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ASSESSING THE RELATION BETWEEN FLEXIBILITY IN EMOTIONAL EXPRESSION AND SYMPTOMS OF ANXIETY AND DEPRESSION: THE ROLES OF CONTEXT SENSITIVITY AND FEEDBACK SENSITIVITY

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Abstract

Expressive flexibility (EF), the ability to enhance and suppress emotional expressions, predicts decreases in anxiety and depression symptoms years later (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004). Bonanno and Burton (2013) proposed that knowing the most appropriate strategy for a situation (context sensitivity; CS), and awareness of how well strategies are working (feedback sensitivity; FS), partially explain this effect. We conducted a conditional process analysis to test this theory. One hundred thirty-eight undergraduates completed a behavioral measure of EF and self-reported symptoms of anxiety and depression, CS, and FS over one month. CS moderated the effect of EF on one-month changes in symptoms of anxiety and depression ($p = .03$): EF only predicted decreased anxiety and depression symptoms among people low in CS. FS mediated the effect of EF (95% CI: $-.10, -.01$) on changes in anxiety and depression symptoms: higher baseline EF was associated with higher two-week FS, which predicted decreased one-month anxiety and depression symptoms. Results suggest EF and CS may be compensatory skills and FS may be necessary to experience the adaptive effects of emotion regulation flexibility.

Keywords

emotion regulation; flexibility; context; feedback sensitivity; expressive regulation

Emotion regulation is the process of influencing the onset, intensity, and/or duration of an emotional experience (Gross & Thompson, 2007). Emotion regulation strategies are used to alter emotional experiences in specific ways and researchers have argued that flexibly using a variety of emotion regulation strategies contributes to psychological health (e.g., Bonanno & Burton, 2013; Cheng, 2001). Emotion regulation flexibility has been operationalized in several ways (e.g., strategy-situation fit, Cheng, 2001; the number of accessible strategies, Cheng, Lau, & Chan, 2014); however, few tests include both in vivo behavioral responses and standardized emotion-eliciting stimuli. These design features help to determine whether people emit the emotion regulation behaviors they self-report and rule out naturalistic

individual differences in emotion-provoking stimuli. One definition of emotion regulation flexibility, the ability to enhance and suppress one's facial expression of emotion, Expressive Flexibility (EF), allows for tests of in vivo behavioral responses in the context of standardized emotion-eliciting stimuli. Expressive Flexibility allows a person to express emotions in ways suited to the situational context. For instance, someone giving a presentation may enhance expressions of excitement to engage her audience while suppressing expressions of anxiety to project assurance.

Bonanno and colleagues (2004) first assessed the longitudinal impact of EF on psychological health. Participants viewed positively- and negatively-valenced images. While doing so, they engaged in each of three randomized tasks. In one task, participants naturally reacted to the images. In another, they enhanced facial expressions of the emotion felt when viewing the images. In the third, they suppressed facial expressions of the emotion felt when viewing the images. Independent coders unaware of task condition rated the degree of emotion each participant expressed. Participants with the largest differences between the natural expression condition and both the enhance and the suppress condition (i.e., those higher in EF) self-reported decreased psychological distress over two years. Those with a large difference from natural expression using only one strategy (e.g., high expressive enhancement) did not report significant changes in psychological distress. Thus, only those who skillfully implemented both strategies when instructed reported decreased psychological distress over time. One year later, a subset of these participants was assessed (Westphal, Seivert, & Bonanno, 2010). Greater EF was again associated with lower distress among those who reported greater chronic and acute environmental stress. Together, these results suggest that EF predicts lower psychological distress over time, perhaps by buffering people from the effects of life stressors.

Bonanno and Burton (2013) proposed that flexible emotion regulation consists of three sequential components: (1) appraising contextual demands, (2) generating, choosing, and applying emotion regulation strategies (e.g., EF), and (3) ongoing sensitivity to feedback regarding the outcome of one's strategies. Although these three aspects have been studied individually, no researchers to our knowledge have examined whether appraising contextual demands or sensitivity to feedback explains the effect of EF on anxiety and depression symptoms.

