



# Adaptation and Validation of a Short French Version of the Affective Style Questionnaire

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## Abstract

Emotion regulation (ER) plays an important role in psychological well-being. Therefore, its valid assessment is a crucial step in the investigation of the interindividual differences linked to effective ER. Adapting and validating a French version of the Affective Style Questionnaire (ASQ) and test its predictive power in detecting mood disorders. We administered to a large sample (1226 participants) a brief (12 items) French version of the ASQ. We tested convergent validity by investigating its links with mindfulness trait and life satisfaction. Moreover, using a machine learning approach, we tested whether ER features could predict the presence of self-reported mood disorders. We demonstrated a good convergent validity by reproducing the original factor structure. We also showed that the *adjusting* dimension, referring to the ability to flexibly modulate our emotional experience according to contextual demands, was associated with concurrent markers of psychological well-being such as dispositional mindfulness and life satisfaction. Moreover, this strategy was also related to a low probability of subjectively reporting suffering from a mood disorder. Our results highlighted adjusting as an adaptive ER strategy. Practical implications for psychotherapeutic approaches of mood disorders are discussed.

**Keywords** Emotion regulation · Affective Style Questionnaire · Mood disorders · Mindfulness

## Introduction

Emotion regulation (ER) refers to the processes by which individuals influence the type, the duration, the experience, and the expression of their emotions (Gross 1998). ER deficits are a critical feature of pathological personality traits and psychiatric

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disorders (Aldao et al. 2010; Garnefski et al. 2002; Martin and Dahlen 2005). The leading model of ER describes various strategies, differing in the moment (antecedent vs response-focused strategies), and the target of their action (the situation, the focus of attention, the cognitive representation, or the bodily state; Gross 2002). Some of these strategies have been classified as inherently maladaptive (John and Gross 2004), while other frameworks have emphasized that their flexible employment, depending on the context, is a critical criterion for defining adaptive ER (Aldao 2013; Aldao and Nolen-Hoeksema 2012; Troy et al. 2013). Given its implication for psychological well-being, fostering an efficient and adaptive ER is the main target of different psychotherapeutic approaches (Berking et al. 2008). For example, relaxation, alternative thoughts generation, cognitive defusion, or acceptance (the latter two both inspired by the third waves of cognitive behavioral therapy) are encouraged as opposed to avoidance, suppression, or self-harm. Thus, developing reliable tools measuring ER is of critical importance for assessing various disorders as well as psychotherapeutic outcomes.

Interestingly, few existing questionnaires were designed to capture both clinical and neuroscientific conceptualizations of ER. Hofmann and Kashdan (2010) developed the Affective Style Questionnaire (ASQ) based on the latest neuroscientific models and, also, suited for a clinical use. This questionnaire has revealed a three-factor structure encompassing concealing, adjusting, and tolerating. *Concealing* refers to suppression and other response-focused strategies aimed at hiding or avoiding emotions after they arise. *Adjusting* refers to the ability to access and utilize emotional information in adaptive problem solving and modulate emotional experience and expression according to contextual demands (Mennin et al. 2002). This strategy is related with the mechanism of reappraisal and, more broadly, cognitive change. Finally, *tolerating* reflects comfort and non-defensiveness in response to arousing emotional experiences as they arise in the present moment, referring to the acceptant stance toward one's emotion experience Salovey et al. 1995). The last construct is similar to the notion of *acceptance*, a key aspect of mindfulness (Hayes 2002) that emphasizes on the non-judgmental attitude toward the present moment (e.g., Kabat-Zinn 1982). This brief questionnaire was validated on undergraduate students and showed good psychometric properties. It has been already adapted in several languages (e.g., German, Japanese, and Serbian; respectively: Graser et al. 2012; Ito and Hofmann 2014; Žuljević et al. 2013), but a French validation is still lacking.

The main aim of the present study was to validate a French version of the ASQ on a large sample and to study its construct validity by investigating the association with related constructs such as mindfulness and well-being. The link between mindfulness and ER has been documented by several studies. Higher mindfulness trait has been related to a decreased neural marker of emotional response (Brown, Goodman, & Inzlicht, 2012). Moreover, dispositional mindfulness has been linked with an increased neural signature of implicit (Creswell, Way, Eisenberger, & Lieberman, 2007) and explicit (Modinos, Ormel, & Aleman, 2010) emotion regulations. Baer, Smith, Hopkins, Krietemeyer, and Toney (2006) reported a negative correlation between the non-judging facet of the Five Facet Mindfulness Questionnaire (FFMQ) and the Difficulties in Emotion Regulation Scale (DERS) score (Gratz & Roemer, 2004). More recently, we showed that the non-reacting facet of the FFMQ was related to faster attentional disengagement from emotional stimuli (Makowski, Sperduti, Lavallée, Nicolas, & Piolino, 2019). Thus, we expected positive correlations between dispositional

mindfulness, in particular the non-judging and non-reacting facets, and adjusting and tolerating facets of the ASQ, while a negative correlation can be expected with concealing.

