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RESEARCH ARTICLE

Habitual Expressive Suppression of Positive, but not Negative, Emotions Consistently Predicts Lower Well-being across Two Culturally Distinct Regions

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Abstract
Habitual expressive suppression (i.e., a tendency to inhibit the outward display of one's emotions; hereafter suppression) is often conceptualized as a maladaptive emotion regulation strategy. Yet, is this equally true for suppression of positive and of negative emotions? Across three studies and seven samples (total $N > 1300$ people) collected in two culturally distinct regions (i.e., Taiwan and the US), we examined the separability and distinct well-being effects of suppressing positive vs. negative emotions. Results consistently showed that (a) people suppressed their positive (vs. negative) emotions less, (b) the construct of suppression of positive (vs. negative) emotions was conceptually farther away from that of suppression of emotions in general, (c) suppression of positive and of negative emotions were only moderately correlated, and (d) only suppression of positive, but not negative, emotions, predicted lower well-being. An internal meta-analysis ($k = 52$ effect sizes) showed that these associations were robust to the inclusion of age, gender, and region as covariates. Future research may further probe the respective links between suppression of positive and of negative emotions and well-being across more cultural regions and across the life-span.

Keywords Expressive suppression · Emotion regulation · Emotion valence · Well-being · Emotion Regulation Questionnaire

Habitual expressive suppression of emotions (i.e., a tendency to inhibit the outward display of one's emotions; hereafter suppression) has a somewhat notorious reputation in affective science. Several meta-analyses showed that this emotion regulation strategy indeed relates to lower well-being and mental health (Aldao et al., 2010; Fernandes & Tone, 2021; Haga et al., 2009; Hu et al., 2014). However, recent theoretical advances and empirical studies have called for a more nuanced approach (Aldao, 2013; Greenaway & Kalokerinos, 2017; Soto et al., 2011). While a growing body of studies has identified culture as an important modulator of suppression effects (e.g., Soto et al., 2011), only sparse attention has been paid to emotional valence (e.g., Nezlek & Kuppens, 2008). Here we propose and empirically demonstrate—across three studies and seven samples collected in Taiwan and the US—the benefits of measuring and analyzing suppression of positive and of negative emotions separately. We show that this can be readily achieved with an existing and widely-used measure (i.e., the *Emotion Regulation Questionnaire*; Gross & John, 2003), and that this approach is conducive to a nuanced and yet critical understanding of the links between suppression and well-being.

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Suppression: a Maladaptive Strategy?

As a *response-focused* emotion regulation strategy, suppression is employed when an emotion episode is fully developed (Gross & John, 2003). As a result, compared to reappraisal—an *antecedent-focused* strategy, suppression is thought to be more affectively and cognitively taxing. For

example, in terms of affective costs, suppression tends to elicit unpleasant feelings of inauthenticity (English & John, 2013). This may be because authenticity is defined as "unobstructed operation of one's true self" (Kernis & Goldman, 2006, p.19), and because emotion is an important part of the self (Tamir, 2016). In terms of cognitive costs, for example, it takes considerable cognitive efforts to regulate an emotion episode when it is fully developed, which crowds out individual's cognitive capacity to process information (Hofstee et al., 2021; Richards & Gross, 1999, 2000). A quick search of the effects of suppression in the literature reveals that it is easy to find suppression labelled as "unhealthy" or "maladaptive," and viewed as an indicator of poor emotional functioning (e.g., Aldao et al., 2010; Beblo et al., 2012; John & Gross, 2004). Yet, recent theoretical advances and empirical evidence have argued for a more nuanced approach towards understanding characteristics and well-being consequences of emotion regulation strategies (Aldao, 2013; Sheppes, 2020; Tamir et al., 2019), including suppression (Greenaway et al., 2018). Two factors that may modulate the links between suppression and well-being have emerged from this line of work: emotion valence and culture.

The Role of Valence in Suppression

Whether an emotion is positive or negative, pleasant or unpleasant, plays a fundamental role in virtually every emotion theory (e.g., Barrett, 2017; Sznycer et al., 2021). Yet, emotion valence has often been overlooked in prior research on suppression. In fact, a recent meta-analysis was unable to examine valence as a moderator of the association between suppression and relationship well-being because of a shortage of studies (Chervonsky & Hunt, 2017).

One possible reason for this may lie in the way suppression has often been measured. For example, in their seminal work, Gross and John (2003) developed the *Emotion Regulation Questionnaire* (ERQ) to capture the use of two widely used emotion regulation strategies (i.e., reappraisal and suppression) in everyday life. Since its publication, the paper has been widely cited and the ERQ has become the go-to instrument for measuring suppression (e.g., Brienza et al., 2018; McCullen et al., 2022; Raio et al., 2021; Shu et al., 2022); nevertheless, the ERQ did not differentiate between the suppression of positive and of negative emotions. Interestingly, although early studies had found that the *expression* of positive and of negative emotions were empirically and conceptually different and had distinct effects on well-being (e.g., Gross & John, 1995, 1997; King & Emmons, 1990), studies of *suppression* often did not make the same distinction. Here we revisit the idea that suppressing positive emotions may be conceptually and empirically different from suppressing negative emotions.

Suppression of Positive vs. Negative Emotions Research shows that expressing positive emotions is often associated with greater well-being (Chervonsky & Hunt, 2017; Gable & Reis, 2010), and suppressing positive emotions is often associated with poorer well-being (Roberts et al., 2021; though see Greenaway & Kalokerinos, 2017). Consistent with a social-functional perspective of emotions (Keltner et al., 2022; Sznycer et al., 2021), by suppressing positive emotions, people may miss opportunities to build or strengthen connections with other people (Epley et al., 2022; Sels et al., 2021). Moreover, suppressing positive emotions could signal psychological distance to a perceiver and thus lead to misunderstandings between the suppressor and the perceiver (Roberts et al., 2021). By contrast, because expressing negative emotions may or may not engender beneficial outcomes, suppressing negative emotions may or may not harm one's well-being (Girme et al., 2021; Le & Impett, 2013; Tamir & Ford, 2012; Yu & Chang, 2023). While in some cases, suppressing negative emotions can undermine relationships, in other cases it can facilitate relationship-enhancing conversations (Graham et al., 2008; Velotti et al., 2016; Wei et al., 2013; Yu & Chang, 2023).

Three different lines of research support the idea that suppression of positive (but not negative) emotions could be related to lower well-being. First, early works using daily diary method revealed that daily suppression of positive emotions was associated with various state-level well-being indices whereas that of negative emotions was only associated with two (i.e., increased negative affect and decreased self-esteem) (Nezlek & Kuppens, 2008). A more recent work using the same method further showed that daily suppression of positive, but not of negative, emotions was associated with lower life satisfaction (Newman & Nezlek, 2022). Second, using an event-recall paradigm, a recent study found that participants' satisfaction with an emotional event was lower when they suppressed (vs. expressed) their positive emotions, but did not vary whether or not they suppressed or expressed their negative emotions (Yu & Chang, 2023). Finally, a recent meta-analysis on the relationship between suppression and positive affect found that valence significantly moderated the effect, such that suppression of positive emotions was associated with lower positive affect, whereas suppression of negative emotions was associated with higher positive affect (Fernandes & Tone, 2021). However, due to small number of studies, both of the effect sizes they found for each valence were not significant. To date, however, very few studies have examined whether suppression of positive and of negative emotions differentially relate to a variety of well-being indices on a trait-level.

