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The Evolution of the Behavioural Approach System (BAS):

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Cooperative and Competitive Resource Acquisition Strategies

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8

9 **Abstract**

10 The nature of approach motivation has not yet been adequately defined. Some authors view  
11 it as a unidimensional construct, while others consider it to be multidimensional. Its  
12 psychometric nature is explored in this study, which tests empirically the motivational  
13 account of the Behavioural Approach System (BAS) within an evolutionary context. In a  
14 sample of 394 participants, we administered the Assessment of Individual Motives  
15 questionnaire (AIM-Q), the Reinforcement Sensitivity Theory Personality Questionnaire  
16 (RST-PQ) and a short version of the Sensitivity to Punishment and Sensitivity to Reward  
17 (SPSRQ-20). The results of set correlation analysis indicated that different BAS scales  
18 relate to different motives, thus supporting the multidimensional perspective on approach  
19 motivation. Specifically, Reward Interest relates to various types of motives that generally  
20 reflect sensitivity to social rewards; Goal-Drive Persistence relates to social exchange;  
21 Reward Reactivity to safety and commitment; while Impulsivity and Sensitivity to Reward  
22 (SR) relate to competitive motives. These results are discussed within an evolutionary  
23 framework for the multidimensionality of the BAS.

24 **Keywords:** reinforcement sensitivity theory, motivation, personality, evolution, set  
25 correlation analysis

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29                   The Evolution of the Behavioural Approach System (BAS):  
30                   Cooperative and Competitive Resource Acquisition Strategies

31           The Behavioural Approach System (BAS) is one of three major systems in the  
32   neuropsychological theory of personality known as the reinforcement sensitivity theory  
33   (RST), which includes two additional defensive systems: the Fight-Flight-Freeze System  
34   (FFFS), responsible for the active avoidance of, and escape, from, aversive stimuli; and the  
35   Behavioural Inhibition System (BIS), responsible for passive avoidance and the detection  
36   and resolution of goal-conflict. It is assumed that the BAS represents a general domain  
37   approach mechanism designed to solve the important evolutionary adaptive problem of  
38   attaining critical resources, such as food, water, sex and social status (Berridge, 2004;  
39   Berridge & Robinson, 2003; Kenrick & Shiota, 2008). In general terms, the BAS mediates  
40   reactions to reward and non-punishment. Its outputs serve to motivate approach behaviours  
41   towards biological reinforcers and to engage in activities that lead to consummatory  
42   behaviour (Corr, 2008; Gray & McNaughton, 2000). Despite the popularity and long  
43   history of this theory, the obvious evolutionary importance of the BAS has not yet been  
44   explored empirically.

45   **1.1. Evolutionary explanations of individual differences**

46           Within evolutionary psychology, individual differences in personality and/or  
47   temperament are interpreted as variations in adaptive mechanisms that evolved to provide  
48   solutions to problems concerning reproduction and survival (Buss, 2008, 2009). Since  
49   environmental conditions were not equal for the entire human population, it may be  
50   assumed that some phenotypic variations were more adaptive in one environment than in  
51   another. Thus, there is no “gold standard” for a personality trait that could provide the best

52 possible fitness in every environment (Penke, 2010; Penke, Denissen, & Miller, 2007).  
53 Therefore, it is reasonable to assume the existence of a variety of resource acquisition  
54 strategies which could ensure flexible and adaptive behaviour in different environmental  
55 conditions.

56 We can distinguish two main groups of resource acquisition strategies developed in  
57 social species: competition (e.g., stealing, trickery, aggression) and cooperation (e.g., social  
58 exchange, altruism) (Buss, 1999). Competitive strategies are mostly related to questions of  
59 social hierarchy, status, or power, with individuals ranking higher on the social scale  
60 having access to more resources whilst facing lower risks and required effort. In contrast,  
61 cooperative strategies are seen as mutually beneficial (Scott-Phillips, Dickins, & West,  
62 2011). On a proximal level, cooperation can be manifested as volunteering, social  
63 exchange, reciprocal altruism, and so on (Buss, 1999; Tooby & Cosmides, 1988). We can  
64 assume that cooperative behaviour is driven by the need for social approval, which is a very  
65 powerful incentive (e.g., Izuma, Saito, & Sadato, 2010), and it serves the function of  
66 attaining social status. In economics, this is known as the ‘public good’ benefit. As such,  
67 helping others may be seen as an investment or even buying insurance for future events in  
68 which one would seek help from the same individuals. Which of these two strategies would  
69 be used, depends upon environmental conditions and individual differences.

