IS EMPATHY OF HEALTH PROFESSIONALS MORE DEPENDENT ON FACIAL EXPRESSION RECOGNITION ACCURACY OR PERSONALITY TRAIT?

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Background: Empathy is an indispensable part of health care. The outcome of empathic response is satisfaction on sides, patient and health professionals. But it also requires a great deal of healthcare staff's engagement what is exhausting and burdening. Many variables in increasing or decreasing way affect empathy.

Aim: Combining facial emotion recognition and personal affective traits, the focus was to determine which one is a better predictor of health professional's empathy.

Methods: Therefore, a total of 150 health professionals was assessed in the level of empathy, position on extraversion-introversion dimension and ability to accurately recognize facial expressions of emotion. Gender and working experience were controlling variables in predicting the health professional's empathy.

Results: Generally, results show that extraverted health professionals with high accuracy of facial expression recognition have also higher empathy scores. Both studied variables were good predictors of health professional's empathy with a stronger unique contribution of personality traits.

Conclusion: Managing health professionals human resources based on their empathy could serve, in long term, to prevent individual level occurrences such as burnout syndrome and extended work absenteeism, and on an organizational level many legal issues and to enhance better treatment outcomes, trust in health professionals with mutual satisfaction. Further studies are required for application in clinical settings.

Keywords: empathy, facial expression, affective personality traits, health professionals.

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INTRODUCTION

An empathetic response is the essence of health care professionals-patient relations. Hojat and colleagues in their study referred to benefits of empathy for such relation inviting to notable studies where benefits are derived as good attitudes toward patients, better clinical outcomes, patient and health care professional satisfaction [1]. The ability to perceive the emotions of another person and to "send" and "receive" nonverbal signals through facial expressions, contributes significantly to emphatic engagement. Regardless of defining varieties within different scientific disciplines, all agree that empathy contains two domains, cognitive and affective/emotional.

Cognitive domain refers to the ability to understand the inner experience of others as well as the capacity to see things from another person's perspective. Emotional sharing accompanied by an adequate response to perceiving another person's emotions are essentials of affective empathy domain [1]. Baron-Cohen and Wheelwright emphasized that emotional re-

sponse to be considered empathetic it has to ensure as a consequence of perceiving another person's emotions [2]. If the perception of emotion is the first presumption of empathy, it follows that emotional discrimination should be the second one.

The human face most reliably conveys information of a person's emotional state. Accurate facial expression recognition provides data on emotional state, as a nonverbal cue of empathy describing congruency/ no congruency with emotional stimuli [3]. Facial feedback leads to an observer's facial micro-expression changes and consequently interpersonal emotional congruency. Such observer's tendency to automatically mimic and synchronize facial expressions, postural and vocalizations leads to interpersonal emotional states alignment, labeled by De Wied and colleagues as "emotional contagion" [4]. Furthermore, the described tendency is present if the facial expression is unconsciously evoked [5]. Wu, Sheppard, and Mitchell see empathy as a state induced by various situations where the capacity to have this experience varies between people as an

empathic disposition that reflecting consistent characteristic patterns of behavior [6].

The main purpose of empathy is to adequately answer to others' pain and suffering in order to reduce it. Thereby, besides accurate emotional discrimination and own emotional experience, Nash and colleagues argue that adequacy of a response is also dependent on some personality traits [7]. The explanation lies in empathy connection with big-five traits. In the absence of other, reliable cues, the observer relies on personality traits in interpreting the behavior. Other studies with a focus of empathy indicators point out that empathy is more or less recognized through empathy-related behaviors, where facial expression is the most reliable [8,9].

Inline to above, it is reasonable to presume a close relationship between the perception of emotional stimuli resulting from an outcome of facial muscle activity and empathy, both moderated by temperamental factors (extraversion and emotional stability). In this study, the goal is to examine what is more relevant to empathy: personality traits (prominent temperament as a pattern of steady response in different situations) or the ability to recognize facially expressed emotions as a trigger for empathic behavior. Thus, the underlying assumption was those extraverted health professionals (corresponding temperament type choleric and sanguinic) are more accurate in facial emotion recognition and high in emotional empathy. Oppositely, due to such expectation, it is assumed that introverted health care professionals (corresponding temperament type phlegmatic and melancholic) are less accurate in facial emotion recognition and low in emotional empathy.

METHOD
PARTICIPANTS

The participants were 150 health care professionals (doctors and nurses) employed at University-Clinical Center Tuzla and Health Care Center Tuzla (72 males and 78 females). They ranged in age from 18 to 64 with a mean age of 42 (SD ±0,64). Average working experiences were mainly above 10 years (18±0,62).