Taken together, this work suggests that suppression of positive, but not necessarily negative, emotions, is associated with lower well-being. Moreover, from a functionalist perspective of emotions (Lench et al., 2015), emotions and

emotion regulatory behaviors that confer more costs (i.e., suppression of positive emotions) are less likely to become part of people's habitual behavioral repertoire compared to those that confer fewer costs (i.e., suppression of negative emotions). Thus, at a habitual level, people may suppress positive emotions less than negative emotions (cf. Yu & Chang, 2023). Finally, cognitive heuristics research (MacLeod & Campbell, 1992) would suggest that, if people indeed suppress positive emotions less often than negative emotions, the latter may also come to mind more readily when they report on their general suppression tendencies.

The Role of Culture in Suppression

Culture has received considerable attention as an important moderator of the well-being effects of suppression. Most research along this line contrasted cultures characterized by independent values (i.e., typically the US) with cultures characterized by interdependent values (i.e., typically East Asian countries). Almost unanimously, this research showed that suppression was associated with well-being costs for people with independent rather than interdependent cultural values (e.g., Butler et al., 2007; Fernandes & Tone, 2021; Han et al., 2022; Soto et al., 2011; Su et al., 2013). At the core of this work is the idea that social harmony, a key aspect of interdependent cultural values, could be maintained via suppression.

Yet, when it comes to the suppression of *positive* emotions specifically, there is considerable support for the idea that this strategy may confer well-being costs in both independent and interdependent cultures. First, from a theoretical perspective, expressions of positive emotions serve important functions in the initiation and maintenance of social bonds across the world (Sznycer et al., 2021). For example, in cultures characterized by independent as well as interdependent values, smiles are perceived as serving important bonding functions (Rychlowska et al., 2015). Second, from an empirical perspective, while cross-cultural studies of suppression have yielded critical insights, they often focused on select well-being indicators and included relatively small samples, often with undergraduate students. Only few studies with a cultural lens have examined suppression from a valence-specific perspective. One recent study that did (Young et al., 2022; for another notable exception see Han et al., 2022) found that suppression of positive and of negative emotions were only weakly correlated, and further showed that they had distinct prospective associations with depressive symptoms among Mexican-origin adolescents in the US. However, this study did not examine whether similar patterns also existed in other racialized groups (see also Fernandes & Tone, 2021). Finally, the suppression of positive vs. negative emotions was often measured with one item each, directly taken from the ERQ, which are slightly asymmetrical in their wording. Single-item measures have important benefits (e.g., reduced participants' burden), but more items tend to lead to higher measurement precision and reliability.

Current Investigation

Across three studies and seven datasets collected in both culturally interdependent and independent regions (i.e., Taiwan and the US), the present investigation aimed to comprehensively examine the separability and adaptiveness of suppressing positive vs. negative emotions. We define adaptiveness in a broad term (VanderWeele, 2017), encompassing higher well-being across various domains (e.g., hedonic happiness, social connectedness) and lower ill-being, again across various domains (e.g., depression, anxiety). To facilitate conversations with the existing literature, we grounded our analyses in the ERQ because an overwhelming majority of prior research has used this scale. Expanding upon prior research, we (a) examined associations between suppression of each valence and a variety of well-being indices, including hedonic, eudaimonic, Chinese culture relevant, and social-relevant well-being, as well as ill-being indices, such as depression and anxiety, (b) used larger and more diverse samples from two culturally distinct regions (i.e., Taiwan and the US), and (c) adapted a multi-item measurement of suppression of each valence.

We first hypothesized that (a) people would suppress their positive emotions less than negative emotions and (b) suppression of positive emotions would be less strongly related to the construct of suppression of emotions in general compared to the suppression of negative emotions. Second, we hypothesized that suppression of positive emotions would be consistently and negatively related to well-being, and suppression of negative emotions would be unrelated to well-being. Finally, we expected the findings would generalize across two culturally distinct regions. To this end, we conducted an internal meta-analysis to synthesize associations between suppression of each valence and well-being, and further examined whether and how much region would explain the variance in these effect sizes.

Study 1

Study 1 examined three Taiwanese datasets that contained the ERQ and a variety of well-being indices. Data collection procedures for Studies 1 and 3 were approved by the IRB at the corresponding author's institution.

Table 1 Sample characteristics and variables included in Study 1

	Dataset 1		Dataset 2		Dataset 3	
	M (*SD*)	α	*M* (*SD*)	α	*M* (*SD*)	α
Expressive suppression	3.29 (1.38)	.80	3.27 (1.16)	. 73	3.23 (1.15)	.76
Satisfaction with life	4.06 (1.37)	.94	3.76 (1.29)	.87	4.12 (1.25)	.90
Psychological well-being			3.99 (0.60)	.93		
Autonomy			3.72 (0.72)	.76		
Environmental mastery			3.40 (0.73)	.76		
Personal growth			4.40 (0.69)	.76		
Positive relations with others			4.27 (0.84)	.83		
Purpose in life			4.09 (0.80)	.79		
Self-acceptance			3.76 (0.89)	.87		
Peace of mind					3.89 (0.88)	.93
Depression (CESD)			1.96 (0.51)	.93		
N	154		137		188	
Age (*SD*)	19.82 (1.72)		20.61 (2.30)		21.70 (1.91)	
Male	32.47%		43.07%		34.43%	

Empty cells indicate that the variable was not included in the dataset

Methods

Sample Characteristics

Dataset 1 included 154 participants, with 32.47% male and a mean age of 19.82 years old (*SD* = 1.72). Dataset 2 included 137 participants, with 43.07% male and a mean age of 20.61 years old (*SD* = 2.30). Dataset 3 included 188 participants, with 34.43% male and a mean age 21.70 years old (*SD* = 1.91). Table 1 shows the sample characteristics and the descriptive statistics of the variables included in each of the datasets, and all participants were Taiwanese.

Measures

Suppression of Positive and of Negative Emotions

The *Expressive Suppression* subscale of the *Emotion Regulation Questionnaire* (Gross & John, 2003) was used to capture people's habitual use of suppression to regulate their emotions in their daily life. This subscale consisted of four items which can be categorized into three groups based on the valance being suppressed: (a) *positive* emotions (i.e., "*When I am feeling positive emotions, I am careful not to express them.")*, (b) *negative* emotions (i.e., "*When I am feeling negative emotions, I make sure not to express them.*"), and (c) emotions *in general* (i.e., "*I control my emotions by not expressing them"* and "*I keep my emotions to myself.*"). Participants rated on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Well-being Measures

Well-being indices spanned across three aspects: hedonic, eudaimonic, and Chinese cultural relevant. For the hedonic aspect, we used the *Satisfaction with Life Scale* (SWLS, Diener et al., 1985). This scale consisted of five items on a 7-point scale (1 = *strongly disagree* to 7 = *strongly agree*), and it measured people's cognitive evaluation of their life quality. This scale was included in all three datasets. For the eudaimonic aspect, we used the *Psychological Well-being Scale* (PWB; Ryff, 1989). This scale consisted of 54 items and six subscales on a 6-point scale (1 = *strongly disagree* to 6 = *strongly agree*), each of which captured a unique dimension of eudaimonic well-being: *Autonomy*, *Environmental Mastery*, *Personal Growth*, *Positive Relations with Others*, *Purpose in Life*, and *Self-acceptance*. This scale was only included in Dataset 2. Finally, for the Chinese cultural relevant aspect, we used the *Peace of Mind Scale* (PoM; Lee et al., 2013). This scale consisted of seven 6-point items (e.g., My lifestyle gives me feelings of peace and stability; from 1 = *not at all* to 6 = *all the time*), and it measured a peaceful and harmonious affective state valued in East Asian culture. This scale was only included in Dataset 3.

