MAIN

The effects of self-critical rumination on shame and stress: an experimental study

Christy Milia, Daniel C. Kolubinski* and Marcantonio M. Spada

Division of Psychology, School of Applied Sciences, London South Bank University, London, UK
*Corresponding author. Email: kolubid2@lsbu.ac.uk

Abstract

Background: Self-critical rumination is the process of repetitively thinking about one's past instances of failure without actively problem-solving. Shame has a central role within self-critical rumination and is accompanied by physiological changes that resemble stress responses.
Aims: To experimentally investigate the effects of self-critical rumination on shame and stress following perceived failure.
Method: Sixty volunteers engaged in an impossible task that resulted in guaranteed failure. Four groups, combining presence or absence of induced self-critical rumination with high or low performance expectations, were created. Self-reports were used to measure levels of shame and stress at baseline immediately after the task, as well as following a debrief on the real purpose of the study.
Results: Participants experiencing self-critical rumination accompanied by high performance expectations reported higher levels of shame and stress, especially immediately following the impossible task. On average, members of the high-expectations groups tended to score higher on shame and stress scales. Reported levels of trait self-critical rumination were also significantly correlated with levels of shame and stress across time when controlling for group membership and baseline stress and shame, respectively.
Conclusions: Self-critical rumination in highly evaluative circumstances increased levels of shame and stress following perceived failure. Even though highly evaluative conditions are considered a particularly strong predictor of shame and stress, they could potentially result in self-critical rumination; this matter needs to be addressed in future research.

Keywords: negative self-evaluations; self-critical rumination; shame; stress

Introduction

Shame: a painful self-conscious emotion

Later in life, people develop a distinct class of self-conscious emotions which contribute to evaluations about one's identity and self-worth and include pride, shame and guilt (Lewis, 2008; Tangney *et al.*, 1992). Shame follows negative self-evaluations and connotes an exposed sense of self, as it requires a set of culturally informed *Standards, Rules or Goals* (SRGs) upon which people evaluate the success or failure of their actions (Lewis, 1971; Lewis, 1992; Lewis, 2008). Although SRGs provide immediate and salient feedback on social and moral acceptability (Tangney *et al.*, 2007), shame is more likely to occur when people are characterised by an internal attribution style that puts the blame on the whole self, following perceived failure (Gilbert, 1997; Lewis, 1992; Lewis, 2008).

Shamed individuals evaluate themselves as inadequate or inferior in both their own and other people's eyes (Gilbert, 1997). This renders shame an acutely painful emotion that elicits the wish to hide (Tangney and Tracy, 2012) and is accompanied by constricted and collapsed posture, gaze

aversion and blushing (Darwin, 1872; Keltner and Harker, 1998). The automatic adoption of such submissive behaviours reflects feelings of helplessness and inferiority and originates from the pervasive fear of being negatively evaluated by others (Beck *et al*., 1985; Gilbert *et al*., 1994).

Nevertheless, shame aims to protect the self from threats that might create a sense of default identity and thwart social survival. Shameful submissive behaviours communicate subordination that facilitates gaining or regaining *Social Attention Holding Power* (SAHP), which emerges from the positive attention of others towards socially attractive features (Gilbert, 1997; Gilbert *et al*., 1994). In fact, shame alerts the self and others of SAHP losses and de-escalates tension and hostility, thereby leading to reconciliation (Gilbert, 1997; Keltner *et al*., 1997). Likewise, it can act as an emotional response to 'social self' threats with accompanied physiological changes that resemble stress responses to actual dangers (Dickerson *et al*., 2004). The evaluation of such threats reinforces people to fulfil their innate need of belongingness, which in turn gives them a sense of identity and purpose (Baumeister and Leary, 1995). Shame occurs when negative *social* evaluations transform into negative *self*-evaluations (Dickerson *et al*., 2004).

Although shame is beneficial for a short time, it can become unbearable in the long run, because it constantly condemns the self even for the slightest transgressions (Tangney and Tracy, 2012). Consequently, it predicts various types of psychopathology, including depression (Gilbert *et al*., 1994; Lewis, 1971; Mollon, 1984; Tangney *et al*., 1992); social anxiety (Beck *et al*., 1985; Clark and Wells, 1995; Gilbert and Trower, 1990); stress (Lewis and Ramsay, 2002); eating disorders (Blythin *et al*., 2018); addiction (Brown, 1991); and suicidality (Mokros, 1995). Shame can also result from the stigma related to severe psychiatric disorders (Gilbert and Trower, 1990; Keen *et al*., 2017; Tangney *et al*., 1992).

The default sense of self and self-criticism

Self-criticism is an intense and persistent internal, evaluative conflict between two self-aspects characterised by the establishment of extremely high standards of performance and a subsequent punitive attitude towards the self (Shahar *et al*., 2011; Shahar, 2015). Although it is a stable personality construct, it can fluctuate according to certain moods, biological factors and social contexts (Zuroff *et al*., 1999; Zuroff *et al*., 2015). When people are self-critical, they either dwell on the self and feel inadequate or hurt the self and feel self-hatred and self-disgust. Hence, self-criticism aims at either improving or harming the self for failures and shortcomings (Gilbert *et al*., 2004). It can also act as a defensive strategy to prevent anticipated rejection or competitive responses by others (Zuroff *et al*., 2015).

Self-critics have a perfectionistically demanding nature and are unable to demonstrate resilience against their own self-attacks, thus adopting submissive postures with shamed and sad facial expressions (Gilbert *et al*., 2006; Whelton and Greenberg, 2005). They derive their self-worth from performance-related accomplishments and are ruled by a pervasive fear of failure in both achievement and interpersonal contexts (Lueke and Skeel, 2017; Shahar, 2015). In fact, their prolonged fear of being judged, disapproved of, and controlled by others leads to interpersonal problems that could result in depression (Blatt and Zuroff, 1992; Mongrain *et al*., 1998; Schanche, 2013; Shahar, 2015). Self-criticism also predicts depression (Beck, 1983; Blatt and Shichman, 1983; Greenberg *et al*., 1998; Schiller *et al*., 2016) and anxiety-related conditions (Cox *et al*., 2004b; Gruen *et al*., 1997; Shahar *et al*., 2011; Zuroff *et al*., 1994). However, it could also stem from psychological distress and chronic acute stress (Schiller *et al*., 2016), socially stressful events and phobias (Cox *et al*., 2004a; Lazarus and Shahar, 2018) and low self-esteem (Dunkley and Grilo, 2007; Fennell, 1997; Shahar, 2015).

