

RESEARCH ARTICLE

Do I really feel better? Effectiveness of emotion regulation strategies depends on the measure and social anxiety

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Abstract

Background: Effective emotion regulation (ER) is important to long-term healthy functioning, but little is known about what constitutes effective ER in the moment or how social anxiety symptoms and different strategies influence short-term effectiveness outcomes.

Methods: Intensive ecological momentary data from $N = 124$ college students illustrate how different ways of operationalizing ER effectiveness leads to different conclusions about the short-term effectiveness of different strategies in daily life.

Results: When effectiveness is operationalized as the degree to which participants judged that their ER attempts made them feel better, social anxiety severity was *negatively* associated with effectiveness, and avoidance-oriented strategies were judged to be *less effective* than engagement-oriented strategies. In contrast, when effectiveness is operationalized as the degree of change in self-reported affect following ER attempts, social anxiety severity was *not related* to effectiveness, and avoidance-oriented strategies were *more effective* than engagement-oriented strategies. Social anxiety and ER strategy type did not interact in either model, regardless of how effectiveness was measured.

Conclusions: The study highlights discrepancies when examining two common but distinct ways of measuring the same overarching effectiveness construct, and raises intriguing questions about how forms of psychopathology that are intimately tied to emotion dysregulation, like social anxiety, moderate different ways of measuring the effectiveness of ER attempts.

KEYWORDS

anxiety/anxiety disorders, coping, measurement/psychometrics, mood disorders, SAD/social anxiety disorder/social phobia

1 | INTRODUCTION

Being effective at emotion regulation (ER) has been associated with a wide range of beneficial long-term outcomes, spanning mental health (e.g., Aldao & Nolen-Hoeksema, 2012), physical health (e.g., Extremera & Rey, 2014), and interpersonal (e.g., Häfner & IJzerman, 2011) domains. However, it is not clear what being effective at ER

means in the moment. Is an ER strategy effective if a person *feels* less distress or is it the person's *judgment* that the strategy attempt was helpful that makes it effective? The current study uses two-weeks of ecological momentary assessment (EMA) data from college students to examine two common but distinct ways of evaluating the short-term effectiveness of the same naturally occurring ER attempts: judgments about effectiveness and change in affect. Additionally,

given that social anxiety is known to influence both the ability to tolerate negative affect (Herbert & Cardaciotto, 2005) and judgments about the self (Hope, Rapee, Heimberg, & Dombek, 1990), this study examines whether social anxiety, a form of psychopathology that is intimately tied to emotion dysregulation (see Morrison & Heimberg, 2013, for review), moderates different ways of measuring the effectiveness of ER attempts in daily life.

1.1 | Importance of time scale when evaluating the effectiveness of ER strategies

Given the importance of ER to healthy functioning, it is not surprising that researchers have sought to identify which ER strategies are most effective. For instance, early theoretical models from the stress and coping literature (e.g., Billings & Moos, 1981) and from cognitive-behavioral approaches to psychopathology (e.g., Beck, 1976) labeled certain ER strategies as adaptive (e.g., cognitive reappraisal) and others as maladaptive (e.g., suppression), which is largely supported by trait-level ER studies (e.g., Aldao, Nolen-Hoeksema, & Schweizer, 2010; D'Avanzato, Joormann, Siemer, & Gotlib, 2013). However, while the habitual use of some ER strategies are associated with better mental health outcomes (Gross & John, 2003), *on average and over extended periods of time*, researchers now recognize that a given strategy is not uniformly effective across all situations (e.g., Bonanno & Burton, 2013), highlighting the need to better understand the short-term, situation-specific effects of ER in daily life.