Ill-being Measure

Ill-being was measured with *Center for the Epidemiological Studies of Depression* (CESD; Radloff, 1977). This scale consisted of 20 items, and it measured people's

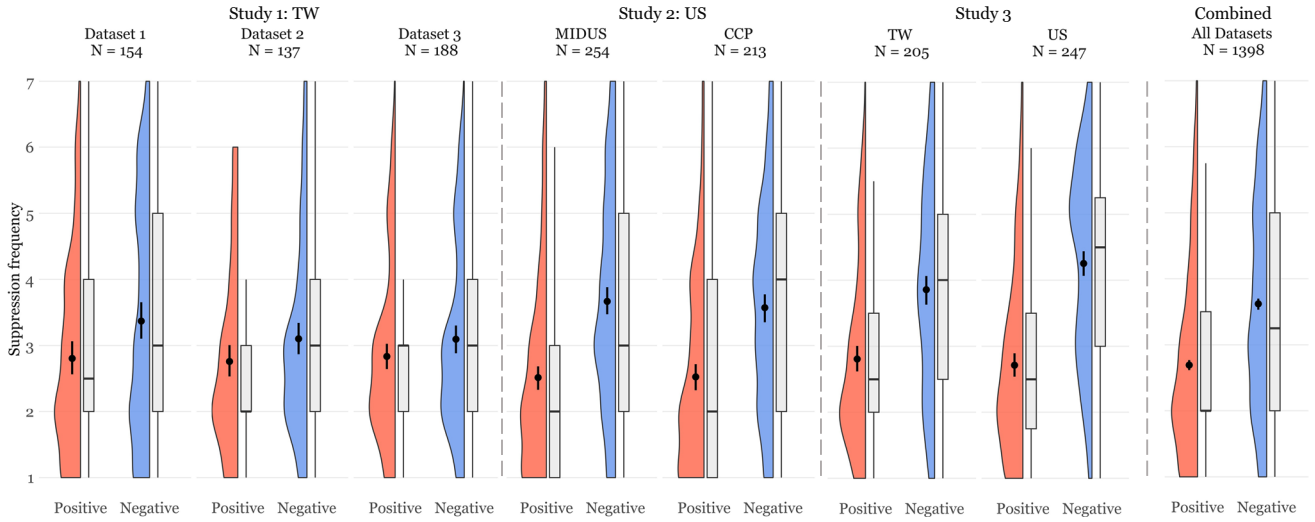

Fig. 1 Mean-level comparisons of the suppression of negative emotions and positive emotions. Box plots and raincloud plots are shown to illustrate the distribution of the data. The black dots and the enclosing lines inside the raincloud are the means and 95% confidence intervals. TW = Taiwan, US = United States, MIDUS = Midlife in the US, CCP = Common Cold Project

self-reported depressive symptoms. This scale was only included in Dataset 2. Participants reported on a 4-point scale (from 0 = *Rarely or none of the time (less than 1 day)* to 3 = *All of the time (5-7 days)*).

Analytic Strategies

All the analyses were conducted using *R* (version 4.1.2; R Core Team, 2017).

First, mean scores of the three forms of suppression were compared (i.e., positive emotions, negative emotions, and emotions in general). Second, the inter-correlation among these forms of suppression was examined by computing the *Pearson's* correlation coefficients (*r*) of the pairs among the three forms. The *r* between suppression of emotions in general and of positive emotions was further compared with that between the suppression of emotions in general and of negative emotions. A significant difference would provide evidence that suppression of emotions in general was conceptually closer to one particular valence. The difference between the *r*s was computed using the procedure laid out by Hittner et al. (2003) with the *cocor* package (Diedenhofen & Musch, 2015).

Third, the discriminant effects of the two constructs of suppression of positive and of negative emotions were examined using multiple linear regression. Specifically, these two forms of suppression were simultaneously entered in the models predicting each of the aforementioned well-being indices (hedonic, eudaimonic, and Chinese cultural relevant well-being, and ill-being), revealing the unique effects of suppression of each valence. In these models, the original suppression subscale and the items on suppression of emotions in general were not entered as covariates because (a) these measures do not specifically consider emotion valence, which was the primary focus of the present investigation, and (b) entering them would cause multicollinearity issues. Finally, age and gender were entered in the model to examine the robustness of the effects of suppression of each valence.

Table 2 Bivariate correlation among suppression of different valences in Studies 1(Datasets 1–3) and 2 (MIDUS and CCP)

	Dataset 1 / Dataset 2 / Dataset 3/ MIDUS/ CCP	
	Suppression of EG	Suppression of PE
Suppression of PE	.40/.24/.33/.41/.50	.32/.25/.32/.35/.38
Suppression of NE	.77/.61/.52/.56/.52	
Z statistic (row 1 – row 2)	−5.19/−3.80/−2.27/−2.52/−0.35	

All coefficients were significant at $p < .01$, except for the last *Z* where its $p = .749$. PE = positive emotions, NE = negative emotions, EG = emotions in general

Table 3 Standardized regression coefficients (β) of multiple linear regression in Study 1

	Dataset 1		Dataset 2		Dataset 3	
	Positive	Negative	Positive	Negative	Positive	Negative
Well-being indices						
Satisfaction with life	−0.10	−0.01	−0.19*	0.03	−0.22**	0.01
Psychological well-being			−0.33***	−0.09		
Autonomy			−0.17†	−0.06		
Environmental mastery			−0.27**	−0.02		
Personal growth			−0.32***	−0.09		
Positive relations with others			−0.36***	0.04		
Purpose in life			−0.06	−0.23*		
Self-acceptance			−0.31***	−0.08		
Peace of mind					−0.18*	0.05
Ill-being index						
Depression			0.27**	−0.03		

† $p < .10$, * $p < .05$**, $p < .01$, *** $p < .001$. Empty cells indicate that the variable is not included in the dataset. Positive = suppression of positive emotions, Negative = suppression of negative emotions

Results

Mean-level Comparisons

Across all three datasets, within-person ANOVAs showed that the extent to which people habitually suppressed their emotions in general, positive emotions and negative emotions was statistically different, Fs > 15.40, ps < .001, partial η^2s > 0.08. Furthermore, as shown in Fig. 1, post-hoc comparisons showed that people habitually suppressed their positive emotions (for Datasets 1 to 3 respectively, Ms = 2.81, 2.76, 2.84, and SDs = 1.50, 1.42, 1.37) less than negative emotions (for Datasets 1 to 3 respectively, Ms = 3.37, 3.10, 3.10, and SDs = 1.82, 1.51, 1.43), ts > 2.18, ps < .05, ds > 0.15.

Inter-correlation Examination

Table 2 shows the rs between suppression of emotions in general, of positive emotions, and of negative emotions. Comparing the rs between suppression of each valence and of emotions in general showed that the r involving positive emotions was significantly weaker than that involving suppression of negative emotions, Zs < −2.27, ps < .01 (last row in Table 2). This indicated that people's responses to the items on suppression of emotions in general were more closely related to negative emotions (rs ranging from .52 to .77) than to positive emotions (rs ranging from .24 to .40).