The relationship between self-criticism and distress is less straightforward than it first appears, with rumination playing a potential mediating role (Schiller *et al*., 2016). Rumination is the process of repeatedly thinking about one's negative emotions and problems without acting to find solutions or improve felt predicaments (Kolubinski *et al*., 2019; Nolen-Hoeksema *et al*.,

2008). As such, it is considered a neurotic type of self-attentiveness (Trapnell and Campbell, 1999) characterised by avoidance and activated by negative mood that thwarts cognitive flexibility (Genet and Siemer, 2012; Treynor *et al.*, 2003; Whitmer and Gotlib, 2013). Hence, it acts as a maladaptive emotion-regulation mechanism (Naragon-Gainey *et al.*, 2017; Rusting and Nolen-Hoeksema, 1998). Specific forms of rumination have been identified for depression (Nolen-Hoeksema, 1991), anxiety (Rector *et al.*, 2008), anger (Rusting and Nolen-Hoeksema, 1998) and self-criticism (Smart *et al.*, 2016). This last type of *Self-Critical Rumination* focuses specifically on self-critical thoughts and is related to depression, anxiety and low self-esteem (Kolubinski *et al.*, 2016; Kolubinski *et al.*, 2017; Smart *et al.*, 2016). Altogether, it seems that self-criticism and shame can manifest themselves through this specific ruminative form.

Self-critical rumination: links to shame and stress

To better understand self-critical rumination, its underlying elements need to be dismantled, beginning with self-criticism and shame. Both components share a multi-faceted nature, act as defensive responses to perceived inferiority of the self and focus on self-devaluing and self-attacking thoughts (Gilbert, 1997; Tangney *et al.*, 2007). Although self-criticism usually regulates shame with regard to various types of psychopathology (Lazarus and Shahar, 2018; Pinto-Gouveia *et al.*, 2013; Shahar *et al.*, 2015), shame has also been found to mediate the relationship between self-criticism and psychological distress (Castilho *et al.*, 2016). Focus on the separate links of rumination to self-criticism and shame could shed light on this complex relationship.

People often refer to self-criticism as an intrusive inner voice manifested via rehearsing, which is ruminative by default (Gilbert, 2000). Indeed, rumination plays a major role in maintaining levels of self-critical thinking and subsequent psychological distress, including unhealthy perfectionism, parental stress, depression and anxiety (James *et al.*, 2015; Moreira and Canavarro, 2018; Schiller *et al.*, 2016; Smart *et al.*, 2016). Similarly, shame produces rumination usually in the form of repetitive thoughts on a 'spoilt' identity, which in turn predict psychopathologies such as depression, social and generalised anxiety, and post-traumatic stress disorder (Beck *et al.*, 1985; Bravo *et al.*, 2019; Cheung *et al.*, 2004; Clark and Wells, 1995).

Aims and objectives

Self-critical rumination, shame and stress share certain features and predict overlapping psychopathologies; hence, their relationship is worth exploring. Research on self-critical rumination is still narrow due to the novelty of the concept, whilst concurrent evidence is primarily correlational. There are few experimental studies on self-critical perfectionism where failure feedback was manipulated and found decreased self-efficacy, positive affect and confidence (Stoeber *et al.*, 2008a); performance dissatisfaction, cognitive rumination and irrational task importance (Besser *et al.*, 2004); and increased shame and guilt (Stoeber *et al.*, 2008b). There are even fewer experiments on self-critical thinking and/or self-critical rumination where failure experiences were self-generated and found elevated over-generalisation and subsequent low mood (Thew *et al.*, 2017).

Kolubinski and colleagues (in press) recently reported an exploratory study which demonstrated that manipulating self-critical rumination had a significant impact on acute distress during an impossible task. The purpose of this study was to experimentally investigate the effects of self-critical rumination on shame and stress following perceived failure. To ensure participants would think in a self-critical way, self-critical rumination had to be manufactured via relative cues. Likewise, to create negative self-evaluative conditions, performance expectations had to be manipulated with regard to western SRGs. In particular,

intelligence was taken into account due to its unique role within Western culture as proven by the manifold scientific endeavours to define and measure it (Nisbett *et al*., 2012). From this perspective and in contrast to Asian and African cultures, intelligence is primarily cognitive and reflects an individualistic and achievement-related orientation (Cocodia, 2014).

It was predicted that induced self-critical rumination combined with high performance expectations would lead to higher levels of shame and stress (*Hypothesis 1*). These effects would apply to all participants following perceived failure on an SRGs-related task (*Hypothesis 2*). Most importantly, participants experiencing self-critical rumination accompanied by high performance expectations were expected to report higher levels of shame and stress following perceived failure (*Hypothesis 3*). Finally, there would be a relationship between reported levels of trait self-critical rumination, shame and stress across time (*Hypothesis 4*).

Method

Participants

The sample consisted of 60 volunteers (24 females; mean age = 33.08 years; *SD* = 10.62; age range: 19–64) equally assigned to each of the four experimental conditions (*n* = 15). Group membership was assigned by the first author by randomly assigning each number between 1 and 60 to each of the four groups prior the start of the study. The ethnic background was 80% White, followed by 10% Black, African, Caribbean or Black British; 6.7% Asian or British Asian; and 3.3% other ethnic groups. Recruitment was conducted via opportunity sampling, where participants answered a call for volunteers. They were required to: (1) be at least 18 years old; (2) have normal or corrected to normal vision; and (3) not be experiencing moderate to severe levels of distress. Entry ensured a chance to win a £50 voucher and additional course credit in case volunteers were students.

Materials

Experiential Shame Scale (ESS; Turner, 2014)
This 11-item measure assesses physiological, emotional and social aspects of state shame. Items such as '*pale-flushed*' represent physical; '*content-distressed*' emotional; and '*being sociable-hiding*' social phenomena of shame. These are displayed directly opposite to one another, and participants are asked to circle the number closest to what best describes their momentary state on a 7-point Likert scale. The original questionnaire used a 9-point scale and had acceptable internal consistency (Turner, 1998). However, the latest version of ESS seems a better match for this study. Not only it has shown high reliability ($\alpha = .81$) but also low face validity which would not trigger socially desirable answers.

Short Stress State Questionnaire (SSSQ; Helton, 2004)
This is a 24-item self-report that measures the multiple dimensions of stress state in a pre-task and post-task form. The SSSQ was initially developed as a short version of the 90-item Dundee Stress State Questionnaire (DSSQ; Matthews *et al*., 1999). Following the DSSQ trilogy, it includes subscales of distress, engagement and worry that reflect the affective, motivational and cognitive aspects of conscious experience respectively (Mayer *et al*., 1997). Items such as '*dissatisfied*' represent distress; '*I wanted to succeed on the task*' represents engagement; and '*I was worried what other people think of me*' represents worry. Participants are required to indicate the truth of each statement using a 5-point Likert scale in which 1 denotes '*not at all*' and 5 '*extremely*'. All dimensions have high internal consistency ($\alpha > .80$), and the test has proven stable over time (Helton, 2004). This implies that the SSSQ captures actual momentary changes in states, and thus is appropriate for the current study.

