Exploring the Relationship between Dysfunctional Personality Traits with Metacognition and Confidence

Abstract

The ability to assess one's own cognitive processes across different domains is known as metacognition. Although it has been hypothesized that people with certain personality disorders have trouble understanding their own mental states, its relationship with metacognition remains unclear. In an online study, 224 adult participants (average age=27.45; 63 males & 161 females) from the general population completed the Personality Inventory Disorders 5 (PID-5) for DSM-5 after completing a dot-density perceptual task. Participants reported their confidence levels on each trial. Using a bias-free metacognitive measure, we conducted several regression models to explore the relationship between metacognitive sensitivity and confidence with dysfunctional personality traits. We found evidence that Grandiosity, Perceptual Dysregulation, Restricted Affectivity, Separation Insecurity, Hostility, Impulsivity and Submissiveness dysfunctional personality facets are associated with confidence level. Moreover, Anxiousness and Emotional Lability showed connections with metacognitive sensitivity. These results support the idea of a potential link between metacognition and mental health in the context of a transdiagnostic framework for personality disorders.

Keywords: metacognitive bias; personality disorders; metacognitive sensitivity; PID-5

The association between cognitive processes and transdiagnostic symptomatology of mental disorders is a major area of interest in cognitive neuroscience (Hoven et al., 2019, 2023a, 2023b; Rouault et al., 2018; Seow et al., 2021; Seow & Gillan, 2020; Fox et al., 2023). Although operational diagnostic systems, such as the Diagnostic and Statistical Manual of Mental Disorders - Fifth Edition (DSM-5; American Psychiatric Association, 2013), have greatly contributed to the field of research, multiple studies have highlighted its limitations (Eaton et al., 2023; Freedman et al., 2013; Fried, 2015; Hyman, 2021; Markon et al., 2011). These models are based on categorical medical models of illness, delimiting discrete and differential diagnoses for specific problems (Echeburúa et al., 2014). Categorical classification approaches are especially useful when all disorders within the same diagnostic class are homogeneous, when the boundaries between classes are clear, and when the different classes are mutually exclusive (American Psychiatric Association & Association, 1994). However, there are some important issues that indicate that this is not the case for mental disorders (Sandín et al., 2012). The most notable of these is the high comorbidity that exists between multiple mental disorders, making it more the rule than the exception (Echeburúa et al., 2014; Sandín et al., 2012). In recent decades, alternatives to this approach have been developed, such as transdiagnostic models in psychiatry (Dalgleish et al., 2020; Eaton et al., 2023; Robbins et al., 2012; Wise et al., 2023), which are based on a dimensional conception of psychopathology (Sandín et al., 2012). This approach attempts to go beyond the current boundaries of each diagnostic condition and emphasizes the importance of underlying processes (Dalgleish et al., 2020; Eaton et al., 2023; Robbins et al., 2012; Wise et al., 2023). One of the possible underlying processes whose assessment has shown promise in this line is metacognition (Hoven et al., 2019, 2023a, 2023b; Rouault et al., 2018; Seow et al., 2021; Seow & Gillan, 2020; Wise et al., 2023; Benwell et al., 2022; Fox et al., 2023).

Metacognition is defined as the ability to evaluate one's own cognitive processes across different domains (Flavell, 1979; Fleming & Lau, 2014). This concept has been widely explored through diverse methodologies and fields of study (Fleur et al., 2021; Fleming & Lau, 2014; Hoven et al., 2019), demonstrating significant implications for both learning and development (Fleming, 2021; Hembacher & Ghetti, 2014; Roebers, 2017; Fleur et al., 2021). Furthermore, several researchers suggest that metacognition plays a crucial role in consciousness (Dehaene et al., 2021; Brown et al., 2019; LeDoux & Brown, 2017), indicating that metacognitive alterations could influence conscious processing. However, it is important to acknowledge that metacognitive functioning can also be affected by the type of task at hand and the required cognitive skills. The debate over whether there is a singular form of

metacognition applicable across various tasks and domains or multiple forms of metacognition remains highly active (Faivre et al., 2018; Morales et al., 2018). Furthermore, research suggests that metacognitive abilities can be influenced by socio-cultural interactions (Van der Plas et al., 2022).