70 The aim of this study is to examine empirically, for the first time, which of these  
71 two evolved resource acquisition strategies are related to individual differences in the BAS.  
72 We expect the BAS to correlate with variation in both cooperative and competitive  
73 strategies, as reflected in different motives that are expected to fuel the exertion of these  
74 strategies.

75           The heterogeneity of the BAS may derive from the ‘arms race’ between predator  
76 and prey. The ‘Life-Dinner Principle’ (Dawkins & Krebs, 1979) suggests that the  
77 evolutionary selective pressure on the prey is much stronger than on the predator: if a  
78 predator fails to kill its prey, it has lost its dinner, but if the prey fails to avoid/escape being  
79 the predator’s dinner, then it has lost its life. Although defensive behaviours, principally  
80 freezing, fleeing and defensive attack, are themselves relatively complex (Eilam, 2005), it  
81 is nonetheless true that the behaviour of the prey is intrinsically simpler than that of the  
82 predator: all it has to do is avoid/escape, making it, quite literally, life-or-death behaviour  
83 (Corr, 2008). In contrast, the predator has to develop counter-strategies to meet its BAS  
84 aims, which entail a higher degree of cognitive and behavioural sophistication over the  
85 prey’s defensive behavioural repertoire. Another reason for the complexity of the BAS  
86 comes from heterogeneity of appetitive goals (e.g., securing food and finding/keeping a  
87 sexual mate), which demand a corresponding heterogeneity of BAS-related strategies

88           The putative multidimensional nature of the BAS is also grounded in the  
89 neurobiology of personality, which recognises two approach related traits: impulsivity and  
90 extraversion, that are related to different neurotransmitters. Impulsivity is associated with  
91 dopamine, serotonin (Dalley, & Roiser, 2012), and testosterone (Montoya, Terburg, Bos, &  
92 van Honk, 2012). Testosterone has been found important in attaining social status in  
93 number of cross-species studies (e.g., Beaver & Amoss, 1982; Coe, Mendoza, & Levine,  
94 1979; Elofsson, Mayer, Damsgård, & Winberg, 2000). In human studies, testosterone is  
95 linked with domination (Sellers, Mehl, & Josephs, 2007), choice of risky carriers  
96 (Sapienza, Zingales, & Maestriperi, 2009), aggression (Archer, 2006), and level of  
97 reproductive effort (Alvergne, Jokela, Faurie, & Lummaa, 2010), which all correspond to

98 competitive motives. Thus, we may expect that the RST scales reflecting impulsivity (the  
99 SR and RST-Impulsivity) should correlate with competitive motives.

100 Neurobiologically, nurturance/cooperativeness is based on oxytocin system  
101 functions (e.g., Feldman, 2012; Yamasue et al., 2009). The second candidate for the  
102 neurobiological underpinnings of nurturance/cooperation are endogenous opiates, which  
103 are involved in the positive emotions that follow attainment or consumption of reward. This  
104 is a key feature of Reward Reactivity, and is important in social affiliation, making opiates  
105 likely candidates for a biological substrate of Extraversion and Social Closeness (Berridge,  
106 2012; Depue & Morrone-Strupinsky, 2005). Thus, we may expect that the RST-PQ scales  
107 designed closely to extraversion (Reward Interest, Goal-Drive Persistence, and Reward  
108 Reactivity) should correlate more with the cooperative motives.

109

## 110 **2. Materials and Methods**

### 111 *2.1. Participants and procedure*

112 A total of 394 (208 male and 186 female) participants ( $M_{AGE} = 27.99$ ;  $SD = 9.70$ ,  
113 range from 16 to 54) completed three questionnaires online using LimeSurvey web  
114 application. Only complete data were recorded. The Ethics Committee of Faculty of  
115 Humanities and Social Sciences in Rijeka gave approval for the study

### 116 *2.2. Measures*

117 We administered two RST questionnaires: Reinforcement Sensitivity Theory  
118 Personality Questionnaire (RST-PQ; Corr & Cooper, 2016), and the Sensitivity to  
119 Punishment and Sensitivity to Reward Questionnaire-20 (SPSRQ-20; Aluja & Blanch,  
120 2011; Torrubia, Avila, Molto, & Caseras, 2001). We also administered the Assessment of

121 Individual Motives (AIM-Q; Bernard, 2013) which provides a measure for cooperative and  
122 competitive resource acquisition strategies and integrity motives.

