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The Wisdom to Know the Difference: Emotion Regulation Strategy-Situation Fit in Daily Life is Associated with Well-Being

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Abstract

The ability to regulate emotions is central to well-being, but healthy emotion regulation may not merely be about using the "right" strategies. According to the *strategy-situation fit hypothesis*, emotion regulation strategies are only conducive to well-being when used in appropriate contexts. This study is the first to test the strategy-situation fit hypothesis in relation to cognitive reappraisal–a putatively adaptive strategy–in daily life using Ecological Momentary Assessment. We expected people who use reappraisal more in uncontrollable situations and less in controllable situations to have higher well-being. Healthy participants (n=74) completed measures of well-being in the lab and used a smartphone app to report their use of reappraisal and perceived controllability 10 times a day for one week. Supporting the strategy-situation fit hypothesis, participants who used reappraisal more in less (versus more) controllable situations had higher well-being, whereas greater use of reappraisal across situations was unrelated to well-being.

Keywords: Emotion Regulation; Well Being; Daily Life; Cognitive Reappraisal; Controllability

Emotions are functional (Frijda, 2007). Yet, in many situations emotions are only adaptive if regulated (Gross & Jazaieri, 2014). A strategy central to cognitive behavioural therapies (e.g., Goldin et al., 2012) and widely considered the exemplar of healthy emotion regulation (Haga, Kraft, & Corby, 2009; John & Gross, 2004) is reappraisal: reframing an emotion-eliciting stimulus to modulate its emotional impact (Gross, 2015).

However, the assumption that reappraisal (or any regulation strategy) is uniformly effective across contexts is contested (Aldao, Sheppes, & Gross, 2015; Bonanno & Burton, 2013). Meta-analyses show that reappraisal is only modestly effective in modulating emotions (Webb, Miles, & Sheeran, 2012) or predicting adjustment (Aldao, Nolen-Hoeksema, & Schweizer, 2010), suggesting that important contextual moderators may have been overlooked (Webb et al., 2012). Reappraisal has mostly been studied using experimental and retrospective methods, not capturing the rich and varied contexts in which emotion regulation naturally occurs. The current study tracks naturalistic variation in reappraisal across situations in daily life, and investigates whether more context-appropriate use of reappraisal is related to greater well-being.

Consistent with Lazarus and Folkman's (1987) transactional model of coping, researchers are increasingly recognising the importance of congruency between emotion regulation strategies and the contexts in which they are used, labelled *strategy-situation fit* (Aldao et al., 2015; Bonanno & Burton, 2013). Specifically, the transactional model predicts that emotion-focused strategies (e.g., reappraisal) should be more adaptive when used in uncontrollable contexts–when the situation itself cannot be changed (Cheng, 2001). Thus, flexibly varying reappraisal use in synchrony with changes in situational controllability may be healthier than simply using reappraisal more across all contexts (Aldao et al., 2015). While this does not necessarily imply that reappraisal is problematic when used in controllable contexts (Folkman, 1984), a recent study by Troy, Shallcross and Mauss (2013) suggests that this may indeed be the case. Troy et al. (2013) found that individuals with higher reappraisal ability reported fewer depressive symptoms if exposed to uncontrollable stressors, but more symptoms if exposed to controllable stressors. These findings suggest that when a situation can be directly changed, reappraisal may undermine the adaptive function of emotions to motivate action (Troy et al., 2013).

While provocative, Troy et al.'s (2013) findings fall short of directly supporting the strategy-situation fit hypothesis, because better reappraisal ability (in the lab) does not necessarily predict more frequent or inflexible use of reappraisal across everyday contexts (McRae, 2013). Naturalistic studies show that people vary their reappraisal use and controllability appraisals across contexts in daily life (Brans, Koval, Verduyn, Lim, & Kuppens, 2013; David & Suls, 1999), allowing for direct estimation of the within-person relationship between reappraisal and controllability across situations (Aldao et al., 2015). The strategy-situation fit hypothesis can be directly tested by examining whether this person-specific covariation between reappraisal and controllability is related to well-being.

The present study used Ecological Momentary Assessment (EMA) to test the strategy-situation fit hypothesis in daily life. Specifically, we investigated whether the association between a person's reappraisal use and controllability appraisals is related to their well-being. In light of previous findings (Cheng, Lau, & Chan, 2014; Troy, Shallcross, & Mauss, 2013), we hypothesised that greater well-being should be associated with a tendency to use reappraisal more in relatively uncontrollable situations and less in relatively controllable contexts.