In cognitive neuroscience metacognition is commonly studied with simple decision-making tasks where participants have to report their choice and subjective confidence on being correct. In these tasks, two separate aspects related to metacognition are identified: metacognitive bias and metacognitive sensitivity (Fleming & Lau, 2014). The former refers to the overall level of reported confidence, i.e., the tendency of a participant to report high or low confidence, regardless of response accuracy (Fleming & Lau, 2014); while the latter is a key component of metacognition, operationally defined as the ability to differentiate between correct and incorrect decisions based on confidence ratings (Fleming & Lau, 2014). For example, a participant with high metacognitive sensitivity would exhibit greater confidence in correct decisions than in incorrect ones. Using bias-free measures of metacognition enables the separation of metacognitive sensitivity from metacognitive bias (Fleming & Lau, 2014).

Currently, deficits in metacognition have been linked to several diagnoses, symptoms, or clusters of symptoms, including depression (Fu et al., 2005; Hoven et al., 2019, 2023a, 2023b; Rouault et al., 2018; Seow et al., 2021; Benwell et al., 2022; Fox et al., 2023), anxiety (Hoven et al., 2019, 2023a; Rouault et al., 2018; Seow et al., 2021; Benwell et al., 2022; Fox et al., 2023), obsessive-compulsive disorder (Hoven et al., 2019, 2023a, 2023b; Rouault et al., 2018; Seow et al., 2021; Seow & Gillan, 2020; Benwell et al., 2022; Fox et al., 2023), schizophrenia (Hoven et al., 2019; Seow et al., 2021), nicotine dependence (Soutschek et al., 2022), autism spectrum disorder (Embon et al., 2023; Nicholson et al., 2020), and stress (Smith et al., 2024). The observed association of metacognition with diverse diagnoses and symptoms has led some studies to propose that metacognition may be a transdiagnostic process (Hoven et al., 2019, 2023a, 2023b; Rouault et al., 2018; Seow et al., 2021; Seow & Gillan, 2020; Wise et al., 2023; Benwell et al., 2022; Fox et al., 2023). It has been suggested that metacognition, as assessed by self-report questionnaires, is related to personality disorders (Pellecchia et al., 2018; Vega et al., 2020), as these types of patients have difficulties knowing their own mental states (Dimaggio et al., 2007; Dimaggio & Lysaker, 2015). These studies point to a role of metacognitive processes underlying personality disorders (Carcione et al., 2019; Semerari et al., 2014). The confirmation of low metacognition as an underlying process in personality disorders would open the door to therapeutic interventions addressing the shared aspects of general personality pathology across different personality disorders (Carcione et al., 2019). Nevertheless, the relationship between bias

free measure of metacognition (Fleming & Lau, 2014) and personality disorders from a dimensional perspective received less, if any, attention.

Section III of the DSM-5 proposes an alternative model of personality disorders, which is based on a dimensional approach (American Psychiatric Association, 2013; Eaton et al., 2023). This model emphasizes dysfunctional personality traits (DPT) as core components underlying personality disorders (Krueger & Markon, 2014; Thimm et al., 2016; Eaton et al., 2023). This study explores the association between visual metacognition and dysfunctional personality traits in a sample (n=224) of the general population, using a dot-density perceptual task (Rouault et al., 2018; Embon et al., 2023). Given that we aimed to investigate DPT from a dimensional perspective, studying this relationship in participants from the general population allowed us to observe the full spectrum of DPT, rather than being limited to a specific clinical category.

