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Identifying the transdiagnostic and unique domains of emotion regulation difficulties in subclinical conditions of anxiety and co-occurring anxiety-depression

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Abstract
It is well documented that emotion regulation difficulties are linked with various forms of psychopathology including anxiety and depression but the literature is still inconclusive regarding whether emotion regulation difficulties are transdiagnostic or pathology-specific. We speculate that certain types of emotion regulation difficulties may be transdiagnostic while others may show specificity. The present study attempts to empirically validate this speculation and tries to explore the common (transdiagnostic) and unique domains of emotion regulation difficulties associated with psychometrically identified subclinical groups of anxious and anxious-depressed individuals. University and college students ($N = 192$) were assessed on self-report measures of emotion regulation difficulties, positive-negative affect, depression, and trait and free-floating anxiety and classified into anxious, anxious-depressed, and normal groups based on the results of cluster analysis. Both subclinical groups reported overall higher levels of emotion regulation difficulties than normals, with anxious-depressed group showing more difficulties than anxious group. While difficulty engaging in goal-directed behaviour, lack of emotional awareness and emotional clarity were common across anxious and anxious-depressed groups, the anxious-depressed group showed a unique profile of emotion regulation difficulties characterized by non-acceptance of emotional response, impulse control difficulties, and limited access to emotion regulation strategies. Findings of discriminant function analysis revealed that while anxious-depressed group was characterised by difficulties in regulating emotions, the anxious group presented difficulties in emotional insight. The findings highlight the possible role of both unique and transdiagnostic components of emotion regulation difficulties in the development/maintenance of psychopathologies and have significant implications for predicting future development and psychotherapeutic management of these disorders.

Keywords Emotional regulation · Anxiety · Depression · Transdiagnostic · Positive affect · Negative affect

Introduction

Emotion regulation difficulties are considered central to various types of psychopathological conditions (see Kring and Sloan 2010). Psychological disorders such as social anxiety disorder, generalized anxiety disorder, substance use, eating disorders, depression, borderline personality disorder etc. have been found to be associated with difficulties in regulating emotions (Mennin et al. 2007; Berking and Wupperman 2012; Aldao 2012; Aldao et al. 2010; Carpenter and Trull 2013; Aldao and Dixon-Gordon 2014; Gratz et al. 2015; Lavender et al. 2015). However, it is not yet clear whether various forms of emotion regulation difficulties are common (i.e., are transdiagnostic in nature) to various types of psychopathologies or certain types of emotion regulation difficulties are uniquely linked to a given disorder. Empirical evidences are available to support both the transdiagnostic view (e.g., Campbell-Sills et al. 2006) as well as the pathology-specific nature of emotion regulation difficulties (e.g., Kring and Werner 2004). In the presence of the said contradictory viewpoints, we propose an alternative viewpoint that makes a compromise between the two. We speculated that emotion regulation difficulties may neither be transdiagnostic nor unique in absolute sense. Some components of emotion regulation difficulties may be common or transdiagnostic while other

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domains may show specificity or uniqueness. We aim to empirically test this speculation by exploring the unique and transdiagnostic components of emotion regulation difficulties underlying the sub-clinical conditions of anxiety and mixed anxiety-depression. We limited our study to the sub-clinical conditions of anxiety and mixed anxiety-depression because the emotion regulation difficulties are considered central and potential etiological contributors to depressive disorders (e.g., Joormann and Stanton 2016) as well as anxiety disorders (e.g., Mathews et al. 2014).

The construct of emotion regulation has been conceptualized in different ways in the existing literature (see Sloan et al. 2017) and still newer views of conceptualizing emotion regulation are emerging. Researchers like Gross and Thompson (2007) opined that emotion regulation involves not only the downregulation of negative emotions but also the upregulation of positive emotions. These researchers also believed that emotion regulation strategies cannot be classified as good or bad, but the same strategy may be good or appropriate in one situation and bad or inappropriate in another. Following the broad classification of Sloan and colleagues (Sloan et al. 2017), who view emotion regulation as a process and as a deficit, the present study considers emotion regulation representing a broader or overall deficit in emotional functioning. Among such emotional deficit models, the present study adopts the framework proposed by Gratz and Roemer (2004).

Gratz and Roemer (2004) viewed emotion regulation as involving not only the regulation of emotions but also the regulation of behaviour in situations of experiencing extreme emotions. Since emotion regulation is contextual, both the situational demands as well as individual goals need to be taken into account when considering emotion regulation (Cole et al. 1994; Thompson 1994). Gratz and Roemer (2004) believed that emotion regulation involves a flexible use of emotion regulation strategies and aims at moderating rather than complete elimination of emotions. Based on the above conceptualisation, Gratz and Roemer (2004) presented emotion regulation as a multidimensional and integrative construct that involves adaptive ways of emotional responding, such as accepting emotions, experiencing and being able to differentiate the full range of emotions, and controlling behaviour during a state of emotional distress.

According to Gratz and Roemer (2004) emotion regulation includes the awareness and understanding of emotions, acceptance of emotional experiences, the ability to engage in goal-directed behaviours and control impulsive behaviours while facing negative emotions, and use of strategies to modulate emotions in accordance with the situational demands. This framework proposes that lack or difficulties in any of these components of emotion regulation may result in emotion dysregulation. Based on the aforesaid components of emotion regulation, Gratz and Roemer (2004) operationalized the construct of emotion regulation difficulties as consisting of six dimensions: impulse control difficulties (Impulse), lack of emotional awareness (Awareness), lack of emotional clarity (Clarity), difficulty engaging in goal-directed behaviour (Goals), limited access to emotion regulation strategies (Strategies), and non-acceptance of emotions (Non-Acceptance).

Based on the said model, several studies have reported a relationship between emotion regulation difficulties and symptoms of various pathologies, such as generalized anxiety disorder (Mennin et al. 2002), post-traumatic stress disorder (Ehring and Quack 2010), borderline personality disorder (Gratz et al. 2006), substance use disorders (Fox et al. 2007; Gratz and Tull 2010), etc. Emotion regulation difficulties are though considered central to various forms of psychopathology including depression and anxiety disorders (Martin and Dahlen 2005; Garnefski and Kraaij 2006, 2012; Schroevers et al. 2008; Nolen-Hoeksema 1991, 2008), there is an outstanding question that remains. It is not much clear whether various types of psychopathological conditions have a similar or common set of emotion regulation difficulties or whether different disorders are linked with specific emotion regulation difficulties. This question becomes important in the light of recent observations that emotion regulation difficulties are transdiagnostic in nature (e.g., Sloan et al. 2017). Given the high rates of co-morbidity (Kessler et al. 2005), some researchers believe that emotion regulation difficulties transcend the boundaries of psychopathological disorders. Such researchers consider emotion regulation to be a transdiagnostic mechanism common to all disorders (Norton and Paulus 2016; Barlow et al. 2013; McEvoy et al. 2009; Harvey et al. 2004). In case of anxiety and depressive disorders also, similarities in emotion regulation difficulties have been noted. For instance, researchers have noted that avoidance and suppression of emotions are the two commonly used emotion regulation strategies in anxiety disorder and depression (e.g., Campbell-Sills et al. 2006).

