Approach/avoidance personality traits as predictors of psychopathology in convicted offenders

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This study examined the role of approach and avoidance personality traits as temperamental risk factors for psychopathology using the revised Reinforcement Sensitivity Theory as theoretical framework. Self-report measures were administered to male convicted offenders (N = 162) and controls matched for age, education, and ethnicity (N = 162). The results show higher approach and passive avoidance tendencies in the forensic sample, as well as higher psychological distress relative to controls. In the forensic sample, both approach and avoidance traits can account for a high degree of psychopathology vulnerability. However, higher behavioral inhibition system sensitivity is the primary risk factor both for general distress and various dimensions of psychopathology, while lower behavioral approach system sensitivity predicts internalizing psychopathology, paranoid, and psychoticism symptoms. The findings are discussed both in the general context of personality-psychopathology links, as well as in the forensic context of potential mental health interventions as part of rehabilitation prison programs.

Key words: Reinforcement Sensitivity Theory, approach/avoidance traits, psychopathology

Highlights:

• Avoidance and approach traits account for a high degree of psychological distress.
• High BIS activity is the most significant predictor of psychopathology.
• Low BAS activity predicts internalizing, paranoid and psychoticism symptoms.
• High FFFS activity predicts only phobic anxiety.

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Approach–avoidance personality theories attempt to describe and explain individual differences in cognition, affect, and behavior in terms of state systems sensitivities that are activated by appetitive and aversive stimuli, i.e., reward vs punishment sensitivity (Corr & McNaughton, 2012). The Reinforcement Sensitivity Theory (RST; Gray, 1982, 1991) is certainly one of the most widely researched and empirically validated theories of motivation and personality, that also provides a framework for research into psychopathology. The revised RST (Gray & McNaughton, 2000; Corr, 2008) postulates three motivational systems. The Fight–Flight–Freeze System (FFFS) motivates avoidant and escape behaviors as responses to both conditioned and unconditioned aversive stimuli. It mediates the emotion of fear and the associated personality factor comprises fear-proneness and avoidance, or phobia and panic as clinical disorders. The activity of the Behavioral Approach System (BAS) is manifested as reward-seeking behavior, impulsivity, and extraversion (Pickering & Corr, 2008). BAS generates the emotion of ‘anticipatory pleasure’ and hope, but it is also related to addictive and high-risk behaviors. The Behavioral Inhibition System (BIS) resolves goal conflicts between the BAS and FFFS (e.g., approach–avoidance conflicts) by inhibiting behavior, increasing arousal, and through risk assessment. The BIS generates the emotion of anxiety, while the associated personality comprises worry-proneness and anxious rumination (generalized anxiety and obsessional-compulsive disorder).

This model thus postulates two distinct avoidance systems – one for simple active avoidance (FFFS) and one for passive avoidance (BIS) (Corr, 2013). The distinction between the two avoidance tendencies can be explained in terms of their “defensive direction”: the FFFS controls behaviors that have evolved to provide escape from danger, while the BIS controls behaviors that have evolved to allow cautious approach to danger (Corr & McNaughton, 2012; Corr, DeYoung, & McNaughton, 2013).

The revised theory therefore departs in certain aspects from the original RST model (Corr, 2008). Namely, it proposes that both conditioned and unconditioned stimuli can activate the FFFS and the BIS, fear and anxiety are distinct emotions, and approach and avoidance systems can be activated concurrently. It also conceptualizes the BAS as multidimensional and more complex than the FFFS and the BIS.

Regarding psychopathology, RST proposes that high BIS activity results in increased sensitivity to cues of punishment and increased risk for internalizing disorders, while high BAS activity results in increased sensitivity to cues of reward and increased risk for externalizing disorders (McNaughton & Corr, 2008; Pickering & Corr, 2008; Zinbarg & Yoon, 2008). Large number of studies have examined the proposed associations between BIS/BAS and specific types of psychopathology, using mostly the original RST and related measures, and supporting some, but not all of the expected links (see Bijttebier, Beck, Claes, & Vandereycken, 2009). In terms of internalizing disorders, studies strongly demonstrate positive association between BIS sensitivity and anxiety and depression (Hundt et al., 2007; Johnson, Turner, & Iwata, 2003; Izadpanah,
Low BAS reactivity is also related to depression, although not consistently (Bijttebier et al., 2009; Harnett, Loxton, & Jackson, 2013; Johnson et al., 2003). However an underactive BAS has been associated with depression disorder onset, course severity and treatment outcome (Zinbarg & Yoon, 2008). Social anxiety can also be predicted by high BIS/low BAS activity (Kimbrel, Mitchell, & Nelson-Gray, 2010), as well as by high FFFS sensitivity (Kimbrel et al., 2016; Kramer, Rodriguez, & Kertz, 2015). Obsessive-compulsive symptoms have been further linked to higher BIS activation (Bijttebier et al., 2009). Regarding externalizing psychopathology, high BAS sensitivity has been related to aggression (Izadpanah et al., 2017), drug abuse and dependence (Johnson et al., 2003), antisocial behavior, and alcohol abuse (Hundt et al., 2008).