Self-Critical Rumination Scale (SCRS; Smart et al., 2016)

This 10-item measure captures the ruminative process associated with self-critical thoughts. Participants are called to evaluate statements such as 'I criticise myself a lot for how I act around other people' or 'My attention is often focused on aspects of myself that I'm ashamed of' on a Likert-type scale that ranges from '1 = not at all' to '4 = very much'. The SCRS has excellent internal consistency ($\alpha = .92$) and good test–re-test reliability ($\alpha = .86$). The scale is also valid due to its moderate to strong correlations with self-criticism ($r = .62$–$.81$), rumination ($r = .53$–$.81$) and shame measures ($r = .55$–$.73$). Herein, SCRS was administered once at the beginning to control for the effects of trait self-critical rumination.

Design

This experimental study utilised a 4×3 mixed design. With regard to the between-subjects factor, four groups were formed in terms of self-critical rumination and performance expectations: high expectations plus self-critical rumination (HSCR); low expectations plus self-critical rumination (LSCR); high expectations without self-critical rumination (HNON); and low expectations without self-critical rumination (LNON). The latter (LNON) was the control group. With regards to the within-subjects factor, changes in shame and stress were assessed across three different time points: before the task (T1); immediately after the task (T2); and following debrief (T3).

Procedure

The current study was approved by the London South Bank University Research Ethics Committee. Shortly after, it was advertised as a research on observation and distraction so that potential participants would not be biased in their reactions. Recruitment was conducted via the Research Participation Scheme platform; and posters displayed at the campus, a charity, and a military base. Although this primarily served a convenience purpose, it constituted a diverse sample which was thereby more representative of the general population.

Volunteers took part one at a time in a quiet room for approximately 30 minutes. The location of the room depended on the location of recruitment to ensure convenience for each entrant and facilitate data collection. After being given a generic consent form, participants were asked to fill out all the aforementioned self-reports. The SCRS was administered only at this time point because it sought to capture pre-disposition to self-critical rumination that could affect the experimental manipulations.

All participants were given 10 minutes to find the word 'NINA' in 7 sketches of Al Hirschfeld. Although this task has been mainly put forward in studies examining motivation (e.g. Neighbors and Raymond Knee, 2003; Ryan, 1982), it was selected due to its challenging nature and its previous successful but untruthful links to intelligence that herein acts as an SRG upon which some participants are expected to compare their performance. All sketches were printed on separate pages, with the number of hidden words written on top of each page. The difficulty of the experimental task was supposed to be increasing; it began with identifying one hidden word in the first item and ended with seven words in the seventh. Two of the items were difficult and other two impossible to complete, thus resulting in guaranteed failure unbeknown to the participants. Impossible items indicated that there were more hidden NINAs in the sketches than the actual number. Instructions and information about the task differed in response to allocated groups.

First, self-critical rumination was induced following the response-style manipulation paradigm (Nolen-Hoeksema and Morrow, 1993), according to which participants were either primed to think in a self-critical way or distracted with a random thought for 3 minutes. Members of the self-critical rumination conditions were asked to think of a recent shortcoming, mistake or

failure and focus on their own part of the blame. Members of the distraction conditions were asked to mentally wander around the building where the experiment took place, think of its size, and recount its rooms. In this way, the former groups were primed to engage in self-critical rumination in the next part of the study, whilst the latter were not.

Afterwards, participants were given task-related information that would create different types of performance expectations. As achievement-domains and intelligence are highly valued in modern Western culture (e.g. Nisbett *et al.*, 2012), expectations were manufactured using equivalent SRGs. Therefore, high expectations were created by linking the experimental task to intelligence and reporting results of a fictional study with successful high school students. Low expectations were created by telling the true story about the sketches, while highlighting the possibility of traps (see Fig. 1). As a result, the former groups were expected to engage in negative self-evaluations about their intelligence, which would be intensified by an upward comparison with supposedly intellectually 'inferior' students. The latter were likely to be more lenient in their self-evaluations as failure would not represent a weakness or deficiency in themselves. To ensure engagement in the task, all participants were told that their answers would be discussed with the researcher at the end.

Shortly after, the experimental task started. When the10-minute time passed, the self-reports were administered for a second time. Following that, participants were provided with written and oral debrief accompanied by a brief talk about their thoughts and emotions in order to alleviate potential distress caused by the experimental manipulations. After having reassured that everything was fully understood, the measurements were administered one last time to control for potential persistence of discomfort. Finally, participants were given a new, valid consent form that replaced the first.

Results

Test of normality

The data analysis began by testing the assumption of normality using a series of Shapiro–Wilk tests in SPSS (version 20; IBM Corporation, 2011). The scores on the SCRS were found not normally distributed (all $p < 0.05$) most likely because they were moderate to low (mean = 13.7, $SD = 3.68$). Thus, a non-parametric method was used to explore the relationship between levels of trait self-critical rumination, shame and stress.

Spearman correlations at T1

Spearman's rho were calculated between the measures and self-reported self-critical rumination prior to the intervention, which was conducted via SPSS (version 20; IBM Corporation, 2011). The correlation between the SCRS and ESS was moderate ($r_s = .39$, $p < .01$) and the correlation between the SCRS and SSSQ was weak ($r_s = .22$, $p < .05$). The correlation between the ESS and SSSQ was also weak ($r_s = .27$, $p < .05$). This demonstrates the usefulness of measuring stress and shame concurrently.

Multivariate analysis of variance

The relationship between induced self-critical rumination, shame and stress across time was explored using R code (R Core Team, 2018) via the Jamovi statistical package (version 1.0; The jamovi project, 2019). In particular, a repeated measures MANOVA was conducted to test the effects of group membership (HSCR, HNON, LSCR and LNON) on shame and stress across three different time-points of testing (T1, T2 and T3).

With regard to the between-subject effects, the data analysis showed that the measurements were significantly different, $F(1,56) = 401.73$ ($p < .001$). However, there were no significant

High expectations group	Low expectations group
According to recent evidence, attention is linked to intelligence as it activates regions of the prefrontal cortex. This particular task has been used as part of IQ tests in many such studies. In a recent study, high-school students found all hidden words in these sketches within 12 minutes, so you as an adult should be able to find them in 10.	Al Hirschfeld is a famous caricaturist who started hiding his daughter's name NINA in his drawings shortly after she was born. This started as a challenge to his friends and family but shortly after it made his drawings well known to the public. However, the sketches you are presented could entail traps; something might not be as it looks or said.

