



Research Article

# Relationship between the Broader Autism Phenotype and empathy among students

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## ABSTRACT

Previous research has shown that persons with a higher level of the broad autism phenotype (BAP) experience deficits in empathy. The aim of the present study is to investigate a multivariate relationship between the BAP and different aspects of empathy. In a sample of 293 university students, we explored the relationship between the BAP and the following aspects of empathy: fantasy, empathic concern, perspective taking, and personal distress. The BAP level was measured using The Broad Autism Phenotype Questionnaire, and the Interpersonal Reactivity Index was used for multidimensional assessment of empathy disposition. Canonical correlation analysis yielded two functions (Function 1 –  $R_c^2 = 18.27\%$ , Function 2 –  $R_c^2 = 11.02\%$ ). In Function 1, Interpersonal Reactivity Index dimensions Personal Distress ( $r_s = -.93$ ) and Perspective Taking ( $r_s = .36$ ) are associated significantly with two domains of the BAP (Rigid and Pragmatic Language Deficits). In Function 2, Interpersonal Reactivity Index dimensions Empathic Concern ( $r_s = -.78$ ), Fantasy ( $r_s = -.47$ ) and Perspective Taking ( $r_s = -.53$ ) are related to the Aloof domain of the BAP. The results imply that the relationship between BAP and empathy differs for different aspects of these two constructs. The more detailed understanding of the relationship between BAP and empathy obtained through the multivariate approach provides a basis from which to create programs for the more efficient promotion of empathy skills.

*Keywords:* broader autism phenotype, empathy, empathic concern, perspective taking, personal distress

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## Introduction

### The broader autism phenotype

The concept of autistic continuum implies that various pervasive disorders, although significantly different in terms of symptom severity, belong to the same continuum. Further, by applying the quantitative approach, a normal distribution of autistic traits in general population has been established (Bolte et al., 2011). The concept of the autistic continuum provides a considerably broader framework for the investigation of autism spectrum disorder (ASD) (Berney, 2000; Constantino & Todd, 2003; Wheelwright et al., 2010), which includes varying levels of symptoms reflected in deficits in social communication and repetitiveness and rigidity of behavior and interests (American Psychological Association, 2013, 2017). The broader autism phenotype (BAP) is a set of subclinical personality traits that manifest in subtle impairments in the social relations of a person, based on his/her feelings of discomfort and diminished wish for close friendships (Bishop et al., 2004; De Groot & Strien, 2017; Murphy et al., 2000; Piven et al., 1997), milder deficits in social communication (Losh & Piven, 2007), and behavioral rigidity tendencies (Bolton et al., 1998).

### The broader autism phenotype and empathy

Persons with higher levels of BAP characteristics display lower empathy, which, although not at a clinical level, negatively influences satisfaction with, and the duration of, their friendships (Jamil et al., 2017). The BAP personality traits are more common among relatives of persons with autism (Bolton et al., 1994; Piven et al., 1997). Although the manifestations of the BAP are non-clinical in their character, recent studies suggest that children (siblings of children with ASD) who are at a higher risk of developing BAP, during the first two years of life, exhibit some behavioral patterns in the areas of social, language, and cognitive development more often than children from general population, which may indicate early signs of future subclinical symptoms of ASD (Kellerman et al., 2019).

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These early signs as decreased interest in reciprocal social interactions and decreased flexibility are also found in the general population (Constantino & Todd, 2003), independently of whether or not a person has a relative with autism (Sasson et al., 2013; Wainer et al., 2011). Two studies investigated the relationship between particular domains of empathy and BAP and yielded inconsistent results. Grove et al. (2014) differentiated between the cognitive, emotional, and social skills dimensions of empathy, as measured by the Empathy Quotient questionnaire (Baron-Cohen & Wheelwright, 2004), and found that parents of children with autism scored higher than persons with autism, but lower than general population controls, on all these dimensions. In a study conducted by Tsang et al. (2016) on a sample comprising young school-aged children with ASD, siblings of children with ASD, and children without a sibling with ASD, it was found that BAP is related to lower cognitive dimension but is unrelated to the emotional dimension of empathy, as assessed by a parental report on the Griffith Empathy Measure (Dadds et al., 2008).