Personality disorders (PD) have also been linked to RST systems. For example, Heym and Lawrence (2010) report that psychoticism is linked to reduced FFFS and BIS activity as well as to increased BAS activity. Paranoid PD has been linked to high BAS sensitivity (Ross, Keiser, Strong, & Webb, 2013), but also with high BIS sensitivity (Claes, Vertommen, Smits, & Bijttebier, 2009). Borderline PD is related both to BIS and BAS reactivity (Soler et al., 2014). One study has also investigated the association between BIS/BAS sensitivity and schizophrenia (Scholten, van Honk, Aleman, & Kahn, 2006) and found that only higher BIS sensitivity is associated with lower levels of negative symptoms. However in another study (Segarra et al., 2007), psychotic symptoms were related to higher BAS sensitivity.

Overall, the empirical evidence suggest that high avoidance tendencies may represent a stronger and more consistent temperamental risk factor for psychopathology, as opposed to low approach tendencies (Harnett et al., 2013; Struijs et al., 2017; Bijttebier et al., 2009). Several studies (Harnett et al., 2013; Taubitz, Pedersen, & Larson, 2015) have further proposed that certain approach traits (reward responsiveness) can promote adaptive psychological functioning. In line with Corr’s (2008) joint subsystems hypothesis, most studies have also tested the interaction effect of BIS/BAS activity, but rarely found evidence of it (Bijttebier et al., 2009).

Since the research on RST and psychopathology has mainly been conducted in community, undergraduate or various clinical samples, we decided to focus our attention to a forensic population, one potentially at-risk for psychopathology (Fazel, Hayes, Bartellas, Clerici, & Trestman, 2016; Stewart et al., 2010). To our knowledge no studies have been conducted with convicted offenders using the RST framework in the context of their mental health problems. The aim of our study is thus to examine which approach and avoidance personality traits can predict general and specific psychopathology in a sample with a history of criminal behavior. We will use a dimensional approach to psychopathology and a recently developed RST personality measure aligned with the revised theory. Based on the empirical evidence, we hypothesize that: 1) high BIS sensitivity can predict all internalizing psychopathology; 2) high BIS sensitivity is a stronger predictor of anxiety and depression than low BAS sensitivity;
3) high FFFS sensitivity can predict phobic, but not general anxiety; 4) BAS is a stronger predictor of hostility, paranoid ideation, and psychoticism than BIS; 5) high BIS sensitivity is a stronger predictor of general psychological distress that BAS. In order to test the postulated hypotheses regarding predictor strength, in each regression model we will compare the significance of the difference between standardized beta coefficients using confidence intervals estimated via bias corrected bootstrapping (Cumming, 2009; Jones & Waller, 2013).

**Method**

**Participants**

The forensic sample consists of 162 male offenders incarcerated in three penitentiary facilities in Macedonia ($M_{age} = 36$ years ± 10.5). They were recruited through the resocialization staff and all provided informed consent to participate in the study. The data was collected during August and October in 2017 in a series of one-on-one interviews with members of the resocialization staff or one of the authors of the study.

Most of the offenders are ethnic Macedonians (77%) and have high school education (53%). Regarding offending type, 13% of the offenders are convicted for homicide, 30% for other violent crimes (nearly half for robbery) and 57% are convicted for non-violent crimes (mostly for production/trade of narcotics/psychotropic substances or thefts). The average duration of the prison sentence in the sample is 7.2 years ($SD = 4.4$; 3 offenders were serving a lifetime sentence). A significant proportion of the offenders (39.5%) have a history of previous penal sanctions (mainly prison sentences). With respect to their health status, approximately every fifth offender has been using secondary health care services during the incarceration, most of them due to somatic complaints or disorders (12%), while few for mental health issues or both somatic and psychological symptoms.

Due to the lack of normative data for the measures used we included a control sample of 162 males from the general population, individually matched for age ($M = 35$ years ± 10.5), education and ethnicity with the forensic sample. The controls were recruited through snowball sampling by undergraduate psychology students for course credit or by the authors of the study. Controls do not differ significantly from convicts in age – $t(322) = 0.86$, $p = .39$, education – $\chi^2(2) = 0.15$, $p = .99$, or ethnicity – $\chi^2(3) = 0.00$, $p = 1.00$. For the last comparison we collapsed four ethnic categories into one to obtain a cell count above 5, but participants were matched identically in each separate category.