Figure 1. Performance expectations manipulation/task-related instructions.

interaction effects between measurements and group, $F(3,56) = .061$ (not significant), measurements and time, $F(2,112) = 2.73$ (not significant), or all three factors, $F(6,112) = 0.56$ (not significant). Therefore, both stress and shame were manipulated at similar levels throughout the experiment and measurements were combined for the duration of the analysis.

A significant difference was found between groups, $F(3,56) = 2.97$ ($p < 0.05$). This indicates that ESS and SSSQ scores varied in response to manipulations of self-critical rumination and performance expectations in each group (see Table 1). On average, the HNON group tended to score higher on the ESS and SSSQ, followed closely by the HSCR group and then by the LSCR group and the LNON group (see Table 2).

Within-subject and interactive effects were explored using the afex package in R due to its capacity to conduct several multilevel analyses (Singmann, 2018). A significant effect across time was found, $F(2, 112) = 14.52$ ($p < 0.001$), meaning that ESS and SSSQ scores differed before and following the task. There was also a significant interaction between time of testing and group membership, $F(6, 112) = 4.51$ ($p < 0.001$). Therefore, ESS and SSSQ scores changed due to the joint effect of time of testing and manipulations of self-critical rumination and performance expectations within the different groups (see Table 1).

Post-hoc Tukey's comparisons were performed using emmeans package in order to correct for the false positive rate stemming from multiple test comparisons (Lenth, 2018). The analysis revealed two significant differences of interest. Firstly, there was a significant difference between T1 and T2 for the HSCR group (mean$_{diff}$ = −6.77, $SE = 1.40$, $p < 0.001$); thus, the ESS and SSSQ scores increased immediately after the task for the HSCR group. Secondly, at T2, HSCR and LNON groups also differed significantly with one another (mean$_{diff}$ = 11.03, $SE = 2.62$, $p = 0.003$); thus, the ESS and SSSQ scores were higher for the HSCR group compared with the LNON group immediately after the task. There was no significant difference between the two self-critical groups at T2 (mean$_{diff}$ = 7.57, $SE = 2.62$, $p > 0.05$) – i.e. the HSCR group did not score significantly higher than the LSCR group on the ESS and SSSQ (see Table 3).

Non-parametric partial correlations

Partial correlations using Spearman's rho were conducted via SPSS (version 20; IBM Corporation, 2011) to better understand the relationship between self-critical rumination, shame and stress regardless of the experimental manipulations (see Table 4). Baseline levels of shame and stress at T1 were accounted for, as they were considered independent of the relationships under evaluation.

When controlling for group membership and baseline shame, trait self-critical rumination was moderately correlated with stress both at T2 ($r_s = 0.35$, $p < 0.05$) and T3 ($r_s = 0.33$, $p < 0.05$); thus the higher the SCRS scores, the higher the SSSQ scores following the task, regardless of the

Table 1. MANOVA effects on shame and stress

	F	d.f.	p
Group	2.97	3	0.04
Error		56	
Measurements (ESS and SSQ)	401.73	1	<.001
Measurements × Group	0.61	3	0.61
Error		56	
Time	14.52	2	<0.001
Time × Group	4.51	6	<0.001
Time × Measures	2.73	2	0.07
Time × Measures × Group	0.56	6	0.74
Error		112	

ESS, Experiential Shame Scale; SSSQ, Short State Stress Questionnaire.

Table 2. Means and standard deviations for each group across all three time-points

Group	Time	ESS mean	ESS *SD*	SSSQ mean	SSSQ *SD*
HSCR	1	33.67	6.23	62.07	11.41
	2	41.27	6.45	68.00	13.28
	3	33.40	3.37	59.27	8.47
LSCR	1	33.53	5.30	60.80	10.72
	2	34.27	5.35	59.87	10.15
	3	32.27	5.04	59.40	10.79
HNON	1	38.27	9.36	63.20	9.57
	2	41.07	10.46	60.93	10.02
	3	35.60	7.14	59.47	9.26
LNON	1	33.40	8.06	58.00	11.87
	2	32.27	6.35	54.93	11.45
	3	29	5.22	54.53	12.03

HSCR, high expectations plus self-critical rumination; LSCR, low expectations plus self-critical rumination; HNON, high expectations without self-critical rumination; LNON, low expectations without self-critical rumination; ESS, Experiential Shame Scale; SSSQ, Short State Stress Questionnaire.

Table 3. Significant Tukey's pairwise comparisons of the interaction effect between time and group

	Mean$_{diff}$	*SE*	p
T1 – T2 HSCR	–6.76	1.40	< 0.001
T2 HSCR – T2 LNON	11.03	2.62	0.003
T2 HSCR – T2 LSCR	7.57	2.62	0.16

T1 = Time 1/baseline; T2 = Time 2/immediately after the task; HSCR, high expectations plus self-critical rumination; LNON, low expectations without self-critical rumination; LSCR, low expectations plus self-critical rumination.

allocated group and initial levels of shame. In addition, there was a strong correlation between stress levels at T2 and T3 ($r_s = 0.89$, $p < 0.001$), which reveals that SSSQ scores heightened similarly at both time points after the experimental task when the aforementioned conditions applied. This echoes the finding above: that there was no statistical difference between each of the groups between T2 and T3.

Finally, when controlling for group membership and baseline stress, trait self-critical rumination was moderately correlated with shame at T2 ($r_s = 0.32$, $p < 0.05$). Thus, the higher the SCRS scores, the higher the ESS scores immediately following the task, regardless of the allocated group and initial levels of stress. In addition, there was a strong correlation between

Table 4. Partial Spearman's correlations

Control for group membership and baseline shame			
	1.	2.	3.
1. SCRS		0.35*	0.33*
2. SSSQ2			0.89**
3. SSSQ3			
Control for group membership and baseline stress			
	1.	2.	3.
1. SCRS		0.32*	0.25
2. ESS2			0.67**
3. ESS3			

*$p < .05$; **$p < .001$. SCRS, Self-Critical Rumination Scale; SSSQ2, Short Stress State Questionnaire at Time 2; SSSQ3, Short Stress State Questionnaire at Time 3; ESS2, Experiential Shame Scale at Time 2; ESS3, Experiential Shame Scale at Time 3.

shame levels at T2 and T3 ($r_s = 0.67$, $p < 0.001$), which shows that ESS scores increased similarly in both post-task time points when the aforementioned conditions applied and also reflects the aforementioned non-significant difference between the groups at T2 and T3.