Moreover, there is good reason to expect that a strategy with beneficial long-term effects may not always initially be perceived as helpful (Aldao, Sheppes, & Gross, 2015). For example, while frequent use of thought suppression (an avoidance-oriented strategy) is positively associated with greater *long-term* symptom severity in anxiety, depression, and disordered eating (Aldao & Nolen-Hoeksema, 2010), suppressing intensely negative thoughts to get through an exam can effectively reduce one's negative emotional experience for a *few hours* (Rottweiler, Taxer, & Nett, 2018). Analogously, though consistent use of problem-solving (an engagement-oriented strategy) is associated with lower *long-term* symptom severity in depression, anxiety, substance use, and disordered eating (Aldao et al., 2010), it is possible that the hard work associated with problem-solving may not lead *immediately* to positive affective rewards, despite helping the individual to achieve an instrumental goal. Given that most prior work has focused on patterns of ER outcomes over time and that there are multiple goals associated with effective ER (e.g., feeling better vs. getting something done; Tamir, Mitchell, & Gross, 2008), there is a clear need to examine different ways of determining ER effectiveness in the moment.

1.2 | Importance of social anxiety when evaluating the effectiveness of ER strategies

The short-term effects of ER strategy use are expected to vary based on individual differences and many psychological disorders have been linked to ineffective ER (often termed emotion dysregulation).

In particular, social anxiety disorder (SAD) is associated with low tolerance of negative affect (Herbert & Cardaciotto, 2005), which could lead to an enhanced perception of regulatory ineffectiveness of ER (e.g., even if the ER attempt actually improved negative affect, the remaining negative affect may still *feel* more distressing to someone who is socially anxious, thereby causing them to believe their attempt was ineffective, despite the affective improvement). Along these lines, in a lab-based cognitive reappraisal task, socially anxious (vs. control) participants rated their reappraisal attempts as *less effective* despite rating their subjective emotional experience following the reappraisal attempt as *less unpleasant* (Kivity & Huppert, 2018).

Further, Barlow theorizes that increased experiences of anxiety lead to the belief that one's own emotions are uncontrollable (Barlow, 2002). De Castella et al. (2014) provided empirical evidence for this claim, showing that SAD is associated with low emotional self-efficacy, or the belief that emotions cannot be changed. This belief seems likely to be related to lower perceived ER effectiveness, perhaps because low emotional self-efficacy negatively biases perceptions of effectiveness or because frequent emotion dysregulation signals ineffective ER and activates beliefs that emotions are uncontrollable. Thus, although the direction of the effect is unclear, low emotional self-efficacy in SAD may contribute to lower perceived ER effectiveness (possibly independent of actual change in affect).

Notably, low emotional self-efficacy is associated with a greater habitual reliance on avoidance-oriented strategies and less frequent use of engagement-oriented strategies (Kneeland, Nolen-Hoeksema, Dovidio, & Gruber, 2016), which is a pattern often observed in socially anxious individuals (e.g., Werner, Goldin, Ball, Heimberg, & Gross, 2011). Importantly, the tendency to rely more heavily on avoidance-relative to engagement-oriented strategies may have implications for short-term changes in affect (irrespective of perceived effectiveness). For example, Ortner, Marie, and Corno (2016) showed that cognitive reappraisal was associated with greater cognitive costs for those who reported less habitual use of the strategy, suggesting that cognitive reappraisal may be associated with greater depletion for socially anxious (vs. nonanxious) individuals. Thus, the short-term cognitive "costs" of using engagement-oriented strategies may be greater for individuals experiencing higher levels of social anxiety, even if avoidance-oriented ER contributes to increased social isolation or heightened levels of trait social anxiety long-term. Taken together, it is plausible that how short-term ER effectiveness is operationalized (e.g., judgment of effectiveness vs. change in affect) may lead to different narratives about the effects of ER attempts, and this may vary as a function of social anxiety symptoms.

1.3 | Previous approaches to measuring short-term effectiveness in daily life

Notably, while EMA is well-suited to the study of short-term ER effectiveness in daily life, both within and across individuals (e.g., Aldao, 2013), researchers differ in how they use EMA self-reports to measure this outcome. ER effectiveness has been measured through: the perceived impact of reported strategies on mood and through

changes in in-the-moment mood reports (Heiy & Cheavens, 2014); degree of positive emotions experienced each day, given the relative use of certain ER strategies the previous day (Farmer & Kashdan, 2014); severity of daily social anxiety symptoms endorsed as a function of daily ER strategy use (Kashdan et al., 2014); and changes to positive and negative affect following an exam (Hou, Ng, & Wan, 2015). While each of the above measures presumably tap some facet of ER effectiveness, it is possible that these different approaches may lead to inconsistent conclusions about the relative effectiveness of a given strategy, making it difficult to integrate findings across studies that operationalize ER effectiveness differently.