Concerning life satisfaction, it has been shown that different ER strategies could lead to opposite outcomes. Indeed, Gross and John (2003) reported that suppression and reappraisal were, respectively, negatively and positively correlated with life satisfaction. Quoidbach, Berry, Hansenne, and Mikolajczak (2010) reported that sharing positive emotion was positively linked with life satisfaction. Interestingly, in the abovementioned study (Gross & John, 2003), the authors reported that suppression and reappraisal were linked with reduced and enhanced expression of positive emotion, respectively. Acceptance, a construct similar to tolerating, has been shown to be positively related to subjectively reported quality of life in elderly (Butler & Ciarrochi, 2007). Thus, we predicted that concealing would negatively correlate with life satisfaction, while for adjusting and tolerating, we should find a positive correlation.

We have further explored the value of this measure in predicting subjectively reported mood disorders in a non-clinical population.

## Material and Methods

### Participants

We recruited 1272 French-speaking participants (age  $26.99 \pm 10.59$ , 79% female) by online advertisement. They filled a battery of questionnaires administered via Google Forms©. All participants were informed of the academic nature of the study and accepted that their responses were anonymously treated. All participants agreed to the informed consent. We used the recently developed multivariate outlier detection based on invariant coordinate selection (ICS) (Archimbaud, Nordhausen, & Ruiz-Gazen, 2018) that detected 46 outliers that we removed, resulting in a final sample of 1226 participants (age  $27.06 \pm 10.68$ , 80.14% female).

### Measures

#### ASQ

The ASQ (Hofmann and Kashdan 2010) is a 20-item (5-point Likert scale) questionnaire distinguishing between antecedent (adjusting, 7 questions) and response-focused (concealing, 8 questions) strategies and adding the notion of acceptance (tolerating, 5 questions) from the mindfulness literature (Hayes 2002). The validation study demonstrated the convergent and discriminant validity in its relations with similar or unrelated constructs. The French version of the ASQ was developed by a panel containing bilingual and fluent speakers in both languages (including academics, PhD and master students, and non-academics). We employed an 8-point Likert scale (0 = not at all, 7 = extremely true) questionnaire, the suggested threshold from moving from a categorical to a continuous scoring (Olsson et al. 1982).

## FFMQ

Mindfulness trait was assessed using the Five Facet Mindfulness Questionnaire (Baer et al. 2008; French version Heeren et al. 2011). The FFMQ consists of 39 items (5-point Likert scale) with a 5-factor structure: *observing* refers to the ability of attending to internal and external events, *describing* refers to the tendency and the ability to verbally label internal experiences, *acting with awareness* is linked to attending to one's present activities, *non-judging* of inner experience is related to a non-evaluative stance of one's own feeling and thoughts, and *non-reactivity* to inner experience describes the tendency to allow one's own feeling and thoughts pass by without getting caught by them.

## Life Satisfaction

Life satisfaction was assessed with four simple 8-point Likert scales (0–7) enquiring the level of life satisfaction in the social, professional, family, and global domain (e.g., “How much are you satisfied with your social life?”).

## Self-Reported Mood Disorders

The question “Are you currently suffering from a mood disorder” was used as a proxy for the presence of a mood disorder. If the participant responded “yes,” the nature of the disorder was asked, as well as the number of years since the beginning of the disorder. We isolated those that responded “depression,” “anxiety,” “bipolar,” and the rest was labeled as “other disorder.”

## Results

Data analysis was performed using R (R Development Core Team 2008) and, in particular, the *psycho* (Makowski 2018), *insight* (Lüdtke, Waggoner, & Makowski, 2019), *psych* (Revelle 2010), *lavaan* (Rosseel 2012), and *caret* (Kuhn 2008) packages.