Discussion

This study sought to explore the effects of self-critical rumination on shame and stress using an experimental design. Participants engaged in an impossible task that resulted in guaranteed failure and subsequent negative self-evaluations and the results partially support the hypotheses set prior to study. Levels of shame and stress heightened following perceived failure, especially for those in the HSCR condition. In fact, members of this group experienced more shame and stress immediately after the impossible task compared with baseline. Their levels at that time point were also higher in comparison with the opposite LNON group but not significantly higher in comparison with the LSCR group. Therefore, it seems that self-critical rumination, accompanied by high performance expectations, increased shame and stress after perceived failure. This confirms that self-criticism is related to feelings of shame (Castilho *et al.*, 2016), and predicts sensitivity to failure-stress (Gruen *et al.*, 1997). Rumination seems to be the key process behind these effects (Schiller *et al.*, 2016); not only does it result in shame, rather than merely stemming from it (Joireman, 2004), but it also preserves self-critical thinking, which in turn predicts stress, acute distress and various types of psychopathology (Nolen-Hoeksema *et al.*, 2008; Kolubinski *et al.*, in press).

The HNON group reported slightly higher levels of shame and stress overall. This means that high performance expectations might have led to more shame and stress because of evaluative threats on social survival (Dickerson *et al.*, 2004). Highly evaluative conditions could have initiated a 'fear of fear' cycle that resulted in repetitive thinking regardless of the self-critical priming (Beck *et al.*, 1985). Indeed, when people feel negatively evaluated by either the self or others, they tend to ruminate on how they come across and would want to be instead (Clark and Wells, 1995). This could also account for the similar average scores on shame and stress between the HSCR and HNON groups.

Furthermore, all participants experienced more shame and stress following perceived failure, possibly due to their engagement in negative self-evaluations. After realising their inability to perform adequately on the task, participants proceeded to evaluate their performance negatively, which in turn elicited shame (Tangney *et al.*, 1992). The researcher's presence during the task must also be taken into consideration. This possibly activated representations

of being exposed (Lewis, 1992). Similar changes in stress levels could be explained by the fact that negative self-evaluations following manufactured failure are related to elevated shame and subsequent high cortisol response to stress (Lewis and Ramsay, 2002).

Moreover, a relationship between self-reported levels of trait self-critical rumination and shame was found immediately after the impossible task. Thus, the more participants identified with the process of self-critical rumination, the more shame they experienced immediately following the task, because perceived failure might have activated a 'spoilt identity' schema (Beck *et al.*, 1985). However, trait self-critical rumination was not related to shame following debrief on the actual purposes of the study, perhaps due to being used in an adaptive, self-repairing way (Tangney and Tracy, 2012). Hence, state self-critical rumination could have accounted for increases in shame only in the face of failure and remitted when truth was revealed.

A relationship between self-critical rumination and stress over time was also revealed. Indeed, rumination predicts increased difficulty in recovering from stress (LeMoult *et al.*, 2013). Levels of self-critical rumination aligned with levels of stress both immediately after the impossible task and following debrief. This confirms that self-critical rumination propels people to experience more stressful situations that in turn increase it (Shahar, 2015). The relationship between self-critical rumination and stress is so pervasive that it appeared at both time points following perceived failure, even though this study included moderate to low self-critical ruminators.

The findings also showed that high levels of shame and stress persisted over time, regardless of reported self-critical rumination. This might be due to the presence of evaluative threats from which participants had difficulty disengaging (Dickerson *et al.*, 2004; Gruen *et al.*, 1997). Therefore, changes in the levels of shame and stress following debrief reflected changes in the levels of shame and stress right after the impossible task. In the case of shame levels, this could also mirror the acutely painful and long-lasting effects of shame (Tangney and Tracy, 2012). Nevertheless, it is also likely that the time between the second and third administration of the measures was not long enough for participants to become desensitised to the effects of negative self-evaluation.

Altogether, the findings add valuable advances to the existing literature. First, whilst most research has found associations between self-criticism, rumination and shame, herein all these components are brought together in a causative relationship that adds stress to the equation. In addition, this was one of the few studies that combined self-critical rumination with performance expectations, due to the acknowledgment of its significance in self-evaluative and achievement-relevant contexts. As self-critical rumination had stronger effects when combined with high performance expectations, it is indeed more likely to occur under evaluative and/or achievement-related instances. This also denotes its ubiquitous nature. In conclusion, this study put forward an experimental design to delve into the effects of self-critical rumination, which differentiates from generic self-critical thinking (Thew *et al.*, 2017) or trait self-critical perfectionism (Besser *et al.*, 2004; Stoeber *et al.*, 2008). Thus, it distinguishes from prior research based on self-reports that sought to explore the relationship of rumination with proneness to self-criticism (Smart *et al.*, 2016) or shame (Joireman, 2004).

Study limitations and future research

This study has several limitations. The fact that self-critical rumination and performance expectations were manufactured might have impeded ecological validity of the results. In particular, the high-expectations conditions could have been extremely acute and thereby not representative of real-world situations. Similarly, the experimental task might have been overtly challenging, thus resulting in increased discomfort, even after debrief. Moreover, the two post-task assessments were relatively close to one another and possibly did not permit desensitisation to the effects of negative self-evaluations. Also, the findings were based only on

self-reports that are subject to response biases and demand effects, especially as administration was conducted at three different time points. The fact that shame and stress were examined jointly and that there were no manipulation checks for self-critical rumination following the 3-minute priming/distraction task are equally important limitations.

Self-critical rumination and performance expectations could have been assessed in real-time situations. Furthermore, if only moderate and impossible items were included, the task might have been less challenging, thus predicting less discomfort following potential incapacity to succeed in the difficult ones. Physiological measures such as salivatory cortisol samples or blood pressure indications (e.g. Gruenewald *et al.*, 2004; Smith *et al.*, 2012) could have been more accurate measurements, whilst findings would have been more concrete if shame and stress were examined in two separate but identical experiments. Lastly, the differences between the HSCR and HNON groups could have been explained better if an assessment tool of state self-critical rumination was included after the priming/distraction task.

Herein, participants were low- to mid-level ruminators. Recruiting high self-critical ruminators could be interesting in exploring differences in shame and stress across time. Due to the associations of self-criticism, rumination and shame with overlapping psychopathologies, it could be useful to explore how self-critical rumination impacts levels of shame and/or stress in clinical samples as well. Alternatively, concurrent literature could benefit from exploring ways of either targeting self-critical rumination in people with dysfunctional shame levels or reducing performance expectations in evaluative contexts and subsequently prevent negative effects of self-critical rumination.

Conclusions

The findings suggest that self-critical rumination, when accompanied by high-performance expectations, leads to increased levels of shame and stress. Even though high-performance expectations predicted higher average levels of shame and stress, participants in these conditions could have engaged in self-critical rumination regardless of self-critical priming due to the intensity of negative self-evaluations. In fact, raising the bar on performance expectations resembles the uncompromising demands for high standards in performance that characterise self-critical individuals (Shahar, 2015). Therefore, self-critical rumination and high-performance expectations complement one another and are equally embedded in negative self-evaluative contexts. Hence, self-critical rumination can be addressed as a separate transdiagnostic phenomenon in psychological therapy with beneficial outcomes in various types of psychopathology. Interventions focusing on reducing levels of rumination could be particularly useful and require further study.