The studies suggest that persons from typical population who exhibit higher BAP features display lower levels of empathy (Jamil et al., 2017; Lepage et al., 2009; Spreng et al., 2009; Wheelwright et al., 2006). It is presumed that these persons, due to impairments in recognizing and understanding others' feelings, avoid initiating and maintaining relationships that require empathy, such as romantic relations (Lampton & Turner, 2014) and friendships (Jamil et al., 2017).

Problems with social functioning and a tendency toward social isolation ensue from an emotional state of discomfort, which persons with BAP experience in interpersonal relations. Impairments in orienting toward and reacting to direct eye gaze, as well as diminished sensitivity to other persons' facial emotional expressions and the ability to understand facial expressions and the mental states of others (Ingersoll & Wainer, 2014), are related to socio-cognitive difficulties and feelings of discomfort experienced by persons with BAP in interpersonal relations. A similar hypothesis is suggested by authors who point to impaired recognition of other persons' emotions in siblings of children

with autism who themselves have a higher level of nonclinical autistic symptoms (Eyuboglu et al., 2017).

## Empathy

Empathy is a basic aspect of social-cognitive abilities and is related to prosocial behavior, aggression, and various indices of interpersonal functioning, such as the quality of peer relationships (Knafo et al., 2008; Lockwood, 2016; McMahon et al., 2006; Portt et al., 2020; Timpke et al., 2020). Studies on the relationship between BAP and empathy differ in terms of the assumptions regarding the dimensionality of empathy. In studies by Lamport and Turner (2014), and Jamil and colleagues (2017), empathy was regarded as a unidimensional construct, and negative correlations between empathy and BAP were found. Sucksmith et al. (2013) also investigated empathy as a unidimensional construct, and found that fathers, but not mothers, of children with autism spectrum conditions exhibited lower empathy compared with controls.

Davis (1983) has proposed an elaborate model of empathy that includes diverse aspects of cognitive and emotional empathy. According to the model, the cognitive domain of empathy consists of two components: Perspective Taking, which manifests as a prosocial tendency of a person to spontaneously understand the psychological perspective of others, and Fantasy, which refers to the ability to identify with the feelings and actions of fictional characters (e.g., in books, movies etc.). The emotional domain of empathy also comprises two components: Empathic Concern, which refers to the tendency to respond empathically (with concern and sympathy) toward a person in an unfortunate life situation, and Personal Distress, which reflects a set of negative feelings (discomfort, worry, anxiety) experienced by a person when he/she perceives the other person as being in an unpleasant, stressful situation. Personal Distress may inhibit the empathic response despite adequately recognized emotional states of others, presumably due to activated mechanisms of egoistic motivation (Díaz-Galván et al., 2015; Seidel, et al., 2013).

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The Personal Distress scale taps the level of stress, i.e., the intense feelings of unease and discomfort experienced in response to the unpleasant emotions evoked by recognition of other person's suffering (Batson et al., 1987; Davis, 1980). According to Liccione et al. (2009), Personal Distress refers to deficits in the ability to differentiate one's own standpoint and emotions from the emotional context and emotions of other persons. A higher level of the Personal Distress, especially in males, may be associated with difficulties in developing and maintaining close interpersonal relationships (Hartley et al., 2019). Persons who experience a high level of Personal Distress tend not to help others in need; rather, they opt for strategies of avoidance or distancing in order to alleviate their own distress (Grynberg, & López-Pérez, 2018). According to Lazarus (1993), the way in which a person copes with a stressful situation is determined by his/her appraisal of whether or not the stressful situation can be changed. If a person believes he/she can change a stressful situation, he/she will decide to undertake a certain action with the aim of helping another person, i.e., to solve a problem. However, if he/she estimates that his/her engagement in helping other will not be fruitful, he/she will choose the strategy of elimination or reduction of his/her negative emotional experience caused by the stressor. This strategy seems to be pronounced in persons with higher levels of Personal Distress. Although the empathy components are interrelated, there is empirical evidence to suggest they also may be expressed as mutually independent performances (Beven et al., 2004; Kim & Han, 2018).