1.4 | Study overview and hypotheses

The current study will examine two effectiveness outcomes—judgments of effectiveness and changes in self-reported affect—following a range of avoidance-oriented relative to engagement-oriented ER strategy attempts in daily life over the course of a 2-week EMA study. Although participants reported on the use of eight specific ER strategies (to broadly sample the domain), hypotheses focus at the ER strategy cluster level (avoidance- or engagement-oriented, described below) to provide an estimate based on larger subsets of data points, which we expect to be more reliable.

We identified competing hypotheses for the expected relationship between social anxiety symptom severity and ER strategy use on judgments of ER effectiveness, given that there are empirical and theoretical reasons to predict that the effect of these predictors could occur in one of two ways. Namely, it is possible that higher (vs. lower) social anxiety severity following avoidance- relative to engagement-oriented ER strategy use predicts either: (a) *lower* perceived effectiveness or, (b) *higher* perceived effectiveness. In support of (a), given that avoidance-oriented ER strategies may be perceived as not addressing the underlying problem, and that social anxiety is associated with believing one is unable to manage one's emotions (De Castella et al., 2014), it is possible that socially anxious individuals will view their use of avoidance-oriented ER strategies as evidence that they cannot effectively address the source of their emotional distress. Thus, it is possible that avoidance- relative to engagement-oriented strategies will predict *lower* perceived effectiveness ratings for those higher (vs. lower) in social anxiety severity. However, in support of (b), social anxiety is linked to more frequent use of avoidance- relative to engagement-oriented ER strategy use, and socially anxious individuals report believing that they are more effective when using suppression and less effective when using reappraisal than nonanxious individuals (Kivity & Huppert, 2018). Thus, it is also possible that avoidance- relative to engagement-oriented strategies will predict relatively *higher* perceived effectiveness ratings for those higher (vs. lower) in social anxiety severity.

Second, we hypothesize that avoidance- relative to engagement-oriented ER strategy use will predict a greater decrease in negative affect, indicating more affective relief, especially for those higher (vs. lower) in social anxiety symptom severity. We expect the relatively greater short-term affective relief for the full sample given that

avoidance (vs. engagement) of problems often provides some initial relief (Chawla & Ostafin, 2007). We expect this effect to be especially strong for those higher (vs. lower) in social anxiety severity, given socially anxious individuals are typically less tolerant of negative affect (Herbert & Cardaciotto, 2005) and may therefore value initial affective relief more. Further, socially anxious individuals' less frequent use of engagement-oriented strategies (Werner et al., 2011) may make engagement-oriented strategies more cognitively taxing when used (Ortner et al., 2016).

By comparing two common but distinct ways of assessing ER effectiveness in daily life, this study will provide insight into how the effectiveness of various ER attempts is influenced by measurement. This issue is of course important for researchers examining situationally grounded ER effectiveness, but also for clinicians working with individuals with emotion dysregulation. It is critical to know how a client's ER vulnerabilities manifest in their daily life and to be clear about what a client's goals are for both short- and long-term ER improvement (e.g., a strategy that is not helpful long-term could be important for in-the-moment crisis management). Effectiveness is a broad and relatively undefined construct, and it is yet unclear which facet(s) of short-term ER effectiveness may differ as a function of strategy and social anxiety symptoms.

2 | METHOD

The hypotheses, inclusion criteria, and analytic approaches were preregistered and the data that support the findings of this study are openly available in Open Science Framework (Daniel et al., 2019, <https://osf.io/njdpf>).