123 The RST-PQ (Corr & Cooper, 2016) contains 65 items for measuring the BAS, the  
124 Behavioural Inhibition System (BIS) and Fight/Flight/Freeze System (FFFS). The BAS  
125 consists of four sub-scales. People that score high on Reward Interest scale (seven items)  
126 are more likely to engage in anticipatory approach, exploration of new objects, places and  
127 people (e.g., *“I regularly try new activities just to see if I enjoy them”*). Goal-Drive-  
128 Persistence (seven items) measures the persistence in achieving the ultimate aim of  
129 obtaining a reward (e.g., *“I put in a big effort to accomplish important goals in my life”*).  
130 Reward Reactivity (ten items) relates to the level of experiencing emotional reaction to  
131 reward (i.e., ‘pleasure’) and provides the positive reinforcement for BAS behaviour (e.g.,  
132 *“Good news makes me feel over-joyed”*). Finally, Impulsivity (eight items) refers to the  
133 final stage of catching the biological reinforcer, where non-planning and fast reactions are  
134 more appropriate (e.g., *“I think I should ‘stop and think’ more instead of jumping into  
135 things too quickly”*). Using the criterion of Hu & Bentler (1999), the four-factor model of  
136 the BAS in this study showed adequate goodness of fit indices ( $\chi^2/df = 2.71$ ,  $CFI = .903$ ;  
137  $RMSEA = .066$ ). Internal reliability coefficients (Cronbach’s Alpha) are 0.75 for Reward  
138 Interest, 0.83 for Goal-Drive Persistence, 0.75 for Reward Reactivity, and 0.67 for  
139 Impulsivity.

140 The SPSRQ-20 (Aluja & Blanch, 2011; Torrubia et al., 2001) measures Sensitivity  
141 to Reward (SR; e.g., *“Do you like being the centre of attention at a party or a social  
142 meeting”*) and Sensitivity to Punishment (SP; e.g. *“Are you often afraid of new or*

143 *unexpected situations?*"); each scale containing 10 items. Reliability coefficients are 0.66  
144 for SR and 0.82 for SP.

145 The Croatian translation of both questionnaires was validated earlier (Krupić,  
146 Križanić, Ručević, Gračanin, & Corr, 2016). Data for the defensive BIS, FFFS, Defensive  
147 fight (for the RST-PQ) and the SP (for the SPSRQ) were also collected, but as they are out  
148 of scope of this study they were not analysed.

149 AIM-Q (Bernard, 2013) is a 60-item questionnaire that measures 15 human-specific  
150 motives (Bernard, 2009, 2010) within the evolutionary theory of human motivation  
151 (Bernard, Mills, Swenson, & Walsh, 2005). Each motive is represented by four items  
152 answered on a seven point Likert-type scale. Bernard (2013) distinguishes three types of  
153 motives: (a) motives facilitating individual integrity (Environmental Inquisitiveness, Threat  
154 Avoidance, Illness Avoidance,); (b) motives facilitating competition for resources and  
155 mates (Interpersonal Inquisitiveness, Aggression, Appearance, Mental, Physical, Wealth,  
156 Sex); and (c) motives facilitating cooperation in order to gain resources (Commitment, Kin  
157 Altruism, Social exchange, Legacy and Meaning). Full description of the questionnaire and  
158 constructs can be found in Bernard and Lac (2014). Reliability coefficients are presented in  
159 Table 1. Generally, all except Illness avoidance achieve reliability above .70.

### 160 2.3. Analytic plan

161 Relationships between the BAS scales and AIM-Q motives were analysed by set  
162 correlation analysis (SCA), which provides the statistical control for a set of research  
163 factors (in our case gender and age), when relating one set of variables (in our case the  
164 BAS scales) to another (in our case 15 AIM-Q motives). In this way, confounding variables  
165 are held under control, and the likelihood of Type I error is reduced, which promotes the

166 uniqueness of relationship between variables (Cohen, Cohen, Aiken, & West, 2003).  
167 Statistical control of gender and age is important in determining the unique adaptive  
168 account of the BAS, since they represent an important source of variation within the  
169 evolutionary psychology. Additionally, we used Bonferroni correction in determining the  
170 statistical significance in order to reduce further Type I error due to a larger number of  
171 correlations tested.

