



Expressive flexibility: Enhancement and suppression abilities differentially predict life satisfaction and psychopathology symptoms



Shuquan Chen^{a,*}, Tong Chen^a, George A. Bonanno^b

^a Department of Psychology, School of Social Sciences, Tsinghua University, China

^b Department of Clinical and Counseling Psychology, Teachers College, Columbia University, United States

ARTICLE INFO

Keywords:

Expressive flexibility
Emotion regulation
Psychopathology
Life satisfaction

ABSTRACT

The aim of the present study is to examine whether expressive flexibility (i.e., enhancement and suppression abilities) are associated with reduced psychopathology and increased life satisfaction. A total of 310 Chinese college participants completed the Chinese version of Flexible Regulation of Emotional Expression (FREE) Scale together with a battery of scales assessing emotion regulation frequency, resilience, depression, anxiety and life satisfaction. Psychometric properties of the Chinese version of FREE were adequate. When controlling for demographics and emotion regulation frequency, higher suppression ability was associated with fewer symptoms of depression and anxiety, while higher enhancement ability was predictive of higher life satisfaction. Moreover, consistent with the flexibility construct, enhancement ability predicted an increase in life satisfaction only when suppression ability was also high. Together, these results suggest that expressive flexibility incrementally accounts for mental health over emotion regulation frequency, and that the enhancement and suppression abilities are responsible for different dimensions of mental health. Clinical implications and future work on expressive flexibility are discussed.

1. Introduction

Individual differences in emotion regulation (ER) frequency are transdiagnostic factors accounting for both psychopathology and well-being (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Gross & John, 2003). Considerable evidence has linked the frequent use of certain ER strategies to mental health (Aldao et al., 2010; Gross & John, 2003; Webb, Miles, & Sheeran, 2012). In these investigations, reappraisal is assumed to be generally adaptive whereas suppression and rumination are regarded as putatively maladaptive strategies. More recent research, however, has highlighted the importance of flexibility in emotion regulation, taking into account both the regulatory efforts and the context in which regulatory strategies are implemented (Aldao, Sheppes, & Gross, 2015; Bonanno & Burton, 2013; Kashdan & Rottenberg, 2010).

These models of flexibility were in part informed by research on expressive flexibility (EF), namely the ability to enhance and suppress one's displayed emotions in accord with situational demands (Bonanno, Papa, Lalande, Westphal, & Coifman, 2004; Gupta & Bonanno, 2011; Westphal, Seivert, & Bonanno, 2010). There are two forms of regulatory abilities within the framework of EF: enhancement and suppression abilities. Whereas enhancement ability refers to showing increased

outward signs of emotional reactivity to meet the needs of a given context such as when friends share their happiness or sorrow, suppression ability conversely relates to a relative reduction in emotional expression in relevant context such as when a colleague makes an amusing but embarrassing error in a slideshow presentation. EF refers to the ability to both enhance and suppress emotions. Previous experimental findings indicate that EF predicts lower levels of psychopathology symptoms (Bonanno et al., 2004; Rodin et al., 2017; Southward & Cheavens, 2017) and better psychological adjustment (Westphal et al., 2010).

Burton and Bonanno (2016) developed a questionnaire measure of EF, the Flexible Regulation of Emotional Expression (FREE) Scale that examines the perceived ability to enhance or suppress emotional expression in an array of hypothetical social situations. The FREE scale measures four dimensions of expressive ability, respectively enhancement of positive emotion, enhancement of negative emotion, suppression of positive emotion, and suppression of negative emotion. There are also two second-order factors, respectively suppression and enhancement abilities.

* Corresponding author at: Department of Psychology, Tsinghua University, China.
E-mail address: chen-sq13@tsinghua.org.cn (S. Chen).

1.1. Emotion regulation frequency (ER) versus ability (EF)

Emotion regulation frequency and ability have been conceptualized as distinct constructs (Aldao et al., 2015; Bonanno & Burton, 2013). Whereas ER captures self-reported frequencies of use of certain emotion regulation strategies (Aldao et al., 2010), EF reflects the ability to modulate emotional expressions according to the context (Bonanno et al., 2004; Burton & Bonanno, 2016). For instance, suppression frequency refers to the overall tendency to suppress one's emotional expressions regardless of situations, whereas suppression ability refers to the capacity to suppress emotional expressions to meet situational demands. Despite theoretical considerations, empirical evidence is limited when it comes to whether EF and ER frequency account for unique or overlapping variances in psychological health. This is an important question with implications for both clarifying these two constructs and informing intervention efforts.