2.1 | Participants

One hundred and 44 undergraduate participants were prompted up to six times a day (between 9 a.m. and 9 p.m.) for 2 weeks with randomly timed smartphone surveys to assess their current self-reported positive and negative affect, use of eight ER strategies, and effectiveness judgments of each ER attempt using single-item measures to reduce participant burden (Sensus; Xiong, Huang, Barnes, & Gerber, 2016; with an overall compliance rate of 58.2%). Research assistants downloaded the EMA application onto participants' phones and went through a demonstration survey with each participant before the 2-week study. Research assistants explained each survey item and answered any participant questions. At each prompt, participants could report the use of multiple strategies or indicate that they were not currently regulating their emotions. To examine the subjective effectiveness of ER attempts, all trials where no ER strategy was reported were excluded (2,713 out of 4,108, leaving $n = 1,395$ trials). Further, to directly compare the effects of avoidance- relative to engagement-oriented strategies, trials where both an avoidance- and an engagement-oriented strategy were simultaneously reported were excluded, leaving 1,204 trials contributed by 124 participants. To be retained in the analysis predicting change in affect, all above trials must have been followed by another trial on the same day,

TABLE 1 Sample demographics

	Effectiveness judgments (n = 124)	Change in affect (n = 106)
Age	M = 19.07 SD = 1.34	M = 19.02 SD = 1.18
Gender		
Female	83 (66.9%)	73 (68.9%)
Male	41 (33.1%)	33 (31.1%)
Race/ethnicity		
White	68 (54.8%)	54 (51.0%)
Asian	38 (30.6%)	35 (33.0%)
Black	8 (6.5%)	6 (5.7%)
Hispanic/Latinx	3 (2.4%)	3 (2.8%)
Multiracial	3 (2.4%)	4 (3.8%)
Other	4 (3.2%)	4 (3.8%)

Note: Social anxiety symptoms were not significantly related to participants' self-reported racial or ethnic identity in either sample.

leaving 696 trials contributed by 106 participants. Samples did not differ on social anxiety severity, age, racial/ethnic identity, or gender (all $p > .73$). See Table 1 for demographic information.

2.2 | Measures

2.2.1 | Social anxiety symptoms

Before the 2-week EMA portion of the study, participants completed the Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998), which ranges from 0 to 80, with higher scores indicating greater social anxiety symptom severity. The SIAS had acceptable internal consistency ($\alpha = .73$) in the present sample, with a mean score of 30.38 ($SD = 9.18$). Approximately 29.8% of the 124 participants scored at or above the mean of a sample diagnosed with SAD ($M = 34.6$, $SD = 16.4$; Mattick & Clarke, 1998). While our sample's average SIAS score is high relative to the clinical norms that were established 21 years ago, anxiety levels have been increasing on college campuses over recent decades (Benton, Robertson, Tseng, Newton, & Benton, 2003; Center for Collegiate Mental Health, 2016) and our sample mean is consistent with that reported in a recent nonclinical college sample ($M = 29.17$; Geyer et al., 2018).

2.2.2 | In-the-moment affect

Positive affect ("How positive are you feeling?") and negative affect ("How negative are you feeling?") were measured on continuous sliding scales from 0 (*not at all*) to 100 (*very positive/very negative*) at each time point. For each observation, positive affect ratings were subtracted from negative affect ratings to create an overall affect composite, such that more negative values indicate relatively more positive affect at that time.

2.2.3 | ER strategies

At each prompt, participants indicated which of eight ER strategies they were currently using in response to the question, "Are you doing

any of the following (if anything) to change your thoughts or feelings?" using a check-all-that-apply list that described each strategy using lay-person language adapted from the Brief COPE Scale (Carver, 1997; see the online supplement for specific wording of strategies shown to participants). To reduce the number of tests and more broadly characterize the effectiveness of strategies that are often considered adaptive versus maladaptive, the eight strategies were classified into either engagement- or avoidance-oriented clusters, according to a principal component analysis ($KMO = 0.614$, $p < .0001$; Hutcheson & Sofroniou, 1999), described in greater detail in Daros et al. (2019). A similar clustering approach, which also found two factors named Engagement and Avoidance across 11 ER strategies, was recently used by McMahon and Naragon-Gainey (2018).