Finally, we found the rs between suppression of positive and of negative emotions were only of moderate magnitudes (rs ranging from .25 to .32). These results corroborated the separation of these two forms of suppression and suggested that they may have different implications for people's well-being, which we examined next.

Discriminant Effects Examination

The rs between the original suppression subscale as well as the valence-specific suppression items and each of the well-being indices can be found in Table 8 in Appendix. Next, as shown in Table 3, multiple linear regression models showed these two forms of suppression had distinct predictive utilities for verious well-being indices. Specifically, controlling for the effect of each other, the models showed that suppression of positive emotions was consistently associated with lower well-being (|β|s ranging from 0.10 to 0.33), whereas that of negative emotions was not associated with well-being at all (β|s ranging from 0.01 to 0.09). The only exception was observed for the purpose in life dimension of the PWB scale in Dataset 2, in which suppression of negative emotion was predictive of purpose in life (β = −0.23, $p < .05$), but suppression of positive emotions was not (β = −0.06, $p = .495$). Controlling for participants' gender[1] and age did not alter the aforementioned results in any way.

Discussion

In Study 1, we showed that suppression of positive and of negative emotions were distinct in terms of (a) the extent to which people habitually engaged in each, (b) the construct proximity between each form of suppression and suppression of emotions in general, and (c) the implications of each for well-being. One major limitation of Study 1, however, is that all the samples consisted of Taiwanese young adults. We addressed this limitation in Study 2.

[1] In this and the following analyses, gender was dummy coded (female = 0, male = 1).

Study 2

Building on the consistent findings of Study 1, Study 2 aims to examine the stability and the generalizability of these results in samples both (a) from a different cultural region and (b) including a wider age range. To this end, we capitalized on two publicly available datasets that included the raw item scores of the ERQ and a variety of well-being indices—the Midlife in the US Study (MIDUS) and the Common Cold Project (CCP).

Method

Participants

MIDUS Sample

MIDUS was a national study carried out with the purpose of understanding the "patterns, predictors, and consequences of midlife development in the areas of physical health, psychological well-being, and social responsibility" (https://midus.wisc.edu/midus1/index.php). We used the only two MIDUS studies that included the ERQ: MIDUS 2 and MIDUS refresher. The former study was conducted during 2002–2009, and the latter during 2011–2014. These two waves of studies were merged to maximize the power of our analyses. After the exclusion of missing values, sample sizes of each regression analysis varied from 171 to 254, based on which well-being index was the outcome variable (see Table 4). Here we reported the demographics of the subset of sample whose scores on suppression of positive and of negative emotions were available, which consisted of 254 people. The sample was 46.46% male with a mean age of 48.09 years old ($SD = 11.02$). There were 91.81% White, 1.75% Native American or Alaska Native Aleutian Islander/Eskimo, 1.74% Asian, 0.58% Black/African American, and 4.68% other race.

CCP Sample

We capitalized on the Pittsburgh Cold Study 3 under the CCP (https://www.cmu.edu/common-cold-project/pittsburgh-cold-study-3/index.html) whose aim was to examine

Table 4 Descriptive statistics of the variables included in Study 2

	MIDUS			Common cold project ($N = 213$)	
	M (*SD*)	α	Valid *N*	*M* (*SD*)	α
Expressive suppression	3.43 (1.26)	.77	254	3.39 (1.21)	.75
Life satisfaction	7.82 (1.52)	–	171		
Stress				1.20 (0.56)	.81
Psychological well-being	5.38 (0.81)	.93	170	4.41 (0.64)	.93
Autonomy	5.18 (1.03)	.76	170		
Environmental mastery	5.26 (1.16)	.84	170	4.53 (0.80	.81
Personal growth	5.60 (0.97)	.78	170		
Positive relations with others	5.68 (1.02)	.78	170	4.40 (0.72)	.81
Purpose in life	5.51 (0.92)	.70	170	4.48 (0.72)	.77
Self-acceptance	5.02 (0.9)	.62	170	4.25 (0.73)	.82
Community				4.51 (0.82)	.80
Social participation				3.24 (0.77)	.82
Social support				2.43 (0.47)	.83
Appraisal support				2.25 (0.57)	.68
Belonging support				2.39 (0.57)	.70
Tangible support				2.39 (0.55)	.61
Family support	3.46 (0.66)	.87	171		
Friend support	3.34 (0.64)	.88	171		
Depressive symptoms					
Anxiety symptoms (trait)	1.99 (0.39)	.86	253		
Anxiety symptoms (state)	1.58 (0.40)	.88	254		
Alexithymia				2.24 (0.51)	.83
Difficulty identifying emotions				1.96 (0.75)	.85
Difficulty describing emotions				2.35 (0.55)	.79
Externally oriented thinking				2.24 (0.82)	.62
Loneliness				1.80 (0.64)	.79

Empty cells indicate that the variable was not included in the dataset

the effects of an exposure to the common cold virus in a sample of healthy adults. The data was collected during 2007–2011. The sample consisted of 213 people, with 57.75% male and a mean age of 30.13 years old (*SD* = 10.85). There were 66.67% White/Caucasian, 27.23% Black/African-American, 1.88% Asian or Pacific Islander, 1.41% Hispanic, 0.47% Native American, Eskimo, Aleut, and 2.35% other race. There were no missing values with regards to the measures used in this study.

Measures and Analytic Strategies

Descriptive statistics of all the scales, including reliability coefficients, can be found in Table 4.

Suppression of Positive and of Negative Emotions

In both the MIDUS and the CCP datasets, suppression of positive and of negative emotions were measured with the ERQ as in Study 1.

Well-being and Ill-being Measures

MIDUS Dataset Well-being indices in the MIDUS dataset spanned across three aspects: hedonic, eudaimonic, and social-relevant. For the hedonic aspect, overall life satisfaction was measured with a 10-point item (i.e., "*Using a scale from 0 to 10 where 0 means 'the worst possible life overall' and 10 means 'the best possible life overall,' how would you rate your life overall these days?*"). For the eudaimonic aspect, the PWB scale described in Study 1 was included. Finally, for the social-relevant aspect, support from family (e.g., "*Thinking about the members of your family, not including your spouse/partner, how much do they care about you?*") and from friends (e.g., "*How much do your friends really care about you?*") were respectively measured with four items (Walen & Lachman, 2000). Participants filled these support measures using a 4-point scale (from 1 = *A lot* to 4 = *Not at all*), which were reversed coded in the analyses such that higher scores reflected more received social support.[2]

As for the ill-being indices, MIDUS included the *Spielberger State-Trait Anxiety Inventory* (Spielberger et al., 1983). The trait form consisted of 20 items, and participants rated on a 4-point scale based on their *general tendency* to experience the feeling described by the item (e.g., "*I tire quickly*"; from 1 = *Almost never* to 4 = *Almost always*). The state form similarly consisted of 20 4-point items, and participants rated the degree to which they experienced the feeling described by the item *at the time* they filled out the survey (e.g., "*I am tense*").

CCP Dataset Well-being indices in the CCP dataset spanned across two aspects: eudaimonic, and social-relevant. In terms of eudaimonic aspect, four subscales of the PWB were included: *Environmental Mastery*, *Positive Relations with Others*, *Purpose in Life*, and *Self-acceptance*. Participants reported on a 6-point scale (from 1 = *Strongly agree* to 6 = *Strongly disagree*).