1.2. The relative importance of expressive enhancement and suppression abilities

Several studies have now demonstrated that EF, rather than only one form of ability (i.e., enhancement or suppression), predicts improved adjustment across time (Bonanno et al., 2004; Westphal et al., 2010). To date, however, evidence remains mixed regarding the relative importance of enhancement and suppression abilities. Whereas some research found that suppression ability is more predictive for depressive symptoms (Burton & Bonanno, 2016) and better psychological adjustment following negative life events (Westphal et al., 2010), other findings suggest that enhancement ability is equally important (Bonanno et al., 2004; Gupta & Bonanno, 2011), or even more important than suppression ability (Rodin et al., 2017). One possible yet unexamined explanation for these mixed findings is that suppression and enhancement abilities might differ in their relationships with different dimensions of psychological health. Suppression ability requires individuals to execute response inhibition, failure in which has been identified as a risk factor for depression and anxiety (Harvey et al., 2004; Parcheco-Unguetti, Acosta, Lupiáñez, Román, & Derakshan, 2012). By contrast, enhancement ability only requires individuals to display existing emotional expressions in a more obvious way. Enhancing one's emotional expression in the right context may promote relationships, thus improving life satisfaction (Guzman, Jurado, & Juson, 2014).

1.3. The present study

There is no direct evidence as regards to whether EF and ER frequency account for unique or overlapping variances in mental health. The present study addressed this issue by testing whether EF could predict both negative and positive mental health states independently of ER frequency. To this end, depression and anxiety were measured to represent psychopathology symptoms, and life satisfaction was assessed to reflect psychological well-being (Headey, Kelley, & Wearing, 1993). In addition, given the inconsistency in previous studies about the relative importance of enhancement and suppression, we investigated whether enhancement and suppression abilities are differentially associated with symptoms of depression and anxiety and with life satisfaction. Research on the EF construct suggested that higher scores in both enhancement and suppression rather than one form of abilities are more predictive for psychological adjustment (Bonanno et al., 2004; Westphal et al., 2010), question may then arise as to whether enhancement and suppression abilities have multiplicative effect or simply additive effect. To clarify this point, we further tested the interaction of enhancement and suppression. Prior to hypothesis testing, we examined whether the factor structure and reliability of the Flexible Regulation of Emotional Expression (FREE) scale are suitable to a Chinese sample.

2. Method

2.1. Participants and procedure

Three hundred and ten (310) undergraduate students participated in this study through an online survey system for either course credits or monetary compensation (ten RMB). The study was approved by the Institutional Review Board (IRB) at Tsinghua University, China. Participants ranged in age from 18 to 24 ($M = 20.03$, $SD = 1.35$), and 47.1% of the sample were female. Participants provided informed consent prior to beginning the survey. The questionnaire package consisted of the Chinese version of FREE Scale together with a battery of measures assessing ER, psychopathology symptoms, and life satisfaction.

2.2. Measures

2.2.1. Expressive regulation ability

The ability to modulate emotional expression was measured by the FREE scale (Burton & Bonanno, 2016). The items were translated into Chinese by two graduate level bilingual psychology students, revised for several times, and then back-translated into English. The research team developing the FREE scale agreed that the back translation reflected the original meanings of the scale. The FREE scale consists of four subscales measuring the abilities to enhance positive emotion ($\alpha = 0.76$), to enhance negative emotion ($\alpha = 0.80$), to suppress positive emotion ($\alpha = 0.65$), and to suppress negative emotion ($\alpha = 0.64$), each of which has four items for a total of 16 items. There are also two second-order factors, respectively the **enhancement** ($\alpha = 0.82$) and **suppression** ($\alpha = 0.78$) abilities. Participants rated how well they could either “be even more expressive than usual of how you were feeling” or “conceal how you were feeling” in a given scenario (e.g., “A friend wins an award for a sport that doesn't interest you”) on a 6-point scale (1 = *unable*, 6 = *very able*). Following guidelines by Burton and Bonanno (2016), we calculated: 1) a sum score by adding enhancement and suppression scores together, and 2) a polarity score by getting the absolute value of the difference between enhancement and suppression. EF was calculated by subtracting the polarity score from the sum score. As a result, the FREE scale has three scores: enhancement ability, suppression ability, and EF. Higher scores indicate greater flexibility in regulating emotional expressions.

2.2.2. Resilience

Resilience was measured using the Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003; Chinese version translated by Yu & Zhang, 2007), a 25-item scale in which participants rated how they have felt during the past month on a scale of 0 (*not true at all*) to 4 (*nearly all of the time*) to a number of statements (e.g., “Able to adapt to change”). Scores of all items were summed to reflect resilience. Internal consistency was good ($\alpha = 0.92$).