References

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, *117*, 497–529. doi: 10.1037//0033-2909.117.3.497

Beck, A. T. (1983). Cognitive therapy of depression: new perspectives. In P. J. Clayton & J. E. Barrett (eds), *Treatment of Depression: Old Controversies and New Approaches* (pp. 265–290). New York, NY, USA: Raven.

Beck, A. T., Emery, G., & Greenberg, R. L. (1985). *Anxiety Disorders and Phobias: A Cognitive Perspective*. New York, NY, USA: Basic Books.

Besser, A., Flett, G. L., & Hewitt, P. L. (2004). Perfectionism, cognition, and affect in response to performance failure vs. success. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 22, 297–324. doi: 10.1023/b:jore.0000047313.35872.5c

Blatt, S. J., & Shichman, S. (1983). Two primary configurations of psychopathology. *Psychoanalysis and Contemporary Thought*, 6, 187–254.

Blatt, S. J., & Zuroff, D. C. (1992). Interpersonal relatedness and self-definition: two prototypes for depression. *Clinical Psychology Review*, 12, 527–562. doi: 10.1016/0272-7358(92)90070-o

Blythin, S. P., Nicholson, H. L., Macintyre, V. G., Dickson, J. M., Fox, J. R., & Taylor, P. J. (2018). Experiences of shame and guilt in anorexia and bulimia nervosa: a systematic review. *Psychology and Psychotherapy: Theory, Research and Practice*. doi: 10.1111/papt.12198

Bravo, A. J., Kelley, M. L., Mason, R., Ehlke, S. J., Vinci, C., & Redman, J. C. (2019). Rumination as a mediator of the associations between moral injury and mental health problems in combat-wounded veterans. *Traumatology*. doi: 10.1037/trm0000198

Brown, H. M. (1991). Shame and relapse issues with the chemically dependent client. *Alcoholism Treatment Quarterly*, 8, 77–82. doi: 10.1300/j020v08n03_07

Castilho, P., Pinto-Gouveia, J., & Duarte, J. (2016). Two forms of self-criticism mediate differently the shame-psychopathological symptoms link. *Psychology and Psychotherapy: Theory, Research and Practice*, 90, 44–54. doi: 10.1111/papt.12094

Cheung, M., Gilbert, P., & Irons, C. (2004). An exploration of shame, social rank and rumination in relation to depression. *Personality and Individual Differences*, 36, 1143–1153. doi: 10.1016/s0191-8869(03)00206-x

Clark, D. M., & Wells, A. (1995). A cognitive model of social phobia. In R. G. Heimberg, M. R. Liebowitz, D. A. Hope, & F. R. Schneier (eds), *Social Phobia: Diagnosis, Assessment, and Treatment* (p. 69–93). New York, NY, USA: Guilford Press.

Cocodia, E. (2014). Cultural perceptions of human intelligence. *Journal of Intelligence*, 2, 180–196. doi: 10.3390/jintelligence2040180

Cox, B. J., Fleet, C., & Stein, M. B. (2004a). Self-criticism and social phobia in the US national comorbidity survey. *Journal of Affective Disorders*, 82, 227–234. doi: 10.1016/j.jad.2003.12.012

Cox, B. J., MacPherson, P. S., Enns, M. W., & McWilliams, L. A. (2004b). Neuroticism and self-criticism associated with posttraumatic stress disorder in a nationally representative sample. *Behaviour Research and Therapy*, 42, 105–114. doi: 10.1016/s0005-7967(03)00105-0

Darwin, C. (1872). *The Expression of the Emotions in Man and Animals*. New York, NY, USA: Philosophical Library.

Dickerson, S. S., Gruenewald, T. L., & Kemeny, M. E. (2004). When the social self is threatened: shame, physiology, and health. *Journal of Personality*, 72, 1191–1216. doi: 10.1111/j.1467-6494.2004.00295.x

Dunkley, D. M., & Grilo, C. M. (2007). Self-criticism, low self-esteem, depressive symptoms, and over-evaluation of shape and weight in binge eating disorder patients. *Behaviour Research and Therapy*, 45, 139–149. https://doi.org/10.1016/j.brat.2006.01.017

Fennell, M. J. V. (1997). Low self-esteem: a cognitive perspective. *Behavioural and Cognitive Psychotherapy*, 25, 1–25.

Genet, J. J., & Siemer, M. (2012). Rumination moderates the effects of daily events on negative mood: results from a diary study. *Emotion*, 12, 1329–1339. doi: 10.1037/a0028070

Gilbert, P., & Trower, P. (1990). The evolution and manifestation of social anxiety. In W. R. Crozier (ed), *Shyness and Embarrassment: Perspectives from Social Psychology* (pp. 144–178). Cambridge, UK: Cambridge University Press.

Gilbert, P. (1997). The evolution of social attractiveness and its role in shame, humiliation, guilt and therapy. *British Journal of Medical Psychology*, 70, 113–147. doi: 10.1111/j.2044-8341.1997.tb01893.x

Gilbert, P. (2000). Social mentalities: Internal 'social' conflicts and the role of inner warmth and compassion in cognitive therapy. In P. Gilbert & K. G. Bailey (eds), *Genes on the Couch: Explorations in Evolutionary Psychotherapy* (pp. 118–150). Hove: Psychology Press.

Gilbert, P., Baldwin, M. W., Irons, C., Baccus, J. R., & Palmer, M. (2006). Self-criticism and self-warmth: an imagery study exploring their relation to depression. *Journal of Cognitive Psychotherapy*, 20, 183–200. doi: 10.1891/088983906780639817

Gilbert, P., Clarke, M., Hempel, S., Miles, J., & Irons, C. (2004). Criticizing and reassuring oneself: an exploration of forms, styles and reasons in female students. *British Journal of Clinical Psychology*, 43, 31–50. doi: 10.1348/014466504772812959

Gilbert, P., Pehl, J., & Allan, S. (1994). The phenomenology of shame and guilt: an empirical investigation. *British Journal of Medical Psychology*, 67, 23–36. doi: 10.1111/j.2044-8341.1994.tb01768.x

Greenberg, L. S., Watson, J. C., & Goldman, R. (1998). Process-experiential therapy of depression. In L. S. Greenberg, J. C. Watson, & G. Lietaer (eds), *Handbook of Experiential Psychotherapy* (pp. 227–248). New York, NY, USA: Guilford Press.