Contrary to this transdiagnostic view, some researchers believe that emotion regulation is a multifaceted construct and different psychological disorders may be associated with difficulties in some unique aspect of emotion regulation (Kring and Werner 2004). In a recent review, Sheppes and colleagues (Sheppes et al. 2015) speculated that difficulties at any stage of emotion regulation may lead to psychopathology and different forms of psychopathology may be associated with difficulties at different stages. Using the emotion regulation model of Gratz and Roemer (2004) researchers have obtained empirical support for the notion that emotion regulation difficulties may be unique to various types of psychopathologies. For instance, a recent study reported that specific characteristics of social anxiety are associated with distinct deficits in emotion regulation (Rusch et al. 2012). The study showed that while performance anxiety in social situations is predicted by emotion regulation difficulty of impulse-control and non-

acceptance, anxiety of interaction in social situations is predicted by limited access to emotion regulation strategies, non-acceptance, and impulse-control difficulties.

Given the contradiction in findings, we hypothesize that a compromise between the two views (transdiagnostic versus unique) may better explain the nature of emotion regulation difficulties underlying psychopathology in general and depression and mixed anxiety-depression in particular. We speculated that emotion regulation difficulties are neither completely transdiagnostic in nature nor absolutely unique to specific psychopathologies. Rather, some forms of emotion regulation difficulties may be transdiagnostic while others may be unique to a particular disorder. Based on the above speculation it was hypothesised that certain emotion regulation difficulties would be common to both the sub-clinical anxiety and mixed anxiety-depression groups while others would be uniquely associated with each of these two conditions. Though very little has been done to empirically test such speculation, findings of some studies do provide some preliminary support for it. For instance, a study based on Gratz and Roemer's model reported that some domains of emotion regulation, such as Non-acceptance, Clarity, and Awareness, were less compromised in euthymic bipolar disorder than in unipolar depression and anxiety. On the other hand, some domains, such as Goals, Impulse, and Strategies, showed deficits in all the three disorders (Becerra et al. 2013).

Based on the aforesaid preliminary empirical evidences and theoretical speculation, the present study aims to explore the unique and/or transdiagnostic components of emotion regulation difficulties associated with sub-clinical anxiety and anxiety co-occurring with depression. More specifically, it attempts to explore which components of emotion regulation difficulties are unique to anxiety and co-occurring anxiety-depression and which domains form the transdiagnostic component of these two sub-clinical conditions. Such an investigation will help in facilitating differential diagnosis of anxiety and mixed anxiety-depression. To have better differentiation of sub-clinical groups of anxiety and mixed anxiety-depression, we followed the approach suggested by the tripartite model of Clark and Watson (1991) and included measures of positive and negative affect in addition to measures of anxiety and depression. According to tripartite model, despite the commonality of negative affect in both anxiety and depressive disorder, depression can be differentiated on the grounds of low positive affect present in depression but absent in anxiety. This model is supported by the empirical observations that enhanced negative affect and reduced positive affect play a role in various affective disorders including depression (Raes et al. 2012; Nolen-Hoeksema et al. 2008; Brown et al. 1998).

The study is though guided by the theoretical framework proposed by Sheppes and colleagues (Sheppes et al. 2015), we use the emotion regulation model of Gratz and Roemer (2004) as it is one of the most comprehensive and validated model of emotion regulation difficulties that has been widely used in psychopathology research (e.g., Bjureberg et al. 2016; Weiss et al. 2015). Further, unlike earlier studies that have used clinical samples of anxiety and depression, the present study utilizes a psychometric approach to study anxiety and depression. The psychometric approach of assessing anxiety and depression assumes a continuous rather than categorical view of psychopathology and aims to assess the magnitude or severity of the manifestation of symptoms of these psychopathological conditions. Further, unlike the clinical approach that aims to classify psychopathological conditions using a polythetic diagnostic criteria, the psychometric approach places individuals on a continuum of psychopathology (anxiety and depression in the present case) ranging from no/low to very high/severe.

The psychometric approach helps to assess varying levels of anxiety and depression that are assumed to lie in between the clinically manifest severe anxiety and depression and the strong anxious and depressed mood that is not yet in the diagnosable range. Moreover, the classification of individuals in this approach is based on pre-validated cut-off scores and not on the presence of some pre-specified cluster of symptoms (as done in clinical approach). The psychometric approach of assessing anxiety and depression reduces the chance of confounding by other relevant variables that are often present in clinical approach such as the heterogeneity of the clinical condition, and comorbidity of disorders other than anxiety and depression. The use of psychometric approach would provide important insights into the possible role of emotion dysregulation in the causation of anxiety and co-occurring anxiety-depression as well as help predict the likelihood of later development of these conditions among normal at-risk individuals, minimising the chances of their progression to full-blown disorder.

Method

Participants

One hundred ninety-two students of Banaras Hindu University, India, pursuing either their undergraduate or post-graduate degrees (94 females and 98 males) who volunteered themselves were initially recruited for this study using the convenience sampling. All the participants lied in the age range of 18 to 30 years, were Asian Indian in ethnicity, and belonged to the middle-class socio-economic status. The socio-economic status of the participants was determined by their monthly per capita income, following the criteria of socio-economic classification in India given by BG Prasad (Khairnar et al. 2016). The mean age of the overall sample was 21.72 years (SD 2.95 years) whereas the mean ages of the

male and the female participants were 21.30 years (SD = 2.92 years) and 22.16 years (SD = 2.91 years), respectively. Around 58% participants were pursuing their undergraduate degree and the remaining were either pursuing or had obtained their postgraduate degrees. Such participants who reported past or present history of a mental disorder (including anxiety and depression), neurological disorder, head injury/trauma or substance abuse were excluded from the present study. Data from such participants who scored very high on the Beck Depression Inventory (BDI score > 36) or on the self-report measures of Trait and Free-floating anxiety (score > 90) were removed from the final dataset. On the BDI, a score above 36 indicates the tendency of individuals from the normal population to fake bad. The same is true for a score greater than 90 on Trait and Free-floating anxiety measures used in the present study. Therefore, the data from such participants were excluded and the final analysis was done on a sample of 177 participants (87 females and 90 males). Though the sample size reduced from 192 to 177 after removing the said outliers, the findings of power analysis suggest that the sample size is adequate. Power analysis with an alpha value of 0.05, a medium effect size of 0.30 and a power of 0.95 for one-way ANOVA (fixed effects) to compare the three subgroups of participants (based on cluster-analysis; see Results) revealed that a sample size of 177 was sufficient to achieve the said power. The generally recommended sample size for cluster analysis is 2^m, where m stands for the number of clustering variables (Formann 1984). Thus, for the present study the recommended sample size using this criteria would be $2^5 = 32$. Since our sample size is well above 32, conducting cluster analysis on a sample of 177 is justified.