APPRAISING CONTEXTUAL DEMANDS

To flexibly regulate one's emotions, it may be necessary to identify salient features of situations. Cheng and Cheung (2005) used hierarchical cluster analysis to group participants into flexible and non-flexible groups based on their responses to hypothetical stressful scenarios. Participants also rated each scenario on four dimensions: controllability, personal impact, predictability, and significance. Multidimensional scaling was used to assess which dimensions each group utilized to choose their response. The flexible group used controllability and impact to determine which response they would use, while the non-flexible group did not use any dimensions consistently. These findings suggest that those who respond flexibly to stressful situations focus on a few key aspects of each context to

choose a response, while those who respond more rigidly apply certain strategies without consistently considering contextual factors.

People who can accurately identify important aspects of situations and match them with an appropriate emotion regulation strategy have greater context sensitivity. In two studies, context sensitivity was indirectly associated with lower anxiety through emotion regulation flexibility (Cheng, 2003). Context sensitivity also indirectly predicted decreased anxiety over eight weeks through emotion regulation flexibility. These findings suggest that identifying important dimensions of situations and flexibly matching an appropriate emotion regulation strategy to those dimensions may be related to less anxiety concurrently and over time.

FEEDBACK SENSITIVITY AND RESPONSIVENESS

The third component of Bonanno and Burton's (2013) model is sensitivity to feedback about the outcome of emotion regulation strategies. One measure of feedback sensitivity defines it as "the ability to discontinue an ineffective strategy and implement an alternative strategy" (Kato, 2012). This measure includes items such as "I am aware of how successful or unsuccessful my attempts to cope with stress have been" and "After coping with stress, I think about how well my ways of coping worked or did not work." Feedback sensitivity predicted depression symptoms twelve weeks later over and above the emotion regulation strategies participants reported (Kato, 2012). According to Bonanno and Burton's (2013) model, feedback sensitivity should mediate the effect of EF on changes in anxiety and depression symptoms.

CURRENT STUDY

We conducted a conditional process analysis of the effect of EF on one-month changes in anxiety and depression symptoms. We examined whether context sensitivity and feedback sensitivity moderated or mediated this effect to empirically test Bonanno and Burton's (2013) theoretical model of emotion regulation flexibility. Previous researchers have tested the effect of EF over years, but there have been no published tests of this effect over shorter time frames. Testing this effect over a briefer interval reduces the number of unmeasured third variables (e.g., changes in living situations, relationships, or academic standing) that may affect these relations. We expected context sensitivity to moderate the effect such that EF would predict decreased anxiety and depression symptoms among those higher in context sensitivity but increased anxiety and depression symptoms among those lower in context sensitivity. We also expected feedback sensitivity to mediate the effect of EF on changes in anxiety and depression symptoms, such that greater EF would predict greater feedback sensitivity, which would predict decreased anxiety and depression symptoms. We included context sensitivity and feedback sensitivity in all moderation and mediation models to compare the strength of the effects of each variable.

METHODS AND MATERIALS

PARTICIPANTS

The sample ($N = 151$) was comprised of students enrolled in introductory psychology courses at a large Midwestern university. Participants were an average of 20.01 years old ($SD = 2.27$; 61.3% female; 72.0% Caucasian). Thirteen participants (9%) did not complete measures at all time points, leaving 138 participants for longitudinal analyses. Participants who did not complete measures at all time points did not differ from the remaining participants on any variables tested ($ps > .3$). The only inclusion criterion was that participants be at least 18 years old at baseline in order to admit a sample similar to that used by Bonanno and colleagues (2004). This study protocol was approved by the local Institutional Review Board.

MEASURES

Behavioral Task

Expressive Flexibility Task (Bonanno et al., 2004): Participants viewed six blocked sequences of images. Each block consisted of seven images selected from the International Affective Picture System (Lang, Bradley, & Cuthbert, 1995). Three blocks consisted of negatively-valenced images and three blocks consisted of positively-valenced images, balanced for arousal (Lang et al., 1995). Each image was displayed for 10 seconds, with 4 seconds between images. In each block, participants performed one of three tasks: (a) react to the images as they naturally would (control condition), (b) enhance their facial expression to express the emotions felt when viewing the images (enhance condition), or (c) suppress their facial expression to conceal any emotions felt when viewing the images (suppress condition). The order of the images and the valence and expression conditions was randomized for each participant.