All procedures performed in the study were in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Measures**

**The Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983).** One of the most widely used self-report measures, designed to assess psychological symptoms in clinical, forensic and community settings. The inventory consists of 53 items reflecting nine primary symptom dimensions: somatization (distress arising from perceptions of bodily dysfunction), obsessive-compulsive symptoms (thoughts and impulses that are experienced as unremitting and irresistible but are of an unwanted nature), interpersonal sensitivity (feelings of personal inadequacy and inferiority in comparison with others), depression (symptoms of dysphoric mood and affect as well as lack of motivation and loss of interest in life), anxiety (nervousness and tension as well as panic attacks and feelings of terror), phobic anxiety (persistent fear response to a specific place, object or situation that is irrational), hostility
(thoughts, feelings or actions that are characteristic of anger), paranoid ideation (disordered thinking characteristic of projective thoughts, hostility, suspiciousness, grandiosity, fear of loss of autonomy, and delusions), and psychoticism (withdrawn, isolated, schizoid lifestyle as well as first rank symptoms of schizophrenia such as thought control). Items are rated on a 5-point scale of distress (0–4), ranging from not at all to extremely. The instrument also provides three global psychopathology indices. The General Severity Index (GSI) combines information on the number of symptoms and the intensity of perceived distress, the Positive Symptom Distress Index (PSDI) measures symptom intensity, while the Positive Symptom Total (PST) is the count of reported symptoms regardless of their intensity. The adaptation and previous utilization of the instrument in Macedonian language is described in Naumova (2008). In this study all subscales show satisfactory internal reliability in both samples, except phobic anxiety in the control sample (Table 1).

Table 1
Descriptive statistics, Cronbach’s alphas, and differences between convicted offenders and controls in approach–avoidance personality traits and psychopathology

|                     | Convicted offenders |              | Controls        |              | t(322) | d   |
|---------------------|---------------------|--------------|-----------------|--------------|--------|-----|
|                     | M (SD)              | α             | M (SD)          | α            |        |     |
| RST-PQ              |                     |               |                 |              |        |     |
| Fight-Flight-Freeze | 20.73 (6.84)        | .81           | 22.23 (6.62)    | .79          | -2.01* | 0.22|
| Behavioral Inhibition | 57.84 (13.91)    | .91           | 52.73 (12.98)   | .91          | 3.42** | 0.38|
| Reward Interest     | 22.87 (3.86)        | .76           | 20.67 (4.40)    | .81          | 4.79***| 0.53|
| Goal-Drive Persistence | 24.00 (3.12)    | .73           | 22.00 (4.30)    | .85          | 4.79***| 0.53|
| Reward Reactivity   | 30.89 (5.01)        | .78           | 29.74 (5.74)    | .84          | 1.92   | 0.21|
| Impulsivity         | 20.85 (4.87)        | .71           | 20.04 (5.07)    | .76          | 1.47   | 0.16|
| Defensive Fight     | 23.58 (4.96)        | .81           | 23.07 (5.38)    | .86          | 0.88   | 0.10|
| BSI                 |                     |               |                 |              |        |     |
| Somatization        | .69 (.81)           | .88           | .60 (.66)       | .84          | 1.08   | 0.12|
| Obsession-compulsion| .95 (.77)           | .79           | .86 (.71)       | .80          | 1.09   | 0.12|
| Interpersonal sensitivity | .88 (.79)    | .72           | .80 (.73)       | .75          | 0.95   | 0.11|
| Depression          | .73 (.72)           | .78           | .57 (.63)       | .82          | 2.07*  | 0.23|
| Anxiety             | .90 (.85)           | .85           | .83 (.75)       | .84          | 0.81   | 0.09|
| Phobic anxiety      | .52 (.61)           | .69           | .37 (.46)       | .58          | 2.52*  | 0.28|
| Hostility           | .52 (.64)           | .72           | .63 (.66)       | .76          | -1.52  | 0.17|
| Paranoid ideation   | 1.48 (.82)          | .68           | 1.16 (.83)      | .74          | 3.40** | 0.38|
| Psychoticism        | .77 (.75)           | .70           | .57 (.62)       | .67          | 2.81** | 0.31|
| General Severity Index | .84 (.62)     | .96           | .70 (.53)       | .96          | 2.11*  | 0.24|
| Positive Symptom Total | 22.72 (12.80)    | -             | 21.93 (13.85)   | -            | 0.54   | 0.06|
| Positive Symptom Distress | 1.83 (.55)    | -             | 1.59 (.61)      | -            | 3.67***| 0.41|

Note. RST-PQ = Reinforcement Sensitivity Theory Personality Questionnaire; BSI = Brief Symptom Inventory.

* p < .05; ** p < .01; *** p < .001.
Reinforcement Sensitivity Theory of Personality Questionnaire (RST-PQ; Corr & Cooper, 2016). Recently constructed instrument consisting of 73 items measuring avoidant and approach behaviors when confronted with punishing or rewarding stimuli, as indicators of activity of separate motivational/emotional/thinking systems. The Fight–Flight–Freeze System subscale measures flight, freeze, and active avoidance behavior. The Behavioral Inhibition System measures motor interruption, behavioral caution/risk assessment, and worry as responses to avoidable dangerous stimuli, as well as obsessional thoughts and behavioral disengagement as responses to unavoidable dangerous stimuli. The Behavioral Approach System consists of four dimensions: Reward Interest (RI) reflecting openness to new experiences and potentially rewarding opportunities, Goal-Drive Persistence (GDP) measuring the motivation towards obtaining a reward, Reward Reactivity (RR) as an indicator of anticipatory pleasure and Impulsivity (I) manifested as lack of planning and fast reactions. Defensive Fight is an additional subscale, measuring approach behavior when escape is not available. All items are rated on a 4-point scale (1–4), indicating accuracy of statement description and ranging from not at all to highly. The subscales show satisfactory internal reliability in both samples (Table 1). However, since the RST-PQ has not been previously used in Macedonian language, we also conducted a CFA to test the predicted factor structure of the instrument. Due to violations of multivariate normality in both samples, for this analysis we used the DWLS estimator in Lavaan R package (Rosseel, 2012). The fit indices suggest a slightly better model fit in the control group (offenders: $\chi^2(2000) = 264.395, p < .001$, CFI = .94, TLI = .94, RMSEA = .04; controls: $\chi^2(2000) = 2613.752, p < .001$, CFI = .96, TLI = .95, RMSEA = .04).