Measures

Hindi Adaptation of the Difficulties in Emotion Regulation Scale (DERS)

The Difficulties in Emotion Regulation Scale (DERS; Gratz and Roemer 2004) is a 36-item self-report tool developed to assess clinically relevant difficulties in emotion regulation. The DERS is comprised of six factors namely non-acceptance of emotional responses, difficulty engaging in goal-directed behaviour, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity. On each of the 36 items of the scale, participants are asked to rate their responses using a five-point Likert scale [ranging from 1 (almost never) to 5 (almost always)] to indicate how often the items apply to them. The Hindi adaptation of the DERS (referred to as DERS-H) developed by Pandey et al. (2011) was used in the present study. The DERS-H is a psychometrically reliable and valid scale. Cronbach's alpha coefficient for the total DERS-25-H is .909 which demonstrates highly satisfactory internal consistency. The internal consistencies of all the five dimensions of the DERS-25-H were also found to be psychometrically satisfactory (Cronbach's alpha ≥ .80). However, the 'lack of emotional awareness' subscale showed somewhat lower reliability (Cronbach's alpha = .606). Higher scores on this scale indicate greater difficulties of emotion regulation.

Positive and Negative Affect Schedule-Hindi Version

The Positive and Negative Affect Schedule-Hindi (PANAS-H; Pandey and Srivastava 2008) was used to assess the positive and negative affective experience of the participants. It is an Indian (Hindi) adaption of the 20-item Positive and Negative Affect Schedule (PANAS; Watson et al. 1988). Positive affect (PA) reflects the pleasurable engagement and subjective experience of happiness whereas negative affect (NA) subscale measures the level of subjective distress and disengagement. The PANAS-H consists of 10 positive and 10 negative mood adjectives in Hindi and the respondents are asked to indicate [on a 5-point scale ranging from 1 (a little bit or never) to 5 (nearly always)] how frequently they experience these moods. This measure was used to assess the long-term or general affectivity of the participants. The range of possible scores for both PA and NA is 10–50. Higher scores indicate higher levels of the particular affect. The PANAS-H has been found to be a reliable (internal consistency for PA = .804, and NA = .776) and valid (see Pandey and Srivastava 2008) self-report measure.

The Self-Evaluation Scale

The Self-Evaluation Scale (Tripathi and Rastogi 1986) consists of three subscales which assess state, trait and free-floating anxiety. However, in the present study only trait and free-floating anxiety subscales (part 2 and 3 of the scale) were used since the aim of the study was to assess the dispositional anxiety and not contextual or situation-specific (state) anxiety. The trait anxiety subscale comprises of 28 items (e.g., *I always try to avoid facing difficulties* (Item 18), *I often feel lost, even on happy or festive occasions* (Item 27), etc.), whereas the free-floating anxiety subscale consists of 24 items (e.g., *My attention is readily drawn towards the sad or negative aspects of anything* (Item 6), *I am always apprehensive that I might get into some problem or danger* (Item 19), etc.). Both subscales utilise a five-point rating scale ranging from 1 (seldom) to 5 (always). The alpha coefficients of trait anxiety and free-floating anxiety scales were found to be highly satisfactory, i.e. 0.869 and 0.892 for trait anxiety and free-floating anxiety, respectively.

Beck Depression Inventory

The Beck Depression Inventory (BDI; Beck et al. 1961) was used in the present study to assess the level of depression among the participants. The BDI is a self-report measure that indicates both behavioural manifestations and depth of depression. It consists of twenty one clinically derived "Symptoms attitude category" judged to be the characteristics of depressive patients (for instances, pessimism, self-dislike, fatigability). The symptoms categories used in the BDI are as follows: Mood, Pessimism, Sense of failure, Lack of satisfaction, Guilt feeling, Sense of punishment, Self-hate, Self-accusations, Self-punitive wishes, Crying spells, Irritability, Social withdrawal, Indecisiveness, Body image, Work inhibition, Sleep disturbances, Fatigability, Loss of appetite, Weight loss, Somatic preoccupation and Loss of libido. Each category represents a characteristic manifestation of depression. The respondents rate the presence of the aforesaid symptoms using a series of four-point ordinal scales (ranging from 0 to 3). Individual category scores are summed to produce a total BDI score. It assesses the cognitive, affective, and vegetative symptoms of depression. Higher scores indicate greater level of depression. The BDI has a high internal consistency with mean consistency of .86 and overall test consistency ranging from .73 to .92 (Beck et al. 1988).

Procedure

Participants were called into the test session and seated comfortably in a chair. They were asked to relax for 5 min during which the basic information regarding the study was given. After being provided the necessary information about the study, the participants were required to provide their written informed consent. The participants were then asked to fill up the demographic datasheet. Following this, the questionnaire measures for assessing anxiety, depression, positive and negative affectivity, and emotion regulation were administered to the participants one by one as per the standard administration procedure of each measure. When the participants handed over the filled-in questionnaires, the test administrator thoroughly checked them for any missing responses and ensured from the participants if they had deliberately chosen to not answer a particular question or item. In case the participants reported an oversight, they were requested to provide the answers to such items. None of the participants reported wilful non-answering of the questions and the non-responding because of oversight was rectified by the participants on the request of the researcher. This resulted in a dataset without any item level missing data. After collecting all the filled-in questionnaires and demographic sheet, the participants were debriefed about the study and the questionnaire measures were scored and analysed as per the standard procedure laid out for each measure. The participants who scored very high on the measures of depression and/or anxiety were advised to consult a professional clinical psychologist for further assessment and help and, if requested, proper referrals were made.