2.2.3. Emotion regulation frequency

We measured the habitual use of three of the most frequently applied strategies: reappraisal, suppression and rumination. **Reappraisal and suppression** were measured by the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003; Chinese version translated by Wang, Liu, Li, & Du, 2007), a 10-item scale assessing the use frequencies of reappraisal and suppression strategies. Participants rated the extent to which they agree with items such as “When I want to feel less negative emotion, I change the way I'm thinking about the situation” on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Internal consistency was good for reappraisal ($\alpha = 0.85$) and adequate for suppression ($\alpha = 0.73$). **Rumination** was measured by the Ruminative Responses Scale (RRS; Treynor, Gonzalez, & Nolen-Hoeksema, 2003; Chinese version translated by Yang, Ling, Xiao, & Yao, 2009), a 22-item scale in which participants rated their tendency

to engage in ruminative behaviors (e.g., “What am I doing to deserve this”) on a 4-point scale (1 = *almost never*, 4 = *almost always*). Item 14 was deleted in the Chinese version according to the result of confirmatory factor analysis. Internal consistency was good ($\alpha = 0.89$).

2.2.4. Psychopathology symptoms

We measured depression and anxiety symptoms as indicators of psychopathology. **Depression** was assessed with the 21-item Beck Depression Inventory-II (BDI-II; Beck, Brown, & Steer, 1996; Chinese version translated by Wang et al., 2011). The item about suicide was not included due to the requirements of IRB, which resulted in 20 items in total. For each item, participants selected one out of four graded statements with scores from 0 to 3 representing symptom severity. Internal consistency was good ($\alpha = 0.87$). **Anxiety** was assessed with the 21-item Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988; Chinese version translated by Cheng et al., 2002). Items such as “Nervous” were rated on a four-point scale from 0 (*Not at all*) to 3 (*Severely—I could barely stand it*). Internal consistency was good ($\alpha = 0.91$).

2.2.5. Life Satisfaction

Life satisfaction was measured by the Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985; Chinese version translated by Xiong & Xu, 2009), a 5-item scale including statements of global life satisfaction. Participants rated the extent to which they agree with the statements (e.g., “In most ways my life is close to my ideal”) from 1 (*strongly disagree*) to 7 (*strongly agree*). Internal consistency was good ($\alpha = 0.84$).

2.3. Statistical analyses

First, maximum likelihood confirmatory factor analysis using AMOS 20.0 was performed to determine how well the original models, including both the four-factor and hierarchical models, fit with the Chinese data. Second, we performed zero-order correlation analyses to examine the relationships between EF and ER, resilience, and health variables. Third, to examine relationships between expressive enhancement/suppression abilities and psychopathology symptoms as well as life satisfaction, several hierarchical multiple regression analyses were conducted. Gender and age were included as covariates in all models (step 1); ER frequency variables were included as well (step 2). Because we were interested in whether enhancement and suppression abilities differentially predicted life satisfaction and psychopathology symptoms, and whether they had interactive effects on mental health (i.e., higher scores in both abilities are more beneficial), we entered enhancement and suppression abilities in step 3 and their interaction in step 4.

3. Results

3.1. Confirmatory factor analysis

We began by assessing the goodness of fit of the four-factor model. This model was adequate across all fit indices ($\chi^2 = 200.32$, $p < .001$; RMSEA = 0.058; GFI = 0.928; CFI = 0.920). The next confirmatory factor analysis we conducted examined the fit of the hierarchical models. Specifically, the model constructed using expressive regulation type as the second-order factor, such that the suppression of positive and negative emotion factors loaded onto one overarching factor and enhancement of positive and negative emotion loaded onto the other overarching factor (see Fig. 1 for standardized factor loadings). The fit indices indicated that this model also evidenced acceptable fit ($\chi^2 = 203.66$, $p < .001$; RMSEA = 0.058; GFI = 0.926; CFI = 0.918).

3.2. Zero-order correlation analysis

Table 1 includes descriptive statistics and correlations among the variables calculated by summing the respective items within each of the subscales. As expected, EF was negatively associated with depression ($r = -0.28$, $p < .001$) and anxiety ($r = -0.12$, $p = .034$), and positively associated with life satisfaction ($r = 0.24$, $p < .001$), supporting the concurrent validity of the Chinese version of FREE. Interestingly, although suppression ability (ER) and suppression frequency (EF) were positively correlated ($r = 0.19$, $p < .01$), their respective relationships to depression were distinct. Whereas suppression ability was negatively correlated with depression ($r = -0.31$, $p < .001$), suppression frequency was positively correlated with depression ($r = 0.13$, $p = .021$).

3.3. Regression analyses

In predicting depression (Table 2), gender and age were not significant independent predictors in step 1. In step 2, both reappraisal and rumination, but not suppression frequency, made a significant contribution. In step 3, suppression ability, but not enhancement ability, made a further significant independent contribution, inversely predicted depression. Both reappraisal and rumination remained significant while suppression frequency, which was insignificant on step 2, became significant on step 3, suggesting that variables added in step 3 improved its predictive ability (Tzelgov & Henik, 1991). The interaction between enhancement and suppression abilities was not significant in predicting depression in step 4.