To score EF, participants' emotional expressions were first independently coded by three research assistants unaware of condition on two scales: the degree of negative emotion expressed and the degree of positive emotion expressed, from 1 (no emotion) to 7 (extreme emotion). Coders exhibited good agreement (negative emotion ICC = .82, positive emotion ICC = .75). Expressiveness scores on the matched-valence scales only (e.g., positive emotion expressed when viewing positively-valenced images) were averaged across coders for each image. Because participants viewed both positively- and negatively-valenced images in each expression condition, we averaged expressiveness scores across valence for each participant to produce one expressiveness score for each participant in each condition: enhance, suppress, and control. We then calculated each participant's enhancement ability and suppression ability by taking the difference between the enhance condition and suppress condition scores, respectively, and the control condition scores. EF was calculated in accordance with Westphal et al. (2010); these scores exhibited good test-retest reliability over three years ($r = .62$). We summed the enhancement ability and suppression ability scores. We then calculated expressive polarity by taking the absolute value of the difference between each participant's enhancement ability and suppression ability scores. Finally, we subtracted expressive polarity from the sum of enhancement ability and suppression ability to calculate EF.

The implementation of this task differed in three primary ways from Bonanno et al.'s (2004) design. First, all images featured a person, because we were interested in expressive regulation in the context of interpersonal stimuli. Second, Bonanno and colleagues provided participants with practice blocks of images. We did not provide practice blocks to reduce participant fatigue. Third, Bonanno and colleagues used a cover story that another person was watching the participants through the camera. We instead told participants they were being recorded and asked them to respond so that if someone was watching them, this person could tell (or not tell) exactly what the participant felt. All other aspects of the original task were preserved as closely as possible.

Self-Report Measures

Center for Epidemiologic Studies Scale—Depression (CES-D): The CES-D (Radloff, 1977) is a 20-item self-report scale designed to measure depressive symptoms. Items are summed to create a total score. Participants rate how often they feel each symptom from 0 (rarely or none of the time) to 3 (most of the time). Items were internally consistent at all time points (α s: .87–.92) and four-week test-retest reliability was adequate ($r = .60$).

Coping Flexibility Scale—Evaluation Coping Subscale (CFS-EC): The CFS-EC (Kato, 2012) is a five-item self-report subscale drawn from the Coping Flexibility Scale. The CFS-EC is designed to assess participants' awareness of the success or failure of their coping strategies (i.e., feedback sensitivity). Items are averaged for a total score. In this sample, the CFS-EC items were not highly internally consistent at baseline ($\alpha = .40$).

Extended Miller Behavioral Style Scale (EMBSS): The EMBSS (Cheng, Chiu, Hong, & Cheung, 2001) measures how adaptively people match regulation strategies to different contexts. It consists of eight hypothetical scenarios in which participants are instructed to imagine themselves (e.g., getting dental work done; being held hostage; having dinner with a boss). Participants report all the ways they would respond to each scenario from a list of eight options. Four options are considered Blunting strategies (tending to avoid threat-related information) and four options are considered Monitoring strategies (tending to focus on threat-related information). A Discriminative Facility score is calculated by comparing participants' responses to those generated by ten independent raters (Chiu, Hong, Mischel, & Shoda, 1995). These raters determined which class of strategies (Monitoring or Blunting) was most adaptive for each hypothetical scenario. Participant responses that are congruent with raters' (e.g., choosing a Monitoring strategy when Monitoring was rated as adaptive) result in a score of 1. Incongruent responses are scored 0. Items are summed, resulting in a total score ranging from 0 to 64.