Results

Table 1 presents the comparison of personality traits and psychopathology between convicted offenders and controls. Regarding avoidance tendencies, the convicts show higher BIS reactivity and lower FFFS reactivity. With respect to approach traits, convicts show higher RI and GDP. The effect size values suggest that the magnitude of group differences is greater for the approach traits.

The comparison of psychological distress also reveals significant differences between offenders and controls. Convicts report higher Positive Symptom Distress and overall symptom severity. Also, 15% of the convicts can be classified as highly distressed (GSI score ≥ 1 SD above $M$). Regarding specific psychopathology, convicts report elevated symptoms of depression, phobic anxiety, paranoid ideation and psychoticism. The effect size values further show that the magnitude of group differences is greatest for paranoid ideation and lowest for depression.

Prior to testing the postulated hypothesis, we examined the associations between all approach/avoidance personality traits and different psychopathology dimensions in both samples. Pearson correlation coefficients are reported in Table 2. The results show that in both groups of participants the avoidance traits (FFFS and BIS) are significantly positively correlated to all symptoms and global psychopathology indices. When comparing these two tendencies, the BIS seems to be correlated to psychopathology more strongly than the FFFS.
Table 2
Correlations between psychopathology and approach-avoidance personality traits in convicted offenders and controls

|                    | FFFS | BIS | BAS-RI | BAS-GDP | BAS-RR | BAS-I | DF |
|--------------------|------|-----|--------|---------|--------|-------|----|
| Somatization       | .27**| .44**| -.03   | -.02    | .14    | .15   | -.01|
|                    | (.30**) | (.56**) | (.05) | (.02) | (.06) | (.20**) | (.08) |
| Obsession-compulsion | .42**| .56**| -.06   | -.11    | .16    | .21** | .12 |
|                    | (.39**) | (.69**) | (.10) | (.09) | (.12) | (.22**) | (.14) |
| Interpersonal sensitivity | .43**| .48**| -.10   | -.10    | .11    | .11   | .06 |
|                    | (.28**) | (.55**) | (.17) | (.09) | (.22**) | (.27**) | (.16) |
| Depression         | .39**| .50**| -.17*  | -.17*   | .06    | .15   | .12 |
|                    | (.32**) | (.56**) | (.00) | (.07) | (.00) | (.15) | (.04) |
| Anxiety            | .36**| .50**| -.26** | -.21**  | .03    | .24** | .12 |
|                    | (.38**) | (.65**) | (.09) | (.08) | (.11) | (.22**) | (.18) |
| Phobic anxiety     | .43**| .42**| -.16*  | -.17*   | .06    | .04   | -.03|
|                    | (.35**) | (.44**) | (.04) | (.07) | (.09) | (.12) | (.16) |
| Hostility          | .25**| .42**| -.06   | -.06    | .13    | .31** | .42**|
|                    | (.24**) | (.47**) | (.11) | (.09) | (.12) | (.34**) | (.28) |
| Paranoid ideation  | .30**| .42**| -.20*  | -.11    | .07    | .15   | .16*|
|                    | (.24**) | (.54**) | (.12) | (.23**) | (.22**) | (.32**) | (.26) |
| Psychoticism       | .34**| .43**| -.17*  | -.15    | .07    | .19*  | .13 |
|                    | (.31**) | (.55**) | (.01) | (.04) | (.01) | (.24”) | (.09) |
| General Severity Index | .43**| .58**| -.17*  | -.15    | .12    | .22** | .14 |
|                    | (.39**) | (.71**) | (.09) | (.07) | (.12) | (.28**) | (.18) |
| Positive Symptom Total | .46**| .52**| -.18*  | -.22**  | .10    | .16*  | .11 |
|                    | (.41**) | (.65**) | (.10) | (.03) | (.09) | (.26**) | (.16) |
| Positive Symptom Distress | .18* | .40**| -.04   | .07     | .05    | .16*  | .12 |
|                    | (.14) | (.40**) | (.17) | (.28**) | (.33**) | (.30**) | (.30) |

Note. Control sample correlations presented in parentheses. FFFS = Fight-Flight-Freeze System; BIS = Behavioral Inhibition System; BAS = Behavioral Approach System; RI = Reward Interest; GDP = Goal-Drive Persistence; RR = Reward Reactivity; DF = Defensive Fight.
* p < .05; ** p < .01.