Method

Participants

Seventy-eight people were recruited by advertisements posted on a local classified, community website (Gumtree) and around the university campus. We aimed to recruit up to 100 participants between June 1st and December 31st, 2015, with sample size determined based on previous EMA research conducted by our team and available funding. To maximise variability in well-being, the ad invited individuals who were either "comfortable" or "fearful" of social situations. Four participants withdrew early, leaving a final sample of 74 (61% female), aged 18 to 32 years (*M* = 23.26; *SD* = 3.54). Participants were studying (58%), working full-time (5%), working part-time (23%), or unemployed (14%). The study was approved by the Australian Catholic University's Ethics Committee and all participants provided informed consent. Participants were reimbursed up to $50, with a minimum of $30 plus incentives contingent on their level of EMA compliance.

Materials and Procedure

During an initial laboratory session, participants completed a demographics questionnaire and the following well-being measures:

Depression, anxiety and stress symptoms. Participants completed the 21-item Depression, Anxiety and Stress Scales (DASS-21; Henry & Crawford, 2005), which assesses frequency and severity of symptoms over the past week on a scale from 0 (*did not apply to me at all*) to 3 (*applied to me very much, or most of the time*) with 7-item scales for depression (e.g., "I felt downhearted and blue"), anxiety (e.g., "I felt I was close to panic") and stress (e.g., "I found it hard to wind down").

Neuroticism. The 8-item neuroticism subscale (e.g., "I am someone who gets nervous easily") of the Big Five Inventory (BFI-44; John, Naumann, & Soto, 2008) using a scale of 1 (*disagree strongly*) to 5 (*agree strongly*).

Social anxiety. Participants completed the 20-item Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998), and the 12-item Brief Fear of Negative Evaluation Scale (BFNE; Leary, 1983), which assess social anxiety (e.g., "when mixing socially, I am uncomfortable") , including preoccupation with negative social evaluation (e.g., "I am afraid that others will not approve of me"), on a scale from 1 (*not at all characteristic of me*) to 5(*extremely characteristic of me*). All 32 items (from both scales) were combined into a measure of social anxiety.

Self-Esteem. Participants' global self-esteem was assessed with Rosenberg's Self-Esteem Scale (RSE; Rosenberg, 1965), comprising 10 items (e.g., "On the whole, I am satisfied with myself") rated on a scale from 1 (*strongly disagree*) to 4 (*strongly agree*).

EMA. After completing the well-being measures, participants downloaded SEMA2, a custom-built EMA app running on iOS and Android, onto their own smartphone. Participants received detailed instructions for using SEMA2 and had a chance to practice answering the EMA survey and ask clarification questions. The experimenter explained to participants the importance of completing as many EMA surveys as possible, while ensuring that their responses were careful and honest. SEMA2 was programed to run between 10am and 10pm for 7 days, with EMA surveys triggered randomly every 72 ± 30 min (i.e., approximately 10 EMA surveys per day). EMA compliance was high, with participants completing an average of 87% of scheduled surveys (*SD* = 9.4%, *Range* = 17-98%). Two participants had poor EMA compliance (i.e., < 50% response rate). However, results remained unchanged when these participants were excluded from analyses. We therefore report results with the full sample.

Reappraisal in daily life. At each EMA prompt, participants reported their use of cognitive reappraisal “since the last survey” using two items rated on a scale from 0 (*not at all*) to 100 (*very much so*). Both items began with the stem “in response to your feelings, have you” followed by “looked at things from a different perspective” and “changed the way you were thinking about the situation”. Because the two reappraisal items were strongly correlated (within-person r = .50, p < .001), we formed a composite momentary reappraisal score by taking their mean, which we used in all subsequent analyses. Importantly, when we repeated analyses separately with each individual reappraisal item, results were substantively identical to those reported below.

Controllability in daily life. Participants also rated the degree to which they perceived their environment as controllable at each EMA prompt using a single item: “to what extent were you in control of what’s happened since the last survey?” rated on a scale from 0 (*not all*) to 100 (*very much so*).

Situation modification. The EMA survey also contained an item assessing the use of *situation modification* (“in response to your feelings, have you changed something in your environment, since last survey?”) rated on a scale from 0 (*not at all*) to 100 (*very much so*).

Other measures not reported here. Finally, in addition to the measures reported above, participants reported demographic information including exposure to major life events, completed cognitive tasks and provided saliva samples for hormonal analysis at baseline. The EMA survey also contained several additional items assessing affect, events and the use of other regulation strategies. Finally, a subset of participants wore ambulatory physiology monitors throughout the EMA sampling period as a pilot for a future study. Data from these additional measures are not relevant to the current study and are therefore not reported here.