Recent research has also examined the relationship between symptoms or symptom clusters of mental disorders and, confidence and metacognitive sensitivity. Based on these studies, we expect confidence level to be negatively correlated with Anxiousness and Depressivity (Hoven et al., 2023a; Rouault et al., 2018; Seow & Gillan, 2020; Benwell et al., 2022; Fox et al., 2023). Conversely, confidence level is anticipated to correlate positively with Grandiosity, as demonstrated in prior research (Littrell et al., 2024, 2020; Macenczak et al., 2016; O'Reilly & Hall, 2021). Furthermore, confidence is expected to have a positive association with the Psychoticism domain, including its facets such as Perceptual Dysregulation, Unusual Beliefs and Experiences, and Eccentricity (Hoven et al., 2019; Rouault et al., 2018). However, previous research did not find a significant association between confidence and the Psychoticism domain nor with the rest of the domains (Wissing & Reinhard 2017). As for metacognitive sensitivity, based on the outcomes of Rouault et al. (2018), we anticipate finding positive correlations with Anxiousness and Depressivity.

Material and Methods

Participants:

The final sample consisted of 224 participants (of the 267 participants who took part in the experiment). Participants in the final sample met the following criteria: no use of psychotropic medication and being over 18 years of age. Also, 43 participants were excluded from the initial sample of 267, a typical number for web-based experiments (Chandler et al., 2014). Participants were recruited from the general population, meaning that we did not specifically screen for healthy individuals or exclude those with particular mental conditions. Exclusion criteria

were: reporting not having performed the experiment carefully (3 participants), performing less than 60% in the dot-detection task (1 participant), having pressed the same confidence key more than 85% of trials (22 participants), having less than 70 trials remaining after filtering for reaction time (3 participants) and having an AUROC2 (see Data Analysis section) less than 1.5 standard deviations from the mean (11 participants). In relation to gender, this study took into account participants' personal identification, as they were asked the question: "How do you identify in terms of gender?" and were provided with options to choose from (female, male, or non-binary). We also excluded participants whose selection in response to the gender question did not reach a representative number (non-binary, 3 participants). The final sample had an average age of 27.45 (*sd* = 9.02, range = 70 - 19), including 63 males and 161 females. Each participant gave informed consent to participate in the experiment. This study was approved by the ethics committee of the Instituto de Investigaciones Psicológicas (CONICET, Córdoba, Argentina) and it was conducted following the most recent edition of the Declaration of Helsinki.

Task:

The experiment involved a visual perceptual task in which participants were presented with two horizontally aligned circles. They were then required to select the circle with the highest number of dots based on their own criteria using the arrow buttons. After that, participants were required to rate their confidence that the prior selection was accurate using a Likert scale of 4 points, ranging from "I don't know" to "I am very sure,". Participants complete 130 trials in a single block, after having completed 15 practice trials. Every trial started with a fixation cross (500ms), followed by the circles (500ms). Subjects responded by pressing the left/right arrows keys. Lastly, subjects reported their confidence on a Likert scale (Figure 1). The task was programmed in JavaScript and run on a JATOS server (Lange et al., 2015). A staircase procedure of one up/two down, identical to Faivre et al., (2018), was used to keep all participant's performance at a 71% level approximately.

Personality Inventory for DSM-5:

The test to measure personality disorders proposed by the DSM-5 (American Psychiatric Association, 2013) is the Personality Inventory Disorders 5 (PID-5) for DSM-5, a self-reported instrument adapted to Argentinian population (Krueger et al., 2012; Stover et al., 2019). It is based on the III section of the DSM-5, where the Dimensional Five Factor Model is incorporated. The PID-5 evaluated five domains (see Table 1) and 25 facets (see Table 2) through 220 self-report with 4-point Likert scale items (Stover et al., 2019).

Data Analysis

Data analysis was carried out in R. Trials with reaction times (RT) larger than 5000 ms and shorter than 200 ms in the dot discrimination task were discarded (5.04% discarded). Trials with RT higher than 5000 ms were also eliminated from the confidence task (0.04% discarded). Each participant's first 20 trials were also discarded to give the staircase time to settle.