In the current study, the component containing strategies that involve actively engaging with the emotional experience (i.e., engagement-oriented strategies) includes introspection, advice-seeking, cognitive reappraisal, problem-solving, and acceptance (factor loadings: 0.50–0.63). The component containing strategies that aim to avoid having or showing an emotional experience (i.e., avoidance-oriented strategies) includes expressive suppression, emotional suppression, and distraction (factor loadings: 0.57–0.75). However, recognizing that there may be within-cluster variability (see Webb, Miles, & Sheeran, 2012, for a meta-analytic review), tests at the individual ER strategy level are provided in the online supplement to inform future studies. Note that because each individual strategy was infrequently reported, these individual strategy analyses are exploratory and likely underpowered, and should be interpreted accordingly.

2.2.4 | Judgments on ER effectiveness

Participants indicated how effective they thought each ER attempt was in response to the question, "How much better or worse have efforts to change your thoughts or feelings made you feel?" on a 0 (*much worse*) to 100 (*much better*) sliding scale.

2.3 | Data preparation and plan for analyses

2.3.1 | Change in affect

To calculate change in affect, two types of trials were defined: leading (T1) and following (T2). The "leading" trials are EMA prompts during which the participant endorsed using one or more avoidance- or engagement-oriented strategies. The "following" trials are comprised of the next EMA prompt that was completed within the same day subsequent to the leading trial. Change in affect scores were calculated by subtracting the affect difference score rating for the leading trial from the affect difference score rating for the following trial ($T2 - T1$). Following Castro-Schilo and Grimm (2017), difference scores were calculated because when there are pre-existing group differences in baseline scores on the dependent variable (which seemed plausible given trait-level social anxiety symptoms are not randomly assigned), difference scores models are less biased than other common analytic alternatives (i.e., residualized change scores).

2.3.2 | Alternate operationalizations considered for change in affect

We selected and preregistered the operationalization of change in affect described above because it has grounding in the literature (e.g., Hou et al., 2015) and because it most closely mirrors the phenomenon that we were interested in capturing (i.e., how much a person's affect improves/worsens after reported use of an ER strategy). However, we recognize that there are many different ways one could calculate an affect change score. Other reasonable operationalizations include: (a) comparing ratings of affect on trials for which a given strategy type was used to the trial immediately before those trials; (b) comparing the affect ratings on the trial that preceded the implementation of the ER strategy to the affect ratings on the trial that followed the strategy use; or (c) comparing the affect ratings reported on the same trial as the ER strategy attempt was reported to the person's average affect ratings across all trials or to the person's average affect rating across trials when no ER attempt was made. Importantly, each methodological choice could potentially lead to different outcomes. For further discussion of the implications of these alternate operationalizations, see the Supporting Information.

2.3.3 | Analytic approach

Data consisted of multiple observations nested within individual participants and were analyzed using mixed-effects regression models using the "lme4" package in R (Bates, Mächler, Bolker, & Walker, 2015). ER strategy type was treated as a Level 1 binary fixed effect (i.e., trials with at least one avoidance-oriented strategy were scored with 1 and trials with at least one engagement-oriented strategy were scored with 0). Social anxiety severity was treated as a Level 2 continuous fixed effect that interacted with ER strategy type. When predicting change in affect, the amount of time elapsed between the leading and following trial pairs was included as a Level 1 fixed effect control. All continuous variables were standardized. Subject was treated as a random effect, intercepts were allowed to vary, and no random slopes were modeled.