Data cleaning and preparation.

Participants' response times for each EMA item were recorded in milliseconds. Following McCabe, Mack, and Fleeson (2011) guidelines, responses to individual EMA items faster than 300ms were treated as missing (n = 35; < 1%), and if more than 50% of items within an EMA survey had response times ≤ 300ms the entire survey was excluded from analysis (n = 7, all from the same participant).

We calculated mean scores for each well-being measure, which were standardized before being entered in our main analyses. However, for descriptive purposes we report sum scores for each well-being scale. Table 1 displays descriptive statistics, reliabilities and inter-correlations for all well-being measures.

Table 1

Descriptive Statistics, Reliabilities and Correlations Among Well-Being Measures

			Range		Correlations				
Well-Being Measure	α	*M* (SD)	Actual	Possible	*1.*	*2.*	*3.*	*4.*	*5.*
1. Depression	.86	6.38 (6.60)	0–32	0–42	—				
2. Anxiety	.77	6.05 (5.35)	0–20	0–42	.56	—			
3. Stress	.80	10.41 (7.20)	0–30	0–42	.55	.52	—		
4. Neuroticism	.86	23.70 (6.37)	9–37	7–56	.52	.55	.67	—	
5. Social Anxiety	.96	81.45 (24.40)	43–141	32–160	.57	.47	.59	.76	—
6. Self-Esteem	.91	31.42 (5.70)	19–40	10–40	–.58	–.41	–.38	–.60	–.66

Note. Descriptive statistics are based on sum scores for each well-being measure, with scores on the Depression, Anxiety and Stress scales multiplied by 2 (to allow for comparison with scores on the 42-item DASS).
For all correlations, n = 74 and p < .001.

Statistical Analyses

Data were analysed using multilevel modelling (HLM version 7.01; Raudenbush, Bryk, & Congdon, 2013) to account for the nesting of measurement occasions (i.e., EMA surveys, n = 5510) within persons (n = 74). Specifically, we ran a series of two-level models with random intercepts and slopes, following Bolger and Laurenceau (2013). To test the strategy-situation fit hypothesis, at the within-person level reappraisal was regressed onto controllability while controlling for the linear effect of time. We also included "lagged" reappraisal as a predictor to control for reappraisal use at the previous occasion and model change in reappraisal as a function of controllability. At the within-person level, predictors were person-mean centred thus removing between-person differences. The within-person model is shown in Equation (1):

$$\text{REAP}_{ti} = \pi_{0i} + \pi_{1i}(\text{CTRL}_{ti}) + \pi_{2i}(\text{Time}_{ti}) + \pi_{3i}(\text{REAP}_{t-1i}) + e_{ti} \quad (1)$$

Here, the outcome (REAP_{ti}) reflects person i's use of reappraisal at time t. Since the predictors are person-mean centred, the intercept (π_{oi}) represents person i's mean use of reappraisal. Of particular interest, the slope (π_{1i}) reflects the within-person association between person i's rating of controllability at time t (CTRL_{ti}) and change in person i's use of reappraisal from time t-1 to time t (i.e., after controlling for reappraisal at t–1, captured by π_{3i}). Possible linear trends in the use of reappraisal are captured by the slope of time (π_{2i}). Thus, π_{1i} (henceforth referred to as the *REAP-CTRL Slope*) is a person-specific index of covariation between change in reappraisal use as a function of perceived controllability, a direct operationalization of strategy-situation fit. A positive REAP-CTRL slope indicates greater use of reappraisal in more controllable contexts (i.e., poorer strategy-situation fit), whereas a negative slope reflects greater use of reappraisal in less controllable contexts (i.e., better strategy-situation fit). Finally, the within-person residual e_{ti} reflects the unexplained component of person i's reappraisal use at time t. At the between-person level, all parameters in Equation 1 were allowed to vary randomly across persons and their associations with standardised well-being measures (denoted as zWell-Being, below) scores were modelled, while controlling for mean level of controllability ($\overline{\text{CTRL}}_i$, reflecting each person *i*'s mean controllability score across all EMA surveys), as shown in Equations (2) to (5):

$$\pi_{0i} = \beta_{00} + \beta_{01}\,(\text{zWell-Being}_i) + \beta_{02}\,(\overline{\text{CTRL}}_i) + r_{0i} \tag{2}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}\,(\text{zWell-Being}_i) + \beta_{12}\,(\overline{\text{CTRL}}_i) + r_{1i} \tag{3}$$

$$\pi_{2i} = \beta_{20} + \beta_{21}\,(\text{zWell-Being}_i) + \beta_{22}\,(\overline{\text{CTRL}}_i) + r_{2i} \tag{4}$$

$$\pi_{3i} = \beta_{30} + \beta_{31}\,(\text{zWell-Being}_i) + \beta_{32}\,(\overline{\text{CTRL}}_i) + r_{3i} \tag{5}$$