### 172 **3. Results**

173 Descriptive statistics for AIM-Q and results of SCA are shown in Table 1, while zero  
174 order correlation matrices between and within questionnaires are available in  
175 *Supplementary materials*. All analyses were conducted using R version 3.2.2 (R  
176 Development Core Team, 2013), using package psych version 1.5.8 (Revelle, 2015).

177 Using set correlation, all canonical variates in a data set were taken into account in  
178 one index to provide an overall estimate of association. The overall relationship between  
179 personality traits and motives using Cohen's Set Correlation was  $R^2 = .82$ , which was  
180 statistically significant  $F(6.75, 105) = 2294.39, p < 0.01$ . Weak to moderate relationships  
181 ( $R^2 = .05$ -.32) were found between discrete motives and personality traits. Further,  
182 different patterns of partial correlations for AIM-Q motives, controlled for gender and age,  
183 were shown among BAS scales. In general, the SR and Impulsivity were more related with  
184 competitive, while Reward Interest, Goal-Drive Persistence and Reward Reactivity were  
185 more related with cooperative motives, as expected. Reward interest was related with Kin  
186 Altruism, Meaning, Legacy, but also with Physical and Environmental Inquisitiveness, that  
187 belongs to competitive and integrity motives, respectively. Goal-Drive Persistence was

188 related with Social exchange, while Reward Reactivity showed links with Commitment  
189 from cooperative group of motives, and Threat avoidance from Integrity motives.

190 TABLE 1 –

#### 191 4. Discussion

192 In order to provide an evolutionary account of the BAS, we examined the  
193 relationships between inter-individual variation on different BAS scales and different types  
194 of motives, including (a) motives facilitating individual integrity, (b) motives facilitating  
195 competition for resources and mates, and (c) motives facilitating cooperation. Overall, the  
196 BAS scales correlated with both resource acquisition strategies and, additionally, with the  
197 integrity motives. More specifically, discrete motives are found to correlate with different  
198 aspects of the BAS functioning. This suggests that different aspects of the BAS were  
199 shaped throughout evolutionary history in order to confront specific adaptive problems. Put  
200 it simply, while the AIM-Q detects *what* were the adaptive goals, the BAS explains *how*  
201 these goals were obtained.

202 Weak to moderate relationships were found between discrete motives and  
203 personality traits, which is reasonable since motives and personality traits are not  
204 equivalent constructs. Motives are defined as a predisposition to behave in a directed  
205 fashion, focusing on behavior solely, while personality traits are defined as a complex  
206 constructs combining stable behavioral, cognitive and emotional characteristics (for details  
207 see Bernard & Lac, 2014). Thus, low to moderate correlations between the BAS scales and  
208 motives are expected.

209 Reward Interest correlated with the tendency of exploring the environment  
210 (Environmental inquisitiveness), participating in competitions that signal gender-

211 appropriate physical ascendancy (Physical), caring for relatives (Kin Altruism), and with  
212 reciprocation among non-kin (Legacy and Meaning). In general, individuals that score high  
213 on Reward Interest scale show a tendency to act prosocially, or to contribute to society.

214         The next finding relates Goal-Drive Persistence with tendency to enter into  
215 reciprocal, mutually beneficial exchanges of resources with non-kin (Social Exchange).  
216 The cooperation is more of a long-term strategy (Barclay, 2013; Stevens, Cushman, &  
217 Hauser, 2005). It takes time to build trust between people, and even then, it is not certain  
218 whether it will be mutually beneficial. Therefore, it is not surprising that many studies  
219 show that reward delay capacity is important in maintaining cooperative behaviour  
220 (Brosnan, Salwiczek, & Bshary, 2010; Kortenkamp & Moore, 2006; Rosati, Stevens, Hare,  
221 & Hauser, 2007), which is the core feature of Goal-Drive Persistence.

222         Individuals high on Reward Reactivity scales show tendency toward maintaining  
223 one's safety (Threat Avoidance) and a greater capacity for developing tender, intimate,  
224 supportive attachments with mates and offspring (Commitment). Reward Reactivity relates  
225 to emotional reactions to the final attainment of a desired goal. It serves as “emotional fuel”  
226 for the previous BAS processes (Corr & Cooper, 2016). Positive outcome followed by  
227 positive emotional reaction serves as reinforcement of invested effort in attaining a desired  
228 goal. According to our results, these processes have the importance in maintaining safety  
229 and a relationship with others.