In terms of the social-relevant aspect, the CCP dataset included the following three measures. First, *Social Participation Measure* was developed by the CCP team and consisted of 16 6-point items (e.g., "*visited with friends*"; from 1 = *Did not do this at all in the past year* to 6 = *More than once a week*). Second, *Perceived Community* was modified from the work of Heidrich and Ryff (1993) by the CCP team and consisted of 10 6-point items (e.g., "*I would be missed if I moved*"; from 1 = *Strongly disagreed* to 6 = *Strongly agree*). Third, the *Interpersonal Support Evaluation List-12* (*ISEL*; Cohen et al., 1997) consisted of three subscales with four items each. These were *Appraisal* (e.g., "*When I need suggestions for how to deal with a personal problem, I know there is someone I can turn to.*"), *Belonging* (e.g., "*If I wanted to have lunch with someone, I could easily find someone to join me.*"), and *Tangible* (e.g., "*If I were sick, I could easily find someone to help with daily chores.*"). Participants filled out these measures on a 4-point scale (from 0 = *Definitely False* to 3 = *Definitely True*). All the scales were reversed coded if necessary, such that higher scores reflected higher psychological well-being.

In terms of ill-being indices, the CCP included three scales. First, the *Perceived Stress Scale* (Cohen et al., 1983) consisted of 10 5-point items (e.g., "*In the last month, how often have you found that you could not cope with all the things that you had to do?*"; from 0 = *Never* to 4 = *Very often*). Second, the *Short Loneliness Scale* (Hughes et al., 2004) consisted of three 4-point items (e.g., "*How often do you feel lack of companionship?*" from 1 = *Never* to 4 = *Very often*). Finally, the *Toronto Alexithymia Scale* consisted of 20 items and three subscales (Bagby et al., 1994). They were *Difficulty in Identifying Feeling* (seven items; e.g., "*I am often confused about what emotion I am feeling.*"), *Difficulty in Describing Feelings* (five items; e.g., "*It is difficult for me to find the right words for my feelings.*"), and *Externally*

[2] These well-being indices were measured on average 2.56 years prior the measurement of the ERQ. Previous study has shown that people's life satisfaction (Fujita & Diener, 2005; Schimmack & Oishi, 2005) and eudaimonic well-being (i.e., PWB) was temporally stable, and has demonstrated the validity of retrospectively predicting PWB (Heller et al., 2013). Therefore, we believed that it was valid to predict PWB and overall life satisfaction with suppression. Given that there is a lack of evidence supporting the temporal stability of received social support, interpretations of the analyses involving these retrospective associations should be cautious.

Oriented Thinking (eight items; e.g., "*I prefer to just let things happen rather than to understand why they turned out that way.*"). Participants reported on a 5-point scale (from 1 = *Strongly disagree* to 5 = *Strongly agree*).

All the measures, including the ERQ, were administered concurrently to the participants prior to the exposure to the common cold virus.

Analytic Strategies

The analytic strategies of Study 2 exactly followed those of Study 1. For the MIDUS dataset, we additionally tested whether controlling for the wave of the data (i.e., MIDUS2 or MIDUS refresher) would influence the results.

Results

Mean-level Comparisons

Across both MIDUS and the CCP datasets, within-person ANOVAs showed that the extent to which people habitually suppressed their emotions in general, positive emotions and negative emotions was statistically different, Fs > 70.00, ps < .001, partial η^2s > 0.27. Furthermore, as shown in Fig. 1, post-hoc comparisons revealed that people habitually suppressed their positive emotions (MIDUS: $M = 2.52$, $SD = 1.50$; CCP: $M = 2.53$, $SD = 1.48$) less than negative emotions (MIDUS: $M = 3.67$, $SD = 1.69$; CCP: $M = 3.57$, $SD = 1.59$), ts > 8.90, ps < .001, ds > 0.60.

Inter-correlation Examination

Table 2 shows the rs between suppression of emotions in general, of positive emotions, and of negative emotions. In the MIDUS dataset, the r between suppression of positive emotions and suppression of emotions in general ($r = .41$, $p < .001$) was weaker than that between suppression of negative emotions and suppression of emotions in general ($r = .56$, $p < .001$), $Z = -2.52$, $p < .01$. In the CCP dataset, there was only numeric difference between the two rs, and no statistical difference, $Z = -0.35$, $p = .749$. Finally, for both the MIDUS and the CPP datasets, suppression of positive and of negative emotions were only moderately correlated, rs = .35 and .38 for MIDUS and CPP, respectively, both ps < .001.

Discriminant Effects Examination

The rs between the original suppression subscale as well as the valence-specific suppression items and each of the well-being indices can be found in Table 9 in Appendix. Multiple linear regression models showed that suppression of positive emotions was consistently associated with lower well-being (|βs| ranging 0.13 to 0.47), whereas that of negative emotions was not associated with well-being (|βs| ranging from < 0.01 to 0.12). Results of these models are shown in Table 5. Controlling for participants' gender, age, and the wave of data collection (in the case of MIDUS) did not change any of the results.

Discussion

Study 2 largely replicated the results of Study 1, showing that suppression of positive and of negative emotions were engaged at a different frequency and that these two forms

Table 5 Standardized regression coefficients (β) of multiple linear regression in Study 2

	MIDUS		Common cold project	
	Positive	Negative	Positive	Negative
Well-being indices				
Life satisfaction	−0.33**	0.05		
Stress			0.18*	< −0.01
Psychological well-being	−0.24*	−0.04	−0.36***	< 0.01
Autonomy	−0.28**	−0.12		
Environmental mastery	−0.17	0.01	−0.23***	< −0.01
Personal growth	−0.21*	−0.05		
Positive relations with others	−0.22**	0.02	−0.47***	0.08
Purpose in life	−0.13	< −0.01	−0.31***	−0.02
Self-acceptance	−0.15	−0.05	−0.21**	−0.02
Community			−0.28***	0.08
Social participation			−0.15*	−0.07
Social support			−0.28***	< 0.01
Appraisal support			−0.30***	0.02
Belonging support			−0.18*	< 0.01
Tangible support			−0.23***	−0.04
Family support	−0.21**	< 0.01		
Friend support	−0.28***	−0.05		
Ill-being indices				
Anxiety symptoms (trait)	0.22***	0.05		
Anxiety symptoms (state)	0.31***	−0.08		
Alexithymia			0.42***	< 0.01
Difficulty identifying emotions			0.30***	−0.07
Difficulty describing emotions			0.34***	0.12†
Externally oriented thinking			0.31***	−0.05
Loneliness			0.13†	< 0.01

† $p < .10$, * $p < .05$**, $p < .01$, *** $p < .001$. Empty cells indicate that the variable is not included in the dataset. Positive = suppression of positive emotions, Negative = suppression of negative emotions

of suppression predicted well-being with distinct patterns. Despite the consistency across Studies 1 and 2, suppression of each valence was measured with only one item each. Furthermore, the well-being measures of these studies did not correspond to each other. Finally, the age groups across these studies also differed.

Study 3

Study 3 addresses the limitations of Studies 1 and 2. First, we created new items assessing suppression for each valence. These items were worded in the exact same way except for the valence component (see below). This could (a) increase our measurement reliability and overcome the limitations of single-item measurement, and more importantly (b) rule out the alternative explanation that the effects we found were due to the subtle asymmetry in the wording of the original scale. In addition, we excluded items in the original scale that assessed suppression of emotions in general. This allowed us to examine the relationships between suppression of each valence with more precision. Therefore, we expected to find larger effect sizes of suppression of positive emotions compared to the previous two studies. Finally, we recruited a new Taiwanese and a new US sample that were similar in age and were larger than any single dataset alone in Studies 1 and 2 in the respective region. We also included the same well-being indices in these two samples to facilitate comparison.