The obtained data was analysed using IBM-SPSS (Version 19). Cluster analysis was conducted to generate subgroups of participants based on their scores on trait anxiety, free-floating anxiety, depression, and positive and negative affect. The analysis was conducted using k-mean non-hierarchical clustering method following the commonly used standard procedure (Hair et al. 1998; Hair and Black 2000; Gore 2000; Tan et al. 2006). The number of clusters was inferred from the convergence pattern of iteration history of change in cluster centre (Hair et al. 1998). Before conducting the cluster analysis, trait anxiety, free-floating anxiety, depression, and positive and negative affective scores were transformed into z-scores. To check the steadiness of the cluster solutions, the consistent convergence pattern of iteration scores of each cluster was checked. After the cluster formation, between-cluster differences on domains of the emotion regulation difficulties were compared using two-way analysis of variance (ANOVA) with repeated measure on the last factor. Bonferroni post-hoc tests were conducted for all the ANOVAs that were significant at .05 level of probability. A discriminant function analysis was also carried out to identify the discriminant functions that differentiate the three subgroups based on the findings of cluster analysis. The classification summary based on discriminant function analysis was also obtained.

Before conducting the said statistical analyses, it was ascertained that the data meet the normality assumption. Since the two-way repeated measures ANOVA and multiple discriminant function analyses both require multivariate normality, the same was tested using the graphical method of Chi-square versus Mahalanobis distance plot (see Arifin 2015). The Chi-square versus Mahalanobis distance plot revealed that all the Chi-square values across Mahalanobis distances aligned closely to the diagonal line, which suggest that the data meets the assumption of multivariate normality. The data was also found to have the skewness and kurtosis values of the six emotion regulation difficulties well within the recommended limits of ±2 for conducting ANOVA (Trochim and Donnelly 2006; Gravetter and Wallnau 2014). In fact, the skewness and kurtosis values for most of the variables were below ±0.5 with one or two values close to or slightly higher than one. Thus, the data meets the assumption of univariate normal distribution also and accordingly ANOVA may be conducted without compromising the robustness of the findings.

The requirement of homogeneity of variance in the present dataset is also met as per the recent recommendations (Blanca et al. 2018). The variance ratio of 1.56 was within the acceptable limit suggesting that variance across groups is sufficiently

homogenous for conducting ANOVA. The coefficient of sample size variation (.46) and the ratio of the largest to the smallest sample size (2.82) were also within the acceptable limits (see Blanca et al. 2018) suggesting that despite inequality of sample sizes in the present study, the F-test sufficiently controls for the type-I error rate. The absence of pairing between group size and group variance (r = 0) provided further support that robustness of the present findings (based on F-test) are less likely to be influenced by variations in group variance and sample size (Blanca et al. 2018). Further, the data was also checked for multivariate outliers using the Mahalanobis distance and the analysis revealed four multivariate outliers. Since the pattern of findings remained same before and after removing the said four outliers, these outliers were not removed in favour of larger sample size and more reliable statistical findings.

Results

Using the scores on trait anxiety, free-floating anxiety, depression, and positive and negative affect a k-means cluster analysis was carried out and based on the convergence pattern of iteration history of change in cluster centre, finally the three cluster solution was retained (Fig. 1). As per the criterion prescribed by Hair et al. (1998), individuals with z-scores below −0.5 were categorised as having low levels of the given traits, those with z-scores between −0.5 and 0.5 were classified as having moderate levels of the given traits while those with z-scores above 0.5 were classified as having high levels of the given traits.

It is evident from Fig. 1 that cluster-I may be considered as depressed group with co-occurring anxiety inasmuch as this group has scored higher (z > .5) on depression, negative affect as well as on both components of anxiety (trait and free-floating) in addition to showing low level of positive affect. This group comprised of 16% ($N = 28$) of the individuals. The second cluster consisted of 40% of the participants ($N = 70$) and was labelled as group of normal healthy individuals as the participants of this cluster scored high on positive affect and low on BDI, negative affect, as well as trait and free-floating anxiety. The third cluster, comprising of 44% of the participants ($N = 79$), was labelled as the anxious cluster since it comprised of the participants who scored higher on both trait anxiety and free-floating anxiety but scored moderately low on BDI, negative affect and positive affect.

In order to explore the differential profile of emotion regulation difficulties of the three groups, a 3 (group: anxious-depressed, normal, and anxious) × 6 (domains of emotion regulation difficulties) repeated-measures ANOVA with repeated measure on the last factor was conducted. To make the different sub-scale scores of the DERS comparable, the obtained scores were converted to percentages using the formula: (Obtained score on the sub-scale / Total possible score on the sub-scale) ×100. Results of the repeated-measures ANOVA revealed that the main effect of types of emotion regulation difficulties was significant [$F(5, 870) = 34.03$, $p < .001$].

Post-hoc comparison of means (Bonferroni, see last column of Table 1) revealed that participants, irrespective of their group membership, showed significantly greater lack of emotional awareness compared to impulse control difficulties, limited access to emotion regulation strategies as well as lack of emotional clarity (all $p < .05$). However, this emotion regulation difficulty (lack of emotional awareness) did not differ significantly from the rest of the domains of emotion regulation difficulty. Similarly, participants showed significantly greater difficulty in engaging in goal-directed behaviour compared to the remaining emotion regulation difficulties viz., non-acceptance of emotional responses, impulse control difficulties, lack of emotional awareness, limited access to emotions, and lack of emotional clarity (all $p < .05$). They also

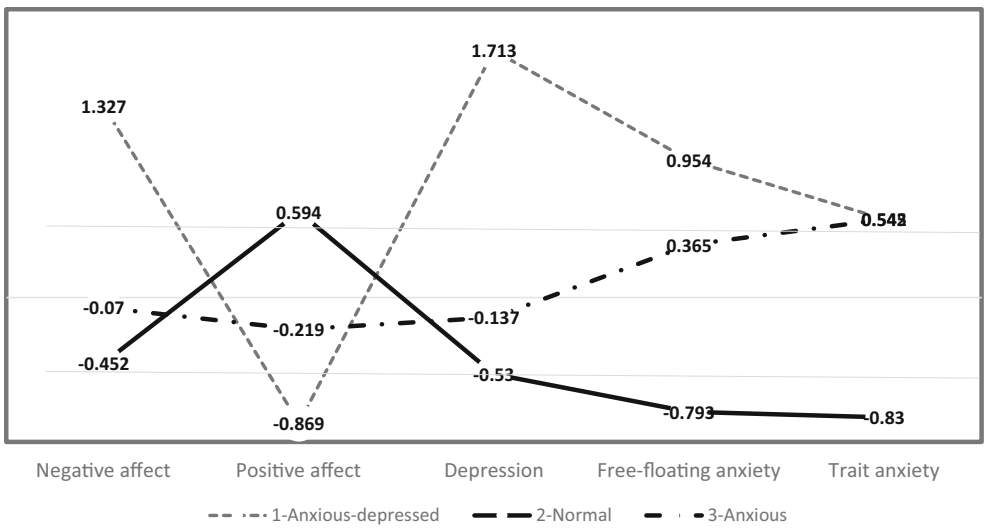

Fig. 1 Pattern of depression, positive/negative affectivity, and anxiety (plotted using z-score) among the three clusters