State-Trait Anxiety Inventory—State Version (STAI-S): The STAI-S (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) is a 20-item self-report measure of momentary anxiety. Participants rate items from 1 (not at all) to 4 (very much so) and items are summed to create a total score. Items were internally consistent at all time points (α s: .92–.95) and test-retest reliability over four weeks was low ($r = .47$), which was unsurprising as the measure assesses participants' momentary state.

STUDY PROCEDURES

At baseline, all participants completed the EF task and then completed all self-report measures in a randomly presented order in the lab. At two weeks and then again one month later, participants completed the same self-report measures in a randomly presented order via an email link.

ANALYTIC STRATEGY

A composite measure of depression and anxiety symptoms was created by standardizing scores on the CES-D and the STAI-S separately at each time point. These standardized scores were then averaged to create a composite score at each time point for each participant. Moderation and mediation analyses were conducted with Hayes' (2013) PROCESS macro. Significant interactions were probed using the Johnson-Neyman technique. Mediation analyses utilized 10,000 percentile bootstraps and 95% confidence intervals.

RESULTS

MANIPULATION CHECK, BASELINE CHARACTERISTICS, AND COMPARISON TO VALIDATION SAMPLE

A 3 (condition) $\times$ 2 (valence) repeated measures ANOVA supported the validity of the EF task. There was a main effect of condition, $F(1.71, 254.79) = 283.09, p < .01$ (Greenhouse-Geisser corrected). Post-hoc paired sample *t*-tests revealed that responses in the enhance condition, $M = 2.86, SD = .96$, were rated as more expressive than responses in the neutral condition, $M = 1.92, SD = .75$, which were rated as more expressive than responses in the suppress condition, $M = 1.16, SD = .40$; all $ps < .01$. There was no main effect of valence, $F(1, 149) = 0.55, p = .46$, so we were confident in combining expressiveness scores from positive and negative valence conditions. See Table 1 for means, standard deviations, and correlations.

To compare expressiveness scores to Bonanno et al. (2004), we conducted three independent sample *t*-tests. In each condition, enhance, $t(181.6) = 9.87, p < .01$; neutral, $t(159.2) = 6.37, p < .01$; suppress, $t(173.7) = 6.13, p < .01$, the average expressiveness score in the current sample was significantly lower than in Bonanno et al. (2004). However, the standard deviations were not significantly different between samples on any condition, enhance, $F(149, 100) = .64, p = .99$; neutral, $F(149, 100) = .45, p > .99$; suppress, $F(149, 100) = .57, p = .99$.

DOES CONTEXT SENSITIVITY OR FEEDBACK SENSITIVITY MODERATE THE EFFECT OF EXPRESSIVE FLEXIBILITY ON CHANGES IN ANXIETY AND DEPRESSION SYMPTOMS?

We first attempted to extend Bonanno et al.'s (2004) findings by testing whether EF predicted symptoms of anxiety and depression at one month, controlling for baseline symptoms. Although in the expected direction, EF did not significantly predict one-month change in anxiety and depression symptoms, $\beta = -.11, SE = .07, p = .12$. However, based on Bonanno and Burton's (2013) model, EF may only predict changes in anxiety and depression symptoms in conjunction with context sensitivity or feedback sensitivity. We ran

two regressions using Model 1 of the PROCESS macro to test whether context sensitivity or feedback sensitivity moderated the effect of EF on one-month changes in anxiety and depression symptoms.¹

Context sensitivity moderated this effect (Table 2): among those lower than average in context sensitivity, $z = -.02$, EF predicted decreased anxiety and depression symptoms (Figure 1). Among those higher than average in context sensitivity, $z > -.02$, EF was unrelated to changes in anxiety and depression symptoms. These results suggest that context sensitivity and EF may function as compensatory skills. Among those lower in context sensitivity, EF predicted decreased anxiety and depression symptoms, but among those lower in EF, context sensitivity predicted decreased anxiety and depression symptoms. Surprisingly, those higher in context sensitivity and EF reported no measurable change in anxiety and depression symptoms.

DOES CONTEXT SENSITIVITY OR FEEDBACK SENSITIVITY MEDIATE THE EFFECT OF EXPRESSIVE FLEXIBILITY ON CHANGES IN ANXIETY AND DEPRESSION SYMPTOMS?

