

# **Reactivity, Intensity, Polarity and Stability questionnaire (RIPoSt-40) assessing emotional dysregulation: development, reliability and validity**

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## Abstract

Emotional dysregulation (ED) is a heterogeneous construct with great relevance in psychiatric research and clinical practice. At least three different facets could be identified, namely mood oscillation, affect intensity and difficulty with emotional and behavioural regulation. To the best of our knowledge, no scale comprehensively assesses all these three components. In the present study, we validated a 40-items version of the Reactivity, Intensity, Polarity and Stability questionnaire (RIPoSt-40), a self-report measure of ED, in a large Italian non-clinical sample (N = 396) and in two clinical samples of patients with cyclothymia (N = 120) and ADHD (N = 54). Forty items out of sixty were selected and subscales were derived through Principal Component Analysis in the non-clinical sample. Four subscales were identified as measures of affective instability, emotional impulsivity, negative and positive emotionality. The first three subscales also sum up to a negative emotion dysregulation score comprising thirty items. Measures of reliability (test-retest  $r = 0.71-0.84$ ) and internal consistency (Cronbach's  $\alpha = 0.72-0.95$ ) were generally high. Concurrent validity was supported by correlations with TEMPS-M factors. Discriminant validity was significant ( $p < 0.001$ ) with cyclothymic and ADHD patients showing higher scores for each subscale, except for positive emotionality. In conclusion, RIPoSt-40 questionnaire has proved to be a valid, reliable and useful tool to assess ED both in clinical and non-clinical contexts.

## Introduction

The failure to regulate emotions, namely emotional dysregulation (ED), is a highly relevant construct in psychiatric research and clinical practice. Despite its relevance, ED shows heterogeneity both in its nomenclature, definition and presentation (Marwaha et al., 2013). Indeed, terms such as affective instability or lability, mood swings and ED are often used as synonyms or without relevant variations. Marwaha et al. (2013) based on current literature on measures of ED, proposed a definition encompassing three different facets, namely oscillation of affect, emotional intensity and regulation capacity. Accordingly, ED could be broadly defined as “rapid oscillations of intense affect, with a difficulty in regulating these oscillations or their behavioural consequences”. As the authors suggested, no scales comprehensively assessing all three components are currently available and a combination of at least three different instruments is required.

Alternatively, ED has been defined as a deficiency in executive or cognitive management of emotions and three basic components have been operationalized, namely emotional impulsivity (EI), emotional intensity (EInt) and deficient emotional self-regulation (DESR) (Barkley, 2015; Faraone et al., 2018). EI refers to the quickness and the greater likelihood that an individual will react with particularly negative emotions and impulsive behavioural responses to events compared to others of the same developmental level or age. EI is related but not superimposable to emotional intensity, which itself can vary across individuals. DESR, instead, has been conceptualized as a deficiency in the ability to self-regulate the intensity of emotions and to generate a secondary emotional state to counteract or supplant the initial primary ones.

A major diagnostic dispute about primacy of attention deficit and hyperactivity disorder (ADHD), borderline personality disorder and bipolar spectrum disorders arise within the ED framework (Asherson et al., 2014; Bayes et al., 2016; Moukhtarian et al., 2018; Skirrow et al., 2012). In ADHD samples, ED rates range from 25-45% in children to 30-70% in adults (Shaw et al., 2014), and ED is longitudinally associated with increased psychiatric comorbidity, persistence of ADHD in adulthood, and functional impairment (Althoff et al., 2010; Barkley and Fischer, 2010; Biederman et al., 2012). Actually, different authors argued that ED should be considered a core feature of adult ADHD (Barkley, 2015; Hirsch et al., 2018; Skirrow et al., 2009), or at least a core feature of a distinct subtype (Reimherr et al., 2015). On the other hand, according to DSM-5 (APA, 2013) “affective instability due to a marked reactivity of mood” is listed among borderline personality disorder criteria.