In predicting anxiety (Table 3), gender and age did not significantly predict anxiety in step 1. In step 2, both reappraisal and rumination, but not suppression frequency. On step 3, suppression ability, but not enhancement ability, made a further significant independent contribution, inversely predicting anxiety, and both reappraisal and rumination remained significant. The interaction between enhancement and suppression abilities was not significant in predicting anxiety in step 4.

In predicting life satisfaction (Table 4), age and gender were not significant predictors in all steps. Both reappraisal and rumination, but not suppression frequency, made a significant contribution. In contrast to the previous analyses, enhancement ability, but not suppression ability, made a further significant independent contribution in step 3, in this case positively predicting life satisfaction.¹ Notably, the interaction term between the enhancement and suppression was significant ($p = .027$, $\beta = 0.115$).

We followed the interaction of enhancement and suppression abilities with simple slopes analyses (Aiken & West, 1991). Thus, we evaluated the role of the enhancement ability as a predictor of life satisfaction at high and low levels of suppression ability (i.e., 1 SD above/below the mean). At low levels of suppression ability, the enhancement ability was unrelated to the life satisfaction, $t(301) = 0.023$, $p = .98$, $B = 0.002$. However, at high levels of suppression ability, greater level of enhancement ability was related to higher level of life satisfaction, $t(301) = 3.11$, $p = .002$, $B = 0.229$ (Fig. 2). This interaction was significant either with or without adding covariates, suggesting that it was robust.

4. Discussion

The current study examined whether enhancement and suppression abilities are differentially associated with life satisfaction and psychopathology symptoms when controlling for ER frequency. As hypothesized, when controlling for demographics and ER frequency, we found a

¹ To explore the potential effects of psychopathology symptoms on life satisfaction, we further included depression and anxiety as covariates, enhancement remained significant ($p = 0.017$, $\beta = 0.121$), and the interaction of enhancement and suppression abilities was marginally significant ($p = 0.095$, $\beta = 0.080$). Depression ($p < 0.001$, $\beta = -0.447$) but not anxiety ($p = 0.998$, $\beta < 0.001$) was significantly predictive for life satisfaction.

Fig. 1. Standardized factor loadings for the hierarchical model of the FREE Scale.

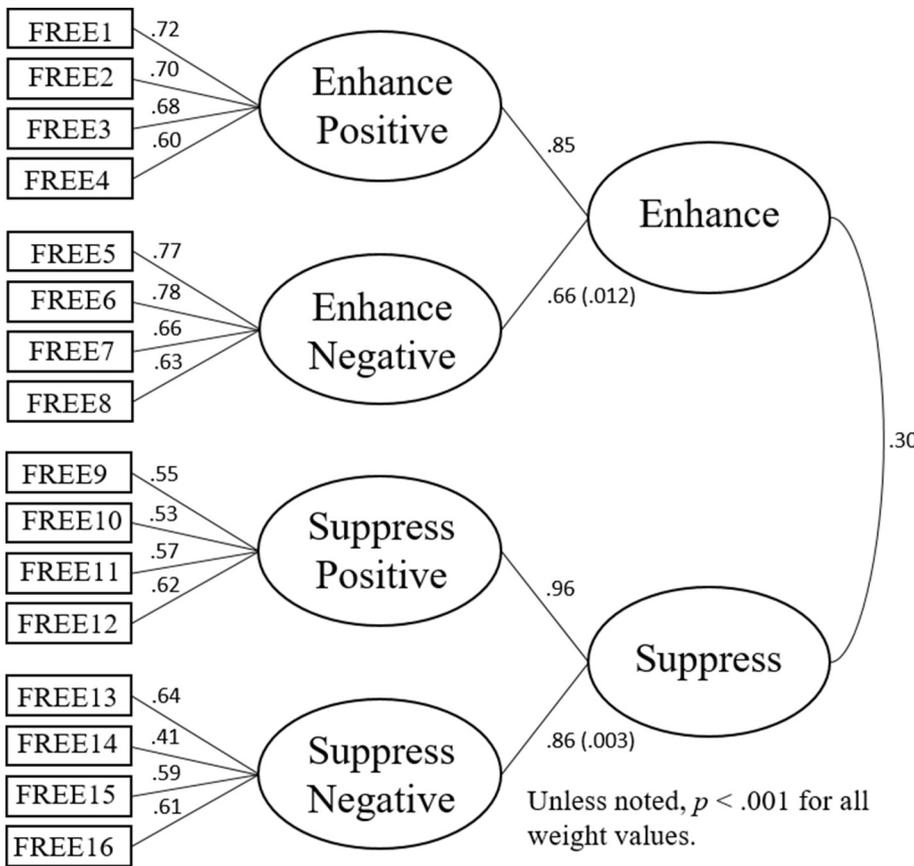


Table 1
Zero-order correlations of the second-order factors of the FREE Scale with measures of ER, resilience, psychopathology and life satisfaction.