## Factor Structure

We first started by partitioning our dataset into a training (3/4) and a test set (1/4). The proportion of self-reported mood disorders was equivalent in the two sets. The overall Kaiser-Meyer-Olkin (KMO) index of sampling adequacy (.87) and Bartlett's test of sphericity ( $\chi^2(190) = 6364.22$ ,  $p < 0.001$ ) suggested that the training set was appropriate for factor analysis. Firstly, we ran an exploratory factor analysis (EFA) on the scaled and centered the scores to extract 3 components using a minimum residual estimator (“minres” method; Revelle 2010) and, following the original validation, a *promax* rotation. The 3 components accounted for 47% of the total variance. This analysis reproduced the model found by Hofmann and Kashdan (2010), with some discrepancies in the item maximum loadings (e.g., item 3 loaded mainly on the adjusting factor). We created a short and balanced (with the same number of items per dimension) form of the questionnaire by keeping only the four most loading items of each dimension (see Table 1), resulting in a total of 12 items.

In order to confirm the factor structure obtained in the EFA and compare the long and the short forms, confirmatory factor analysis for both variants was conducted on the test set. Vuong's test (Vuong 1989)—allowing comparison of models based on different sets of observed variables—showed that the short form performed better than the original one (variance test revealed that the models are distinguishable:  $w^2 = 5.82$ ,  $p < 0.001$ ; non-nested likelihood ratio test showed that the short form had a better fit than the long form:  $z = -72.549$ ,  $p < 0.001$ ). Although outperforming the long form, the goodness-of-fit indices of the short form were in, or below, the lower range of adequacy ( $\chi^2(51) = 222.2$ ,  $p < 0.001$ ; CFI = 0.81, TLI = 0.76, AIC = 9660, BIC = 10,206, SRMR = 0.082, RMSEA = 0.10, 90% CI [0.09–0.11]). The three factors (concealing, adjusting, and tolerating) accounted for 26.1%, 29.5%, and 34.4% of the variance, respectively. All correlations between the latent factors were positive and significant (concealing and adjusting,  $r = 0.37$ , 95% CI [0.24, 0.49],  $p < 0.001$ ; concealing and tolerating,  $r = 0.21$ , 95% CI [0.03, 0.39],  $p < 0.001$ ; tolerating and

**Table 1** Descriptive statistics and item loadings for each of emotion regulation dimension. Mean and SD were computed on the 4 most loading items (in italic) of each subscale

Descriptive	French	Concealing	Adjusting	Tolerating
Mean ± SD		3.75 ± 1.48	3.86 ± 1.46	4.18 ± 1.14
Items				
9	<i>J'arrive parfaitement à cacher mes émotions</i>	0.80	-0.05	0.08
15	<i>Je peux faire de telle sorte que les gens ne remarquent pas que je suis énervé</i>	0.72	0.07	-0.01
13	<i>Cela ne se voit pas quand je suis triste</i>	0.71	-0.10	0.07
1	<i>Les gens auraient du mal à savoir comment je me sens à l'intérieur</i>	0.61	-0.27	0.06
20	Je peux tout à fait cacher ma colère si nécessaire	0.61	0.18	0.04
10	Cela ne se voit pas quand je suis énervé	0.58	0.14	-0.16
2	J'arrive à garder mes émotions sous contrôle	0.52	0.23	0.06
18	Je pourrais facilement feindre des émotions	0.51	-0.05	0.12
5	J'ai tendance à essayer de réprimer mes réactions émotionnelles	0.50	-0.09	-0.16
19	<i>Je peux me mettre de bonne humeur assez facilement</i>	-0.15	0.78	0.05
16	<i>Je sais exactement comment faire pour me mettre de bonne humeur</i>	-0.15	0.69	0.08
7	<i>J'arrive à me calmer très rapidement</i>	0.05	0.67	-0.07
12	<i>Je peux quitter une humeur négative très rapidement</i>	-0.05	0.60	0.09
4	J'évite de m'énervier en adoptant un autre point de vue sur la situation	0.24	0.54	-0.30
3	Je tolère bien le fait de ressentir des émotions fortes	0.11	0.39	0.25
8	Je suis capable de me détacher de ce que je ressens	0.37	0.37	-0.05
17	<i>Il n'y a rien de mal à être émotionnellement très sensible</i>	-0.08	0.23	0.59
6	<i>Cela ne me dérange pas que les gens me voient énervé</i>	-0.14	-0.07	0.59
14	<i>Je tolère bien le fait d'être énervé</i>	0.10	0.17	0.47
11	<i>Il est normal de parfois ressentir des émotions négatives</i>	0.20	0.02	0.33

adjusting,  $r = 0.36$ , 95% CI [0.19, 0.52],  $p < 0.001$ ). Means and standard deviations are shown in Table 1. For the following analyses, we computed the score of each dimension as the average of the corresponding 4 items.