Several statistical analyses were conducted to address each of our research questions in order to observe the robustness of our results (Embon et al., 2023; Steegen et al., 2016). The 'confidence level' was operationalized as the mean confidence reported by each participant throughout the experimental task. Metacognitive sensitivity was quantified using the Type 2 Receiver Operating Characteristic (ROC) curve (AUROC2; Fleming & Lau, 2014) for each participant. To explore the relationships between confidence level and metacognitive sensitivity, with the DPT, we employed three distinct analytical strategies (refer to Supplementary Information for further details of the models).

The first approach involved analyzing the relationship between confidence level or metacognitive sensitivity with each DPT individually (we referred to these models as unitrait models). Separate regression models were constructed for each DPT, controlling for gender, age, and their interactions with DPT. P-values were adjusted for multiple comparisons using the Bonferroni correction.

The second approach expanded the unitrait model to multitrait models by incorporating data from all DPT simultaneously. Two sets of multiple regression models were used to explain confidence level and another two to explain metacognitive sensitivity. One multitrait model included all DPT facet traits, while the other included all DPT domain traits. This approach was particularly valuable for determining the most influential traits when all variables were considered together, providing insights into the relative importance of each trait.

For the first and second approaches, beta regression models were utilized because the dependent variables (confidence level and metacognitive sensitivity) fit well to this distribution after minor rescaling (see Supplementary Information for more details).

To further explore the relationships between confidence level and metacognitive sensitivity, with DPT, we applied regularized elastic-net regression to our dataset. This technique is well-suited for dealing with multicollinearity among predictors, a common issue given that personality facets tend to be correlated.

Results

The results for the facets and domains of DPT can be observed in Table 1 and Table 2.

Association Between DPT and confidence level:

Our analyses revealed a significant relationship between dysfunctional personality facets and the confidence level (see Figure 2). Specifically, Grandiosity exhibited a significantly positive association with confidence level both for the beta multitrait regression model (β = 0.146, *se* = 0.068, 95% *CI* = [0.013, 0.279], p = 0.032) and the beta unitrait regression model (β = 0.204, *se* = 0.059, 95% *CI* = [0.088, 0.32], p = 0.001). Furthermore, the coefficient of Grandiosity in the regression elastic net model (β = 0.043) was significantly different from zero. To determine the optimal lambda (λ) and alpha (α) parameters for the elastic net regression, a leave-one-out cross-validation approach was employed, resulting in λ = 0.155 and α = 0.229. Conversely, Perceptual Dysregulation had a significant negative association with confidence level in the beta multitrait regression model (β = -0.196, *se* = 0.087, 95% *CI* = [-0.367, -0.024], p = 0.025). Similarly, Restricted Affectivity had a significant positive association with confidence level in the beta multitrait regression model (β = 0.130, *se* = 0.066, 95% *CI* = [0.001, 0.259], p = 0.048) and its positive beta coefficient was different from 0 in the elastic net regression model (β = 0.016). Notably, Separation Insecurity exhibited a significant negative relationship with confidence level in both the beta multitrait regression model (β = -0.128, *se* = 0.059, 95% *CI* = [-0.244, -0.012], p = 0.031) and its negative beta coefficient was different from 0 in the elastic net regression model (β = -0.026). Additionally, Hostility and Impulsivity displayed a positive association with confidence level (β = 0.034 and β = 0.058 respectively), while Submissiveness exhibited a negative relationship with confidence level in the elastic net regression model (β = -0.039). Interestingly, confidence level did not show a significant association with any dysfunctional personality domains.

Association Between DPT and Metacognitive Sensitivity:

Two personality facets were significatively associated with metacognitive sensitivity (Figure 3). We found that Anxiousness exhibited a positive relationship with metacognitive sensitivity in the beta multitrait regression model (β = 0.164, *se* = 0.068, 95% *CI* = [0.031, 0.297], p = 0.015). Conversely, Emotional Lability was negatively associated with metacognitive sensitivity in the beta multitrait regression model (β = -0.127, *se* = 0.062, 95% *CI* = [-0.249, -0.005], p = 0.042). No other significant relationships were observed between DPT and metacognitive sensitivity. For the elastic net regression, the lambda and alpha parameters were selected through leave-one-out

cross-validation, resulting in $\lambda = 0.013$ and $\alpha = 0.651$. However, using these parameters, the regression did not yield coefficients different from 0 for any facet, indicating no significant findings. In contrast, when metacognitive sensitivity was explained based on dysfunctional personality domains, we did not find any statistically significant result.