Procedures and Material

The participants were recruited by asking all health professionals employed in two selected institutions to voluntary assessment. They were informed that the purpose of the study was to examine the connection between empathy and facial emotion recognition in a function of personality traits. A between-subject design was set to answer if extraverted health professionals are higher in empathy and more accurate in facial emotion recognition, compared to introverted. The primary criteria for creating groups were accuracy of facial expression judgment and temperamental type based on the position on two personality dimensions (extraversion - introversion and emotional stability - neuroticism).

To get a measure of facial feedback effect, participants rated images from Pictures of Facial Affect collection-POFA [10]. Images (total of 15 images with facial clues intensity 40-70%) of seven basic emotions (fear, happiness, sadness, anger, surprise, disgust and contempt) were presented. Images were displayed on a computer screen for five seconds and participants were asked to identify facially expressed emotion by singling out one of seven names emotions. Based on facial recognition accuracy, results were set as "above 50%" and "below 50%"successful recognition and two groups accordingly.

Personality traits of interest that determine temperament type was assessed by E (extraversion) and N (neuroticism) scales of Eysenck personality test [11]. Values of T scores on two dimensions in range 34-45 and 55-65 were indicators for consistent weak/strong characteristics for dimension domain. Sanguine temperament was assigned to low neuroticism-high extraversion (N-E+); Choleric to both high neuroticism and extraversion (N+E+); Melancholic to high neuroticism-low extraversion (N+E-) and Phlegmatic to both low neuroticism and extraversion (N-E-). According to two-dimensional positions on the circumplex model, the temperamental type was assigned to each participant.

Empathy test by Baron-Cohen and Wheelwright [2] was applied in order to self-assess health professionals' empathy level. Empathy Quotient (EQ) questionnaire consist of a total of 60 items where 40 items refer to empathy and 20 items are filter questions for bias elimination. Participants choose on a 4-point scale (from definitely disagree to definitely agree) the answer which fits them the best. Answers are valued 0, 1 or 2 points depending on emphatic features in response. Summary of empathy response is presented as empathy quotient (EQ) ranged from low (0-32), average (33-52), above average (53-63) to high (64-80).

Results

A total of 150 health professionals participated in the study, for a response rate of 86%.

The majority of health professionals obtained >50% recognition accuracy of facially expressed emotions (128 of 150). By the two dimensional positions, health professionals were predominantly extraverted (94 of 150; F=39,9; p<0,01) leading with a sanguine type (Figure I).
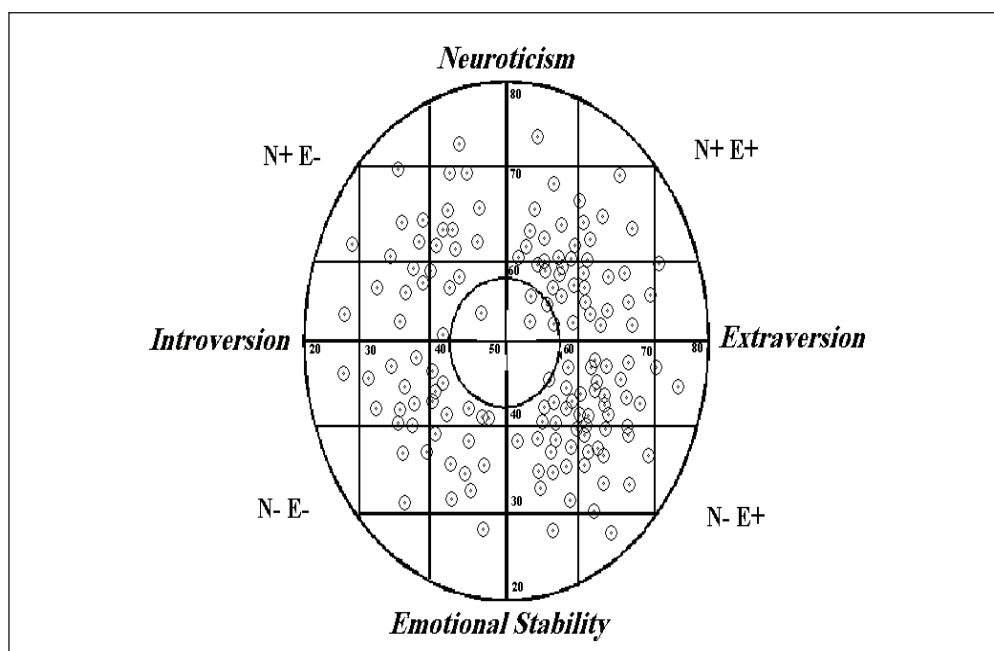
Figure I. Distribution of health professionals position on two-dimensional scale

