgoszcz (KB610/2020).

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