Discussion

In this study, we investigated the relationships between confidence levels, metacognitive sensitivity, and dysfunctional personality traits (DPT) in participants from the general population, taking a dimensional approach to personality disorders proposed in Section III of the DSM-5. We found links between specific DPT, confidence levels, and metacognitive sensitivity. These results support the notion that metacognitive alterations can be observed from a transdiagnostic perspective and they align with other studies in this research domain (Hoven et al., 2019, 2023a, 2023b; Rouault et al., 2018; Seow et al., 2021; Seow & Gillan, 2020; Benwell et al., 2022; Fox et al., 2023).

Confidence Level

We hypothesized a negative association between confidence and the Anxiousness or Depressivity DPT facets based on several prior studies (Hoven et al., 2023a; Rouault et al., 2018; Seow & Gillan, 2020; Benwell et al., 2022; Fox et al., 2023). These studies consistently observed that the 'Anxiety-Depression' dimension, as leveraged by a transdiagnostic approach, exhibits a negative relation with confidence (Hoven et al., 2023a; Rouault et al., 2018; Seow & Gillan, 2020; Benwell et al., 2022; Fox et al., 2023). However, despite this robust observation, it is crucial to note that the relationship of confidence with the individual test outcomes constituting the Anxiety-Depression dimension reveals some inconsistencies. For instance, Seow & Gillan (2020) found no direct relationship between confidence and anxiety related test, or confidence and depression related test, despite identifying a negative relation with the Anxiety-Depression dimension as a whole. In contrast, in Rouault et al. (2018), besides identifying a negative relationship between the Anxiety-Depression dimension and confidence, negative relationships were also evident between confidence and Depression, Social Anxiety, and Generalized Anxiety. In Benwell et al. (2022), a negative relationship was also observed between the Anxiety-Depression dimension and confidence, and between Generalized Anxiety and confidence. Furthermore, Hoven et al. (2019) argued that in non-clinical populations, there is inconsistent evidence on the relationship between confidence and anxiety or depression. Considering these findings collectively, one might assume that the negative relationship between confidence and anxiety and depression could be specific to the transdiagnostic dimension of Anxiety-

Depression, as defined in these studies (Hoven et al., 2023a; Rouault et al., 2018; Seow & Gillan, 2020; Benwell et al., 2022; Fox et al., 2023). Therefore, it is reasonable that we did not find a negative relationship between confidence levels and the Anxiousness or Depressivity DPT facets.

Similarly, Seow & Gillan (2020) reported a positive relationship between impulsivity and confidence, in contrast to Rouault et al. (2018) and Benwell et al. (2022) finding of no significant association. In our study, while the regularized regression model indicated a positive link between impulsivity and confidence level, this relationship was not observed in beta regressions. These divergent outcomes emphasize the importance of exploring different statistical approaches. Consequently, the inconsistent findings suggest that the observed relationship may lack robustness, warranting further investigation and replication studies to establish a more conclusive understanding of the association between impulsivity and confidence level.

Our study revealed a significant negative association between Perceptual Dysregulation and confidence level. Anomalous perception is a hallmark of schizotypy or schizophrenia-related disorders (Rollins et al., 2020; Silverstein et al., 2017). Previous studies have hinted at positive associations between confidence and schizotypy and/or schizophrenia as a potential explanation for positive symptoms such as delusions and hallucinations (Hoven et al., 2019; Lehmann & Ettinger, 2023; Moritz et al., 2017; Rouault et al., 2018). While some studies have demonstrated a positive link between schizotypy or schizophrenia-related disorders and confidence, conflicting evidence exists (Hoven et al., 2019; Lehmann & Ettinger, 2023). The results presented in this study support the notion of a negative relationship between confidence level and traits associated with schizophrenia and/or schizotypy. The observed inconsistencies in these findings have been attributed to a lack of performance control, which could be a confounding factor (Faivre et al., 2021). However, this was mitigated in our study, as we determined this negative association between perceptual dysregulation and confidence level while controlling for performance using a staircase procedure. Future research should investigate these inconsistencies in greater detail.