Because a statistically significant direct effect is not a prerequisite to test mediation (Hayes, 2013), we used Model 4 of the PROCESS macro to test the hypothesis above. We entered baseline EF as the predictor, two-week CFS-EC and EMBSS Discriminative Facility scores as parallel mediators, and one-month anxiety and depression symptoms as the outcome, controlling for baseline anxiety and depression symptoms.² EF indirectly predicted changes in anxiety and depression symptoms through feedback sensitivity but not context sensitivity (Figure 2). Higher baseline EF scores were positively associated with feedback sensitivity at two weeks, which in turn predicted decreased anxiety and depression symptoms. These results suggest that greater awareness of the outcomes of one's expressive regulation explains the effect of flexible expressive regulation on decreased anxiety and depression symptoms.

DISCUSSION

In this study, we sought to extend Bonanno et al.'s (2004) findings to one-month changes in anxiety and depression symptoms and test context sensitivity and feedback sensitivity as moderators and as mediators of this effect. We hypothesized that EF would predict decreased anxiety and depression symptoms over one month and that context sensitivity would moderate this effect. We expected participants high in context sensitivity and EF to report the greatest decrease in symptoms of anxiety and depression. We also expected feedback sensitivity to mediate the effect of EF on one-month changes in anxiety and depression symptoms.

Although EF did not predict decreased symptoms of anxiety and depression over one month, the effect was in the hypothesized direction. The effect size ($\beta = -.11$) was less than half as

¹As an exploratory analysis, we tested the three-way interaction of EF, CFS-EC, and EMBSS Discriminative Facility as a predictor of one-month changes in anxiety and depression symptoms. This product term was not significant, $\beta = .02$, $SE = .08$, $p = .77$.

²As an exploratory analysis, we re-ran this model controlling for baseline CFS-EC and EMBSS Discriminative Facility scores. We did not find evidence of an indirect effect of EF on 1-month changes in anxiety and depression symptoms through CFS-EC, $ab = -.05$, 95% CI: $-.11, .00$ or EMBSS Discriminative Facility, $ab = -.01$, 95% CI: $-.04, .01$.

large as Bonanno et al. (2004) reported ($\beta = -.27$); this may indicate that one month was not long enough for participants to report much change in anxiety and depression symptoms. Alternatively, the more restricted range of EF scores in our sample may have reduced our power to detect a significant effect. Also, Bonanno and colleagues recruited students within one month of beginning college, while our sample was recruited in the spring semester of the academic year and was not limited to first-year students. Measuring EF among students who were more likely to have initially adjusted to college may have reduced our power to detect a significant effect.

Despite the non-significant direct relation between EF and change in anxiety and depression symptoms, there was a significant interaction between EF and context sensitivity. EF predicted decreased anxiety and depression symptoms when context sensitivity was low but was unrelated to anxiety and depression symptoms when context sensitivity was high. This finding suggests that the ability to flexibly regulate one's facial expressions may compensate for a lack of sensitivity in knowing exactly when to use different regulation strategies. Those higher in context sensitivity, who also reported lower levels of anxiety and depression at baseline, may not have reported much change in symptoms in part because context sensitivity may enable people to identify important aspects of situations and determine an adaptive response earlier in the emotion generation and regulation processes. This explanation is in line with a recent finding that exposure to traumatic events was associated with greater post-traumatic stress disorder (PTSD) symptoms among active duty firefighters low in context sensitivity but unrelated to PTSD symptoms among firefighters high in context sensitivity (Levy-Gigi et al., 2016). Together, these findings highlight the buffering effect of context sensitivity on environmental stressors.

Feedback sensitivity mediated the effect of EF on changes in anxiety and depression symptoms. That is, people who demonstrated greater EF tended to report greater evaluation of the outcome of their emotion regulation strategies, which in turn predicted decreased anxiety and depression symptoms. This finding supports the second aspect of Bonanno and Burton's (2013) model and suggests that evaluating the outcome of emotion regulation strategies may be necessary for successful emotion regulation flexibility. Future researchers should examine feedback sensitivity in laboratory contexts to provide stronger evidence for this interpretation.