Affective instability has been found to be the strongest predictor of suicidal behaviour in these patients (Yen et al., 2004) and could be used as a gate criterion to screen patients for borderline personality disorder (Zimmerman et al., 2019). Besides, self-reported frequent “ups and downs” and mood lability have repeatedly proved to be the greatest risk factors for transition from unipolar to bipolar disorders (Akiskal et al., 1995; Angst et al., 2003). Cyclothymic temperament, which is by definition characterized by constitutional ED (Perugi et al., 2017), has been shown to negatively affect illness course in mood disorders (Innamorati et al., 2015; Mechri et al., 2011; Nilsson et al., 2012) and in its extreme presentations actually constitutes an incapacitating mood disorder on its own (Perugi et al., 2015). The fact that all these conditions share a difficulty in modulating behavioral response during emotional states suggests a plausible common neurophysiological basis: neurodevelopmental dysfunctions of amygdala and fronto-limbic circuitries may represent the common neurophysiological substrate of ED involved in different and apparently separated clinical entities (Petrovic et al., 2016; Petrovic and Castellanos, 2016; Shaw et al., 2014; van Zutphen et al., 2015). Accordingly, “one may encounter patients in whom different conditions associated with ED coexist, emerging in childhood and adolescence, or becoming recognizable a few years later in early adult life” (Stone, 2013).

Through the development of the Reactivity, Intensity, Polarity and Stability (RIPoSt) scale we aimed to provide a useful self-report questionnaire for psychiatric patients and healthy subjects to quantify ED in its different facets. Starting from 60 items concerning reactivity, intensity, polarity of emotional responses and affective stability, we developed four subscales measuring affect oscillation over time, tendency for more intense and frequent negative and positive feelings and inability to regulate impulsive behavioural responses to emotionally salient stimuli, and assessed their reliability and validity in a relatively large Italian sample of subjects both from the general and the clinical population.

## **Methods**

### **Scale development**

Items were formulated by EH through an iterative process that incorporated feedback on wording from researchers, clinicians (see Acknowledgement) and research volunteers. The first version contained 60 items assessing reactivity (items 1-15), intensity (items 16-30), polarity (items 31-45) of

emotional responses and affective stability (items 46-60) (see Appendix for English, French and Italian versions). Answers were given in a six-point Likert-type scale ranging from 1 to 6 (1 = 'mai' [never]; 2 = 'quasi mai' [rarely]; 3 = 'occasionalmente' [sometimes]; 4 = 'abituamente' [usually]; 5 = 'quasi sempre' [mostly]; 6 = 'sempre' [always]).

## **Participants**

Three samples were collected. The first sample consisted in individuals from the general population. Anonymous volunteers were recruited with a web-based survey spread through social media between May and December 2018. Subjects were asked about previous history of psychiatric diagnoses and socio-demographical variables including age, gender, marital status, education and occupation. 441 adult subjects finished the survey. Forty-five individuals (10.2%) were excluded due to previous psychiatric diagnoses and the latter 396 were included in the normative sample. Among these, sixty subjects (15.2%) accepted to take part in a second evaluation during March 2019, after 96 days on average (SD = 10.4, range = 46-112 days), in order to assess test-retest reliability.

Two clinical samples were also collected at the Department of Psychiatry of the S. Chiara University Hospital in Pisa, between January and December 2018. The first one included 120 adult outpatients satisfying Akiskal and Mallya's (1987) criteria for cyclothymia. A second clinical sample included 54 adult outpatients diagnosed with ADHD in accordance with structured Diagnostic Interview for Adult ADHD, second edition (DIVA 2.0). Patients with intellectual disability and/or schizophrenia spectrum disorders according to DSM-5 criteria were excluded from the clinical samples.

## **Statistical Analysis**

The normative sample data were first used to identify items to retain, to evaluate the conceptual validity and to empirically derive subscales by Principal Component Analysis (PCA). To avoid redundancy, correlations between items were evaluated. Inter-item correlations with  $r > 0.8$  were identified and an item was deleted for each couple. Items that were unrelated to the others were identified as those showing no more than 10% of correlations (6) with  $r > 0.3$  and were discarded. A PCA with Promax (oblique) rotation was carried out on the correlation matrix. Scree plot evaluation suggested two possible solutions: a two-component solution explaining 42% of variance and a four-component solution explaining 54% of variance. Four components were initially extracted. Items with