Interestingly, Grandiosity showed a robust positive association with confidence level, aligning with finding from previous studies that have provided supporting evidence for the relation between overconfidence and narcissism (Littrell et al., 2024, 2020; Macenczak et al., 2016; O'Reilly & Hall, 2021). Grandiosity, a fundamental characteristic of the grandiose subtype of narcissism, often manifests as aggressiveness and a pronounced sense of superiority (Littrell et al., 2020). In contrast, the vulnerable subtype of narcissism is more commonly associated with expressions of insecurity, introversion, and heightened defensiveness (Littrell et al., 2020). It is plausible that

confidence in decision-making could serve as a distinguishing factor between these two subtypes of narcissism. Indeed, Littrell et al. (2020) reported a positive relationship between overconfidence and grandiose narcissism, whereas no such relationship was found with vulnerable narcissism. These results were replicated in a recent study (Littrell et al., 2024). Furthermore, additional associations were observed between confidence level and several personality facets, such as Restricted Affectivity, Separation Insecurity, Hostility, and Submissiveness, for which no readily apparent explanations are evident. Given the absence of prior studies investigating these specific relationships, further exploration of their implications is deferred to future studies.

Interestingly, no statistically significant associations were observed between confidence and any domain of personality disorders, including the domain of psychoticism, contrary to our expectations. In this regard, our results were compatible to those of Wissing & Reinhard (2017), who evaluated the relationship between trust and domains using the PID-5 through a task in which participants watched videos of liars versus truth-tellers and judged the veracity of the statements. These findings suggest that the relationship between confidence and the DPT may be more related to specific facets rather than broad domains.

Metacognitive Sensitivity

Anxiousness revealed a positive relationship with metacognitive sensitivity, indicating that individuals with higher levels of Anxiousness exhibit greater awareness and sensitivity to their own cognitive processes. This finding aligns with the research conducted by Rouault et al. (2018), who identified a positive association between a dimension of symptoms related to Anxiety and Depression and metacognitive efficiency. Moderate evidence suggests that individuals with high anxiety symptoms also report higher scores on measures assessing awareness of their cognitive processes, such as the "Cognitive self-consciousness" subscale (Capobianco et al., 2020; Donnellan et al., 2016; Quattropani et al., 2017). Additionally, considering that metacognition can be trained (Carpenter et al., 2019), it could be hypothesized that individuals with higher anxiety symptoms, who are also associated with higher scores in self-awareness on subjective self-report scales, may have developed enhanced metacognitive skills. However, although depression also scores high on self-awareness scales, in contrast to Rouault et al., (2018) findings, we did not find a relationship between metacognition and Depressivity (Donnellan et al., 2016; Quattropani et al., 2016).

Moreover, Emotional Lability exhibited a negative association with metacognitive sensitivity, suggesting that individuals with greater emotional volatility or instability may present reduced metacognitive awareness.

Similar to the relationship between DPT and confidence, no statistically significant associations were observed between metacognitive sensitivity and any domain of DPT. Furthermore, this suggests that metacognitive sensitivity may be related to specific facets of DPT, related to Anxiousness and Emotional Volatility, rather than to the overall domains.

Limitations

The overall results of this study are promising, yet some caveats should be considered when interpreting these findings. First of all, this study utilized participants from the general population. Although these participants were not on psychiatric medication, we cannot confirm whether they had not been clinically diagnosed with a mental disorder. However, it is a common practice when evaluating the relationship between metacognition and various psychopathological tests in the general population (Hoven et al., 2019, 2023a, 2023b; Seow & Gillan, 2020; Benwell et al., 2022; Embon et al., 2023). Nonetheless, the outcomes may differ in a strictly clinical population (Hoven et al., 2019). Replicating these findings in a clinical setting represents a crucial next step in this research project.