Table 1 Cluster-wise mean percentage scores of the six domains of DERS

Domains of DERS	Scores M (SD)				Significant mean differences between clusters		
	Cluster 1 (anxious-depressed) $N = 28$ Mean (SD)	Cluster 2 (normals) $N = 70$ Mean (SD)	Cluster 3 (anxious) $N = 79$ Mean (SD)	Total	Cluster 1 - Cluster 2	Cluster 2 - Cluster 3	Cluster 1 - Cluster 3
Non-acceptance of emotional responses	55.95 (14.50)	40.43 (14.52)	41.31 (14.51)	45.90 (16.11)	4.657***	−.264	4.393***
Difficulty engaging in goal-directed behaviour	62.86 (14.77)	51.89 (14.78)	55.59 (14.77)	56.78 (16.40)	2.743***	−.927	1.816*
Impulse control difficulties	51.07 (13.85)	38.14 (13.86)	42.41 (13.86)	43.87 (15.38)	3.879***	−1.279	2.600**
Lack of emotional awareness	51.55 (13.82)	46.14 (13.81)	54.14 (13.81)	50.61 (15.34)	1.621	−2.398***	−.776
Limited access to emotion regulation strategies	55.09 (12.75)	36.21 (12.75)	41.77 (12.75)	44.36 (14.16)	7.550***	−2.223**	5.327***
Lack of emotional clarity	45.86 (14.37)	33.49 (14.37)	41.87 (14.37)	40.41 (15.95)	3.093***	−2.097***	.996
Total	53.73 (8.78)	41.05 (8.78)	46.18 (8.78)				

*$p < .05$, **$p < .01$, ***$p < .001$

showed greater difficulties in the form of limited access to emotion regulation strategies compared to lack of emotional clarity ($p < .05$). Other domains of emotion regulation difficulties did not differ significantly. This pattern of findings suggests that people in general show greater lack of emotional awareness and difficulty engaging in goal-directed behaviour compared to rest of the domains of emotion regulation difficulties. Against the a priori power of 0.95 (with alpha 0.05 and effect size 0.30), the post-hoc power analysis revealed a power of 1.00 for the main effect of cluster as well as for the main effect of within-subjects variable of emotion regulation difficulties. The post-hoc power for the interaction effect of cluster X emotion regulation difficulties was found to be 0.99.

The main effect of group was also found significant [F (2, 174) = 21.48, $p < .001$] and the post-hoc comparison (see last row of Table 1) revealed that the anxious-depressed group showed greater emotion regulation difficulties (pooled across different types) compared to the anxious group, which in turn showed greater emotion regulation difficulties compared to normal healthy individuals. As expected, these findings suggest that individuals having co-occurring anxiety and depression demonstrate more severe difficulties of emotion regulation than those suffering from anxiety alone, while individuals suffering from anxiety are deficient in the regulation of their emotions compared to normal individuals.

The interaction effect of group (clusters) x emotion regulation difficulties was also found significant [F (10, 870) = 3.40, $p < .001$], which suggests that the profile of emotion regulation difficulties differs across the three groups. Examination of the graphical representation of the interaction effect (see Fig. 2) reveals that the anxious-depressed and the anxious groups are relatively less differentiated on difficulty engaging in goal-directed behaviour, lack of emotional awareness and lack of emotional clarity but the remaining three domains of emotion regulation difficulties appear to differentiate the said two groups.

Figure 2 further reveals that the normal group scored much below the grand mean (of emotion regulation difficulties) of all the domains of emotion regulation, except lack of emotional awareness (mean was slightly above the grand mean) and difficulty engaging in goal-directed behaviour (mean was clearly above the grand mean). On the other hand, for the anxious-depressed group the scores on all the emotion regulation difficulties were quite high and above the grand mean. The anxious group lies in between the two extremes, with scores on difficulty in four emotion regulation strategies below the grand mean and scores on difficulty engaging in goal-directed behaviour and lack of emotional awareness above the grand mean. The anxious group scored the highest among the three groups on lack of emotional awareness, though the difference of scores was significant ($p < .05$) only with the normal group.

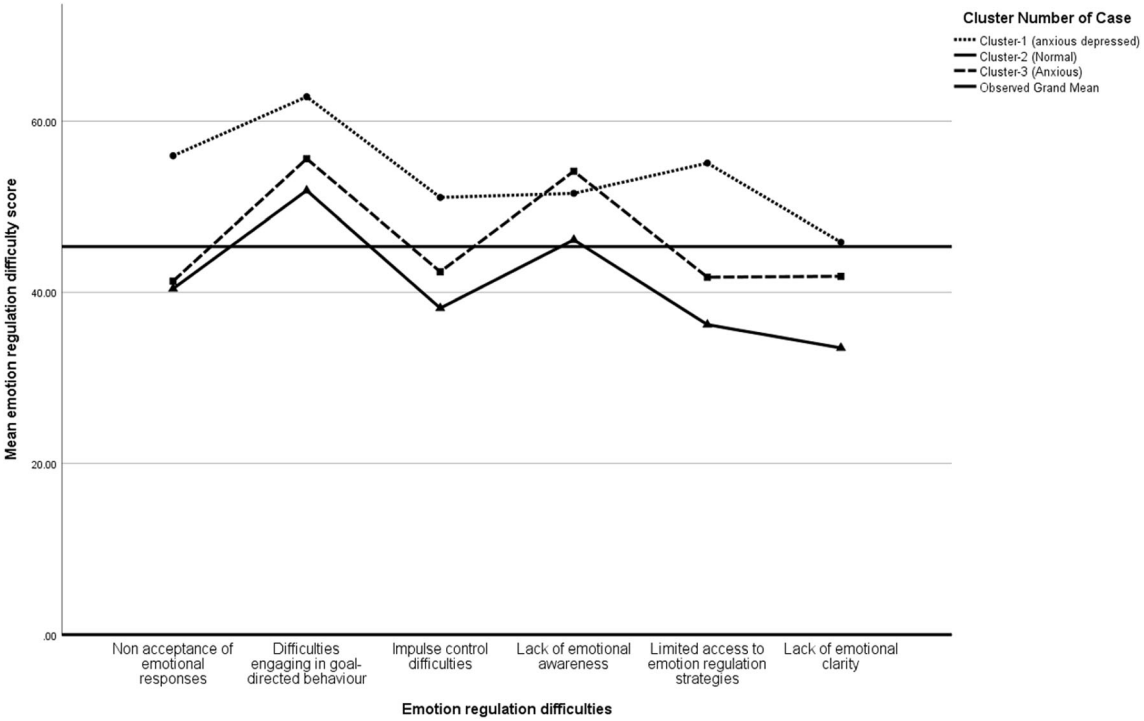

Fig. 2 Interaction of group (clusters) by type of emotion regulation difficulties