Method

Participants

Based on the effect sizes from Studies 1 and 2, we aimed for a medium-to-large effect size (Funder & Ozer, 2019) of the suppression of positive emotions on well-being, $r = .25$. Power analysis showed that to detect this effect with 80% power we needed 123 participants.

The Taiwanese sample of consisted of 205 Taiwanese people, which gave us 95% power to detect the targeted effect size. The sample was 45.37% male, the mean age was 28.12 ($SD = 6.75$). Participants completed the study measures in the lab after finishing a task unrelated to the current investigation.

For the US sample, we recruited 250 people via *Prolific* (https://www.prolific.co). Excluding those who did not pass attention checks, the final sample consisted of 247 people, with 46.15% male and a mean age of 28.86 ($SD = 4.20$). This sample size gave 97% power to detect the targeted effect size. There were 73.68% White/Caucasian, 11.34% Hispanic, 10.93% Black/African-American, 0.81% Asian, 0.41% Native American, Eskimo, Aleut, 0.41% Native Hawaiian or Pacific Islander, and 2.43% other race.

Measures

In addition to the two items on suppression of positive and of negative emotions that were present in the original scale, additional items with near-identical wording were adapted from the ERQ and included in the study.

For the Taiwanese sample, each form of suppression was measured with two items ("*When I am feeling [positive/negative] emotions, I am careful not to express them*", and "*When I am feeling [positive/negative] emotions, I make sure not to express them.*"). For the US sample, additional two items were included ("*I keep my [positive/negative] emotions to myself*", "*I control my [positive/negative] emotions by not expressing them*"), and thus suppression of each valence was measured with four items. Hedonic and eudaimonic aspects of well-being as well as ill-being measures described in Study 1 were included.[3] Reliabilities of these scales were acceptable (αs ranged from .58–.95; see Table 6), except for the purpose in life subscale of the PWB in the US sample, which was .31. Descriptive statistics of all the measures can be found in Table 6.

Analytic Strategies

The separability of suppression of each valence and their respective effects on well-being were examined in the same way as previous studies.

To examine the robustness of the results, in addition to controlling for age and gender, additional three sets of analyses were conducted with the US sample. Specifically, models were rerun (a) with the same two items on suppression of each valence used in the Taiwanese sample to check if our findings were driven by the number of items or by the wording of the items, (b) excluding participants whose response time was two *SD*s away from the median to ensure the quality of this online sample, and finally, (c) restricting the sample to white participants only to check if our findings from Taiwanese samples were generalizable to this group of people conventionally thought to be culturally distinct from East Asians (Han et al., 2022; Soto et al., 2011; Su et al., 2013).

Results and Discussion

Mean-level Comparisons and Zero-order Correlation

A paired *t*-test showed that participants in both cultural region (Taiwan and US) suppressed their positive emotions (Taiwan: $M = 2.81$, $SD = 1.28$; US: $M = 2.71$, $SD = 1.41$)

[3] SWLS, the shortened 10-item CESD, and 18-item PWB scale were used.

Table 6 Sample characteristics and variables included in Study 3

	Taiwanese sample		US sample	
	M (*SD*)	α	*M* (*SD*)	α
Suppression of positive emotions	2.81 (1.28)	.86[a]	2.71 (1.41)	.95
Suppression of negative emotions	3.86 (1.61)	.69[a]	4.26 (1.51)	.94
Satisfaction with life	3.85 (1.43)	.91	3.96 (1.66)	.92
Psychological well-being	4.81 (0.78)	.85	4.66 (0.89)	.87
Autonomy	4.59 (1.11)	.66	5.12 (0.99)	.60
Environmental mastery	4.41 (1.12)	.66	4.01 (1.42)	.78
Personal growth	5.68 (0.95)	.76	5.54 (0.99)	.65
Positive relations with others	4.81 (1.22)	.58	4.47 (1.28)	.60
Purpose in life	4.83 (1.26)	.61	4.55 (1.10)	.31
Self-acceptance	4.54 (1.27)	.78	4.33 (1.51)	.83
Depression (CESD)	1.45 (0.58)	.86	1.12 (0.74)	.91
N	205		247	
Age (*SD*)	28.12 (6.75)		28.86 (4.20)	
Male	45.37%		46.15%	

[a]Reliability of suppression of each valence in the Taiwanese sample was calculated based on *r*s between the two items

less than negative emotions (Taiwan: $M = 3.86$, $SD = 1.61$; US: $M = 4.26$, $SD = 1.51$), ts = 8.00, ps < .001, ds > 0.61 (see Fig. 1). Furthermore, the association between these two constructs was of moderate magnitude, both rs = .35, ps < .001.

Discriminant Effects Examination

The *r*s between the valence-specific suppression scales and each of the well-being indices can be found in Table 10 in Appendix. As shown in Table 7, across multiple regression models, suppression of positive emotions was consistently predictive of lower well-being (|β|s ranging from 0.23 to 0.49 in Taiwanese sample, and from 0.26 to 0.51 in US sample), whereas suppression of negative emotions was not or only weakly so (|β|s ranging from 0.01 to 0.13 in Taiwanese sample, and from 0.04 to 0.16 in US sample). Controlling for participants' gender and age did not alter the aforementioned results in any way.

Table 7 Standardized regression coefficients (β) of multiple linear regression in Study 3

	Taiwanese sample		US sample	
	Positive	Negative	Positive	Negative
Satisfaction with life	−0.23**	−0.01	−0.26***	0.07
Psychological well-being	−0.49***	−0.05	−0.51***	0.12*
Autonomy	−0.24***	−0.13†	−0.30***	0.11
Environmental mastery	−0.39***	0.07	−0.29***	0.16*
Personal growth	−0.30***	−0.08	−0.45***	0.12†
Positive relations with others	−0.33***	−0.04	−0.46***	0.05
Purpose in life	−0.27***	−0.08	−0.38***	0.04
Self-acceptance	−0.44***	0.03	−37***	0.09
Depression (CESD)	0.38***	−0.07	0.28***	−0.10

† $p < .10$, * $p < .05$**, $p < .01$, *** $p < .001$. Positive = suppression of positive emotions, Negative = suppression of negative emotions

Sensitivity Analyses

For the US sample, quantifying suppression of each valence using only the two items used in Taiwanese sample rendered all the effects of suppression of negative emotions non-significant (|β|s ranging from 0.01 to 0.10). Furthermore, excluding participants whose response time was unusually shorter or longer than the median ($N = 228$), or restricting the sample to white participants only ($N = 182$) did not change the results in any way.

In sum, the findings from Study 3 replicated those of Studies 1 and 2, corroborating the separability of suppression of positive and of negative emotions and the well-being implications for such separation.

Mini Meta-analysis

Internal mini meta-analyses were conducted to synthesize the *r*s between all the pairs of suppression of each valence and each of the well-being indices (Goh et al., 2016). Although the well-being indices included in each dataset varied, they were treated as reflecting one overarching well-being index of human flourishing (VanderWeele, 2017).

Method

Procedure and Analytic Strategy

The *r*s were first transformed into *Fisher's Z*s before synthesized.[4] Only the subscales of a measure were included in the model to avoid score dependency issue.