Secondly, it is important to consider that the concepts used above, such as Anxiousness and Depressivity, may not correspond exactly to their counterparts, Anxiety and Depression. This discrepancy arises because, although these concepts align closely with our theoretical framework, we used different psychometric tests to assess these traits in the participants. This consideration also applies to the other traits discussed above. Recognizing this caveat does not diminish the importance of the current study's contributions but highlights the need for careful consideration.

Lastly, it is important to note that this study primarily focused on local metacognitive computations. Global metacognitive evaluations of performance were not assessed in this study, yet they could be crucial for understanding the broader implications of metacognition (Seow et al., 2021). It should also be noted that this study exclusively evaluated metacognition within a specific task of visual perception, but metacognition may involve modality-specific components (Faivre et al., 2018; Morales et al., 2018). Future research is needed to extend these findings to global evaluations of metacognition and to other types of tasks and domains.

Conclusions

The findings of this study provide valuable insights into the relationships between confidence, metacognitive sensitivity, and certain dysfunctional personality traits in the general population. These results

suggest that some metacognitive components could be important in understanding certain personality traits. Future studies should focus on extending these findings to clinical populations and their potential in therapeutic contexts, such as interventions aimed at improving metacognition. Additionally, it would be valuable to investigate these relationships across different tasks and domains to better understand the generalization of these results and their theoretical implications.

Tables

Table 1

Mean and Standard Deviation of Dysfunctional Personality Domains in the Collected Sample

Domains	Mean	*SD*
Negative Affect	1.288	0.546
Detachment	0.902	0.527
Antagonism	0.741	0.509
Disinhibition	0.868	0.487
Psychoticism	0.682	0.499

sd = standard deviation

Table 2

Mean and Standard Deviation of Dysfunctional Personality Facets in the Collected Sample

Facets	Mean	*SD*
Anhedonia	1.054	0.62
Anxiousness	1.664	0.747
Attention Seeking	1.198	0.68
Callousness	0.361	0.4
Deceitfulness	0.741	0.507
Depressivity	0.81	0.677
Distractibility	1.259	0.757
Eccentricity	0.897	0.706
Emotional Lability	1.394	0.662

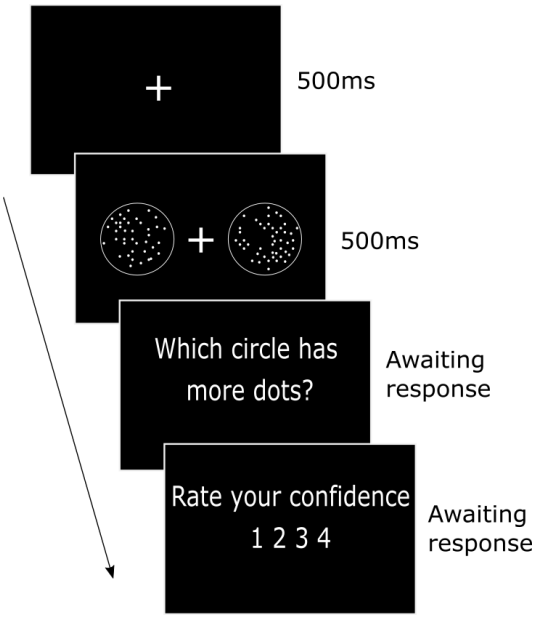
Grandiosity	0.607	0.578
Hostility	1.125	0.58
Impulsivity	0.789	0.689
Intimacy Avoidance	0.85	0.618
Irresponsibility	0.557	0.452
Manipulativeness	0.875	0.697
Perceptual Dysregulation	0.656	0.495
Perseveration	1.12	0.638
Restricted Affectivity	1.111	0.677
Rigid Perfectionism	1.284	0.729
Risk Taking	1.085	0.515
Separation Insecurity	0.806	0.63
Submissiveness	1.251	0.714
Suspiciousness	1.108	0.594
Unusual Beliefs And Experiences	0.491	0.509
Withdrawal	0.802	0.667