The aim of this study is to investigate the relationship between the BAP and the following aspects of empathy, in accordance with Davis' (1983) model: Fantasy, Empathic Concern, Perspective Taking, and Personal Distress, in general population. According to our knowledge, this study is the first to use a multivariate approach to investigate the relationship between the BAP and empathy. This allows to examine the patterns of associations between various domains of these constructs when controlled for intercorrelations between the domains of each construct. We assume that there is a high positive correlation between aloofness and pragmatic language deficits which represent so called

social components of the BAP and affective (empathic concern and personal distress) and cognitive (perspective taking and fantasy) empathy dimensions. Further, we assume that there is a positive correlation of a lower magnitude between rigidity and empathy dimensions.

Insights into the relationship between aloofness, pragmatic language deficits and behavior rigidity and dimensions of empathy will elucidate the difficulties in social functioning of persons with pronounced BAP characteristics. This may provide a basis for designing programmes of support focused on specific domains of deficits of these persons.

## Method

### Participants and Procedure

Questionnaires were filled out by 293 students at the University of Belgrade (49% male), whose ages ranged from 19 to 24 years ( $M = 21.67$ ,  $SD = 1.29$ ). Participation in the study was voluntary. Before completion of questionnaires, participants were informed that the data of the study will be anonymous and used for scientific purposes. Instructions about questionnaires completion were provided in a written form and in accordance with the instructions created by the authors of the questionnaires. Data were collected at faculty premises before or after lectures. Questionnaires were distributed to 350 students, of which 330 completed and returned questionnaires. Students who provided answers to all questionnaires' items were included in the study sample ( $N = 293$ ). Participants attended the following faculties at the time of data collection: Faculty of Special Education and Rehabilitation ( $N = 73$ ), Faculty of Transport and Traffic Engineering ( $N = 65$ ), Faculty of Organizational Sciences ( $N = 51$ ), Faculty of Political Sciences ( $N = 38$ ), Faculty of Medicine ( $N = 29$ ), Faculty of Physics ( $N = 23$ ) and Faculty of Mathematics ( $N = 14$ ). The study was approved by the Research Ethics Board of the Faculty of Special Education and Rehabilitation, University of Belgrade.

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## Instruments

### *The Interpersonal Reactivity Index (Davis, 1980)*

The Interpersonal Reactivity Index (Davis, 1980), is a 28-item questionnaire which provides a multidimensional assessment of empathy disposition. The questionnaire consists of four subscales, each comprising seven items. Two subscales assess the cognitive domain (Perspective Taking and Fantasy), and two subscales assess the emotional domain of empathy (Empathic Concern and Personal Distress). The participants' responses are given on a 5-point Likert scale ranging from "Does not describe me well" to "Describes me very well". The author of the scale reports Cronbach's alpha coefficients of internal consistency ranging from .68 to .79 (Davis, 1980). Factor analysis of the Interpersonal Reactivity Index was performed in order to establish whether the instrument is suitable for the use in the population of students in Serbia. Bartlett's test of sphericity was statistically significant ( $p < .001$ ) and Kaiser-Meyer-Olkin measure was above 0.60. Maximum likelihood estimation method with orthogonal Varimax rotation was applied for the extraction of factors. The number of factors to be extracted was set to four. The obtained four-factor solution explains 34.0% of the variance. The loadings of items on the factors correspond to the structure of the scale, save that some items had low loadings on factors corresponding to their position in the Interpersonal Reactivity Index scale (items No. 15 – .106, No. 12 – .170, No. 4 – .217, and No. 18 – .235).

### *The Broad Autism Phenotype Questionnaire (Hurley et al., 2007)*

The Broad Autism Phenotype Questionnaire (Hurley et al., 2007) consists of 36 items distributed across three subscales: Social aloofness (refers to withdrawal and being aloof in social relations), Pragmatic Language Deficits (problems in social aspects of language), and Rigid (unwillingness to accept changes, and difficulties adapting to changes). Each subscale contains 12 items. The participants' responses to the Broad Autism Phenotype Questionnaire are given on a six-point Likert type scale from 1 (*never*) to 6 (*always*). Hurley et al. (2007) report high to satisfactory internal consistency of the questionnaire and

its subscales, as measured by Cronbach's alpha coefficients: Aloof ( $\alpha = .94$ ), Pragmatic Language Deficits ( $\alpha = .85$ ), Rigid ( $\alpha = .91$ ), and for the Broad Autism Phenotype Questionnaire total score ( $\alpha = .95$ ). After establishing that the Broad Autism Phenotype Questionnaire item pool is appropriate for factor analysis ( $KMO > 0.60$  and Bartlett's test of sphericity statistically significant,  $p < .001$ ), a three-component predefined solution was obtained using Maximum Likelihood estimation. In accordance with correlations between the components, a nonorthogonal Direct Oblimin rotation was applied. Loadings of items on particular factors were in accordance with the theoretical model of the BAP and with the structure of the Broad Autism Phenotype Questionnaire.