To interpret the significant interaction effect and have better insight into the differential emotion regulation profile of the three groups, a simple effects analysis was carried out in which the three groups were compared on each of the six types of emotion regulation difficulties. The findings revealed that non-acceptance of emotional response was significantly higher in the anxious–depressed group compared to both normal and anxious groups (mean difference was 15.524 and 14.644 respectively, $p < .05$). However, this emotion regulation difficulty was not evident in the anxious group as indicated by a non-significant difference on this domain between the normal and anxious groups (mean difference was 0.879, $p > .05$). Similarly, the anxious-depressed group showed significantly higher levels of impulse control difficulties compared to both normal and anxious groups (mean difference was 12.929 and 8.666 respectively, $p < .05$) but the anxious group did not show this difficulty (reflected in the non-significant difference between anxious and normal groups; mean difference = −4.262, $p > .05$). These observations suggest that higher levels of non-acceptance of emotional responses and impulse control difficulties characterize the anxious-depressed group and differentiate it from the pure anxious group.

Difficulty engaging in goal-directed behaviour was also significantly higher in the anxious-depressed group compared to normal (mean difference 10.971, $p < .05$) but not compared to anxious group (mean difference 7.262, $p > .05$). However, this emotion regulation difficulty was also not evident in the anxious group as indicated by a non-significant difference between anxious and normal groups on this emotion regulation difficulty (mean difference, 3.709, $p > .05$). The findings imply that though difficulty engaging in goal-directed behaviour appears to be a prominent emotion regulation difficulty in anxious-depressed individuals and differentiates them from normal individuals, it does not differentiate the anxious-depressed from the pure anxious group.

On the other hand, compared to anxious-depressed group the anxious group showed a differential emotion regulation profile. Simple effects analysis revealed that anxious group showed significantly higher levels of lack of emotional awareness and lack of emotional clarity compared to normal group (mean difference was 7.992 and 8.388, $p < .05$) but not compared to anxious-depressed group (mean difference was 2.587 and 3.984, $p > .05$). Further, the lack of emotional clarity was also significantly higher among anxious-depressed individuals compared to normal individuals (see Fig. 2). These findings suggest that difficulty in emotional insight (i.e. lack of emotional awareness and lack of emotional clarity) is common to both anxiety and mixed anxiety-depression but some form of difficulty in emotional insight (lack of emotional clarity in the present case) is more prominent in anxious-depressed group in comparison to normal but not anxious group.

The limited access to emotion regulation strategies was the only emotion regulation difficulty on which all the three groups differed significantly from each other. The anxious-depressed group scored significantly higher on limited access to emotion regulation strategies compared to normal (mean difference = 18.875, $p < .05$) as well as anxious group (mean

difference = 13.317, $p < .05$) and anxious group in turn scored higher than normal group (mean difference = 5.558, $p < .05$).

From the aforesaid findings it is also evident that the anxious-depressed group (compared to normal healthy individuals) showed greater non-acceptance of emotional responses, difficulty engaging in goal-directed behaviour, impulse control difficulties, limited access to emotion regulation strategies, and lack of emotional clarity but not lack of emotional awareness. Contrary to this, the pure anxious group showed greater levels of lack of emotional awareness, limited access to emotion regulation strategies and lack of emotional clarity compared to normal healthy individuals.

To sum up, the observed higher levels of non-acceptance of emotional response, impulse control difficulties, and limited access to emotion regulation strategies in anxious-depressed group compared to both anxious and normal groups suggest that these difficulties differentiate the two sub-clinical groups and may be the unique component of the anxious-depressed group. On the other hand, the observed absence of significant difference between anxious and anxious-depressed groups in terms of difficulties engaging in goal-directed behaviour, lack of emotional awareness and lack of emotional clarity suggest that these domains of emotion regulation difficulties are common to both the sub-clinical groups and thus may form the transdiagnostic components of anxiety and mixed anxiety-depression.

A closer look at the differential profile of emotion regulation difficulties of anxious-depressed and the pure anxious groups suggests a thematic similarity. The anxious group was found to have difficulties on such domains (e.g. lack of emotional awareness and lack of emotional clarity) that can be thematically summarized as difficulty in emotional insight whereas the anxious-depressed group seems to have difficulties in regulating emotions (e.g., limited access to emotion regulation strategies, impulse control difficulties, and non-acceptance of emotional responses). Examination of the inter-correlation matrix of the said six domains revealed that while lack of emotional awareness and lack of emotional clarity correlated significantly with each other (r = .339, $p < .0005$), the lack of emotional awareness was not related significantly with any other domain of emotion regulation difficulty. Similarly, the four domains summarized as 'difficulties in regulating emotions' showed a relatively stronger association among themselves as compared to their correlation with the domains of 'difficulties in emotional insight'. This pattern of correlation provides some empirical support to our theoretical clustering of various domains of emotion regulation difficulties in two groups.

Further, empirical support for the said two clusters of emotion regulation difficulties comes from the findings of the multiple discriminant function which identified two significant discriminant functions ($p < .05$). Examination of the discriminant function structure matrix (Table 2) reveals that the first function loaded significantly and positively on almost all the domains of emotion regulation difficulties except one (lack of emotional awareness) whereas the second function loaded highly and positively on only lack of emotional awareness. This pattern of loadings and the thematic similarity of the emotion regulation domains suggest that the first function may be labelled as 'Difficulties in regulating emotions' and the second function as 'Difficulties in emotional insight'.

To explore how and to what extent the said two discriminant functions differentiate the three groups a combined centroid plot was created (Fig. 3). It is evident from the plot that the first function (Difficulties in regulating emotions) differentiates anxious-depressed (centroid 1) from both anxious (centroid 3) and normal groups (centroid 2) but does not differentiate anxious and normal groups (centroid 3 and 2, respectively). On the other hand, the second function (difficulties in emotional insight) differentiates anxious individuals from both anxious-depressed and normal individuals but it does not significantly discriminate the anxious-depressed group from the group of normal healthy individuals. These observations basically substantiate the speculation based on the findings of the significant group x emotion regulation difficulties interaction effect.