3 | RESULTS

On average, participants contributed 9.71 ($SD = 8.64$) and 6.57 ($SD = 6.08$) trials for the effectiveness judgments and the change in affect analyses, respectively. Engagement-oriented strategies were more frequently chosen relative to avoidance-oriented strategies in both analyses (76.4% of trials predicting effectiveness judgments and 75.4% of trials predicting change in affect). See additional descriptive information in Tables S2 and S3. On average, 2.64 hr ($SD = 1.38$, range = 0.007–9.74 hr) elapsed between leading and following trials comprising the change in affect analysis. Note that 6 hr was originally preregistered (<https://osf.io/njdpf>) as the maximum amount of time allowed between leading and following trials. However, when only including observation pairs that occurred within less than 6 hr of each other, the model converged with singularity. We decided to

increase the number of trials included to help address this convergence issue, so we reran the analysis using all paired observations that occurred within the same day. This revised model converged without over-specification, and so we interpret this same-day model for more robust estimates. Note that the main findings from the original over-specified model do not differ from the findings reported in the main text, pointing to the robustness of the findings. The results when including only paired observations that occurred within 6 hr of each other are included in Table S4.

3.1 | ER strategy and social anxiety predictors of ER effectiveness judgments

Social anxiety severity was negatively associated with self-rated effectiveness of ER attempts, regardless of strategy type, suggesting that individuals experiencing greater (vs. lesser) social anxiety severity perceived their ER attempts to be less effective. Additionally, avoidance- relative to engagement-oriented strategy use was associated with lower self-rated effectiveness (Figure 1a) across all levels of social anxiety, suggesting that participants judged their

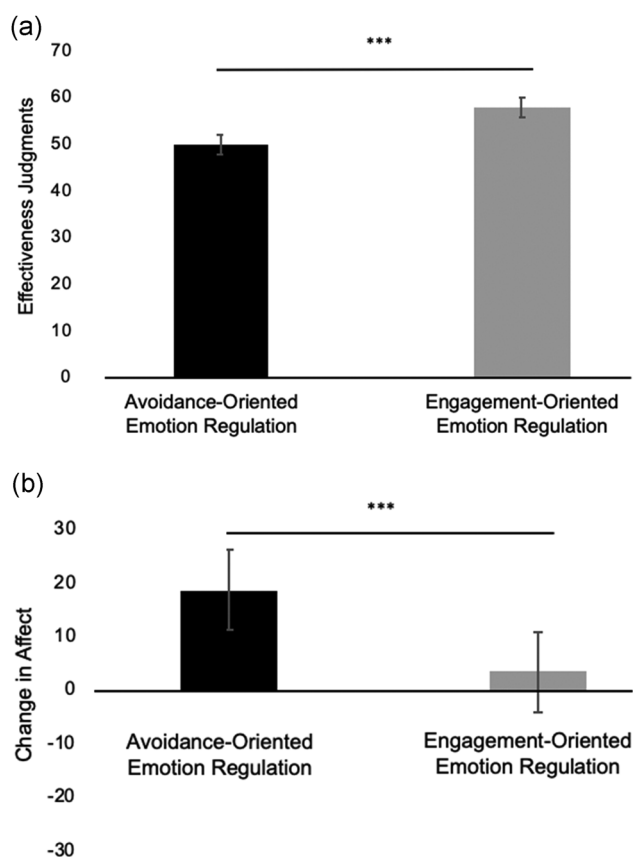


FIGURE 1 Effectiveness measures of each emotion regulation strategy type. Figures based on unstandardized estimates. (a) Larger values indicate stronger judgments that emotion regulation attempts were effective at making the individual feel better rather than worse. (b) A positive change reflects an improvement in affect over time and a negative change reflects a worsening in affect over time, after controlling for the amount of time between observations. *** $p < .001$

avoidance-oriented ER attempts to be less effective than their engagement-oriented ER attempts. Social anxiety severity did not moderate self-rated effectiveness of avoidance- relative to engagement-oriented ER.

3.2 | ER strategy and social anxiety predictors of change in self-reported affect over time

There was no main effect of social anxiety in predicting change in affect, suggesting that social anxiety severity was not systematically related to how an individual's ER attempts, regardless of strategy type, influenced their degree of affect change (although we may have been underpowered to detect an effect of social anxiety, see Table S5 for results of the effectiveness judgments analysis using the change in affect data set). However, holding social anxiety severity constant, avoidance- relative to engagement-oriented strategy use was associated with *greater increases* in positive (relative to negative) affect over time (Figure 1b). Social anxiety severity did not moderate change in affect following avoidance- relative to engagement-oriented ER. Fixed and random effects estimates for both models are included in Table 2. Further, in response to a helpful reviewer suggestion, we included an additional operationalization of change in affect (i.e., deviation of regulating affect from nonregulating affect) and corresponding set of analyses in the Supporting Information for the interested reader (Table S6).