The approach traits, on the other hand, are only weakly correlated with certain groups of symptoms in both samples. It should be noted that in the forensic sample two separate structures of the BAS show opposed patterns of associations with psychopathology. Namely, RI and GDP are negatively correlated with psychopathology (most significantly with anxiety), while Impulsivity is positively correlated (most significantly with hostility). RR seems to be non-relevant for psychopathology, showing only a very weak, although significant correlation with obsession-compulsion. In the control sample, Impulsivity is the only approach trait that is relevant to psychopathology, since it is positively related to almost all symptoms.
The last trait is Defensive Fight, which has theoretically and empirically been linked both with the FFFS and the BAS, but in the context of psychopathology in the forensic sample it reveals a moderate tendency to correlate with the externalizing features of hostility and a weak correlation with paranoid ideation. However, in the control sample it is also weakly correlated to internalizing symptoms.

If we compare internalizing vs. other psychopathology symptoms, we find that avoidance traits are the most relevant correlates of all types of mental health complaints in both samples. An additional confirmation is the fact that the highest correlation is obtained between the BIS and the General Severity Index, which is the most sensitive distress measure that the BSI offers.

We then proceeded to conduct a series of multiple linear regression analyses in order to examine the predictive power of all approach/avoidance traits in both samples. The models were computed using the enter method and all are significant ($p < .001$), accounting for a considerable degree of variance in the psychopathology dimensions (adj. $R^2 = .19–39$ in the forensic sample vs adj. $R^2 = .19–48$ in the control sample). Regarding general psychopathology (GSI) individual differences in avoidance and approach traits can explain over 40% in the variance of general distress in the offenders and over 50% in the controls.

With respect to the postulated hypotheses we will first comment all findings relevant to the forensic sample, and will summarize the findings for the control participants at the end of this section.

Table 3

|                      | Offenders | Controls | Offenders | Controls | Offenders | Controls |
|----------------------|-----------|----------|-----------|----------|-----------|----------|
|                      | $\beta$   | $BCa$    | $\beta$   | $BCa$    | $\beta$   | $BCa$    |
| FFFS                 | -.01      | [-.22, .20] | -.10      | [-.29, .10] | .09       | [-.10, .30] |
| BIS                  | .48**     | [.26, .69] | .67**     | [.47, .86] | .53**     | [.37, .70] |
| BAS GDM              | -.12      | [-.32, .10] | .04       | [-.17, .24] | -.11      | [-.27, .03] |
| BAS GGDP             | -.04      | [-.26, .15] | -.04      | [-.21, .13] | -.16      | [-.33, .00] |
| BAS RR               | .04       | [-.14, .24] | -.16      | [-.35, .07] | .04       | [-.14, .27] |
| BAS I                | .07       | [-.10, .23] | .02       | [-.16, .19] | .05       | [-.12, .22] |
| DF                   | -.17      | [-.35, .03] | -.01      | [-.16, .13] | -.05      | [-.21, .12] |

Note. FFFS = Fight-Flight-Freeze System; BIS = Behavioral Inhibition System; BAS = Behavioral Approach System; RI = Reward Interest; GDP = Goal-Drive Persistence; RR = Reward Reactivity; DF = Defensive Fight.

* $p < .05$; ** $p < .01$.

Table 3 presents the regression models for the first set of internalizing symptoms. Regarding somatization, only the BIS and Defensive Fight are
significant predictors in the forensic sample. The difference between the two beta weights (Δβ = .31) is significant (p < .05) since the confidence intervals overlap by less than 50%. For obsession-compulsion and interpersonal sensitivity only the BIS stands out as a significant predictor of these types of psychopathology.

Table 4
Approach–avoidance traits as predictors of depression, anxiety, and phobic anxiety

|                | Depression | Anxiety | Phobic anxiety |
|----------------|------------|---------|----------------|
|                | Offenders  | Controls| Offenders      | Controls| Offenders | Controls|
|                | β          | BCa     | 95% CI         | β       | BCa       | 95% CI |
| FFFS           | .11        | [-.12, .32] | -.07 [-.24, .10] | .04 [-.13, .20] | -.05 [-.22, .10] | .26″ [.06, .48] | .12 [-.05, .27] |
| BIS            | .51**      | [.34, .68] | .70″ [.52, .91] | .54″ [.39, .70] | .74″ [.59, .92] | .37″ [.18, .57] | .41″ [.21, .66] |
| BAS RI         | -.21*      | [-.39, -.02] | .07 [-.09, .25] | -.34″ [-.54, -.10] | .08 [-.12, .28] | -.17 [-.33, .01] | .02 [-.18, .23] |
| BAS GDP        | -.12       | [-.30, .04] | -.16 [-.33, .00] | -.10 [-.30, .06] | -.03 [-.22, .16] | -.10 [-.29, .06] | .02 [-.21, .26] |
| BAS RR         | -.03       | [-.17, .13] | -.16 [-.38, .06] | -.02 [-.17, .14] | -.18 [-.36, -.01] | .01 [-.19, .18] | -.12 [-.35, .08] |
| BAS I          | .00        | [-.16, .18] | -.04 [-.23, .13] | .15 [0.00, .29] | -.06 [-.24, .12] | -.07 [-.25, .10] | -.09 [-.28, .11] |
| DF             | .00        | [-.14, .14] | .00 [-.13, .14] | -.05 [-.22, .10] | .10 [-.02, .23] | -.12 [-.32, .05] | .12 [-.04, .27] |

Note. FFFS = Fight–Flight–Freeze System; BIS = Behavioral Inhibition System; BAS = Behavioral Approach System; RI = Reward Interest; GDP = Goal-Drive Persistence; RR = Reward Reactivity; DF = Defensive Fight.