Gruen, R. J., Silva, R., Ehrlich, J., Schweitzer, J. W., & Friedhoff, A. J. (1997). Vulnerability to stress: self-criticism and stress-induced changes in biochemistry. *Journal of Personality*, 65, 33–47. doi: 10.1111/j.1467-6494.1997.tb00528.x

Gruenewald, T. L., Kemeny, M. E., Aziz, N., & Fahey, J. L. (2004). Acute threat to the social self: shame, social self-esteem, and cortisol activity. *Psychosomatic Medicine*, 66, 915–924. doi: 10.1097/01.psy.0000143639.61693.ef

Helton, W. S. (2004). Validation of a Short Stress State Questionnaire. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, *48*, 1238–1242. doi: 10.1177/154193120404801107

IBM Corporation (2011). *IBM SPSS Statistics for Windows, version 20.0*. Armonk, NY, USA.

James, K., Verplanken, B., & Rimes, K. (2015). Self-criticism as a mediator in the relationship between unhealthy perfectionism and distress. *Personality and Individual Differences*, *79*, 123–128. doi: 10.1016/j.paid.2015.01.030

The jamovi project (2019). jamovi (version 1.0) [computer software]. Retrieved from: http://www.jamovi.org

Joireman, J. (2004). Empathy and the self-absorption paradox II: Self-rumination and self-reflection as mediators between shame, guilt, and empathy. *Self and Identity*, *3*, 225–238. doi: 10.1080/13576500444000038

Keen, N., George, D., Scragg, P., & Peters, E. (2017). The role of shame in people with a diagnosis of schizophrenia. *British Journal of Clinical Psychology*, *56*, 115–129. doi: 10.1111/bjc.12125

Keltner, D., & Harker, L. (1998). The forms and functions of non-verbal signal of shame. In P. Gilbert & B. Andrews (eds), *Shame: Interpersonal Behavior, Psychopathology, and Culture*. New York, NY, USA: Oxford University Press.

Keltner, D., Young, R. C., & Buswell, B. N. (1997). Appeasement in human emotion, social practice, and personality. *Aggressive Behavior*, *23*, 359–374. doi: 10.1002/(sici)1098-2337(1997)23:53.0.co;2-d

Kolubinski, D. C., Marino, C., Nikčević, A. V., & Spada, M. M. (2019). A metacognitive model of self-esteem. *Journal of Affective Disorders*, *256*, 42–53. https://doi.org/10.1016/j.jad.2019.05.050

Kolubinski, D. C., Nikčević, A. V., Lawrence, J. A., & Spada, M. M. (2016). The role of metacognition in self-critical rumination: an investigation in individuals presenting with low self-esteem. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, *34*, 73–85. doi: 10.1007/s10942-015-0230-y

Kolubinski, D. C., Nikčević, A. V., Lawrence, J. A., & Spada, M. M. (2017). The Metacognitions about Self-Critical Rumination Questionnaire. *Journal of Affective Disorders*, *220*, 129–138. doi: 10.1016/j.jad.2017.06.002

Kolubinski, D. C., Nikčevićb, A. V., & Spada, M. M. (in press). The effect of self-critical rumination on acute distress: an experimental investigation. *Journal of Rational-Emotive and Cognitive Behavior Therapy*.

Lazarus, G., & Shahar, B. (2018). The role of shame and self-criticism in social anxiety: a daily-diary study in a nonclinical sample. *Journal of Social and Clinical Psychology*, *37*, 107–127. doi: 10.1521/jscp.2018.37.2.107

LeMoult, J., Arditte, K. A., D'Avanzato, C., & Joormann, J. (2013). State rumination: associations with emotional stress reactivity and attention biases. *Journal of Experimental Psychopathology*, *4*, 471–484. doi: 10.5127/jep.029112

Lenth, R. (2018). *emmeans: Estimated Marginal Means, aka Least-Squares Means* [R package]. Retrieved from: http://cran.r-project.org/package=emmeans

Lewis, H. B. (1971). *Shame and Guilt in Neurosis*. New York, NY, USA: International Universities Press.

Lewis, M. (1992). *Shame: The Exposed Self*. New York, NY, USA: The Free Press.

Lewis, M. (2008). Self-conscious emotions: embarrassment, pride, shame, and guilt. In M. Lewis, J. M. Haviland-Jones, & L. F. Barrett (eds), *Handbook of Emotions* (3rd edn, pp. 742–756). New York, NY, USA: Guilford Press.

Lewis, M., & Ramsay, D. (2002). Cortisol response to embarrassment and shame. *Child Development*, *73*, 1034–1045. doi: 10.1111/1467-8624.00455

Lueke, N., & Skeel, R. (2017). The effect of self-criticism on working memory in females following success and failure. *Personality and Individual Differences*, *111*, 318–323. doi: 10.1016/j.paid.2017.02.035

Matthews, G., Joyner, L., Gilliland, K., Huggins, J., & Falconer, S. (1999). Validation of a comprehensive stress state questionnaire: towards a state big three? In I. Merville, I. J. Deary, F. DeFruyt, & F. Ostendorf (eds), *Personality Psychology in Europe* (7th edn, pp. 335–350). Tilburg: Tilburg University Press.

Mayer, J. D., Chabot, H. F., & Carlsmith, K. M. (1997). Conation, affect, and cognition in personality. *Advances in Psychology*, *124*, 31–63.

Mokros, H. B. (1995). Suicide and shame. *American Behavioral Scientist*, *38*, 1091–1103. doi: 10.1177/0002764295038008005

Mollon, P. (1984). Shame in relation to narcissistic disturbance. *British Journal of Medical Psychology*, *57*, 207–214. doi: 10.1111/j.2044-8341.1984.tb02580.x

Mongrain, M., Vettese, L. C., Shuster, B., & Kendal, N. (1998). Perceptual biases, affect, and behavior in the relationships of dependents and self-critics. *Journal of Personality and Social Psychology*, *75*, 230–241. doi: 10.1037/0022-3514.75.1.230

Moreira, H., & Canavarro, M. C. (2018). The association between self-critical rumination and parenting stress: the mediating role of mindful parenting. *Journal of Child and Family Studies*, *27*, 2265–2275. doi: 10.1007/s10826-018-1072-x

Naragon-Gainey, K., McMahon, T. P., & Chacko, T. P. (2017). The structure of common emotion regulation strategies: a meta-analytic examination. *Psychological Bulletin*, *143*, 384–427. doi: 10.1037/bul0000093

Neighbors, C., & Raymond Knee, C. (2003). Self-determination and the consequences of social comparison. *Journal of Research in Personality*, *37*, 529–546. doi: 10.1016/s0092-6566(03)00047-3

Nisbett, R. E., Aronson, J., Blair, C., Dickens, W., Flynn, J., Halpern, D. F., & Turkheimer, E. (2012). Intelligence: new findings and theoretical developments. *American Psychologist*, *67*, 130–159. doi: 10.1037/a0026699

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology*, *100*, 569–582. doi: 10.1037/0021-843x.100.4.569