230         Compared to cooperation, competition as a resource acquisition strategy is a more  
231 short-term strategy (Barclay, 2013; Stevens et al., 2005). RST-PQ Impulsivity relates with  
232 motives such as achieving domination (Aggression), tendency of mocking others, being  
233 sarcastic (Interpersonal Inquisitiveness), and searching for mates (Sex). In addition,

234 individuals high on SR are more willing to display intellectual and physical superiority  
235 (Mental and Physical, respectively), material resources (Wealth), and to invest resources in  
236 order to look well (Appearance). In general, a common feature of individuals that score  
237 high on RST-PQ Impulsivity and the SR is a tendency to represent themselves as better  
238 than others. However, it is important to emphasize the difference between SR and  
239 Impulsivity (RST-PQ), which appeared in our results. While Impulsivity relates exclusively  
240 to competitive motives, SR additionally correlates with integrity motives (Illness avoidance  
241 and Threat avoidance) and negatively with Social Exchange. Furthermore, the Impulsivity  
242 scale contains items that reflect tendencies of acting fast without thinking and not planning,  
243 thus reflecting poor executive function (e.g. *“I think I should ‘stop and think’ more instead  
244 of jumping into things too quickly”*). On the other hand, the SR contains items relating to  
245 behavioural tendencies (e.g. *“When you are in a group, do you try to make your opinions  
246 the most intelligent or the funniest?”*). The AIM-Q items are also designed to measure  
247 motivational tendencies on a behavioural level (e.g. *“I show off my understanding of  
248 abstract or complex ideas so people will respect me”*), which could result in common  
249 method variance with the SR, and thus spuriously increases correlation coefficients. Hence,  
250 we cannot discuss the relative importance of these two scales in competitiveness within this  
251 study, since they obviously measure different aspects of impulsivity.

252         The rest of associations were not significant, although zero-order correlation matrix  
253 in *Supplementary materials* might suggest the opposite. This discrepancy suggests that the  
254 BAS scales correlate with some other motives as well, but these relations are confounded,  
255 since the both – the BAS scales and the motives - are highly inter-correlated. Thus, the  
256 discrepancy of the results represents the ability of SCA to detect confounding effects

257 between two sets of variables. This way, the SCA provides a unique relationship between  
258 two variables, when many other variables are held under statistical control, and these  
259 effects are very likely to replicate.

260 Most of the empirical work in the original version of the RST was based on animal  
261 studies, particularly rodents. Upon these experiments, the idea of the unidimensional BAS  
262 could seem very plausible. However, as we can see, different adaptive goals demand  
263 different strategies of the BAS. We believe that the BAS complexity arises from highly  
264 complex human environment in comparison to rodents' - which has not been taken into  
265 account in the original version of RST.

266 The findings of this study hold significance in understanding the differences that are  
267 commonly observed between the various BAS scales (e.g. Jackson & Smillie, 2004; Krupić  
268 & Corr, 2014; Smillie, Jackson, & Dalgleish, 2006). Understanding the conceptual  
269 differences between the BAS scales could lead toward setting more precise hypotheses in  
270 RST studies. However, much work is needed in order to produce a complete picture of the  
271 evolutionary origins of the BAS. Further studies should focus on sex dimorphism and  
272 relationships between different aspects of the BAS functioning and variables such as  
273 relationship instability, sociosexuality, parental effort, etc., which are important for  
274 understanding its adaptive functions.

275 The major limitation of this study concerns the usage of only one psychometric  
276 measure for competitive and cooperative motives, and the study design that does not allow  
277 for causal interpretation. Furthermore, we did not include the BIS and FFFS scales in our  
278 study, what might have influenced the results. Currently, the theory is not clear whether the  
279 approach and avoidance system function separately, or they have mutually inhibitory

280 effects, which is beyond the scope of this paper (*however, reanalysed data can be found in*  
281 *Supplementary materials*).

282 In conclusion, the results of this study show that impulsivity, as measured by RST-  
283 PQ and SR from SPSRQ, relates to competitive, Goal-Drive Persistence and Reward  
284 Reactivity relate to cooperative, while Reward Interest relates to both resource acquisition  
285 strategies, which altogether represent a set of novel findings in RST research. Clearly, the  
286 evolutionary perspective provides a coherent theoretical account of the multidimensionality  
287 of approach motivation.