component loading  $< 0.5$  were ruled out and a second-run PCA with Promax was performed. For each component, score of items loading  $> 0.5$  were summed to form corresponding subscale scores for each subject. Items with item-total correlation  $r < 0.5$  were dismissed and a third-run PCA with Promax rotation was performed both for two- and four-components solutions. Test-retest reliability was assessed by computing Spearman's  $r$  for each subscale separately. Internal consistency was assessed by computing Cronbach's  $\alpha$  coefficients (1951) for each subscale in each sample and also inter-subscales Spearman's correlations were computed. Concurrent validity was evaluated separately for each sample, by correlating each subscale with TEMPS-M depressive, cyclothymic, hyperthymic, irritable and anxious temperament scores (Erfurth et al., 2005) using the Spearman's  $r$ . Finally, age and gender differences among the three samples were assessed using ANOVA and chi-squared test, respectively. Given the significant differences in the former variables, subscales scores were compared using three-way ANOVA controlling for age and gender, to evaluate discriminant validity. Tukey-Kramer post-hoc tests were run for each ANOVA. Alpha level of significance was set at  $p < 0.05$ .

## **Results**

### **Items removal**

40 items out of the original 60 were retained. Among the 20 items deleted, two (items 51 and 57) showed inter-item correlations with  $r > 0.8$  (respectively with items 47 and 56), eight (items 11, 12, 13, 15, 24, 26, 31, 41) had no more than 10% of correlations (6) with  $r > 0.3$ , six (items 8, 16, 17, 23, 29, 47) loaded less than 0.5 on each component and four (items 20, 25, 32, 42) showed item-total subscale score correlation with  $r < 0.5$ .

### **Subscale construction**

First, the four-component solution was evaluated (**table 1**). The first component, with an eigenvalue of 11.80, accounted for 29.5% of the variance. 12 items (46, 48, 49, 50, 52, 53, 54, 55, 56, 58, 59, 60) showed loadings greater than 0.5 only on this component and were all originally intended to measure affective instability. Ten items (18, 19, 27, 28, 30, 33, 36, 37, 38, 40) loaded more than 0.5 only on the second component, which accounted for 12.8% of the variance and showed an eigenvalue of 5.11. Half of the items were originally intended to measure positive polarity, with the other half

measuring emotional intensity related to positive stimuli. The second component could be thus interpreted as representing positive emotionality. Also, ten items (7, 9, 10, 22, 34, 35, 39, 43, 44, 45) loaded more than 0.5 only on the third component, which accounted for 6.3% of the variance and showed an eigenvalue of 2.52. Six items were mainly originally intended to measure negative polarity, three were related to reactivity and one to intensity of emotional responses to negative stimuli. The third component could be thus interpreted as representing negative emotionality. The latter eight items (1, 2, 3, 4, 5, 6, 14, 21) loaded more than 0.5 only on the fourth component, which accounted for 5.4% of the variance and showed an eigenvalue of 2.16. Seven items originally assessed reactivity and one item intensity, and all were related to impulsive reactions to negative and frustrating stimuli. The fourth component could be thus interpreted as representing emotional impulsivity.

Interestingly, items from the affective instability, negative emotionality and emotional impulsivity components loaded more than 0.4 only on the first component of the two-component solution, with the positive emotionality component remaining unchanged (**table 2**). This component could, thus, be interpreted as generally representing negative emotion dysregulation. In summary, items were subdivided in four subscales respectively measuring affective instability, negative emotionality, emotional impulsivity and positive emotionality. The first three subscales could be summed to form a total negative emotion dysregulation (NED) score.

Affective instability, negative emotionality and emotional impulsivity scores were all significantly highly positively correlated in each sample (**table 3**) with  $r$  comprised between 0.48 for the correlation between negative emotionality and emotional impulsivity in the general sample and 0.64 for the correlation between affective instability and emotional impulsivity in the cyclothymia sample. Positive emotionality subscale was significantly correlated with affective instability and emotional impulsivity in each sample, with  $r$  comprised between 0.27 for the correlation with affective instability in the general sample and 0.38 for the correlation with both affective instability and emotional impulsivity in the ADHD sample. The correlation between positive and negative emotionality subscales was significant only in the cyclothymia sample with  $r = 0.24$ .

## **Reliability**

Test-retest reliability was significant for each subscale and for NED score ( $p < 0.001$ ) with Spearman's  $r$  coefficients ranging between 0.71 for the emotional impulsivity subscale and 0.84 for the

affective instability subscale and the NED scores (**table 4**). Cronbach's  $\alpha$  coefficients were generally high ( $> 0.85$ ) in each sample (**table 4**), except for negative emotionality subscale in the ADHD sample, whose reliability was still sufficiently high ( $\alpha = 0.72$ ).