## Sociodemographic Variables

### Age

We did not report any significant correlation between age and any of the 3 dimensions (concealing,  $r = -0.03$ ,  $p > 0.05$ ; adjusting,  $r = 0.05$ ,  $p > 0.05$ ; tolerating,  $r = 0.04$ ,  $p > 0.05$ ).

### Sex

*t* tests showed that men had higher scores of concealing ( $M_{\text{women}} = 3.60$ ,  $M_{\text{men}} = 4.35$ ,  $t = -7.3$ ,  $p < 0.001$ ), adjusting ( $M_{\text{women}} = 3.77$ ,  $M_{\text{men}} = 4.20$ ,  $t = -4.10$ ,  $p < 0.001$ ), and tolerating ( $M_{\text{women}} = 4.15$ ,  $M_{\text{men}} = 4.33$ ,  $t = -2.2$ ,  $p < 0.05$ ).

### Education

There was no correlation between the education level (years of education after high school) and any dimension of the ASQ (concealing,  $r = -0.002$ ,  $p > 0.05$ ; adjusting,  $r = 0.005$ ,  $p > 0.05$ ; tolerating,  $r = 0.01$ ,  $p > 0.05$ ).

## Construct Validity

### Relationship with Mindfulness

>Partial correlation analysis, which assesses each correlation (Holm-Bonferroni corrected) adjusted for all the others, between the FFMQ and the ASQ showed that adjusting and concealing were both linked with the non-reactivity facet of mindfulness. However, concealing was, additionally, negatively correlated with non-judging and describing facets of mindfulness. On the contrary, tolerating was positively associated with these 2 dimensions. Partial correlation coefficients are reported in Table 2.

### Relationship with Life Satisfaction

Although the consistency for the 4 life satisfaction items was acceptable (Cronbach's  $\alpha = 0.78$ ), we decided to keep them separate as a partial correlation analysis between the specific satisfactions (social, professional, and family) revealed negligible or small effect sizes (family and professional,  $r = -0.03$ ,  $p > 0.1$ ; social and professional,  $r = 0.13$ ,  $p < 0.001$ ; social and family,  $r = 0.14$ ,  $p < 0.001$ ). However, the correlations with the general satisfaction were moderate (general and family,  $r = 0.35$ ,  $p < 0.001$ ; general and professional,  $r = 0.38$ ,  $p < 0.001$ ; general and social,  $r = 0.44$ ,  $p < 0.001$ ).

Partial correlation analysis between life satisfaction items and ER showed that concealing was negatively associated with global life satisfaction but positively with professional satisfaction. On the other hand, adjusting was positively associated with

**Table 2** Holm-Bonferroni-corrected partial correlations coefficients (i.e., correlations when taking into account the effect of all other variables) between ER (ASQ), mindfulness (FFMQ), and life satisfaction

	Concealing	Adjusting	Tolerating
Emotion regulation			
Concealing			
Adjusting	0.23***		
Tolerating	0.01	0.32***	
Mindfulness			
Observing	-0.05	0.02	0.03
Describing	-0.09*	0.04	0.14***
Acting with awareness	-0.03	0.06	-0.04
Non-judging	-0.13***	0.09	0.16***
Non-reactivity	0.27***	0.33***	-0.07
Life satisfaction			
Social	-0.03	0.15***	0.00
Professional	0.08*	0.05	-0.03
Family	-0.03	-0.01	0.09*
Global	-0.10***	0.14***	-0.02

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

global life satisfaction and social life satisfaction. Finally, tolerating was only positively associated with family life satisfaction. The partial correlation coefficients are reported in Table 2.

### Subjectively Reported Mood Disorder

#### Prevalence

One hundred and thirty-five (10.61%) participants (age  $29.80 \pm 12.27$ , 80% female) answered suffering from a mood disorder. The prevalence of the subgroups was compared to the official prevalence rate (American Psychiatric Association 2013). Twelve-month prevalence of major depressive disorder is approximately 7%, while in our sample, only 5.58% of participants reported suffering from this disease. The bipolar disorder (including bipolar I and bipolar II) yields a cumulative prevalence rate up to 2.7% of adults in non-US countries, while only 1.41% of our sample reported currently suffering from the disease; 1.18% of our sample reported suffering from anxiety, which is lower than the prevalence of specific phobia (7–9%), social anxiety (2.3%), or panic disorder (2–3%). Other answers were labeled as “other.”