The said two discriminant functions though were found to significantly differentiate the two sub-clinical groups of anxious and anxious-depressed individuals as well as the normal group, the classification accuracy was not found to be very high. These discriminant functions correctly classified 42.9% of anxious-depressed individuals, 65.7% of normals, and 64.6% of anxious individuals with an overall classification accuracy rate of 61.6%. The classification accuracy was though significantly better than that achieved by chance, the accuracy rate was not very high.

Discussion

The present study explored the differences in emotion regulation deficits between anxious and anxious-depressed individuals in comparison to normals in order to identify whether the emotion regulation difficulties involved in these disorders are transdiagnostic or unique. The three groups found on the basis of the cluster analysis of the psychometrically measured levels of anxiety, depression, and positive-negative affectivity showed some unique and some transdiagnostic emotion regulation difficulties. Significant differences were observed among the three clusters on overall emotion regulation difficulties. Evidence for a dose-response relationship was observed in emotion regulation difficulties with increase in the types of symptoms, such that individuals with co-occurring depression and anxiety showed the highest level of emotion regulation deficits, followed by those with anxiety only, with the least difficulty in emotion regulation reported by the

Table 2 Discriminant functions structure matrix based on domains of emotion regulation difficulties

Domains of emotion regulation difficulties	Discriminant functions	
	Difficulties in regulating emotions	Difficulties in emotional insight
Limited access to emotion regulation strategies	.917*	−.114
Non-Acceptance of emotional responses	.643*	−.483
Impulse control difficulties	.581*	−.020
Lack of emotional clarity	.559*	.454
Difficulty engaging in goal-directed behaviour	.463*	−.006
Lack of emotional awareness	.278	.701*

*$p < .05$

normal cluster. Findings of the present research study are consistent with the findings of Becerra et al. (2013) who stated that compared to the healthy control group, patients with depressive and anxiety disorders reported prominently higher overall difficulties in emotion regulation. The anxious-depressed group reported significantly higher difficulties of emotion regulation compared to normals for nearly all the domains of emotion regulation i.e. difficulty engaging in goal-directed behaviour (Goals), impulse control difficulties (Impulse), limited access to emotion regulation strategies (Strategies), non-acceptance of emotions (Non-Acceptance), and lack of emotional clarity (Clarity), except lack of emotional awareness (Awareness). The anxious group, however, differed from normals on fewer domains of emotion regulation, reporting significantly higher difficulties only on Strategies, Clarity, and Awareness domains of emotion regulation. This relative difference in the emotion regulation profile of the two groups is also evident in higher than grand mean score on all domains of emotion regulation in the anxious-depressed group whereas the anxious group showed higher scores than grand mean score of emotion regulation on only two domains of Goals and Awareness. Further, a comparison of the different domains of emotion regulation difficulties, irrespective of cluster membership, indicated that lack

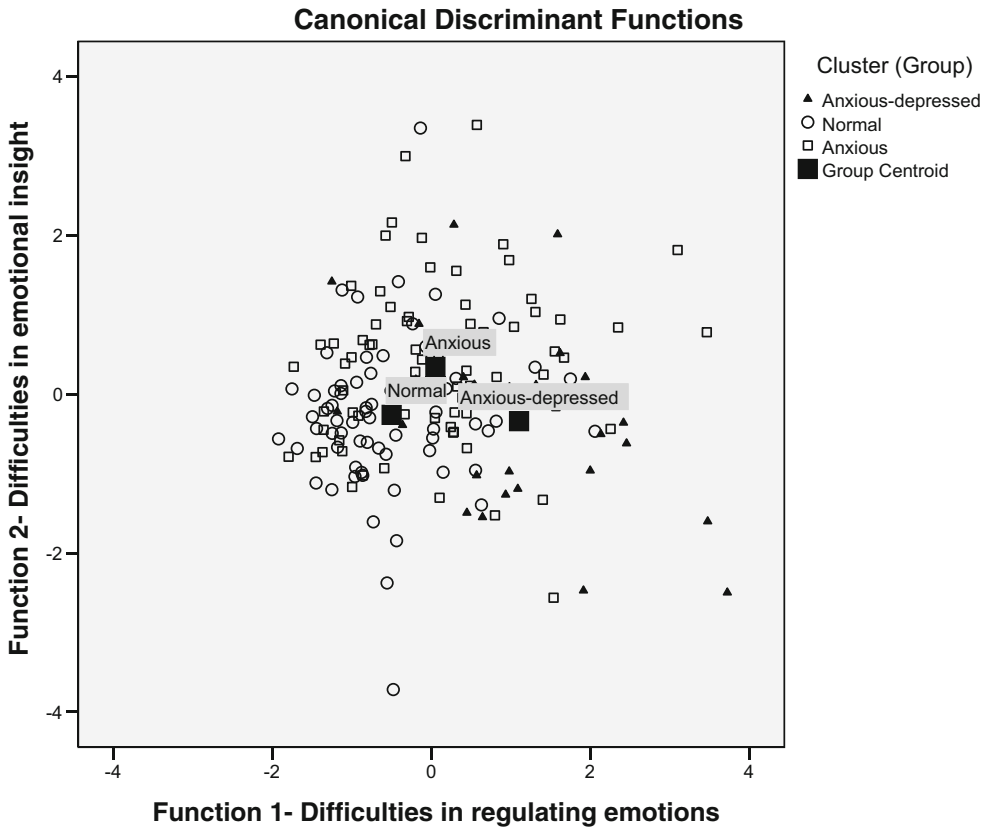

Fig. 3 Combined centroids of the three groups for discriminant functions 1 and 2

of emotional awareness and difficulty engaging in goal-directed behaviour are common forms of emotion regulation difficulties experienced by people in general.

The two subclinical groups did not differ in their scores on the domains of difficulty engaging in goal-directed behaviour, lack of emotional awareness and lack of emotional clarity, indicating that these three domains of emotion regulation difficulties are common to both the anxious-depressed and anxious groups and are therefore likely to be transdiagnostic emotion regulation difficulties. This implies that difficulty engaging in goal-directed behaviour, lack of emotional awareness and lack of emotional clarity are the core dimensions of emotion regulation difficulties that underlie the manifestation of pathological traits of anxious-depressed and anxious individuals. Among the three identified transdiagnostic emotion regulation difficulties, difficulty engaging in goal-directed behaviour appeared the most prominent transdiagnostic difficulty followed by lack of emotional awareness and lack of emotional clarity. The non-acceptance of emotional responses, impulse control difficulties, and limited access to emotion regulation strategies not only significantly differentiated the anxious-depressed group from the anxious group, but also differentiated the anxious-depressed group from the normal. Since the anxious-depressed group reported the highest levels of these difficulties among the three groups, these Non-Acceptance, Impulse, and Strategies domains are likely to be the domains of emotion regulation difficulties that are unique to the anxious-depressed group and may serve to distinguish them from not only anxious but normal individuals too.