Factor scores of The Interpersonal Reactivity Index and The Broad Autism Phenotype Questionnaire obtained using regression method were used in the subsequent analyses.

## Results

Descriptive statistics of the study variables are presented in Table 1. The values of skewness and kurtosis suggest that the scores on all dimensions are normally distributed (Evans, 2007, as cited in Razali et al., 2012).

**Table 1**  
Values of skewness and kurtosis for the study variables

		<i>Skewness</i>	<i>Kurtosis</i>
The Broad Autism Phenotype Questionnaire	Aloof	.355	-.206
	Rigid	-.253	.180
	Pragmatic Language Deficits	.007	-.128
	Total	-.011	-.123
Interpersonal Reactivity Index	Fantasy Scale	.509	-.204
	Empathic Concern	-.047	.258
	Perspective Taking	-.033	.151
	Personal Distress	.555	.508

## Correlations between the Broad Autism Phenotype Questionnaire and the Interpersonal Reactivity Index

Bivariate correlations between the Interpersonal Reactivity Index and the Broad Autism Phenotype Questionnaire dimensions are presented in Table 2. The correlations are mostly statistically significant and low (Pearson  $r$  from .13 to .34). Personal distress is statistically significantly positively related to Rigid ( $r = .34$ ), and Pragmatic Language Deficits ( $r = .26$ ), whereas other empathy dimensions are negatively related to the dimensions of the Broad Autism Phenotype Questionnaire.

**Table 2**  
**Bivariate correlations between the Interpersonal Reactivity Index and the Broad Autism Phenotype Questionnaire (Pearson  $r$ )**

			Fantasy Scale	Empathic Concern	Perspective Taking	Personal Distress
Aloof	$r$		-.13*	-.28**	-.20*	.03
	$p$		.026	.000	.001	.636
Rigid	$r$		-.02	-.05	-.21**	.34**
	$p$		.749	.446	.000	.000
Pragmatic Language Deficits	$r$		.04	-.18*	-.05	.26**
	$p$		.467	.002	.375	.000

Notes. \*  $p < .05$ . \*\*  $p < .001$ .

## Canonical correlation between the Broad Autism Phenotype Questionnaire and the Interpersonal Reactivity Index

We performed canonical correlation as a multivariate procedure to investigate the overall relationship between domains of BAP and empathy components (Table 3). The goal of canonical correlation is to examine the relationships between two sets of variables (Tabachnick & Fidell, 2014). As Harris (2001) points out, canonical correlation is a perfectly symmetric technique in a sense that the sets of predictor variables and of outcome variables are statistically equally treated. However, a common practice is to denote one set

of variables as predictor variables and another as criterion variables (e.g., Sherry & Henson, 2005). The three dimensions of The Broad Autism Phenotype Questionnaire were entered as the criteria variables, and the four dimensions of the Interpersonal Reactivity Index were entered as predictors.

**Table 3****Canonical Solution for relationship between the Broad Autism Phenotype and Empathy for Functions 1 and 2**

Variable	Function 1			Function 2			
	<i>Coef</i>	$r_s$	$r_s^2(\%)$	<i>Coef</i>	$r_s$	$r_s^2(\%)$	$h^2(\%)$
Aloof	.21	-.28	8.95	1.13	.94	90.19	99.14
Rigid	-.81	-.90	80.66	-.14	.12	1.56	82.22
Pragmatic Language Deficits	-.51	-.66	43.54	-.29	.20	4.05	47.59
$R_c^2(\%)$			18.27			11.02	
Fantasy Scale	-.03	-.08	.65	-.38	-.47	22.34	22.99
Empathic Concern	.13	.16	2.64	-.68	-.78	60.87	63.51
Perspective Taking	.32	.36	12.97	-.41	-.53	28.15	41.12
Personal Distress	-.92	-.93	86.52	-.25	-.28	7.78	94.30

*Notes.*  $R_c^2$  = squared canonical correlation coefficient; *Coef* = standardized canonical function coefficient;  $r_s$  = structure coefficient;  $r_s^2$  = squared structure coefficient;  $h^2$  = communality coefficient.