#### Logistic Model

In order to investigate the probability of subjectively reporting a mood disorder as a function of emotion regulation, we fitted a logistic general linear model with the

presence of subjectively reported mood disorder as a binary outcome. The 3 ER dimensions (concealing, adjusting, and tolerating) were set as predictors. The coefficients are expressed in log odds ratio. The intercept was at  $-1.28$  ( $z = -3.22$ ,  $p < 0.01$ ), meaning that when all ER variables are 0 (i.e., at their lowest value), the probability of reporting a mood disorder is 22%. Variations of concealing or tolerating were not related to a significant modulation of this probability (respectively,  $\beta = 0.08$ ,  $z = 1.42$ ,  $p > 0.05$ ;  $\beta = 0.07$ ,  $z = 0.86$ ,  $p > 0.05$ ). However, adjusting significantly decreased the odds for reporting a mood disorder ( $\beta = -0.42$ ,  $z = -6.03$ ,  $p < 0.001$ ).

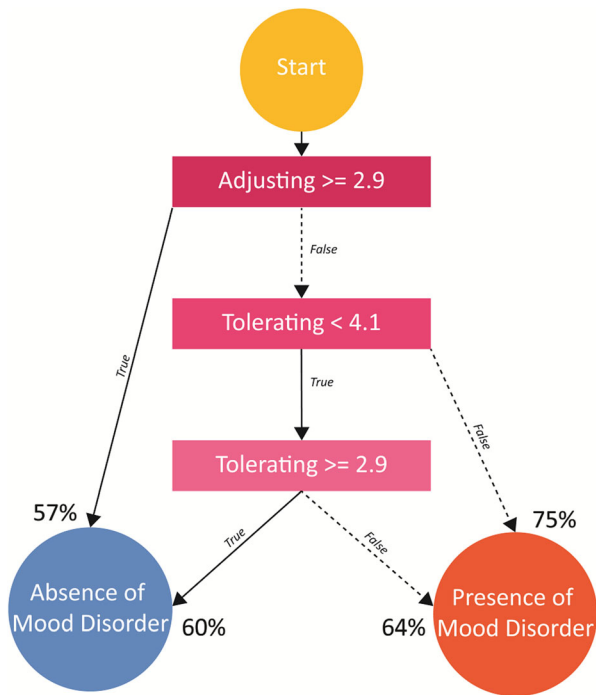
### Machine Learning Tree-Based Model

To investigate possible non-linear interactions and associations between ASQ scores and mood disorders, we employed a machine learning approach. We tested the predictive value of the 3 ASQ dimensions by growing a classification tree (Breiman et al. 1984; Liaw and Wiener 2015) using the caret package (Kuhn 2008). The model is built using input features (e.g., ASQ scores) and matching them with expected outputs (e.g., the subjective report of a mood disorder). The model is then confronted to a new independent dataset to estimate its validity. We used a classification tree algorithm (“rpart2”; Therneau et al. 2010) with a 5-fold cross-validation repeated 10 times and up sampling to attenuate the effect of class imbalance. This machine learning algorithm creates, out of a set of predictive variables, a classification pipeline that has a straightforward interpretation. This technique seems more suited for our purpose, having the benefit of being intelligible to humans (i.e., the classification tree is made of a set of simple decision nodes leading to a probability of being associated with a particular outcome), often at the expense of predictive power. The data was first partitioned into a training (2/3 of the initial sample,  $n = 844$ ) and a test set (1/3,  $n = 436$ ). Each set contained the same proportion of participants with mood disorders and similar demographic characteristics. After growing the tree on the training set, we ran the model on the test set and compared the new classification to the original one. This operation was repeated 5000 times, and the best model (based on the kappa) was selected (see Fig. 1). Its overall accuracy was of 0.84 (95% CI [0.80, 0.87]; kappa = 0.28,  $p < 0.05$ ), the sensitivity was of 0.46, and the specificity of 0.88. Scaled variable importance showed that adjusting was the most important variable (100%) for the decision, concealing, not used in the decision process, the least important (0%), and that tolerating had a medium importance (68%). The model highlights the role of adjusting as an adaptive ER strategy, high scores being associated with the absence of mood disorder. Interestingly, it underlines tolerating as a double criterion: in case of low adjusting, both high and low scores of tolerating are associated with the presence of mood disorder.