In Equations (2) to (5), because well-being scores (zWell-Being_i) are standardised, the intercepts β_{00}, β_{10}, β_{20} and β_{30} reflect estimates of each within-person parameter in Equation 1 for a person with an average well-being score. The slopes β_{01}, β_{11}, β_{21} and β_{31} represent between-person associations between well-being and each within-person parameter modelled in Equation 1, and the between-person residuals r_{0i}, r_{1i} , r_{2i} and r_{3i} reflect person-specific variance in each within-person parameter that is unexplained by well-being. We were primarily interested in the β_{01} and β_{11} slopes. First, the β_{01} slopes are estimates of the association between well-being and mean use of reappraisal across contexts in daily life. According to the strategy-situation hypothesis, well-being should not be associated with merely using reappraisal more regardless of context. Second, and most importantly, the β_{11} slopes represent associations between well-being and the within-person REAP-CTRL slopes (i.e., strategy-situation fit). According to the strategy-situation fit hypothesis, lower well-being should be related to a more positive REAP-CTRL slope and greater well-being to a more negative REAP-CTRL slope. We ran separate models with each well-being measure as an individual between-person predictor.

Results

Preliminary Analyses

We estimated means, *SD*s and ICCs for reappraisal and controllability using intercept-only models (also known as *null models*, as they include no predictors). For reappraisal, the mean level was 29.50 (*SE*

= 1.97, 95% CI [25.58, 33.43]), with *SD*s of 18.47 and 16.89 at the within- and between-person levels, respectively. The ICC for reappraisal was .46, indicating that 46% of the total variability in reappraisal was between-persons and 54% was within-persons. For controllability, the mean level was 64.55 (*SE* = 1.89, 95% CI [60.79, 68.32]), with *SD*s of 21.82 and 16.12 at the within- and between-person levels, respectively. The ICC for controllability was .35, indicating that 35% of the total variability in controllability was between-persons, and 65% was within-persons.

A preliminary analysis using the same within-person model as shown in Equation 1 and estimating random effects without any predictors at the between-person level, showed that the average REAP-CTRL slope was close to zero, β_{10} = –0.005, *SE* = 0.023, 95% CI [–0.05, 0.04], *p* = .835. Thus, for the average person, reappraisal use did not covary with changes in perceived controllability. However, REAP-CTRL slopes varied substantially between-persons (*SD* = 0.14, χ^2 = 157.52, p < .001). Our main analyses involved modelling this between-person variability in REAP-CTRL slopes as a function of well-being.

Main Analyses

Results of our main analyses (i.e., standardized β_{01} and β_{11} estimates and 95% CIs) are displayed in Table 2. Examination of the β_{01} estimates, representing associations between well-being and mean use of reappraisal in daily life, revealed that none of the well-being measures was reliably associated with mean reappraisal use (see Table 2). Thus, consistent with the strategy-situation fit hypothesis, greater use of reappraisal across all contexts in daily life was not associated with well-being.

Table 2

Fixed Effect Estimates Reflecting Associations between Well-Being with Mean Reappraisal Use (β_{01}) and REAP-CTRL Slopes (β_{11})

	Associations with Mean Reappraisal (β_{01})				Associations with REAP-CTRL Slope (β_{11})			
Well-Being Measure	Est. (*SE*)	*LL*	*UL*	*p*	Est. (*SE*)	*LL*	*UL*	*p*
Depression	–0.841 (1.919)	–4.667	2.986	.663	0.059 (0.018)	0.023	0.095	.002
Anxiety	–0.635 (1.801)	–4.227	2.956	.725	0.047 (0.018)	0.012	0.082	.009
Stress	3.075 (2.140)	–1.192	7.343	.155	0.063 (0.017)	0.030	0.097	< .001
Neuroticism	2.564 (2.191)	–1.805	6.933	.246	0.050 (0.020)	0.010	0.089	.014
Social Anxiety	2.607 (2.019)	–1.419	6.632	.201	0.035 (0.018)	–0.001	0.071	.059
Self-Esteem	–1.454 (2.056)	–5.554	2.646	.482	–0.039 (0.022)	–0.083	0.006	.088

Note. For all multilevel model estimates, approximate *df* = 71.
REAP-CTRL Slope = model estimated within-person association between momentary reappraisal and person-centered controllability in daily life (i.e., strategy-situation fit).