The analysis yielded three functions with squared canonical correlations ( $R_c^2$ ) of .18, .11, and .04, successively. The full model across the three functions was statistically significant, Wilk's  $\lambda = .70$ ,  $F(12, 756.98) = 9.15$ ,  $p < .001$ . The dimension reduction analysis revealed that Functions 2 to 3 and 3 to 3 were also statistically significant ( $F(6, 574) = 7.79$ ,  $p < .001$ , and  $F(2, 288) = 5.86$ ,  $p < .05$ , respectively). As Functions 1 and 2 had also substantial canonical correlations (.43 and .33, respectively), while the canonical correlation of Function 3 was low (.20), Functions 1 and 2 were considered relevant. Table 3 presents canonical solution for Functions 1 and 2.

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As the observed variables within the two sets are correlated, we rely on structure coefficients in determining what variables are contributing to the relationship between the variables sets across the two functions (Sherry & Hanson, 2005). Looking at the Function 1 structure coefficients, one sees that Rigid and Pragmatic Language Deficits are relevant criteria variables. Regarding the predictor variable set in Function 1, Personal Distress was the primary contributor to the predictor synthetic variable, with a secondary contribution by Perspective Taking. Personal Distress relates positively and Perspective Taking relates negatively to BAP domains.

For Function 2, the structure coefficients in Table 3 suggest that the only criterion variable of relevance was Aloof. With regard to empathy aspects, Empathic Concern was the dominant predictor, with Perspective Taking and Fantasy making a secondary contribution to the predictor synthetic variable, while Personal Distress was not relevant. Aloof is negatively related to the empathy aspects. In sum, the results of canonical correlation suggest that empathy and BAP are related along two functions. The first canonical function suggests that Personal Distress and, to a lesser degree, Perspective Taking predict Rigid and Pragmatic Language Deficits. The second canonical function suggests that Aloof may be understood as resulting from deficits in Empathic Concern, Perspective Taking and Fantasy, with Empathic Concern playing the most important role.

## Discussion

According to our knowledge, previous studies have rarely investigated the relationship between various components of BAP and the multidimensional construct of empathy defined by Davis (1983) using a multivariate approach. Canonical correlation analysis applied in the present study yielded two functions of the relationship between empathy and BAP. Function 1 demonstrates that rigid behavior tendencies and pragmatic language deficits are related to higher stress, insecurity and/or fear in situations requiring creation of close social relationships and helping other persons (Personal Distress), as well as to

difficulties in recognizing the intentions and emotions of other persons (Perspective Taking). The BAP may be associated with difficulties in creating and maintaining emotionally close relationships, as well as with reduced flexibility of behavior, which is important for adequate social relationships (Hartley, et al., 2019). It may be assumed that persons with higher levels of BAP characteristics, in situations in which other persons need help, tend to focus more on their own emotional experience because they perceive themselves as incompetent to provide help due to their social-skills deficits. In order to maintain a positive self-concept and to justify their emotional and physical distancing from others in need, persons with a high level of Personal Distress tend to see other persons as responsible for their own misfortune (Grynberg, & López-Pérez, 2018).

In a study in which siblings of children with ASD were faced with an examiner pretending to be hurt, it was found that their level of Personal Distress was negatively related to prosocial behavior, communication, and social skills. Interestingly, children with ASD displayed a lower level of Personal Distress compared to their siblings without ASD. However, these two groups did not differ in the level of prosocial behavior. The authors of the study assume that children with ASD may have learned to act prosocial even when these reactions are not motivated by emotional empathic responses (McDonald et al., 2017). A lower level of Personal Distress in adults with ASD, compared with typical adults, was also found using self-reports on emotional responding to images of persons in distressing situations. In empathic reactions to images of persons in neutral situations, no significant differences between these two groups were found (Holt et al., 2018). Based on the results obtained in our study, it can be concluded that Personal Distress is the empathy component, which is associated with the greatest proportion of the variance of Rigid and Pragmatic Language Deficits BAP domains.