* p < .05; ** p < .01.

In the regression models for the second set of internalizing symptoms (Table 4) we find that in the forensic sample both the BIS and Reward Interest are significant predictors of depression and anxiety, but their beta weights significantly differ only regarding depression (Δβ = .30, p < .05). In the model for phobic anxiety, only the avoidance traits (FFFS and the BIS) can significantly predict variations in this type of psychological distress, with no significant difference detected between the beta weights.

Overall, we can conclude that the results fully support our prediction that in convicted offenders high BIS sensitivity can predict all dimensions of internalizing psychopathology (H1); they partially support hypothesis 2, since high BIS sensitivity is a stronger predictor than low BAS sensitivity only with respect to depression; and they fully support our prediction that FFFS can predict phobic, but not general anxiety (H3).

The analyses of the regression models for other psychopathology dimensions (Table 5) show that in the forensic sample high BIS reactivity and Defensive Fight are significant predictors of hostility, while high BIS reactivity and low RI predict paranoid ideation. We find the latter prediction pattern also regarding psychoticism. In all three cases the difference between the standardized betas are not significant. These findings do not confirm hypothesis 4, that BAS is a stronger predictor of hostility, paranoid ideation, and psychoticism than BIS.
Table 5
Approach–avoidance traits as predictors of hostility, paranoid ideation, and psychoticism

|                   | Hostility | Paranoid ideation | Psychoticism |
|-------------------|-----------|------------------|--------------|
|                   | Offenders | Controls         | Offenders    | Controls    | Offenders | Controls     |
|                   | β         | 95% CI           | β            | 95% CI      | β          | 95% CI       |
| FFFS              | -0.05     | [-.23, .16]      | .08          | [-.25, .08] | .05        | [-.18, .26]  |
| BIS               | .38**     | [.23, .51]       | .47**        | [.31, .64] | .44**      | [.26, .61]   |
| BAS RI            | -.13      | [-.30, .03]      | .03          | [-.19, .25] | -.30**     | [-.47, -.14] |
| BAS GDP           | -.12      | [-.30, .06]      | -.02         | [-.21, .14] | -.02       | [-.21, .16]  |
| BAS RR            | .01       | [-.14, .19]      | -.22**       | [-.45, .01] | .01        | [-.16, .19]  |
| BAS I             | .07       | [-.12, .25]      | .19**        | [.01, .38] | .01        | [.16, .20]   |
| DF                | .31**     | [.15, .48]       | .20**        | [.04, .39] | .05        | [.10, .20]   |

Note. FFFS = Fight–Flight–Freeze System; BIS = Behavioral Inhibition System; BAS = Behavioral Approach System; RI = Reward Interest; GDP = Goal-Drive Persistence; RR = Reward Reactivity; DF = Defensive Fight.
* p < .05; ** p < .01.

Table 6
Approach–avoidance traits as predictors of general distress

|                   | Global Severity Index | Positive Symptom Total | Positive Symptom Distress |
|-------------------|-----------------------|------------------------|--------------------------|
|                   | Offenders | Controls         | Offenders    | Controls    | Offenders | Controls     |
|                   | β         | 95% CI           | β            | 95% CI      | β          | 95% CI       |
| FFFS              | .09       | [.09, .26]       | -.10         | [-.24, .05] | .17**      | [.00, .32]   |
| BIS               | .58**     | [.42, .75]       | .81**        | [.66, .98] | .48**      | [.32, .66]   |
| BAS RI            | -.25**    | [-.41, -.07]     | .06          | [-.10, .24] | -.19*      | [-.34, -.03] |
| BAS GDP           | -.11      | [-.29, .04]      | -.06         | [-.21, .09] | -.21*      | [-.38, -.05] |
| BAS RR            | .01       | [-.14, .18]      | -.18*        | [-.35, -.03] | .04        | [-.11, .20]  |
| BAS I             | .05       | [-.11, .20]      | .02          | [-.13, 15] | .00        | [-.16, .14]  |
| DF                | -.03      | [-.19, .14]      | -.08         | [-.04, .19] | -.02       | [-.16, .13]  |

Note. FFFS = Fight–Flight–Freeze System; BIS = Behavioral Inhibition System; BAS = Behavioral Approach System; RI = Reward Interest; GDP = Goal-Drive Persistence; RR = Reward Reactivity; DF = Defensive Fight.
* p < .05; ** p < .01.