Estimates of β_{11}, representing associations between well-being and within-person REAP-CTRL slopes (i.e., strategy-situation fit), were in the predicted direction for all well-being measures: higher levels of depression, anxiety, stress, neuroticism, and social anxiety, and lower levels of self-esteem, were associated with more positive REAP-CTRL slopes. Thus, people with lower well-being tended to use reappraisal more in relatively controllable contexts (i.e., poorer strategy-situation fit), while those with higher well-being used reappraisal more in situations perceived as less controllable (i.e., better strategy-situation fit).

Simple Slopes

To further explore the association between well-being and the REAP-CTRL slopes (representing strategy-situation fit), we conducted simple slopes analyses using the method developed by Preacher, Curran, and Bauer (2006). Simple slopes were calculated based on analyses using within-person standardized controllability ratings (i.e., each person *i*'s mean controllability rating across all EMA occasions was subtracted from their controllability rating at each occasion *t*, and then divided by their *SD* of controllability ratings across occasions). Results of the analyses using within-person standardized controllability ratings were highly consistent with our main findings. Estimates of simple slopes at ± 1 *SD* of well-being scores are shown in Table 3.

Table 3

Simple Slope Estimates of the Association between Reappraisal and Controllability at High and Low Levels of Well-Being Measures

	Low (–1 *SD*)				High (+ 1 *SD*)			
		95% CI				95% CI		
Well-Being Measure	Est. (*SE*)	*LL*	*UL*	*p*	Est. (*SE*)	*LL*	*UL*	*p*
Depression	–1.33 (0.66)	–2.65	–0.02	.047	0.99 (0.43)	0.13	1.85	.025
Anxiety	–1.19 (0.61)	–2.41	0.04	.057	0.88 (0.53)	–0.19	1.94	.104
Stress	–1.54 (0.55)	–2.64	–0.44	.007	1.21 (0.53)	0.15	2.26	.026
Neuroticism	–1.18 (0.53)	–2.24	–0.12	.029	0.83 (0.63)	–0.44	2.09	.196
Social Anxiety	–0.86 (0.58)	–2.02	0.30	.144	0.53 (0.59)	–0.64	1.70	.368
Self-Esteem	0.67 (0.57)	–0.46	1.80	.243	–0.92 (0.70)	–2.32	0.47	.192

Note. Simple slopes were calculated at ± 1 *SD* around the mean score on each well-being measure, based on multilevel models using within-person standardized controllability scores as a predictor of reappraisal (while also controlling for the linear effect of time and use of reappraisal at *t*-1). For all simple slopes, approximate $df = 71$. P-values for simple slopes are based on *t*-tests with a test value of zero, and are calculated by dividing the simple slope estimate (Est.) by the corresponding standard error (*SE*).

As expected, simple slopes were negative at –1 *SD* for all well-being measures (except self-esteem, for which the simple slope at –1 *SD* was positive, as expected). However, only the simple slopes at –1 *SD* of depression, stress and neuroticism were statistically significant at $p < .05$. Also as expected, simple slopes were positive at + 1 *SD* of all well-being measures (except self-esteem, which the simple slope at + 1 *SD* was negative, as expected). However, only the simple slopes at + 1 *SD* of depression and stress were statistically significant at $p < .05$ (see Table 3). Although not all simple slopes at ± 1 *SD* of anxiety, neuroticism, social anxiety and self-esteem were statistically significant, Preacher et al.'s (2006) method also allows calculation of *regions of significance*, reflecting values of each well-being measure (in standard deviation units) outside which simple slopes were statistically significant. Simple slopes were statistically significant outside the region of –1.07 to 1.33 *SD*s for anxiety, and –0.79 to 2.30 *SD*s for neuroticism. However, it is not always mathematically possible to calculate regions of significance (Preacher et al., 2006) and this was the case for the analyses with social anxiety and self-esteem.

For illustrative purposes, Figure 1 plots the simple REAP-CTRL slopes at ± 1 *SD* of depression (Panel A) and stress (Panel B). The patterns in Figure 1 are representative of the results for all other well-being measures (see Figure S1 in the Supplemental Material available online). Figure 1 (Panel A) shows that individuals scoring higher (+1 *SD*) than average on depression tend to use less reappraisal in relatively uncontrollable contexts and increase their use of reappraisal as their perceptions of controllability increase. In contrast, participants with lower (–1 *SD*) depression scores tend to use reappraisal more in situations they perceive as lower in controllability and decrease their use of reappraisal as their perceptions of controllability get higher. A similar pattern for the simple slopes can be seen in Panel B of Figure 1, with the only difference being that mean use (i.e., the intercept) of reappraisal is higher among participants with higher (+ 1 *SD*) stress scores, although this difference was not statistically significant (see β_{01} estimates in Table 2).