Perspective Taking is another empathy component of the Davis' model which is related to the BAP domains Rigid and Pragmatic Language Deficits. The level of Personal Distress is generally not related to Perspective Taking which,

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according to Davis (1983), presents a cognitive component of empathy, except that intense emotional arousal may compromise the ability to infer others' mental states (Kanske et al., 2016). The results show that besides Personal Distress, Perspective Taking also explains the significant proportions of variance of Rigid and Pragmatic Language Deficits, albeit to a lesser extent than Personal Distress. As the ability to comprehend another person's thoughts, emotional states, and intentions, Perspective Taking is a basis for understanding complex social relations. It was shown that the level of BAP relates negatively to the performance on theory of mind tasks (Stewart et al., 2020). Among parents of children with ASD, it was also found that they experience problems in understanding another person's social cognitions, intentions, and emotions (Gokcen et al., 2009), and have difficulties creating social relationships (Mugno et al., 2007). Among university students of psychology, Rigid, as measured by The Broad Autism Phenotype Questionnaire, was related to the Perspective Taking scale of the Interpersonal Reactivity Index (Vachon & Lynam, 2016). A higher level of Rigid was related to a better performance in tasks involving understanding complex social interactions involving joking, sarcasm, and white lies, i.e., to a better understanding of messages of a person whose non-verbal signals were incongruent with the verbal content (Jakobson et al., 2018). Despite deficits in the domain of social skills being considered core characteristics of persons who belong to the BAP (Kadak et al., 2014), the Pragmatic Language Deficits and Aloof which pertain to social aspects of the BAP, were unrelated to performance on this task. The authors of the study assume that persons who have more rigid behavioral tendencies tend to focus on details, i.e., on non-verbal signals (Jakobson et al., 2018).

There is empirical evidence that impaired ability to identify and describe one's own feelings is related to difficulties in recognizing emotional experiences of other persons, i.e., to the scores on the Perspective Taking subscale of the Interpersonal Reactivity Index (Di Tella, 2020). Further, difficulties of persons with BAP in recognizing emotions of other persons may be explained by their

impaired ability to recognize emotional facial expressions, as evidenced in previous research (Kadak, et al., 2014).

Function 2 yielded Empathic Concern as a dominant variable, explaining, along with Fantasy and Perspective Taking, 11.02% of the shared variance of Aloof. The negative correlation between Aloof and these empathy domains is in accordance with the results obtained by Vachon and Lynam (2016) in a sample of university students. It was found in a nonclinical sample that Aloof has a positive correlation with social anxiety, characterized by the avoidance of social relations. Moreover, Aloof is related to lower satisfaction with romantic relationships among students (Beffel et al., 2021). When analyzing the results of the relationship between Empathic Concern and BAP, differences between empathy, as an emotional reaction, and Empathic Concern, which pertains to cognition and behavioral responses, should be considered. Empathy is an emotional experience, which is identical to the emotion of the other, or congruent with it (Batson & Coke, 1981). The Empathic Concern dimension of the Interpersonal Reactivity Index refers to compassion and concern for the welfare of others, and it is the basis of prosocial behavior. Although empathy may be related to Empathic Concern, it is not a *sine qua non* for caring for the welfare of others and for moral behavior. In certain circumstances, empathy may be related to morally wrong decisions, and to breaking social rules (Bloom, 2017).