sd = standard deviation

Figures

Figure 1

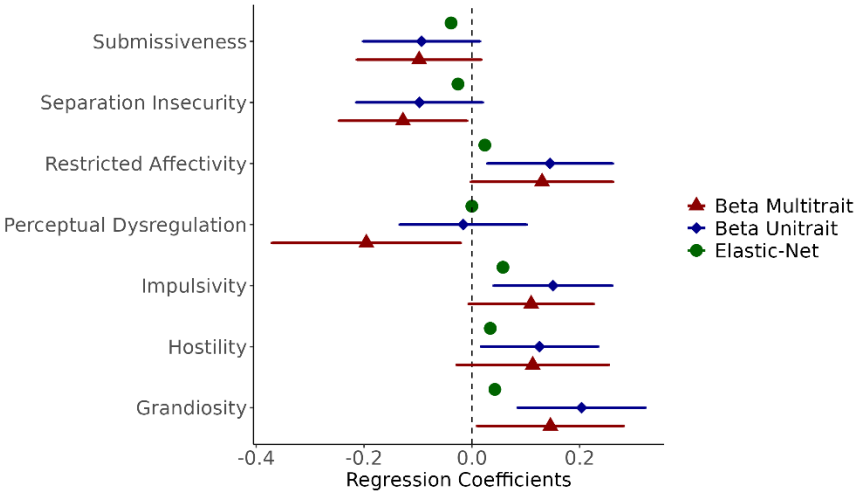
Experimental Task.



In each trial, participants compared dot clouds in two circles, selecting the cloud with a larger amount of dots count using the keyboard arrow keys. They subsequently rated their confidence on a 4-point Likert scale. Each trial started with a fixation cross (500ms), followed by the dots displays (500ms), and unlimited response time

Figure 2

Regression Models for Explaining Confidence Levels Based on Specific Facets

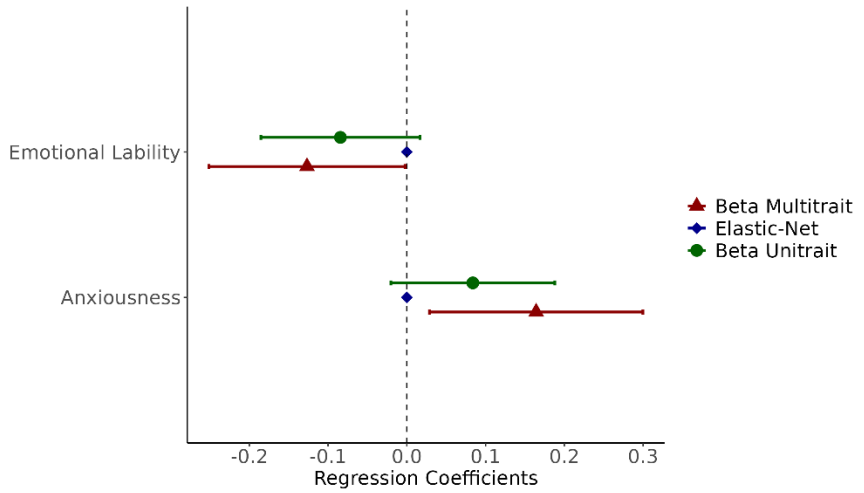


Multiple regression models were employed to examine the association between confidence level and dysfunctional personality traits. Separated beta regression models were run for each facet and domain (unitrait models).

Additionally, a multitrait regression model encompassing all facets/domains was conducted, and an elastic-net regression approach was employed using personality facets as explanatory variables

Figure 3

Regression Models for Explaining Metacognitive Sensitivity Based on Specific Facets



Multiple regression models were used to investigate the relation between metacognitive sensitivity and dysfunctional personality traits. Individual beta regression models were applied to each facet and domain (unitrait models). A comprehensive multitrait regression model was executed, encompassing all facets/domains. Furthermore, an elastic-net regression method was employed, employing personality facets as explanatory variables

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