4 | DISCUSSION

Findings show that, when measuring effectiveness as the degree to which participants perceived their ER attempts to make them feel better or worse (a judgment), social anxiety severity was *negatively*

associated with ER effectiveness and avoidance-oriented strategies were *less effective* than engagement-oriented strategies. In contrast, when measuring effectiveness as the degree of change in self-reported affect following ER attempts, social anxiety severity was *not related* to ER effectiveness and avoidance-oriented strategies were *more effective* than engagement-oriented strategies. Social anxiety and ER strategy type did not interact in either model.

The current findings suggest that higher social anxiety symptoms are associated with a general (i.e., not strategy specific) *perceived lower ability* to effectively regulate emotions, but not less of an ability to experience *affective relief* following ER (although reduced power for this analysis could contribute to the null result). That social anxiety symptoms were associated with a judgment of being less effective at regulatory attempts is consistent with evidence that social anxiety is associated with low emotional self-efficacy (De Castilla et al., 2014). However, that differential changes in affect were not observed as a function of social anxiety is consistent with the prior finding that socially anxious (vs. control) participants self-rated as being *less effective* in a reappraisal task despite evidence for them being *more effective* based on lower unpleasantness ratings (Kivity & Huppert, 2018). Taken together, while it is important not to overinterpret these results given differences in sample size (and consequently power), these findings highlight the differential relationship of social anxiety symptoms to two effectiveness outcomes. Further, because effectiveness judgments are based on one's perception of strategy impact rather than an objective assessment of affect change following strategy use, this measure likely also reflects a general tendency for self-criticism in social anxiety, in addition to serving as a putative measure of (in)effective regulation.

The current findings suggest that avoidance- relative to engagement-oriented strategies are *judged* to be less effective, but they may contribute to more positive affective change in the short-term, on

TABLE 2 Model estimates

Model Outcome	Predictor	Fixed effect	t	p	Random effect (variance)	Random effect (SD)	Marginal R ²	Conditional R ²
Effectiveness judgments	Intercept	0.04	0.60	.55	0.31	0.56	0.07	0.37
	Strategy type	-0.42	-6.74	<.001***				
	Social anxiety	-0.14	-2.25	.03*				
	Strategy × Social anxiety	-0.09	-1.52	.13				
Change in affect	Intercept	0.09	2.05	.047*	0.002	0.04	0.029	0.03
	Strategy type	-0.36	-4.04	<.001***				
	Social anxiety	0.02	0.35	.73				
	Strategy × Social anxiety	-0.01	-0.10	.92				
	Time elapsed	-0.05	-1.31	.19				

Note: The Effectiveness Judgments analysis was run using 1,204 observations contributed by 124 participants, whereas the Change in Affect analysis was run using a subset of those observations that met a priori inclusion criteria ($k = 696$, $n = 106$). All continuous variables were standardized so fixed effect β values can be interpreted as smaller, more conservative correlation coefficients (Ferguson, 2009; Lorah, 2018).

A negative β estimate for Strategy Type in the Effectiveness Judgments output indicates that avoidance (relative to engagement) strategies were judged to be *less effective* by participants, whereas a negative β estimate for Strategy Type in the Change in Affect output indicates that avoidance (relative to engagement) strategies were associated with *greater decrease in negative affect over time* (i.e., more affective relief).

* $p < .05$.