	M (SD)	1	2	3	4	5	6	7	8	9
1. FREE Enhancement	31.98 (5.81)									
2. FREE Suppression	31.07 (6.15)	0.22***								
3. FREE EF	57.35 (10.95)	0.66***	0.73***							
4. ERQ Reappraisal	29.56 (5.39)	0.19**	0.29***	0.26***						
5. ERQ Suppression	14.25 (4.55)	-0.15*	0.19**	0.06	0.05					
6. RRS	43.35 (9.40)	0.01	-0.04	0.01	-0.04	0.20***				
7. CD-RISC	64.36 (13.26)	0.26***	0.33***	0.33***	0.46***	0.04	-0.23***			
8. BDI	9.55 (7.52)	-0.11	-0.31***	-0.28***	-0.37***	0.13*	0.41***	-0.56***		
9. BAI	7.37 (7.69)	0.02	-0.18**	-0.12*	-0.16**	0.06	0.50***	-0.29***	0.50***	
10. SWLS	21.78 (6.15)	0.20***	0.17**	0.24***	0.35***	-0.08	-0.23***	0.58***	-0.54***	-0.27***

Note. FREE = Flexible Regulation of Emotional Expression; ERQ = Emotion Regulation Questionnaire; RRS = Ruminative Response Scale; CD-RISC = Connor-Davidson Resilience Scale; BDI = Beck Depression Inventory; BAI = Beck Anxiety Inventory; SWLS = Satisfaction with Life Scale.

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

negative relation between suppression ability and symptoms of depression and anxiety, and a positive relation between enhancement ability and life satisfaction. Results support assertions that EF is a different construct from ER frequency (Burton & Bonanno, 2016) and that enhancement and suppression abilities are beneficial for different dimensions of psychological health. Besides from testing our hypothesis, the current investigation validated the FREE scale in Chinese. By examining the factor structure and concurrent validity of the Chinese version of the FREE scale, our findings further support Burton and Bonanno's (2016) proposal that the structure of EF is relatively consistent across cultures. As a direct result, the present study provides an internally consistent tool for future Chinese research on EF.

To our knowledge, the present study is the first to examine the predictive abilities of EF and ER frequency conjointly for mental health.

Even when controlling for ER frequency, at least one form of expressive abilities remained predictive for depression and anxiety suggesting that EF and ER may influence mental health via different pathways. The R-square of ER frequency was larger than that of EF, which may easily lead to plausible conclusion that ER frequency is more important. Indeed, even if we first enter EF and then ER frequency, ER frequency still accounts for more variances in predicting depression (0.096 for EF versus 0.249 for ER). However, we suggest caution in this interpretation given that some items measuring ER frequency are very similar to those measuring depression and anxiety (Joormann & Stanton, 2016; Treynor et al., 2003), which may result in the inflated variances that ER account for. Rumination, for instance, has a depression-related sub-factor, items of which are highly similar to questions in BDI assessing sadness and dysphoria (Treynor et al., 2003). In fact, if rumination is not added in

Table 2
Standardized regression coefficients predicting depression with EF controlling for gender, age, and ER.

	Step 1	Step 2	Step 3	Step 4	R ²
Demographics					0.003
Gender	0.048	0.047	0.050	0.045	
Age	−0.033	−0.004	0.006	0.007	
ER					0.302***
Reappraisal frequency		−0.353***	−0.293***	−0.291***	
Suppression frequency		0.064	0.112*	0.113*	
Rumination frequency		0.390***	0.373***	0.378***	
EF					0.349***
Enhancement ability			0.020	0.027	
Suppression ability			−0.235***	−0.232***	
Interaction					0.355
Enhancement × Suppression				−0.079	

* $p < .05$.
*** $p < .001$.

Table 3
Standardized regression coefficients predicting anxiety with EF controlling for gender, age, and ER.

	Step 1	Step 2	Step 3	Step 4	R ²
Demographics					0.013
Gender	−0.110	−0.074	−0.072	−0.076	
Age	0.027	0.060	0.066	0.068	
ER					0.273***
Reappraisal frequency		−0.144**	−0.112*	−0.111*	
Suppression frequency		−0.019	0.011	0.012	
Rumination frequency		0.490***	0.479***	0.483***	
EF					0.289*
Enhancement ability			0.028	0.035	
Suppression ability			−0.135*	−0.133*	
Interaction					0.293
Enhancement × Suppression				−0.065	

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

Table 4
Standardized regression coefficients predicting life satisfaction with EF controlling for gender, age, and ER.