Compared to the normal heathy cluster the anxious-depressed cluster showed greater problems in all domains of emotion regulation except lack of emotional awareness, while the anxious group showed higher levels of difficulties than normals on lack of emotional awareness and clarity as well as limited access to emotion regulation strategies. Thus, with respect to the normal group, the anxious-depressed group showed problems of managing or regulating emotional responses while the anxious group uniquely differed from the normal group on lack of emotional awareness, indicating greater difficulties in emotional insight. This finding is further corroborated by the findings of discriminant function analysis, which revealed that difficulties in regulating emotions discriminated the anxious-depressed group from both the anxious and the normal groups, while difficulties in emotional insight discriminated the anxious group from anxious-depressed and normal groups but did not differentiate between the latter two groups. The normal and the anxious groups were differentiated with greater accuracy with respect to difficulties in regulating emotions than were the anxious and anxious-depressed groups. A reason behind lesser difference between the anxious and the anxious-depressed groups may be the overlap of symptoms reported by the two clusters which may have resulted in the poor classification accuracy. Further research using a pure depressed group may result in higher accuracy. Although the scores on the six domains of emotion regulation predicted the group classification of individuals with higher than chance accuracy, the accuracy of the classification was not high, particularly for the anxious-depressed group. This poor classification accuracy resulting from higher misclassifications is understandable in the light of the possible overlap of symptoms between the anxious and the anxious-depressed groups. Given that the individuals in all the three clusters were normal with non-diagnosable levels of symptoms of anxiety and depression, the overall classification accuracy (61.6%) indicates that the responses on the domains of emotion regulation were still reliably able to predict group membership of anxious, anxious-depressed and normal clusters.

The present study contributes significantly to the existing literature by attempting to identify the transdiagnostic and unique aspects of emotion regulation difficulties associated with anxiety and mixed anxiety-depression. This study also makes a contribution in that it identifies the emotion regulation difficulties profile of the co-occurring condition of depression and anxiety, which is lacking in other studies. The finding of unique and transdiagnostic emotion regulation difficulties in anxiety and co-occurring anxiety-depression, the major contribution of the present study, highlights that while some emotion regulation difficulties are transdiagnostic, there are also some emotion regulation difficulties specific or unique to a particular disorder. Furthermore, in a recent review, Sheppes et al. (2015) noted that regulation of emotion is a multi-stage process and most of the studies linking emotion regulation difficulties with psychopathology have focused on impairment in the implementation of emotion regulation strategies. Citing suitable empirical evidences they have theorized that psychopathology may result because of impairment at any of the specific stages of emotion regulation such as identification of the need to regulate emotions, selection of specific emotion regulation strategy among the available strategies, implementation of the selected regulatory strategies, and monitoring of the emotion regulation strategy over time. Thus, it is likely that depression and/or anxiety may be associated with impairment at a specific stage of emotion regulation. This possibility is supported by observations that depression is often associated with more frequent use of the less effective emotion regulation strategies (reflective of impairment in selection) and/or reduced ability to use effective strategies (reflective of impaired implementation) to regulate emotions (see Joormann and Stanton 2016 for a review). However, future research is needed to empirically support the aforesaid speculation and to identify anxiety- and depression-specific impairment in emotion regulation process or stages using the ‘extended process model of

emotion regulation' as proposed by Sheppes and colleagues (Sheppes et al. 2015).

In generalizing the findings obtained, the limitations of the present investigation need to be taken into account. One of the important limitations of the present study is the unequal sample size after formation of clusters. The anxious-depressed cluster comprised of only 28 students, which comprised of less than half the number of individuals in each of the remaining two clusters (anxious and normal). However, given that the anxious-depressed group showed significantly more emotion regulation difficulties as compared to the other groups despite its small sample size, it indicates the severity of difficulties in emotion regulation in the said group. Secondly, though not a study limitation as such, but clearer patterns of emotion regulation difficulties would have emerged had we used individuals with clinically diagnosed anxiety and depression. Future investigations should target diagnosed cases of anxiety and depression when studying the deficits in emotion regulation in these clinical groups. Thirdly, in addition to the normal healthy control group, a pure anxious group, and an anxious-depressed group, inclusion of a fourth group of only depressed individuals would have provided far more insights into the results by enabling comparisons of emotion regulation difficulties of the purely anxious and depressed groups with the anxious-depressed group. This limitation is acknowledged and future researches addressing this limitation are encouraged. However, the formation of an anxious-depressed group as a result of cluster analysis, instead of a pure depressed group, lends support to the common observation that depression is generally co-morbid with anxiety (Kaufman and Charney 2000). Another potential limitation of the present study is the probable criterion contamination that may have occurred because of the nature of the design used in the present study. The findings are based on a mixed ANOVA design in which the first factor is a between-subjects factor (Group: Anxious, normal and mixed anxious-depressed) which is classificatory in nature (the mutually exclusive groups were formed based on cluster analysis) whereas the second factor (emotion regulation difficulty) is a within subject factor. Such a design is likely to yield a distorted estimate of various sources of variance. Thus, while interpreting the findings this limitation should be kept in mind. Finally, though the present findings are encouraging and provide insight into the differential diagnosis of anxiety and mixed anxiety-depression, the observed poor classification accuracy precludes the recommendation of the DERS scores for the practical purpose of making a differential diagnosis.

Conclusion

In conclusion, the nature of emotion regulation difficulties involved in anxiety and co-occurring anxiety-depression is neither entirely unique or entirely transdiagnostic but represents a compromise between the two. While difficulty in engaging in goal-directed behaviour, lack of emotional awareness and emotional clarity emerged as the transdiagnostic emotion regulation difficulties in anxiety and co-occurring anxiety-depression condition, the non-acceptance of emotional responses, impulse control difficulties, and limited access to emotion regulation strategies emerged as unique emotion regulation difficulties associated with the anxious-depressed group. These findings also suggest that unique components of emotion regulation difficulties may be used to predict future development of these disorders while the transdiagnostic emotion regulation difficulties may be addressed more in treating anxiety-depression co-morbidities. Although the mixed anxious-depressed group showed overall higher level of difficulties than the anxious only group, the difficulties in regulating emotions appeared characteristic of the anxious-depressed group whereas difficulties in emotional insight were particular to the anxious group. In order to have a better insight into the transdiagnostic and unique components of emotion regulation difficulties, future researches should use a more comprehensive approach of assessing emotion regulation difficulties, including behavioural/experimental measures of emotion regulation difficulties. Findings from such investigations would not only be helpful in early identification of these disorders but also help pave the way for psychotherapeutic treatment of such conditions.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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