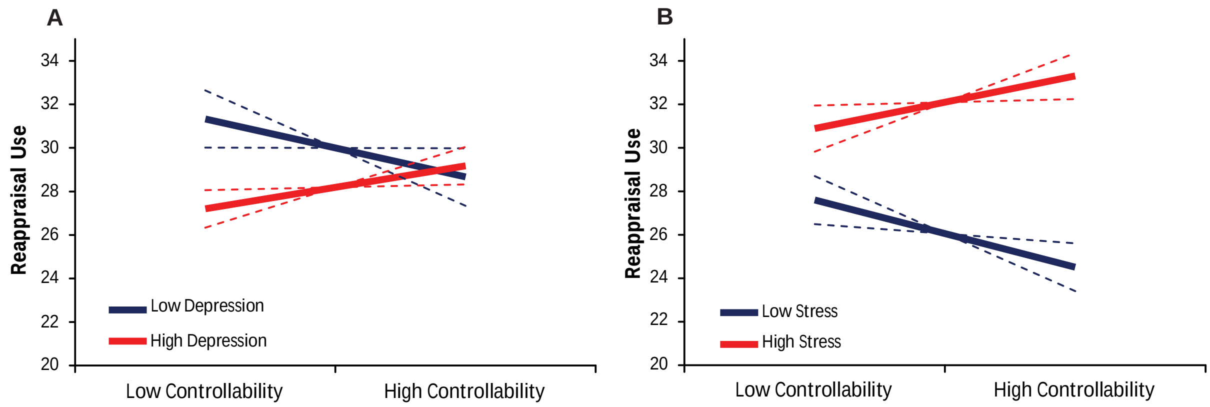

Figure 1. Simple slopes reflecting use of reappraisal in situations rated as low (–1 *SD*) versus high (+1 *SD*) in controllability, among individuals scoring low (–1 *SD*) versus high (+1 *SD*) on depression (Panel A) and stress (Panel B). Dashed lines represent 95% CIs.

Supplementary Analyses

To ensure that our findings were robust and not exclusively due to the particular specification of our multilevel models, we ran several supplementary analyses with alternate model specifications (e.g., removing all covariates from the within-person model, additionally including controllability at *t*-1 at the within-person level, including mean reappraisal use at the between-person level, etc.). Across all alternate model specifications, results were consistent with our main findings (reported above). In a final model including all well-being measures together at the between-person level, depression emerged as the only well-being measure to uniquely predict REAP-CTRL slopes. Alternate model specifications are described in the Supplemental Materials available online. Estimates of the associations between well-being and REAP-CTRL slopes based on supplementary analyses are reported in Tables S1 and S2 in the Supplemental Materials available online.

Finally, *situation modification* is a problem-focused strategy, which may be more adaptive when deployed in controllable versus uncontrollable situations (Lazarus & Folkman, 1987). Thus, a complimentary hypothesis regrading flexible use of situation modification would predict that greater use of situation modification in more (versus less) controllable contexts should be related to higher well-being. To investigate this, we repeated our main analyses with situation modification as the outcome and report the results in Table S3 of the Supplemental Material available online.

Discussion

This study was the first to assess within-person covariation between reappraisal and controllability in daily life using EMA, thus capturing strategy-situation fit with greater temporal resolution and ecological validity than previous studies (Cheng et al., 2014; Troy et al., 2013). As predicted, and extending on previous research (Troy et al., 2013), people with higher well-being increased their use of reappraisal in less controllable contexts, whereas individuals with lower well-being showed the opposite pattern. Thus our findings support the view that the adaptiveness of emotion regulation strategies crucially depends on situational factors in real life contexts (Aldao et al., 2015; Bonanno & Burton, 2013).

Whereas reappraisal has often been assumed to be a generally healthy strategy (Gross & Thompson, 2007), the current findings support a context-dependent account, according to which flexibly matching use of reappraisal with contextual demands (e.g., controllability) is central to healthy emotion regulation (Kashdan & Rottenberg, 2010). Thus, rather than being a panacea, reappraisal may only be adaptive in less controllable situations.

Consistent with Troy et al. (2013), our findings indicate that individuals lower in well-being may actually increase their use of reappraisal in more controllable situations. This suggests that using reappraisal to modulate emotions when the situation can be directly altered may undermine the adaptive function of emotions to motivate action (Troy et al., 2013). However, we cannot rule out the possibility that lower well-being may be associated with a general increase in regulatory effort in more controllable situations.