	Step 1	Step 2	Step 3	Step 4	R ²
Demographics					0.013
Gender	−0.063	−0.050	−0.043	−0.035	
Age	0.040	0.023	0.022	0.020	
ER					0.273***
Reappraisal frequency		0.339***	0.297***	0.295***	
Suppression frequency		−0.047	−0.041	−0.042	
Rumination frequency		−0.214***	−0.214***	−0.220***	
EF					0.289*
Enhancement ability			0.120*	0.109*	
Suppression ability			0.066	0.063	
Interaction					0.293*
Enhancement × Suppression				0.115*	

* $p < .05$.
*** $p < .001$.

the regression model of depression in the present study, ER frequency and EF account for similar R-square, respectively 0.096 and 0.120.

Previous studies have demonstrated that suppression ability may be more important clearly predictive of adjustment than enhancement (Burton & Bonanno, 2016; Westphal et al., 2010), which, according to the present study, may result from the fact that the outcome variables in these studies are more closely associated with psychological distress. By including life satisfaction as an additional outcome, our findings indicated that enhancement ability was a significant predictor of higher life satisfaction, while higher suppression ability was predictive of lower levels of depression and anxiety.

The divergent outcomes of enhancement and suppression may be a

result of their social consequences and cognitive underpinnings. Socially, enhancement ability enables individuals to provide robust emotional signals to better meet situational demands especially during social interactions, which may promote interpersonal relationships and thus improve life satisfaction (Guzman et al., 2014). By contrast, suppression ability may be especially important for avoiding undesirable social outcomes in certain situations such as when individuals outperformed their counterparts (Schall, Martiny, Goetz, & Hall, 2016). Failure in suppression in these encounters may exacerbate the situations thereby increasing psychological distress. This may be one reason for the observed differential effects. Cognitively, whereas enhancement ability only requires individuals to increase existing emotions,

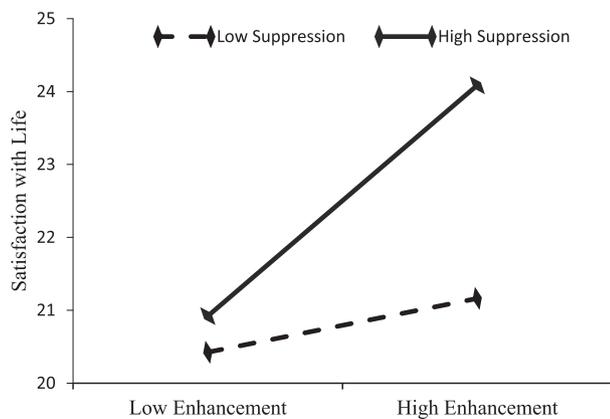


Fig. 2. Interaction between enhancement and suppression abilities in predicting life satisfaction. High and low levels correspond to 1 SD above or below the mean, respectively. Enhancement ability has a positive association with life satisfaction only at high levels of suppression ability.

suppression ability incorporates the process of inhibiting emotional response. Failure in response inhibition is a risk factor for stress-related disorders (e.g., Harvey et al., 2004), so it is not surprising that suppression but not enhancement ability is more related to psychopathology symptoms. Both the aforementioned explanations remain untested. Thus, future studies examining social outcomes and cognitive underpinnings of the two forms of EF are needed.

Contradictory to our findings, Rodin et al. (2017) found that enhancement ability, but not suppression ability, was predictive for depression and posttraumatic stress symptoms. However, these authors used a relatively small ($n = 59$) military sample that consisted mainly of men. Considering the sample differences in the diagnostic status, gender, and culture, it is difficult to tell what are responsible for the observed differences. Both Rodin et al. (2017) and our study have difficulties generalizing the results. Therefore, future research using diverse samples may be particularly informative in refining understanding of these constructs.

Our results provide support for the hypothesis that both enhancement and suppression abilities are important for maintaining psychological health. Though only higher suppression ability is predictive for lower levels of depression and anxiety, enhancement ability is important in maintaining life satisfaction, especially at higher levels of suppression ability. These findings demonstrate that higher scores in both abilities can go beyond mere additive effects; rather, higher suppression ability can actually magnify the effect of enhancement ability on life satisfaction. It is possible that higher suppression ability is related to decreased depression, thereby making it easier for individuals to savor the benefits of enhancement in the appropriate context. Future studies may test this possibility by assessing subjective benefits (e.g., achieving emotion regulation goals) following enhancement and suppression. Our study adopts the interaction between enhancement and suppression instead of the EF score (e.g., Westphal et al., 2010) as index of expressive flexibility, which provides a new way of investigating the effects of separate abilities (i.e., enhancement and suppression) and flexibility at the same time. Future replication is needed for this method.

The present study has important clinical implications. First, our findings suggest that improving EF might have a desirable effect on reducing psychological distress and promoting well-being in addition to traditional emotion regulation training (Denny & Ochsner, 2014), therefore including a module of EF training may improve treatment efficacy. Second, as suppression and enhancement abilities are differentially related to psychopathology symptoms and life satisfaction, training programs focusing on different abilities may be developed to serve different purposes. Third, our study highlights the importance of training the utilization of different strategies according to the context,

rather than advising clients to use any single strategy globally. For example, although research has emphasized the undesirable effects of expressive suppression (for a review, see Webb et al., 2012), our results suggest the importance of using this strategy when in the appropriate context. Hence, clinical work could benefit from improving the clients' context-sensitivity and expressive flexibility.