Finally, we will examine the regression models for the general psychopathology indices (Table 6). Regarding the GSI, we find that higher BIS reactivity and lower RI predict higher general distress in the forensic sample. In this case, the BIS is a more significant predictor since the confidence intervals don’t overlap ($\Delta \beta = .34, p < .01$). The number of reported symptoms in convicted offenders can also be predicted by both avoidant and approach traits. However, the BIS is more significant than the other predictors (BIS/FFPS $\Delta \beta = .32, p < .01$; BIS/RI $\Delta \beta = .30, p < .05$; BIS/GDP $\Delta \beta = .28, p < .05$). Lastly, the
average level of experienced symptom distress in this sample can be predicted only by the activity of the BIS. Overall, these findings confirm hypothesis 5 that high BIS sensitivity is a stronger predictor of general psychopathology distress than BAS.

It is relevant to note that in the control sample high BIS sensitivity is also the most significant predictor of all specific psychopathology as well of the three indices of general distress. For most psychopathology dimensions it is actually the only significant predictor. Low BAS sensitivity in controls is related only to hostility, psychoticism, and general distress, mainly through RR.

**Discussion**

The examination of approach–avoidance personality traits as predictors of psychopathology in incarcerated offenders reveals several valuable findings. First, it shows higher BIS and BAS activity and lower FFFS activity in offenders relative to controls. In the context of high-risk behavior, Corr and Krupić (2017) define this combination of personality traits as a “striving” personality type, one sensitive to wins and insensitive to losses, but high in goal conflict detection. This is in line with the two approach traits that are higher in offenders, namely the increased tendency toward novelty seeking and the persistent motivation for goal achievement. Knyazev, Wilson, and Slobodskaya (2008) have also linked joint activity in both systems to social maladjustment, although they suggest that in a dangerous and poor environment, which is often a most accurate description of incarceration – this could be beneficial for survival. In the context of mental health, high activity in both systems has empirically been related to borderline personality disorder (Soler et al., 2014) and increased comorbidity risk (Knyazev et al., 2008), although in the latter case this risk is however lower relative to high/low combinations of BIS/BAS activity.

In the forensic sample we did find elevated general psychological distress compared to controls, as well as elevated symptoms of depression, phobic anxiety, paranoid ideation, and psychoticism. Previous studies have indicated that mental health problems can increase during imprisonment (Fazel et al., 2016; Otte et al., 2017) and if not properly treated can increase the risk of offending, both violently and non-violently. It is also important that similar sets of symptom elevations were found in other forensic samples (Otte et al., 2017).

With respect to the primary aim of this study, the correlation and regression analyses in the forensic sample provided data that is mostly in line with previous research conducted in community and clinical samples. Although both avoidance traits (FFFS and BIS) were found to be the most relevant correlates of general and specific psychopathology, high BIS sensitivity can predict the full spectrum of measured symptoms, thus supporting the proposition that it is a primary temperamental risk factor (Bijttebier et al., 2009; Harnett et al., 2013; Struijs et al. 2017). High FFFS activity can predict higher phobic
anxiety, but not anxiety symptoms, which is in line with the conceptualization of this system (Corr, 2008). However, high BIS can also predict phobic symptoms, supporting the notion that behavior inhibition increases the fear response and threat avoidance (McNaughton & Corr, 2008). Obsessive-compulsive symptoms and interpersonal sensitivity (an aspect of social anxiety) can only be predicted by high BIS activity, which is in line with Gray’s predictions (1991). Certain previous findings have also implicated the BAS and FFFS in social anxiety (Kimbrel et al., 2016; Kramer et al., 2015), however they were based on unidimensional BAS measures and a multidimensional FFFS measure.

Regarding the approach traits, we found that low Reward Interest and GDP, as well as high Impulsivity are generally weakly related to certain groups of symptoms, although only low RI can predict internalizing (anxiety and depression), paranoid and psychoticism symptoms in the offenders. The first finding supports previous empirical evidence (Bijttebier et al., 2009; Harnett et al., 2013; Johnson et al., 2003) thus emphasizing the role of reduced proactivity as potential vulnerability for affective disorders (Trew, 2011). Regarding paranoid and psychoticism symptoms our results do not relate to previous findings (Ross et al., 2013; Segarra et al., 2007; Sholten et al., 2006). This “disagreement” might reflect the specific operationalization of the BAS construct in the RST personality measure that we used in this study. Namely, in the revised RST, Corr (2008) proposes that BAS is complex and multidimensional. Empirical evidence also support this notion (Corr & Cooper, 2016). Previous studies have used a unidimensional BAS score, derived from Carver and White’s (1994) BIS/BAS Scale, which does provide a multidimensional approach to BAS (however not reflecting the revised RST). The RST-PQ used in this study, on the other hand, consists of four BAS factors measuring separate subprocesses of approach behavior.

One additional finding regarding the approach tendencies is also important. Namely, RR was found to be non relevant to psychopathology in this sample, contrary to recent findings (Harnett et al., 2013; Taubitz et al., 2015) that it might promote psychological well-being. In the control sample, on the other hand, it was a significant predictor of hostility and psychoticism, as well as general psychological distress, so further research is needed to clarify the role of this approach trait.