This study has several limitations. First, as controllability was measured subjectively (cf. Troy et al., 2013) it may be confounded with individual differences in well-being (Cheng et al., 2014). However, by including mean controllability in our analyses, we can rule out its influence on the association between well-being and strategy-situation fit. Second, being cross-sectional, the present study cannot establish whether well-being is a consequence and/or precursor of flexible reappraisal use; longitudinal studies are necessary to establish such causal directionality. Third, we did not measure perceived self-efficacy of reappraisal, or reappraisal ability, both of which may contribute to greater well-being (Gross & Jazaieri, 2014). Finally, this study focused on cognitive restructuring, whereas other forms of reappraisal (e.g., self-distancing, positive reappraisal) may show differential patterns.

In conclusion, the current study provides clear support for a contextualized account of emotion regulation. By examining the process of strategy-situation fit as it unfolds over time in daily life, we found that individuals who use reappraisal more in situations they perceive as low in controllability, have greater well-being. These findings have important implications for theoretical models of emotion regulation and their clinical applications.

Author Contributions

P. Koval, J. Gleeson, P. Kuppens, T. Hollenstein and J. Ciarrochi developed the study concept. All authors contributed to the study design. Testing and data collection were performed by S. J. Haines and C. Grace under the supervision of P. Koval and I. Labuschagne. P. Koval and S. J. Haines performed the data analysis and interpretation of results. S. J. Haines and P. Koval drafted the manuscript, and J. Gleeson, P. Kuppens, T. Hollenstein and J. Ciarrochi provided critical revisions. All authors approved the final version of the manuscript for submission.