Nolen-Hoeksema, S., & Morrow, J. (1993). Effects of rumination and distraction on naturally occurring depressed mood. *Cognition and Emotion*, 7, 561–570. doi: 10.1080/02699939308409206

Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science*, 3, 400–424. doi: 10.1111/j.1745-6924.2008.00088.x

Pinto-Gouveia, J., Castilho, P., Matos, M., & Xavier, A. (2013). Centrality of shame memories and psychopathology: the mediator effect of self-criticism. *Clinical Psychology: Science and Practice*, 20, 323–334. doi: 10.1111/cpsp.12044

R Core Team (2018). *R: A Language and Envionment for Statistical Computing* [computer software]. Retrieved from: http://cran.r-project.org/

Rector, N. A., Antony, M. M., Laposa, J. M., Kocovski, N. L., & Swinson, R. P. (2008). Assessing content domains of repetitive thought in the anxiety spectrum: rumination and worry in nonclinical and clinically anxious samples. *International Journal of Cognitive Therapy*, 1, 352–377. doi: 10.1521/ijct.2008.1.4.352

Rusting, C. L., & Nolen-Hoeksema, S. (1998). Regulating responses to anger: effects of rumination and distraction on angry mood. *Journal of Personality and Social Psychology*, 74, 790–803. doi: 10.1037//0022-3514.74.3.790

Ryan, R. M. (1982). Control and information in the intrapersonal sphere: an extension of cognitive evaluation theory. *Journal of Personality and Social Psychology*, 43, 450–461. doi: 10.1037/0022-3514.43.3.450

Schanche, E. (2013). The transdiagnostic phenomenon of self-criticism. *Psychotherapy*, 50, 316–321. doi: 10.1037/a0032163

Schiller, M., Hammen, C. C., & Shahar, G. (2016). Links among the self, stress, and psychological distress during emerging adulthood: comparing three theoretical models. *Self and Identity*, 15, 302–326. doi: 10.1080/15298868.2015.1131736

Shahar, B., Carlin, E. R., Engle, D. E., Hegde, J., Szepsenwol, O., & Arkowitz, H. (2011). A pilot investigation of emotion-focused two-chair dialogue intervention for self-criticism. *Clinical Psychology & Psychotherapy*, 19, 496–507. doi: 10.1002/cpp.762

Shahar, B., Doron, G., & Szepsenwol, O. (2015). Childhood maltreatment, shame-proneness and self-criticism in social anxiety disorder: a sequential mediational model. *Clinical Psychology & Psychotherapy*, 22, 570–579. doi: 10.1002/cpp.1918

Shahar, G. (2015). *Erosion: The Psychopathology of Self-Criticism*. New York, NY, USA: Oxford University Press.

Singmann, H. (2018). *afex: Analysis of Factorial Experiments* [R package]. Retrieved from: http://cran.r-project.org/package=afex

Smart, L. M., Peters, J. R., & Baer, R. A. (2016). Development and validation of a measure of self-critical rumination. *Assessment*, 23, 321–332. doi: 10.1177/1073191115573300

Smith, T. W., Birmingham, W., & Uchino, B. N. (2012). Evaluative threat and ambulatory blood pressure: cardiovascular effects of social stress in daily experience. *Health Psychology*, 31, 763–766. doi: 10.1037/a0026947

Stoeber, J., Hutchfield, J., & Wood, K. V. (2008a). Perfectionism, self-efficacy, and aspiration level: differential effects of perfectionistic striving and self-criticism after success and failure. *Personality and Individual Differences*, 45, 323–327. doi: 10.1016/j.paid.2008.04.021

Stoeber, J., Kempe, T., & Keogh, E. J. (2008b). Facets of self-oriented and socially prescribed perfectionism and feelings of pride, shame, and guilt following success and failure. *Personality and Individual Differences*, 44, 1506–1516. doi: 10.1016/j.paid.2008.01.007

Tangney, J. P., Stuewig, J., & Mashek, D. J. (2007). Moral emotions and moral behavior. *Annual Review of Psychology*, 58, 345–372. doi: 10.1146/annurev.psych.56.091103.070145

Tangney, J. P., & Tracy, J. (2012). Self-conscious emotions. In M. R. Leary & J. P. Tangney (eds), *Handbook of Self and Identity* (2nd edn, pp. 446–478). New York, NY, USA: Guilford Press.

Tangney, J. P., Wagner, P., & Gramzow, R. (1992). Proneness to shame, proneness to guilt, and psychopathology. *Journal of Abnormal Psychology*, 101, 469–478. doi: 10.1037/0021-843x.101.3.469

Thew, G. R., Gregory, J. D., Roberts, K., & Rimes, K. A. (2017). Self-critical thinking and overgeneralization in depression and eating disorders: an experimental study. *Behavioural and Cognitive Psychotherapy*, 45, 510–523. doi: 10.1017/s1352465817000327

Trapnell, P. D., & Campbell, J. D. (1999). Private self-consciousness and the five-factor model of personality: distinguishing rumination from reflection. *Journal of Personality and Social Psychology*, 76, 284–304. doi: 10.1037//0022-3514.76.2.284

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: a psychometric analysis. *Cognitive Therapy and Research*, 27, 247–259.

Turner, J. E. (1998). An investigation of shame reactions, motivation, and achievement in a difficult college course. *Dissertation Abstracts International Section A: Humanities and Social Sciences*, 59 (6-A).

Turner, J. E. (2014). Researching state shame with the Experiential Shame Scale. *Journal of Psychology*, 148, 577–601. doi: 10.1080/00223980.2013.818927

Whelton, W. J., & Greenberg, L. S. (2005). Emotion in self-criticism. *Personality and Individual Differences*, 38, 1583–1595. doi: 10.1016/j.paid.2004.09.024

Whitmer, A. J., & Gotlib, I. H. (2013). An attentional scope model of rumination. *Psychological Bulletin*, 139, 1036–1061. doi: 10.1037/a0030923

Zuroff, D. C., Blatt, S. J., Sanislow, C. A., Bondi, C. M., & Pilkonis, P. A. (1999). Vulnerability to depression: reexamining state dependence and relative stability. *Journal of Abnormal Psychology*, *108*, 76–89. doi: 10.1037//0021-843x.108.1.76

Zuroff, D. C., Koestner, R., & Powers, T. A. (1994). Self-criticism at age 12: a longitudinal study of adjustment. *Cognitive Therapy and Research*, *18*, 367–385. doi: 10.1007/bf02357511

Zuroff, D. C., Sadikaj, G., Kelly, A. C., & Leybman, M. J. (2015). Conceptualizing and measuring self-criticism as both a personality trait and a personality state. *Journal of Personality Assessment*, *98*, 14–21. doi: 10.1080/00223891.2015.1044604