These findings should be considered within certain limitations. Our measure of feedback sensitivity, the CFS Evaluation Coping subscale, exhibited low internal consistency, suggesting that the resulting score may measure multiple facets of feedback sensitivity. However, Evaluation Coping was conceptualized as a multifaceted construct so the internal consistency may reflect that. Future researchers may refine this measure to better capture a unidimensional construct. Second, while we found statistical evidence for mediation using a longitudinal design, the mediator (feedback sensitivity) was not experimentally manipulated. This limits how strongly a claim of causal mediation can be made, but suggests an avenue for future research. Finally, the sample was primarily composed of young adult Caucasian women, but this relative lack of demographic diversity naturally ruled out some potential third-variable concerns.

Given these limitations, we provided the first empirical test of a novel theory of emotion regulation flexibility using a behavioral manipulation from previous research but implemented independently. In a longitudinal design, EF predicted one-month changes in anxiety and depression symptoms when context sensitivity was low and through feedback sensitivity. These results shed light on the mechanisms of EF and lay a foundation for future experimental studies.

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FIGURE 1.

Context sensitivity (CS) moderates the effect of Expressive Flexibility on 1-month changes in anxiety and depression symptoms.

FIGURE 2.

Completely standardized parallel mediation model of 2-week Feedback Sensitivity (CFS Evaluation Coping) and Context Sensitivity (EMBSS Discriminative Facility) entered as mediators of the effect of baseline Expressive Flexibility (EF) on 1-month changes in anxiety and depression symptoms.

Note. $^\dagger p < .10$; $*p < .05$; $**p < .01$.

TABLE 1
Means, Standard Deviations, and Correlations Among Baseline and One-Month Measures

Measure	M	SD	1	2	2a	2b	3	4	5	6
1. Expressive Flexibility (EF)	.71	.95	–							
2. Anxiety & Depression Symptoms (Baseline)	.00	.89	.10	–						
2a. CES-D (Baseline)	14.14	8.50	.13	.89**	–					
2b. STAI-S (Baseline)	35.86	10.67	.04	.89**	.58**	–				
3. EMBSS Discriminative Facility	34.63	5.09	.04	–.14	–.16	–.10	–			
4. CFS Evaluation Coping	8.80	2.26	.04	–.19*	–.12	–.21*	.12	–		
5. Anxiety & Depression Symptoms (One Month)	.00	.92	–.05	.58**	.56**	.47**	–.12	–.06	–	
5a. CES-D (One Month)	12.76	9.29	–.03	.56**	.60**	.40**	–.10	–.07	.92**	–
5b. STAI-S (One Month)	36.91	11.76	–.07	.51**	.43**	.47**	–.12	–.04	.92**	.70**

Note.

*
p < .05;

**
p < .01; N = 138.

TABLE 2

EF $\times$ Context Sensitivity and EF $\times$ Feedback Sensitivity Predicting One-Month Changes in Anxiety and Depression Symptoms

Variable	<i>B</i>	<i>SE</i>	β	<i>p</i>
Model 1				
Intercept	1.06	.56	-.01	.06
Baseline Anxiety/Depression Symptoms	.61	.07	.59	< .01
Expressive Flexibility (EF)	-1.28	.52	-.14	.02
Context Sensitivity	-.03	.02	-.03	.08
EF $\times$ Context Sensitivity	.03	.01	.17	.03
Model 2				
Intercept	.07	.36	-.00	.86
Baseline Anxiety/Depression Symptoms	.62	.07	.59	< .01
Expressive Flexibility (EF)	-.35	.31	-.10	.26
Feedback Sensitivity	.00	.04	.05	1.00
EF $\times$ Feedback Sensitivity	.03	.04	.07	.43

Note. Model 1: *Adj. R*² = .36, *F*(4, 133) = 19.87. Model 2: *Adj. R*² = .34, *F*(4, 133) = 18.32. Negative values indicate a decrease in anxiety and depression symptoms.