Our study has limitations. First, we did not include a follow-up assessment of EF, ER frequency and psychological health. Problems may arise, therefore, as to whether a lack in EF is indeed a risk factor or concurrent symptoms. However, previous studies have shown that higher EF prospectively predicts lower levels of psychological distress (Bonanno et al., 2004) and better psychological adjustment (Westphal et al., 2010). To clarify the temporal ordering of EF, ER frequency and psychological health, further longitudinal designs are needed. Second, the sample used in the present study consisted of healthy undergraduates. Thus, replication is needed for wider generalization. Specifically, future research should examine EF in at-risk and clinical samples to see if the results are generalizable to these populations. Third, we used self-report measure of EF. Although this measure has been shown to predict a laboratory assessment of EF (Burton & Bonanno, 2016) further exploration using both laboratory and ecological momentary assessment of EF (Aldao et al., 2015) are needed to further elucidate the construct. Finally, the incremental variances added by EF are relatively low. Future research examining ER, EF and psychopathology at multiple time points will further improve our understanding of the predictive abilities of EF and ER. As recent research highlights the importance of examining the stress-buffering effect of resilient factors such as EF and ER (Kalisch et al., 2017), longitudinal research including the assessment of stress severity may be informative in determining whether ER and EF are protective factors, temporal features of symptoms, or buffers against stress.

In conclusion, the current study shows that enhancement and suppression abilities differentially predict life satisfaction and psychopathology symptoms, when controlling for gender, age and ER frequency. Whether these results apply to longitudinal designs using populations of different levels of mental health and from different backgrounds, remains unknown and calls upon future research endeavors.

Declaration of interest

The authors report no conflicts of interest.

Acknowledgement

Shuquan Chen and Tong Chen received support from Tsinghua University Initiative Scientific Research Program (2016080166).

References

- Aiken, L., & West, S. (1991). *Testing and interpreting interactions in multiple regression* (1st ed). Thousand Oaks: Sage Publications.
- Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review, 30*(2), 217–237. <http://dx.doi.org/10.1016/j.cpr.2009.11.004>.
- Aldao, A., Sheppes, G., & Gross, J. J. (2015). Emotion regulation flexibility. *Cognitive Therapy and Research, 39*(3), 263–278. <http://dx.doi.org/10.1007/s10608-014-9662-4>.
- Beck, A. T., Brown, G., & Steer, R. A. (1996). *Beck Depression Inventory II manual*. San Antonio, TX: Psychological Corporation.
- Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology, 56*, 893. <http://dx.doi.org/10.1037/0022-006X.56.6.893>.
- Bonanno, G. A., & Burton, C. L. (2013). Regulatory flexibility. *Perspectives on Psychological Science, 8*, 591–612. <http://dx.doi.org/10.1177/1745691613504116>.
- Bonanno, G. A., Papa, A., Lalande, K. M., Westphal, M., & Coifman, K. G. (2004). The importance of being flexible: The ability to both enhance and suppress emotional expression predicts long-term adjustment. *Psychological Science, 15*, 482–487. <http://dx.doi.org/10.1111/j.0956-7976.2004.00705.x>.
- Burton, C. L., & Bonanno, G. A. (2016). Measuring ability to enhance and suppress