*** $p < .001$.

TABLE 3 Model estimates predicting affect composite score when regulating

Model outcome	Predictor	Fixed effect	t	p	Random effect (variance)	Random effect (SD)	Marginal R ²	Conditional R ²
Affect composite	Intercept	-0.03	-0.56	0.57	0.30	0.55	0.08	0.38
	Strategy type	0.33	5.33	<0.001***				
	Social anxiety	0.19	3.21	<0.01**				
	Strategy × Social anxiety	0.11	1.85	0.06 [†]				

Note: Analysis run on 1,204 observations contributed by 124 participants. All continuous variables were standardized so fixed effect β values can be interpreted as smaller, more conservative correlation coefficients (Ferguson, 2009; Lorah, 2018). Individuals with greater social anxiety severity tended to rate their in-the-moment overall affect as more negative. Avoidance- relative to engagement-oriented strategies were associated with greater overall negative in-the-moment affect.

[†] $p < 0.10$.

** $p < .001$.

*** $p < 0.001$.

average (though no causal inferences are possible with this nonexperimental design). It is possible that these findings are related to differences in how the two effectiveness measures tap instrumental and hedonic goals in ER. Self-rated judgments of how effective avoidance-oriented strategies are might reflect a *belief* that these strategies are not as useful in changing their underlying thoughts and feelings. As a result, this measure may not account for the short-term relief or pleasure that often stems from avoiding something challenging. Although the findings need to be replicated, this explanation is consistent with previous findings that hedonic and instrumental goals in ER are distinct and can uniquely affect strategy selection (Tamir et al., 2008). An alternative explanation for why avoidance- relative to engagement-oriented strategies are associated with greater affective improvement could be that avoidance-oriented (vs. engagement) strategies are more often implemented during relatively more intense negative affect (e.g., Sheppes, 2014), therefore allowing for greater change over time. In fact, participants in the current sample were more likely to report avoidance- relative to engagement-oriented strategies during greater in-the-moment negative affect (Table 3), further highlighting that each way of operationalizing effectiveness raises interesting questions about what “effectiveness” really means. To this point, the additional operationalization of change in affect in the online supplement suggests yet another interpretation of how different types of ER strategies and social anxiety severity are associated with “effective” short-term ER (Table S6).

5 | CONCLUSIONS AND LIMITATIONS

The current study's intensive ecological momentary data from college students illustrates how different ways of operationalizing ER effectiveness lead to different conclusions about the relative short-term effectiveness of ER strategies in daily life. The current findings need to be understood in light of the study's limitations. Due to more stringent inclusion criteria to assess affect change over time, we may have been underpowered to detect an effect of social anxiety on change in affect following an ER attempt, though other analyses (see Table S5) also suggest that in-the-moment strategy use may

have a stronger effect on short-term ER effectiveness outcomes than trait social anxiety. Further, although in line with our preregistered plan for analysis, the current models did not allow the effect of strategy type to vary randomly between participants and observations were only nested within participants (rather than first nesting observations within days). Future studies with greater numbers of data points per participant could consider including these parameters in their models to better account for between-person and day-to-day differences. The current effectiveness ratings were also aggregated across situations given the number of observations, reducing chances to evaluate contextual influences on ER effectiveness. Further, although running analyses at the cluster-level allows for comparison of current findings with previous cluster-level findings from the literature (e.g., McMahon & Naragon-Gainey, 2018), opportunities for strategy-specific conclusions are necessarily limited when clustering. Replications within college student samples and extensions to other populations will also be important to evaluate generalizability of these findings. Finally, longer monitoring periods and increased response rates will allow for more assessments, allowing for a broader sampling of the domain and more reliable estimates.

While EMA is increasingly being used to study short-term and situationally grounded ER effectiveness in daily life, both within and across individuals (e.g., Aldao, 2013), researchers differ in how they measure effectiveness (e.g., Farmer & Kashdan, 2012; Heij & Cheavens, 2014). Just as Mauss and Robinson (2009) argue that experiential, physiological, and behavioral measures of emotional responding are all relevant and noninterchangeable, the current study suggests it is critical not to assume one way of operationalizing effectiveness will correspond to another. An exciting next step will be to determine how different facets of short-term ER effectiveness uniquely relate to various long-term mental, physical, and interpersonal health ER outcomes.

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CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in the Open Science Framework (<https://osf.io/njdpf/>).

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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