## **Concurrent validity**

Three items from TEMPS-M cyclothymic factor showed high overlap in meaning and wording with three items from RIPoSt-40 affective instability subscale and negative emotion dysregulation score and were thus removed prior to conducting those correlations. Correlations between each subscale and TEMPS-M factors were as expected (**table 5**). In each sample, affective instability was highly positively correlated with cyclothymic temperament ( $r > 0.7$ ), negative emotionality was mostly positively correlated with depressive ( $r > 0.6$ ) and anxious temperaments ( $r > 0.55$  in clinical samples) and negatively correlated with hyperthymic temperament ( $r < -0.25$ ), emotional impulsivity was mostly correlated with irritable temperament ( $r > 0.7$  in clinical samples). Positive emotionality pattern of correlations was not consistent across samples, except for depressive temperament which was always not significantly correlated. In the non-clinical and the ADHD groups, the strongest correlation ( $r = 0.41$ ) was observed, as expected, with, the hyperthymic temperament. Conversely among cyclothymic patients, the strongest, though weak, correlation ( $r = 0.32$ ) was observed with cyclothymic temperament and the correlation with anxious temperament was not significant. In the ADHD sample, instead, the second strongest correlation was found with anxious temperament ( $r = 0.41$ ), followed in order by irritable and cyclothymic temperament. NED score was strongly correlated with depressive, cyclothymic, irritable and anxious temperament ( $r > 0.55$  in the clinical samples) and not significantly with hyperthymic factor.

## **Discriminant validity**

As the cyclothymia sample compared with both the general and the ADHD samples showed a significantly higher mean age and each sample differed from each other in terms of gender distribution (**table 6**), differences in subscales' scores among the three groups were controlled for age and gender. Clinical samples showed significantly greater affective instability, negative emotionality, emotional impulsivity and negative emotion dysregulation scores compared to the general sample. No significant differences in positive emotionality were detected (**table 6**). When not controlling for age and gender, patients with ADHD showed a significantly higher emotional impulsivity score compared to patients



with cyclothymia ( $p = 0.04$ ).

## Discussion

In the present study, we first report about the development and validation of the Reactivity, Intensity, Polarity and Stability (RIPoSt) scale, a self-report questionnaire to measure emotional dysregulation (ED) both in clinical and non-clinical samples. Items selection and subscales construction were first carried out in a non-clinical sample ( $N = 396$ ); test-retest reliability was evaluated in a non-clinical subsample ( $N = 60$ ) and internal consistency and concurrent validity were examined both in the general sample and in two clinical samples, respectively including patients with cyclothymic disorder ( $N = 120$ ) or with ADHD ( $N = 54$ ). Finally, discriminant validity was assessed comparing the three groups. Among the originally proposed 60 items, 40 ones were retained and subdivided using principal component analysis in four subscales, which all presented good test-retest reliability and internal consistency.

Affective instability subscale comprised 12 items investigating about the presence of a cyclic pattern of sudden mood shifts between positive and negative polarity, impacting on social and general functioning. A good convergent validity was demonstrated by strong positive correlations with cyclothymic temperament score measured by TEMPS-M (Erfurth et al., 2005) in each of the samples. Both cyclothymic and ADHD patients, as expected, showed higher scores in affective instability compared with the non-clinical sample.

Positive emotionality subscale comprehended 10 items evaluating the tendency to experience more often and more easily strong positive feelings, such as euphoria, joy, enthusiasm and exuberance. Positive correlations were consistently observed with hyperthymic temperament across the samples and no significant correlations with depressive temperament were found. Although no significant differences in its scores were found between the three groups, the relationships between positive emotionality and cyclothymic, irritable and anxious temperaments seem to vary across samples. Moreover, positive emotionality and affective instability resulted more strongly related in cyclothymic and ADHD subjects. This observation may be related to qualitative rather than quantitative differences in positive emotionality between clinical and non-clinical samples. Positive emotionality in cyclothymic and ADHD may be more reactive and transitory or may show different behavioural

correlates which may have passed unnoticed. Alternatively, variations in frequency and intensity of positive emotionality may be more difficult to be detected than those in negative emotionality and may require larger sample size to obtain statistically significant results. Further studies are thus needed to elucidate or eventually discard positive emotionality subscale clinical utility. Anyway, to the best of our knowledge, this is the first time that an effort is made to detect difficulties with positive emotion regulation in clinical samples.