- emotional expression: The Flexible Regulation of Emotional Expression (FREE) scale. *Psychological Assessment*, 28, 929. <http://dx.doi.org/10.1037/pas0000231>.
- Cheng, K. W., Wong, C. W., Wong, K. C., Chong, H. C., Wong, T. P., Chang, S., ... Ng, K. O. (2002). A study of psychometric properties, normative scores and factor structure of Beck Anxiety Inventory Chinese version. *Chinese Journal of Clinical Psychology*, 10, 4–6.
- Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety*, 18, 76–82. <http://dx.doi.org/10.1002/da.10113>.
- Denny, B. T., & Ochsner, K. N. (2014). Behavioral effects of longitudinal training in cognitive reappraisal. *Emotion*, 14, 425–433. <http://dx.doi.org/10.1037/a0035276>.
- Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49, 71–75.
- Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85, 348. <http://dx.doi.org/10.1037/0022-3514.85.2.348>.
- Gupta, S., & Bonanno, G. A. (2011). Complicated grief and deficits in emotional expressive flexibility. *Journal of Abnormal Psychology*, 120(3), 635–643. <http://dx.doi.org/10.1037/a0023541>.
- Guzman, A. B. D., Jurado, J. B. N., & Juson, A. J. A. (2014). Examining the structural relationship of chronic illness, physical function, life satisfaction, and social support in the development of depression among Filipino elderly in institutionalized settings. *Educational Gerontology*, 41(3), 193–206. <http://dx.doi.org/10.1080/03601277.2014.918836>.
- Harvey, P. O., Bastard, G. L., Pochon, J. B., Levy, R., Allilaire, J. F., Dubios, B., & Possati, P. (2004). Executive functions and updating of the contents of working memory in unipolar depression. *Journal of Psychiatric Research*, 38, 567–576. <http://dx.doi.org/10.1016/j.jpsychires.2004.03.003>.
- Headey, B., Kelley, J., & Wearing, A. (1993). Dimensions of mental health: Life satisfaction, positive affect, anxiety and depression. *Social Indicators Research*, 29, 63–82.
- Joormann, J., & Stanton, C. H. (2016). Examining emotion regulation in depression: A review and future directions. *Behaviour Research and Therapy*, 86, 35–49. <http://dx.doi.org/10.1016/j.brat.2016.07.007>.
- Kalisch, R., Baker, D. G., Basten, U., Boks, M. P., Bonanno, G. A., Brummelman, E., ... Kleim, B. (2017). The resilience framework as a strategy to combat stress-related disorders. *Nature: Human Behavior*, 1, 784–790.
- Kashdan, T. B., & Rottenberg, J. (2010). Psychological flexibility as a fundamental aspect of health. *Clinical Psychology Review*, 30(7), 865–878. <http://dx.doi.org/10.1016/j.cpr.2010.03.001>.
- Parchecho-Unguetti, A. P., Acosta, A., Lupiáñez, J., Román, N., & Derakshan, N. (2012). Response inhibition and attentional control in anxiety. *The Quarterly Journal of Experimental Psychology*, 65, 646–666. <http://dx.doi.org/10.1080/17470218.2011.637114>.
- Rodin, R., Bonanno, G. A., Rahman, N., Kouri, N. A., Bryant, R. A., Marmar, C. R., ... Brown, A. D. (2017). Expressive flexibility in combat veterans with posttraumatic stress disorder and depression. *Journal of Affective Disorders*, 207, 236–241. <http://dx.doi.org/10.1016/j.jad.2016.09.027>.
- Schall, M., Martiny, S. E., Goetz, T., & Hall, N. C. (2016). Smiling on the inside: The social benefits of suppressing positive emotions in outperformance situations. *Personality and Social Psychology Bulletin*, 42(5), 559–571. <http://dx.doi.org/10.1177/0146167216637843>.
- Southward, M. W., & Cheavens, J. S. (2017). Assessing the relation between flexibility in emotional expression and symptoms of anxiety and depression: The roles of context sensitivity and feedback sensitivity. *Journal of Social and Clinical Psychology*, 36(2), 142–157. <http://dx.doi.org/10.1521/jscp.2017.36.2.142>.
- Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research*, 27, 247–259. <http://dx.doi.org/10.1023/A:1023910315561>.
- Tzelgov, J., & Henik, A. (1991). Suppression situations in psychological research: Definitions, implications, and applications. *Psychological Bulletin*, 109, 524–536. <http://dx.doi.org/10.1037/0033-2909.109.3.524>.
- Wang, L., Liu, H., Li, Z., & Du, W. (2007). Reliability and validity of emotion regulation questionnaire Chinese revised version. *China Journal of Health Psychology*, 10, 503–504.
- Wang, Z., Yuan, C., Huang, J., Li, Z., Chen, J., Zhang, H. Y., ... Xiao, Z. P. (2011). Reliability and validity of the Chinese version of Beck Depression Inventory-II among depression patients. *Chinese Mental Health Journal*, 25, 476–480.
- Webb, T. L., Miles, E., & Sheeran, P. (2012). Dealing with feeling: A meta-analysis of the effectiveness of strategies derived from the process model of emotion regulation. *Psychological Bulletin*, 138, 775–808. <http://dx.doi.org/10.1037/a0027600>.
- Westphal, M., Seivert, N. H., & Bonanno, G. A. (2010). Expressive flexibility. *Emotion*, 10(1), 92–100. <http://dx.doi.org/10.1037/a0018420>.
- Xiong, C., & Xu, Y. (2009). Reliability and validity of the Satisfaction with Life Scale for Chinese people. *China Journal of Health Psychology*, 17, 948–949.
- Yang, J., Ling, Y., Xiao, J., & Yao, S. (2009). The Chinese version of ruminative responses scale in high school students: Its reliability and validity. *Chinese Journal of Clinical Psychology*, 17, 27–31.
- Yu, X., & Zhang, J. (2007). Factor analysis and psychometric evaluation of the Connor-Davidson Resilience Scale (CD-RISC) with Chinese people. *Social Behavior and Personality*, 35, 19–30. <http://dx.doi.org/10.2224/sbp.2007.35.1.19>.