288

289

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440 *Table 1. Descriptive statistics and results of set correlations analysis between AIM-Q*  
 441 *motives and approach dimensions of SPSRQ-20 and RST-PQ controlled for gender and*  
 442 *age*

	Motives facilitating individual integrity			Motives facilitating cooperation				
	THA	ILA	EIQ	COM	KIN	SOC	LEG	MEA
Gender	.01	-.03	<b>.24**</b>	.09	-.07	.05	.12	.11
Age	.06	.05	.01	-.04	-.09	.06	.05	.05
Reward Interest	-.08	-.11	<b>.44**</b>	-.02	<b>.22**</b>	.15	<b>.32**</b>	<b>.32**</b>
Goal-Drive Persistence	.07	.02	.07	.02	-.04	<b>.23**</b>	-.03	-.08
Reward Reactivity	<b>.26**</b>	.14	-.00	<b>.18**</b>	.02	.14	.04	-.06
Impulsivity	-.04	.02	.07	.08	.12	-.07	.06	.03
Sensitivity to reward	<b>-.19**</b>	<b>.17**</b>	-.11	-.13	-.10	<b>-.23**</b>	-.09	-.00
M	15.49	12.29	17.96	18.11	16.03	20.25	12.36	11.98
SD	4.217	3.738	4.025	4.987	4.033	2.621	4.966	5.822
$\alpha$	.73	.58	.87	.91	.75	.72	.87	.93
R	.29	.23	.56	.26	.28	.44	.38	.29
R <sup>2</sup>	.086	.053	.318	.067	.079	.197	.143	.084
F (7, 386)	5.20**	3.09**	25.71**	3.98**	4.74**	13.51**	9.19**	5.05**

443 \*  $p < 0.05$ ; \*\*  $p < 0.01$ ;  $\alpha$  – Cronbach alpha; R – multiple correlation coefficient; R<sup>2</sup> – multiple  
 444 determination coefficient; THA – Threat Avoidance; ILA – Illness Avoidance; EIQ -  
 445 Environmental Inquisitiveness; COM – Commitment; KIN – Kin Altruism; SOC – Social;  
 446 Exchange; LEG – Legacy; MEA – Meaning; positive correlation for Gender indicates  
 447 higher score for males.

448 *Table 1. (continued) Descriptive statistics and results of set correlations analysis between*  
 449 *AIM-Q motives and approach dimensions of SPSRQ-20 and RST-PQ controlled for*  
 450 *gender and age*

	Motives facilitating competition for resources and mates						
	AGG	INI	SEX	APP	WEA	MEN	PHY
Gender	-.01	-.08	<b>-.27**</b>	<b>.18**</b>	-.11	.02	<b>-.17**</b>
Age	-.07	-.11	.06	.04	-.00	-.07	.02
Reward Interest	-.01	-.07	.00	.04	-.10	-.01	<b>.25**</b>
Goal Drive Persistence	-.05	-.08	-.14	-.03	.01	.10	.06
Reward Reactivity	-.11	.03	-.02	-.04	.05	.01	-.04
Impulsivity	<b>.21**</b>	<b>.22**</b>	<b>.17**</b>	.06	.12	.01	-.11
Sensitivity to reward	<b>.32**</b>	<b>.24**</b>	<b>.19**</b>	<b>.37**</b>	<b>.41**</b>	<b>.49**</b>	<b>.36**</b>
M	6.84	10.53	8.60	6.64	6.75	10.63	10.97
SD	3.357	5.161	4.218	3.446	3.554	4.552	5.257
$\alpha$	.80	.91	.85	.80	.84	.83	.89
R	.43	.42	.43	.38	.49	.53	.51
R <sup>2</sup>	.183	.176	.186	.148	.239	.283	.262
F (7, 386)	12.37**	11.74**	12.60**	9.57**	17.29**	21.75**	19.58**

451 *\*\* p < 0.01;  $\alpha$  – Cronbach alpha; R – multiple correlation coefficient; R<sup>2</sup> – multiple*  
 452 *determination coefficient; AGG – Aggression; INI - Interpersonal Inquisitiveness; SEX*  
 453 *– Sex; APP – Appearance; WEA – Wealth; MN – Mental; PH – Physical; positive*  
 454 *correlation for Gender indicates higher score for males.*

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