For each form of suppression, multilevel meta-analysis was conducted using the *Metafor* package (Viechtbauer, 2010) to parse out different sources of variations in effect sizes (Pastor & Lazowski, 2018). A four-level model was first conducted. Specifically, for each form of suppression, there were at least 1300 respondents[5] (level 1) contributing to 52 effect sizes

[4] The *r*s involving ill-being indices were multiplied by negative one to facilitate interpretation.

[5] The exact number of respondents depended on which well-being index was used (ranging from 1314 to 1398).

(level 2) derived from seven datasets (level 3) spanning across two regions (level 4). Variations in the effect sizes at each level were examined. Next, log-likelihood tests were conducted to examine whether more complicated models with more levels outperformed simplified models with fewer levels (Harrer et al., 2021). If the model performed equally well, the more parsimonious model was chosen. The final chosen model was the one from which the synthesized effect size (converted back to *r*)—along with the variations in the effect sizes—was reported. Furthermore, if the test for heterogeneity in the effect sizes was significant (based on the *Q* statistics), meta-regression was conducted on the final model to explain the heterogeneity in the effect sizes. Specifically, the percentage of males in and the average age of a dataset were treated as continuous meta-regressors, and region (reference group = Taiwan) in which the dataset was collected was treated as a categorical meta-regressor.

Results

Synthesized Effect of Suppression of Positive Emotions

The three-level model fitted the data equally well as the four-level model, $\chi^2 < 0.01$, $p > .99$, but significantly better than the two-level model, $\chi^2 = 5.20$, $p < .05$. Therefore, the three-level model was chosen as the final model. Suppression of positive emotions showed a medium-to-large negative correlation with well-being, $r = -.26$, $p < .001$, 95% CI = [−.30–−.21]. According to the guidelines provided by Funder and Ozer (2019), this effect size is explanatorily and practically important and has implications for the outcomes of interest in the short run for a single person or in a group of people in one occurrence.

Variance decomposition showed the total variation not attributable to participants sampling error was $I^2 = 47.73\%$, which could be further decomposed into 25.81% on the dataset level and 21.92% on the effect size level. Because there was significant heterogeneity in the effect sizes ($Q = 90.18$, $p < .001$), meta-regression was conducted. However, results showed that gender (estimate = 0.33), age (estimate = < .01), and region (estimate = −0.09) were all unable to explain such heterogeneity, all *p*s > .10.

Synthesized Effect of Suppression of Negative Emotions

The three-level model fitted the data equally well as the four-level model, $\chi^2 = 0.25$, $p = .618$. and as the two-level model, $\chi^2 = 2.57$, $p = .11$. Therefore, the more parsimonious two-level model was chosen as the final model. Suppression of negative emotions showed a very small negative correlation with well-being, $r = -.07$, $p < .001$, 95% CI = [−.10–−.03]. According to Funder and Ozer (2019), the capability of this effect size to explain single events is very limited, but could potentially have consequences in the short-run.

Variance decomposition showed the total variation not attributable to participants sampling error on the effect size level was $I^2 = 34.00\%$. Because of a lack of significant heterogeneity in the effect sizes ($Q = 46.00$, $p = .672$), meta-regression was not conducted to avoid over-fitting.

Finally, as indicated by the non-overlapping confidence intervals, the synthesized effect size of suppression of positive emotions was stronger than that of suppression of negative emotions.

General Discussion

The present investigation shows that habitual expressive suppression of positive and of negative emotions are related yet distinct constructs with differential well-being implications. Across three studies ($N > 1300$) with data collected in two culturally distinct regions (i.e., Taiwan and US), we established the separability and differential adaptiveness of suppressing positive vs. negative emotions. Studies and 1 and 2 utilized existing datasets that were collected in Taiwan and the US respectively and that included the ERQ. Findings showed that (a) people suppressed their positive (vs. negative) emotions less, (b) the construct of suppression of positive (vs. negative) emotions was less related to the construct of suppression of emotions in general, and (c) suppression of each valence were only moderately correlated. Finally, via regression analyses, we showed that only the suppression of positive, but not negative, emotions predicted lower well-being and higher ill-being. Building on these results, Study 3 recruited larger and comparable samples in Taiwan and the US, and furthermore included new items that were symmetrical in wording. The results of Study 3 replicated those of Studies 1 and 2. Finally, internal meta-analyses showed that suppression of positive emotions was moderately costly to well-being, and suppression of negative emotions was only weakly so. These associations were further found to be robust to gender, age, and region. Overall, our consistent results provide strong and comprehensive support for the claim that expressive suppression should be separated based on emotion valence in order to obtain a nuanced and yet critical understanding of the adaptiveness of this emotion regulation strategy. All results were based on correlational evidence, and therefore causal evidence from experiments or longitudinal data (e.g., Young et al., 2022) is needed to disentangle the direction of the effects. Several other directions for future research flow from this work.

Are the Well-being Costs of Suppression more Valence-specific than Culture-specific?

Taking a valence-specific lens, we found that suppression of positive, but not negative, emotions was related to lower well-being for both Taiwanese and US participants. This was found across a variety of well-being indices and across a wide age range of US participants, and the effect remained stable in the US sample of Study 3 when we restricted the sample to white Americans only. The present findings expand upon previous research that has examined effects of suppression on well-being across different cultures (Han et al., 2022; Soto et al., 2011; Su et al., 2013). Few existing studies have examined suppression using a valence-specific approach, but among those that did, our findings for Taiwanese participants are in line with prior work with East Asian samples (Han et al., 2022), whereas our findings for US American samples are consistent with some previous studies (Newman & Nezlek, 2022; Nezlek & Kuppens, 2008; Young et al., 2022), but not all (Han et al., 2022). This could be due to differences in sampling and modelling approaches (e.g., whether the effects of suppression of each valence were controlled for) and highlights the need for more research. Given that expressions of positive emotions serve critical functions for relationships (Sels et al., 2021) and that relationships are closely tied to well-being universally (Gable, 2018; VanderWeele, 2017), future research may test possible well-being costs of suppression of positive vs. negative emotions with samples from a variety of cultures and regions (e.g., Korea vs. Taiwan, cf. Han et al., 2022), including those that have received far too little attention to date (e.g., in Latin America or Africa; see Senft et al., 2020; Young et al., 2022). Moreover, suppression may also have effects on other adaptive outcomes that we did not measure here (e.g., state well-being; cognitive functioning; Hofstee et al., 2021). It would also be interesting to examine whether other outcomes more closely related to physical health (e.g., physiological arousal, Peters & Jamieson, 2016) would be more associated with suppression of positive (vs. negative) emotions across cultures as well (cf. Miyamoto et al., 2019).

What Are the Mechanisms?

Future research is needed to elucidate both the intrapersonal and interpersonal mechanisms that explain the well-being costs of suppressing positive emotions. First, social bonds are intimately implicated in well-being, and suppressing positive emotions may cost individuals opportunities to connect with other people. Given that suppression is often used in social contexts and with social motives (English et al., 2017; Weidman & Kross, 2021), future research should examine how suppression of positive emotions might influence the well-being of the suppressor, of their interaction partner(s), and of their relationship (cf. Butler et al., 2003; Peters & Jamieson, 2016). Second, people can have miscalibrated social cognitions (e.g., over-estimate how awkward their gratitude expressions might make the recipients feel) that can lead them to suppress their positive emotions, despite the desire to express them and the awareness of such expression's benefits (Epley et al., 2022; Kumar, 2022; Rimé, 2009; Yu & Chang, 2023). These two forces might create intrapsychic conflicts, which in and of itself feels aversive (Inzlicht et al., 2015) and thus may contribute to low well-being.