In relation to temperamental type and self-assessed empathy, all range of empathy (low to above average) was identified at extraverted (Choleric and Sanguinic type) while introverted health professionals (Melancholic and Flegamtic type) achieved mainly low and average empathy (Figure II).
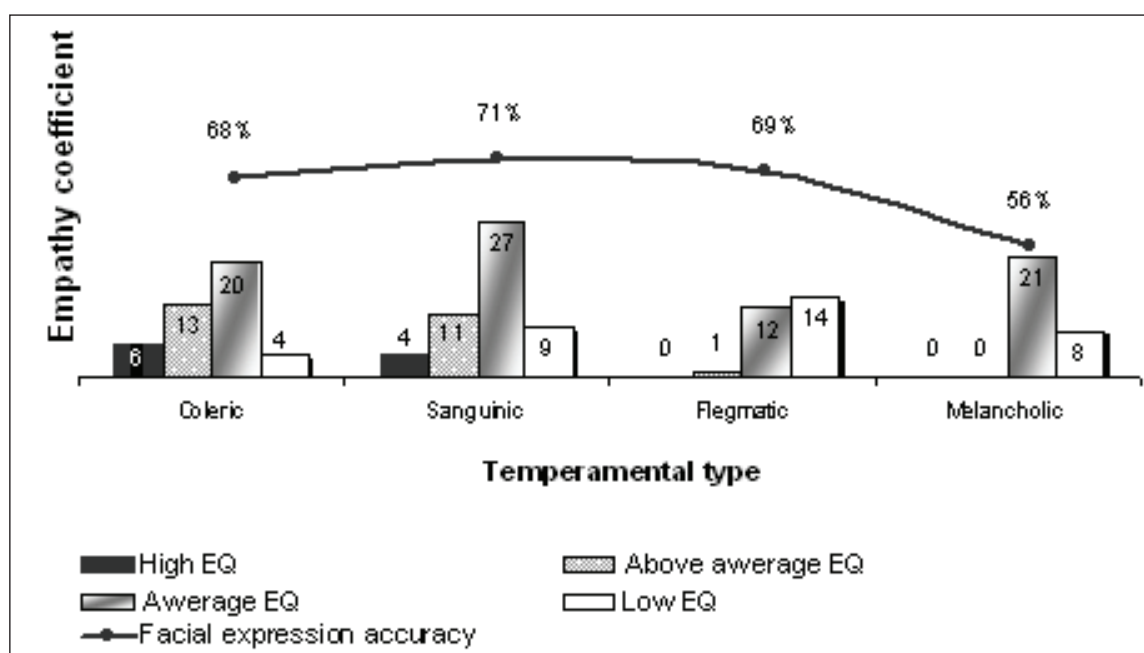
Figure II. Interaction of Health professionals Empathy and Recognition Accuracy of Facially expressed emotions

Also, accuracy in facial expression recognition showed a similar trend, lower accuracy followed lower empathy and vice versa. The measure of facial expression recognition impact on empathy was significant (p<0.05) and medium-size according to Cohen´s interpretation guidelines (3.8% of variance) (Table I).

Table I. Interaction of facial expression recognition accurasy with health professionals empathy

Empathy coefficient	Facial expression recognition accuracy	M	SD	N	df	F	p	η²
Low	<50%	26.38	3.284	16				
	>50%	28.68	2.868	19				
	Total	27.63	3.237	35				
Average	<50%	44.80	7.190	5				
	>50%	40.83	5.285	75				
	Total	41.07	5.451	80				
Above average	<50%	53.00	-	1				
	>50%	54.50	3.730	24				
	Total	54.44	3.664	25				
High	<50%	-	-	-				
	>50%	70.10	3.985	10				
	Total	70.10	3.985	10				
Total	<50%	31.77	10.080	22				
	>50%	43.87	11.687	128				
	Total	42.10	12.214	150				
Empathy coefficient					3	175.71	.001	.787
Facial expression recognition accuracy					1	.001	.976	.000
Empathy coefficient x Facial expression recognition accuracy					2	2.86	.030	.038

M-menan; SD-standard deviation; N-number participants; df-degree of freedom; F-ANOVA;
p-value of significants; Ŋ²-partial eta square

Impact evaluation of two different empathy benchmarks (the accuracy of recognizing facially expressed emotions and temperament) to predict empathy, used hierarchical multiple regression. Preliminary analyses confirm that the assumptions of normality, linearity, multicollinearity, and homogeneity were not disturbed. In firs step predictors of gender and working experience explain about 6% of the emphatic behavior variance.