Lower scores on the Fantasy dimension of the Interpersonal Reactivity Index are associated with deficits in the area of social-cognitive abilities. The finding suggests that persons who have deficits in imagination and motivation to interact with other people are less able to recognize and understand non-verbal signals displayed during communication and, consequently, incorrectly interpret the intentions of persons with whom they communicate. Although the Fantasy mostly assesses the capacity to empathize with fictional characters (film, literature), the authors of the instrument suggest that, besides cognitive empathy, the Fantasy covers the capacity for imagination and emotional self-control in a broader sense, in various real-life social contexts (Jakobson et al.,

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2018). Considering the negative relationship between Fantasy and Aloof, we may presume that reduced capacity for identification with fictional characters is related to the impaired ability to interpret socially relevant information, which, subsequently, leads to lower motivation for social interactions and to social withdrawal. This assumption is in accordance with the results of a previous study, which revealed that among Interpersonal Reactivity Index dimensions, only Fantasy and Rigid were related to the performance of university students on a task requiring understanding of a person's intentions when his/her verbal and non-verbal expressions were inconsistent (Jakobson et al., 2018). However, it is important to note that the concept of the Fantasy has been criticized. Cliffordson (2001, 2002a, 2002b) suggests that Fantasy should be regarded as belonging neither to the cognitive nor to the affective domain of empathy, because it represents a combination of both domains. Some authors regard Fantasy as encompassing a concept much broader than the cognitive and affective domains of empathy (Baron-Cohen & Wheelwright, 2004). The items of the Fantasy, besides identification with fictional characters, refer also to imagining one's own future (Davis, 1980). De Corte et al. (2007) suggest that items of Fantasy cover various dimensions, and that regarding Fantasy as a unitary factor is not justified.

The relationship between Perspective Taking and Aloof obtained in this study is consistent with previous research. It is presumed that persons with higher BAP scores, due to impairments in recognizing and understanding of others' feelings, avoid initiating and maintaining relationships that require empathy, such as romantic relations (Lamport & Turner, 2014) and friendships (Jamil et al., 2017). Personal Distress wasn't relevant for Function 2, which refers to the relationship between Aloof and empathy. Function 2 suggests that the tendency to avoid emotionally close social relationships is related to a lower level of proactive social behavior and to difficulties comprehending other people's feelings.

## Limitations

It is important to note some limitations of this study. The first limitation refers to the method of measuring empathy. We employed only a self-report measure of dispositional empathy. Some authors of earlier studies point out that self-report empathy measures may, to a certain extent, lack validity and objectivity (Gleason et al., 2009; Jamil 2016; Lamport & Turner, 2014). It would be beneficial to use observational measures of empathy in naturalistic or controlled laboratory settings in future research, in addition to dispositional empathy measures, in order to capture actual empathic behavior in concrete situations. As the study included the convenience sample of university students, generalization of the results is limited. In future studies, general community samples should be included. In accordance with the aim of the study, we employed the concept of a continuum of the BAP, so that the differences between persons who fulfill criteria for the BAP and persons whose scores are below cut-off scores were not analyzed.

## Conclusions

The results reveal an overall relationship between BAP and empathy aspects but point that the relationship between BAP and empathy differs for empathy aspects. Personal Distress was the primary contributor to the synthetic variable which, together with Perspective Taking, explains 18.27% of the variance of the three BAP domains. It may be assumed that the higher level of Personal Distress among persons with BAP is a consequence of their difficulties in acquiring and applying emotion-regulation strategies and social-skills in general. The results further suggest that lower Perspective Taking, Empathic Concern and Fantasy may lead to tendencies of aloofness as a characteristic of BAP, while rigid behavior and pragmatic language skills are unaffected by these components of empathy among university students. The relatively low shared variance between BAP and empathy domains leaves space for the influence of other variables not included in this research.

## Implications

The identification of subtle difficulties in social functioning of persons from university student population, who exhibit higher BAP features, provides information on specific ways in which these persons experience the world, and provides directions for programs aimed at supporting these persons in coping with certain challenges. The results of the present study suggest that supporting persons with higher BAP features to overcome tendencies of personal distress may contribute to the improvement in all the domains in which the BAP is manifested: rigid behavior, aloofness, and difficulties in language pragmatics. On the other hand, when targeting specifically the aloofness of the persons with the higher BAP features, it is recommendable to promote cognitive and empathic perspective taking both in real life situations and in situations from the literature and other arts.

When counseling students who have difficulties in creation and maintenance of social relations, it is important to recognize persons with higher levels of the BAP and deficits in empathy and support them to develop skills to cope with stressful situations in social interactions. While respecting individual differences, it would be beneficial to teach them strategies of forming social relations and creating the level of social closeness in accordance with their needs.

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### *Conflict of interest*

We have no known conflicts of interest to disclose.

### Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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