### Discussion

The validation of the French short form of the ASQ, done on a large sample, showed good psychometric properties and a factor structure consistent with the





**Fig. 1** Classification tree (trained on a set of 845 participants) predicting the presence of mood disorder using the 5 dimensions of the ASQ. Plain arrows represent the pathway when the node's condition is true and dashed arrows the pathway when the condition is false. Each arrow connecting a terminal node is associated with the percentage of correct predictions (% CP)

original validation (Hofmann and Kashdan 2010). This questionnaire measures the use of three partially independent ER strategies: concealing (i.e., suppression and other response-focused strategies), adjusting (i.e., the ability to be more able to access and utilize emotional information in an adaptive manner according to contextual demands), and tolerating (i.e., referring to the acceptant stance toward one's emotion experience). It is important to note that the indices of fit of the structure were in the lower range of adequacy, supporting a cautious interpretation of the results and advocating for further investigation.

Convergent validity was demonstrated by investigating the relationship with mindfulness and well-being. We reported association in the expected directions. In particular, these analyses revealed the dissociation between adjusting, positively associated with well-being and mindfulness non-reacting abilities, and concealing, negatively associated with well-being and mindfulness non-judging. Moreover, we found that tolerating was linked with the FFMQ facets of describing and non-judging, which could be as prerequisite for further acceptance and letting go of our emotional experiences.

Finally, we tested the association and predictive power of the ASQ in detecting subjective reported mood disorders. While such self-reports remain a limitation compared to those made by expert clinicians, we did not find that the prevalence was overestimated compared to the official prevalence rate. This is in line with studies investigating other types of psychiatric symptoms (Johns et al. 2004). We

first found that ER was, indeed, associated with self-reported mood disorders. In particular, adjusting was negatively associated with the probability of reporting a mood disorder. Interestingly, the machine learning model was far more accurate in predicting the absence than the presence of mood disorders. This result is coherent with the literature reporting a stronger association between psychopathology and the use of maladaptive strategies such as rumination and avoidance compared to that with adaptive strategies (Aldao et al. 2010). In particular, rumination has been shown to be a transdiagnostic factor associated with mood disorders (especially depression and anxiety; McLaughlin and Nolen-Hoeksema 2011). Moreover, the use of adaptive strategies seems to be negatively associated with the presence of psychopathology only in the context of high levels of maladaptive strategies (Aldao and Nolen-Hoeksema 2012). Taken together, these findings underline the importance of incorporating the screening of maladaptive strategies in questionnaires aimed at clinical use.

Although the regression and classification models were not sufficiently sensitive to be used as diagnostic helpers, the results underlined the importance of the adjusting dimension as a protector against mood disorders. This is important as the improvement of this ER strategy is precisely the focus of treatments such as “classic” cognitive behavioral therapy (CBT) (Beck 2011). Interestingly, more recent psychotherapeutic approaches, especially “third-wave” CBT integrating mindfulness (e.g., MBCT, ACT) strive at developing acceptance to deal with one’s negative thoughts and emotions. Our data, however, suggest that the association between self-reported mood disorders and ER strategies is quite complex. Although the regression model showed no direct relationship between tolerating and the probability of reporting a mood disorder, the classification tree suggests that in case of low abilities of adjusting, both high and low scores of tolerating are associated with the presence of self-reported mood disorders. In other words, tolerating can be considered as both healthy and unhealthy, depending on the availability of other ER resources.

## Conclusion

In summary, this French validation of the Affective Style Questionnaire, done on a large sample, showed that a brief 12-item version is suitable for assessing the use of 3 distinct ER strategies: adjusting, concealing, and tolerating. Throughout all analyses, adjusting was associated with markers of psychological well-being such as life satisfaction and dispositional mindfulness and was related with the absence of self-reported mood disorders. Thus, according to clinical and neuroscientific models, the employment of this strategy seems to be adaptive and to foster positive life outcomes. On the other hand, concealing was negatively associated with life satisfaction and key components of mindfulness, such as non-judging. Finally, tolerating could be seen as a mixed strategy, adaptive and beneficial when sustained by high adjusting, but possibly associated with negative outcomes on a fragile terrain. These findings have practical implications, as they suggest that treatments focusing on developing acceptance and tolerating might reach optimal effects either in specific individuals with already good ER abilities implying

cognitive change (adjusting) or, additionally, to other psychotherapies focusing on enhancing them, such as CBT.

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## Compliance with Ethical Standards

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

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