Moreover, it will be important to elucidate the specific contexts (e.g., quality of close relationships; cf. Han et al., 2022) in which the suppression of negative emotions may help vs. harm well-being. Instead of viewing suppression of negative emotions as overall unrelated to well-being, we suspect that both forces are at play, thus aggregating to the many null-effects in the present investigation (cf. Yu & Chang, 2023).

Measuring the Suppression of Positive vs. Negative Emotions

Our findings demonstrate the benefits of distinguishing between suppression of positive vs. negative emotions. As shown in the present investigation, this approach does not necessarily require the creation of new items. Instead (and particularly important given the widespread popularity of the ERQ), simply treating the respective ERQ items as two different constructs and controlling for each other in the model will allow researchers to examine suppression using a valence-specific approach and partial out the unique effects of each. We believe that this nuanced separation could benefit the field by better reflecting the complexity of affective phenomena. Future research could also examine the suppression of positive vs. negative emotions using methods beyond self-report (e.g., behavioral coding).

Finally, we deeply resonate with what Gross and John concluded in their 2003 paper: "Emotion-specific scales for reappraisal and suppression that build on the present findings should provide new insights into the consequences of regulating emotion through reappraisal and suppression […]" (pp. 360–361). Research on the *experience* of emotions has flourished over the years and provided insights into the distinct effects of various discrete emotions (Cowen and Keltner, 2021; Sels et al., 2021; Shiota et al., 2017; Sznycer et al., 2021). However, the progress for the research on *expression/suppression* (as well as on *reappraisal*) of specific emotion has been slow (cf. Keltner et al., 2019). Future research should consider taking, in addition to culture, emotion valence and/or specific emotion categories into account to further our understanding in when and how emotion regulation is adaptive versus maladaptive.

Conclusion

The present investigation established the separability of differential adaptiveness of habitual expressive suppression of positive and of negative emotions. Across three studies and two culturally distinct regions (i.e., Taiwan, US), we found that (a) people's suppression of positive (vs. negative) emotions was engaged less and was less integral to their general suppression tendencies, (b) the two forms of suppression were only moderately correlated, and (c) only suppression of positive, but not of negative, emotions predicted lower well-being. Together, these results show the benefits of adopting a valence- (or even emotion-) specific approach to better understanding expressive suppression.

Appendix: Bivariate Correlation Between Suppression of Each Valence and Outcome Variables

Table 8 Bivariate correlation coefficients (r) between suppression of each valence and each of the outcome variables in Study 1

	Dataset 1			Dataset 2			Dataset 3		
	Original	Positive	Negative	Original	Positive	Negative	Original	Positive	Negative
Well-being indices									
Satisfaction with life	−0.13†	−0.11†	−0.04†	−0.15†	−0.18*	0.02	−0.28***	−0.22**	−0.01
Psychological well-being				−0.31***	−0.35***	−0.18*			
Autonomy				−0.17†	−0.19*	−0.10			
Environmental mastery				−0.23**	−0.27**	−0.09			
Personal growth				−0.24**	−0.34***	−0.17*			
Positive relations with others				−0.24**	−0.35***	−0.05			
Purpose in life				−0.23**	−0.12	−0.24**			
Self-acceptance				−0.30***	−0.33***	−0.16			
Peace of mind							−0.14†	−0.17*	−0.01
Ill-being index									
Depression				.15†	.26**	.04			

† $p < .10$, * $p < .05^{**}$, $p < .01$, *** $p < .001$. Empty cells mean that the variable is not included in the dataset

Table 9 Bivariate correlation coefficients (r) between suppression of each valence and each of the outcome variables in Study 2

Variables	MIDUS			Common cold		
	Original	Positive	Negative	Original	Positive	Negative
Well-being indices						
Life satisfaction	−0.16*	−0.23**	−0.06			
Stress				.12†	.17*	.06
Psychological well-being	−0.19*	−0.19*	−0.11	−0.29***	−0.36***	−0.13†
Autonomy	−0.26***	−0.26***	−0.19*			
Environmental mastery	−0.10	−0.12	−0.04	−0.17*	−0.23***	−0.09
Personal growth	−0.22**	−0.19*	−0.12			
Positive relations with others	−0.12	−0.16*	−0.06	−0.34***	−0.44***	−0.10
Purpose in life	−0.09	−0.10	−0.04	−0.26***	−0.31***	−0.13
Self-acceptance	−0.16*	−0.13†	−0.09	−0.19**	−0.22**	−0.10
Community				−0.18*	−0.25***	−0.03
Social participation				−0.17*	−0.17†	−0.12†
Social support				−0.28***	−0.28***	−0.11
Appraisal support				−0.24***	−0.29***	−0.09
Belonging support				−0.19**	−0.18**	−0.07
Tangible support				−0.28***	−0.24***	−0.12†
Family support	−0.14†	−0.21**	−0.08			
Friend support	−0.22**	−0.28***	−0.15†			
Ill-being indices						
Anxiety symptoms (trait)	.22***	.22***	.11†			
Anxiety symptoms (state)	.17**	.31***	−0.04			
Alexithymia				.35***	.42***	.15*
Difficulty identifying emotions				.17*	.28***	.05
Difficulty describing emotions				.43***	.38***	.25***
Externally oriented thinking				.22***	.30***	.08
Loneliness				.17*	.13†	.05

† $p < .10$, * $p < .05$**, $p < .01$, *** $p < .001$. Empty cells mean that the variable is not included in the dataset. Original = the ERQ suppression subscale Positive = suppression of positive emotions, Negative = suppression of negative emotions

Table 10 Bivariate correlation coefficients (r) between suppression of each valence and each of the outcome variables in Study 3

	Taiwanese sample		US sample	
	Positive	Negative	Positive	Negative
Satisfaction with life	−0.23***	−0.09	−0.23***	−0.02
Psychological well-being	−0.50***	−0.23**	−0.47***	−0.06
Autonomy	−0.29***	−0.22**	−0.27***	< 0.01
Environmental mastery	−0.36***	−0.07	−0.23***	.06
Personal growth	−0.32***	−0.18**	−0.41***	−0.04
Positive relations with others	−0.34***	−0.16*	−0.44***	−0.11†
Purpose in life	−0.30***	−0.17*	−0.36***	−0.09
Self-acceptance	−0.43***	−0.13†	−0.33***	−0.03
Depression (CESD)	.36***	.07	.25***	< .01

† $p < .10$, * $p < .05$**, $p < .01$, *** $p < .001$. Positive = suppression of positive emotions, Negative = suppression of negative emotions

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Availability of data and material The datasets of Studies 1 and 3 are available in the Open Science Framework repository https://osf.io/zy975/. The publicly accessible dataset of Study 2 and be accessed in the project websites (MIDUS: https://midus.wisc.edu/; CCP: https://www.cmu.edu/common-cold-project/pittsburgh-cold-study-3/index.html).

Code availability Not applicable.

Authors' contributions C.H.F.Y. & J.H.C. conceptualized the studies. C.H.F.Y. & J.H.C. collected and processed the data. C.H.F.Y. & J.H.C. analyzed data. C.H.F.Y., C.M.H. & J.H.C. wrote the manuscript.

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