Negative emotionality subscale included 10 items evaluating the propensity for experiencing more often and more easily strong negative feelings, such as sadness, worry, anxiety and dissatisfaction. Negative emotionality highly overlaps with neuroticism (McCrae and John, 1992), depressive and anxious temperament (Akiskal et al., 1998; Hantouche and Akiskal, 2005) constructs. Accordingly, convergent validity was demonstrated by the positive correlations with depressive and anxious temperament scores, and the negative correlations with hyperthymic temperament in each of the samples. Compared with the non-clinical sample, both cyclothymic and ADHD patients showed higher scores in negative emotionality.

Emotional impulsivity subscale consisted of 8 items estimating the over-reactivity of a subject to negative or frustrating stimuli and the inability to inhibit impulsive behavioural responses. Also the definition proposed by Faraone et al. (2018) in a review of ED studies in ADHD, fitted our items content: “emotional impulsivity is shown as fast-rising, with unusually high reactivity in emotionally evocative situations, which leads to quicker-than-typical emotional responses to provoking stimuli”. Convergent validity was demonstrated by the positive correlations with irritable temperament, and interestingly, when not correcting for gender and age, ADHD patients showed significantly increased emotional impulsivity scores compared to both controls and cyclothymic patients. Otherwise, both the clinical samples scored higher than the non-clinical one. These observations are consistent with the view that the failure of inhibitory emotional control may be more related to the hyperactive-impulsive dimension rather than to the cyclothymic mood instability.

Finally, a second-order scale formed by the 30 items comprising affective instability, negative emotionality and emotional impulsivity subscales was identified as generally representing negative emotion dysregulation (NED) and showed strong correlations with depressive, cyclothymic, irritable and anxious temperament and no significant correlations with the hyperthymic temperament. Its score was significantly increased in clinical samples compared with the general population. Internal

consistency for the whole scale was the highest in each of the sample. Accordingly, this 30-items scale could represent a shorter instrument of evaluation which provides both a total score for NED and three different subscales representing its facets identified by Marwaha et al. (2013). Indeed, affective instability, negative emotionality and emotional impulsivity respectively reflect mood oscillation, negative affect intensity and difficulty to regulate emotional and behavioural responses.

From a methodological standpoint, three major limitations should be acknowledged. First of all, the use of a web-based survey to recruit our non-clinical sample could have biased our results in different ways. More than a half of responders were in fact students and almost the entire sample consisted of people with a high educational qualification (at least high school diploma). Therefore, generalizability of our results to less educated populations remain uncertain. Moreover, two thirds of the subjects recruited were less than 30 years old, possibly limiting generalizability to older samples. However, as personality and neurodevelopmental disorders onset, by definition, in the developmental period, the high proportion of recruited youths also represents a point of strength in our study. A second limitation comes from the exclusion of individuals from the non-clinical sample based on their positive report on previous history of psychiatric diagnoses. On one hand, this approach cannot guarantee that no subject among the included satisfies criteria for a psychiatric diagnosis. Anyway, the inclusion of possibly undiagnosed patients approximates better the real-world scenario and has not prevented us to identify significant differences in ED from the clinical samples. Finally, the third limitation also deals with the real-world clinical context. While both ADHD in adults and cyclothymia are frequently associated with comorbidities, mainly mood, anxiety, impulse control disorders (Katzman et al., 2017; Perugi et al., 2017), we did not exclude patients from the clinical samples due to these psychiatric comorbidity. However, this choice seems justified since ADHD and cyclothymic disorder respectively represent the primary neurodevelopmental and temperamental ground on which other disorders take form. Furthermore, the exclusion of patients due to mood and anxiety disorders, for example, could have deprived our samples from the more emotionally dysregulated patients. Future studies will be carried out in order to elucidate the relationships between ED and comorbidity in both the samples.

In conclusion, our findings support the construct, concurrent, and discriminant validity of a 40-items version of the Reactivity, Intensity, Polarity and Stability (RIPoSt-40) scale to assess ED. Moreover, in our study, RIPoSt-40 subscales have proved good test-retest reliability and high internal consistency in both clinical and non-clinical samples. Importantly, both a general score for negative

emotion regulation and four subscales for ED facets are provided. Further research is warranted to evaluate the specificity of each facet to different disorders and the influence of each measure on illness course and functional impairment.

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