Finally, we did not pose any hypotheses regarding the Defensive Fight trait, but found that it can predict somatization (low DF) and hostility (high DF). Empirical evidence has linked Defensive Fight mainly with BAS factors (Corr & Cooper, 2016). Since hostility is conceptualized in the BSI as overt expression of anger, this finding suggests that in the forensic sample higher DF is related to aggressive behavior, while lower DF is related to anger suppression and hence somatization.

Overall, we can conclude that this study provides further evidence that depression and anxiety, as most often studied internalizing psychopathology, can be predicted by high BIS/low BAS reactivity, even in individuals with
higher activity in both systems. It is relevant to point out that BAS activity in this study is represented by RI, as initial openness toward new experiences that can further generate approach behavior. Empirical evidence (Corr & Cooper, 2016) suggest that this approach trait is associated with high Extraversion, Openness to experience and low Neuroticism, while high BIS sensitivity is related to low Extraversion and high Neuroticism, implying that high negative and low positive affectivity constitute the primary vulnerability for psychological distress.

The possibility to test BAS activity as potential vulnerability risk for externalizing psychopathology was limited in this study, since the BSI measures only hostility as externalizing psychopathology. We did not find a significant link between BAS and hostility in the forensic sample, but low Reward Responsiveness and high Impulsivity were significantly related to hostility in the control sample, indicating that certain approach traits might have differentiated roles in the psychological (mal)adjustment of specific subpopulations. Further research should include other typical externalizing symptoms (substance abuse and addiction). However, various authors have used different approaches when examining the relationship between RST systems and psychopathology, so caution is advised when comparing findings, since prediction of symptoms should not equal prediction of a clinical diagnosis. An additional confounding factor is the variety of utilized RST measures, most of them not related to the revised RST model.

Regarding future research, although avoidance and approach traits accounted for a high percent of variability in the general distress of the offenders, we suggest that personality–environment interactions should also be examined. Previous studies have found that temperament can moderate the risk of psychopathology outcomes following adverse life events (Gudiño, Nadeem, Kataoka, & Lau, 2012; Hundt et al., 2007). In a penitentiary context this is relevant both regarding past and current life experiences as well as for potential resocialization success. A prospective design could also provide a possibility to differentiate whether the activity of both systems increases in response to incarceration or is this the primary temperamental makeup of specific offender groups.

Mental health interventions as part of rehabilitation prison programs should also address personality vulnerabilities to psychopathology, specifically the overtly cautious ("paranoid") approach to potential threats (high BIS) and hyporeactivity to new appetitive stimuli (low BAS/reward interest). Providing a variety of potentially rewarding environmental cues, thus stimulating behavioral activation, and reducing distorted information processing mechanisms (attentional bias toward threat) have lately been shown to mediate temperament–psychopathology associations (Bijttebier, et al., 2009) and can serve both as prevention and treatment interventions. Keeping in mind that striving tendencies are already increased in the offenders, these interventions should be based on careful individual assessments of the nature of potentially rewarding stimuli. Despite the limitations of using a cross-sectional design and self-report measures
in a convenience sample, our findings contribute to the literature on approach/avoidance traits and psychopathology, since this is the first study conducted in a forensic context, with implications regarding the mental health care of convicted offenders.

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Osnovne osobine pristupa i izbegavanja kao prediktori psihopatologije kod osuđenih prestupnika

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U ovom istraživanju ispitivana je uloga osobina pristupanja i izbegavanja kao temperamentalnih faktora rizika za psihopatologiju, pri čemu je korišćena Teorija osetljivosti kao teorijski okvir istraživanja. Mere samoprocene su zadate grupi osuđenih prestupnika muškog pola (N = 162), kao i kontrolnoj grupi koja je sa grupom osuđenika izjednačena po godinama, obrazovanju i etničkoj pripadnosti (N = 162). Rezultati su pokazali više skorove na pristupanju i pasivnom izbegavanju kod forenzičkog poduzorka, kao i viši nivo psihološkog distresa u odnosu na kontrolnu grupu. Na forenzičkom poduzorku,
i osobine koje se odnose na pristupanje i osobine koje se odnose na izbegavanje u velikoj meri objašnjavaju vulnerabilnost na psihopatologiju. Međutim, viši nivo osetljivosti sistema bihevioralne inhibicije je primarni faktor rizika i za opšti distres i za različite dimenzije psihopatologije, dok niži nivo osetljivosti sistema bihevioralne aktivacije predviđa internalizaciju psihopatologije, paranoidne simptome i simptome psihoticizma. Rezultati su razmatrani u opštem kontekstu veza između ličnosti i psihopatologije, kao i u forenzičkom kontekstu potencijalnih intervencija u oblasti mentalnog zdravlja koje bi bile deo programa rehabilitacije u zatvoru.

**Ključne reči:** Teorija osetljivosti na potkrepljenje, osobine pristupanja/izbegavanja, psihopatologija

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