Accuracy of recognizing facial emotions and temperament type (step 2), after removed the influence of gender and the working experience explain the additional 18% of the variance ($F(4,145) = 17.27$, $p<.001$). The entire model explained 24% of variance ($F (4,145) = 11:42$, $p<.001$) (Table II).

Table II. Hierarchical Multiple Regression Analyses Predicting Empathy from Accuracy of Emotional Expression Recognition and Health care professionals Temperament Characteristics

Predictor	Empathy coefficient		
	ΔR²	β	F
Step 1	.059*		11.42**
Control variables[a]			
Step 2	.181**		17.28**
Facial expression recognition accuracy		.236**	
Temperament type		.329**	
Total R²	.240**		
n	150		

[a] Control variables included gender and working experience.
*p<.05, **p<.001.

While empathy was not found to be influenced by gender, the working experience was. Significant prediction of empathy mostly have two predictors, where temperamental type have a unique contribution to higher ($β = .33$, $p<.001$) than the recognition accuracy of facially expressed emotions ($β = .24$, $p<.001$) (Table III).

Table III. Empathy predictor's correlation matrix

Variable	Emphaty	Gender	Working experience	Facial expression recognition accuracy	Temperament type
Empathy	1.00	.11	.22	.35	-.39
Gender	.11	1.00	.10	.16	-.11
Working experience	.22*	.10	1.00	.36	-.07
Facial expression recognition accuracy	.35**	.16*	.36**	1.00	-.21
Temperament type	-.39**	-.11	-.07	-.21*	1.00

*p<.05 ; **p<.001

DISCUSSION

The ability to interpret nonverbal cues and another person's state of mind correctly is relevant to the capacity to form an emphatic relationship. This study assumed that two mechanisms underlie empathy. First that empathy was dependent of cognitive representation evoked by facial expression of emotions, in terms of recollecting adequate and similar past emotional experience, so empathy depends on the cognitive alignment of two emotional states (perceived and recollected). In that way we aligned with Schabracq, Winnubst and Cooper point of view on the empathetic response as a range of present emotional experiences based on facial expression imitation which in turn leads to a similar emotional state [12]. Second assumed mechanism was influence of temperament as mediating personality trait seen as individual differences in emotional, motor and conative reactivity and self-regulation, characterized by consistency in occurring and relative time stability in different occasions [13]. This study finds an assumption on which the extrovert health professionals are more sensitive and accurate to facially expressed emotions and therefore more empathetic, justified. In these contexts, two personality traits stand out, extraversion/ introversion and emotional stability/ neuroticism. Both rely on biological system responsible for emotional behavior and underlying temperament [13,14].

Also, Niedenthal, Augustine and Rychlewska hypothe-size that if facial expressions affect emotional state, and the person who expresses a person who is perceived, is the main mechanism of recognizing the emotional state of another person and thus the essence of empathy [15]. Based on the results of his study, emphasize the facial expression of emotion as a reliable measure of empathy. The significant correlation between the score on a scale of emotional sensitivity and self-report about their own emotional state was noted by Riggio and Riggio [16].

Results in the present study, suggest direct propo-rtionality between decoding accuracy of facially expressed emotion and health professionals' empathy where personality traits played a substantial role. Extrovert showed higher accuracy in facial decoding followed by higher empathy score, compared to introvert health professionals. The positive connection between extraversion, facial expression recognition and empathy was also reported in several other studies [7,16] where the general conclusion was that significant link between expressing and decoding facial expressions and extraversion comes from personality factor called "person-orientation" characteristics that have been identified as a central component of sanguinic and choleric temperamental type. On the contrary, introverts because lacks of face-to-face contact have more misjudging of facial expression and when complemented with high neuroticism score, empathy is extremely low.

Most studies with empathy subject, among other factors, considered gender and working experience relevant for empathy. Indeed generally taken, women are more receptive to emotional signals than men are, but when it comes to health professionals, many studies

showed that they are not always superior to men [17-19]. Our study suggests nonsignificant gender effect on health professionals' empathy unlike working experience where a positive connection was recorded.

Significant of working experience on empathy is present for some time when Hall and Dornan in their study raised concerns about a possible decline in empathy as a result of older age or more professional experience [20]. Thus, further study consideration took in count

four variables (gender, working experience, accuracy in facial decoding and personality traits) in order to determine who has the biggest impact on health professionals' empathy.

The importance of empathy is unmistakable to human interaction especially with people in need. Nurturing and elevating empathy is the essence of health carers, adding to proper management in return leads to mutual satisfaction.

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