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Supplemental Materials

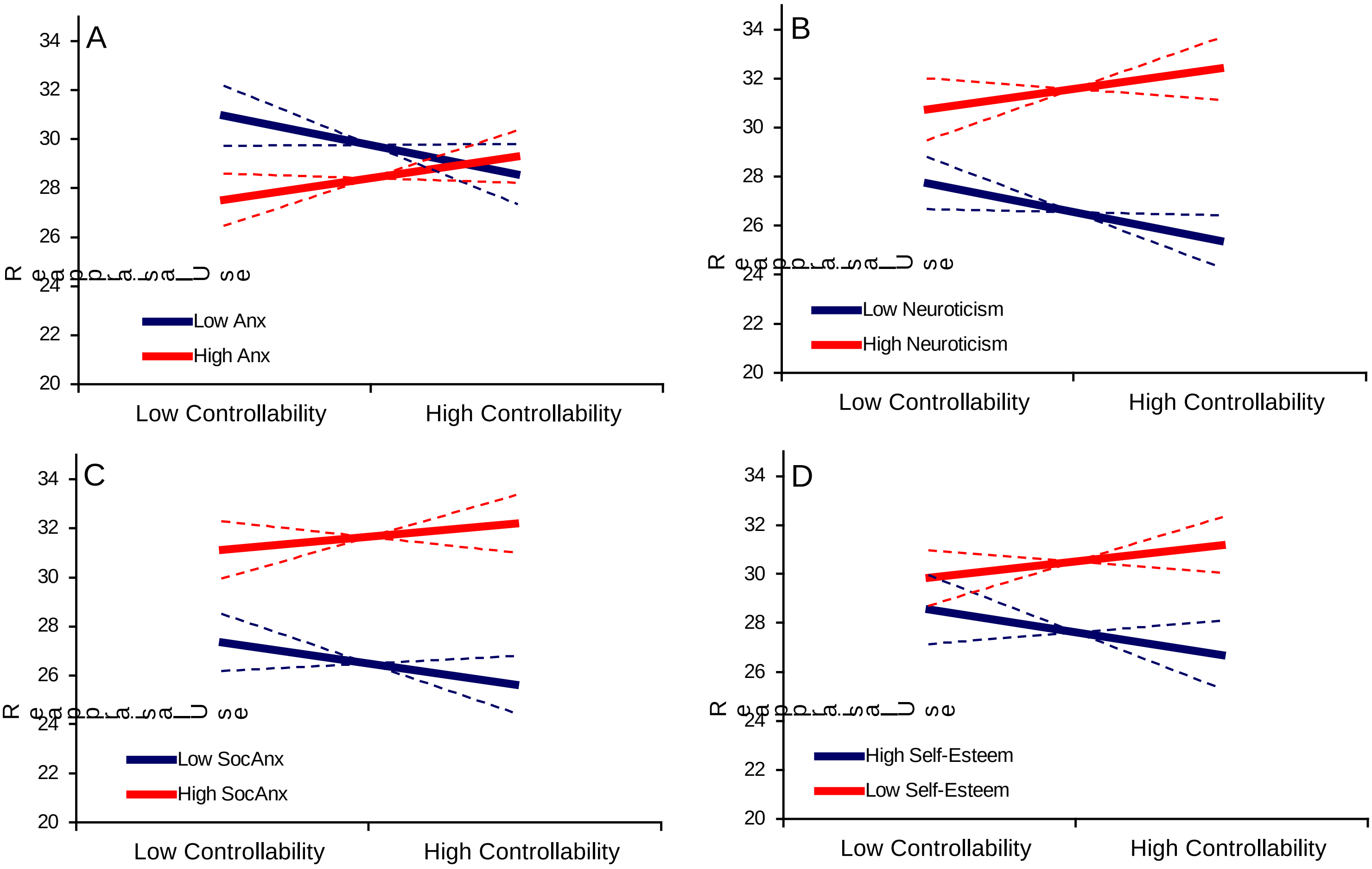

Figure S1. Simple slopes reflecting use of reappraisal in situations rated as low (–1 *SD*) versus high (+1 *SD*) in controllability, among individuals scoring low (–1 *SD*) versus high (+1 *SD*) on anxiety (Panel A), neuroticism (Panel B), social anxiety (Panel C) and self-esteem (Panel D). Dashed lines represent 95% CIs.

Alternate Within-Person Model Specifications

For the first set of supplementary analyses, we specified alternate within-person models while maintaining the same between-person model as in our main analyses, as shown below in Supplementary Models 1–3. All within-person predictors were group-mean centered.

Supplementary Model 1

Within-person model does not include Time or REAP$_{t-1}$ (lagged reappraisal) as predictors.

Within-person model:

$$\text{REAP}_{ti} = \pi_{0i} + \pi_{1i}(\text{CTRL}_{ti}) + e_{ti}$$

Between-person model:

$$\pi_{0i} = \beta_{00} + \beta_{01}\,(z\text{Well-Being}_{i}) + \beta_{02}\,(\overline{\text{CTRL}}_{i}) + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}\,(z\text{Well-Being}_{i}) + \beta_{12}\,(\overline{\text{CTRL}}_{i}) + r_{1i}$$

Supplementary Model 2

Within-person model does not include REAP$_{t-1}$ (lagged reappraisal) as a predictor.

Within-person model:

$$\text{REAP}_{ti} = \pi_{0i} + \pi_{1i}(\text{CTRL}_{ti}) + \pi_{2i}(\text{Time}_{ti}) + e_{ti}$$

Between-person model:

$$\pi_{0i} = \beta_{00} + \beta_{01}\,(z\text{Well-Being}_{i}) + \beta_{02}\,(\overline{\text{CTRL}}_{i}) + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}\,(z\text{Well-Being}_{i}) + \beta_{12}\,(\overline{\text{CTRL}}_{i}) + r_{1i}$$

$$\pi_{2i} = \beta_{20} + \beta_{21}\,(z\text{Well-Being}_{i}) + \beta_{22}\,(\overline{\text{CTRL}}_{i}) + r_{2i}$$

Supplementary Model 3

Within-person model additionally includes CTRL$_{t-1}$ (lagged controllability) as a predictor.

Within-person model:

$$\text{REAP}_{ti} = \pi_{0i} + \pi_{1i}(\text{CTRL}_{ti}) + \pi_{2i}(\text{Time}_{ti}) + \pi_{3i}(\text{REAP}_{t-1i}) + \pi_{4i}(\text{CTRL}_{t-1i}) + e_{ti}$$

Between-person model:

$$\pi_{0i} = \beta_{00} + \beta_{01}\,(z\text{Well-Being}_{i}) + \beta_{02}\,(\overline{\text{CTRL}}_{i}) + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}\,(z\text{Well-Being}_{i}) + \beta_{12}\,(\overline{\text{CTRL}}_{i}) + r_{1i}$$

$$\pi_{2i} = \beta_{20} + \beta_{21}\,(\text{zWell-Being}_{\text{i}}) + \beta_{22}\,(\overline{\text{CTRL}}_{\text{i}}) + \text{r}_{2\text{i}}$$

$$\pi_{3i} = \beta_{30} + \beta_{31}\,(\text{zWell-Being}_{\text{i}}) + \beta_{32}\,(\overline{\text{CTRL}}_{\text{i}}) + \text{r}_{3\text{i}}$$

$$\pi_{4i} = \beta_{40} + \beta_{41}\,(\text{zWell-Being}_{\text{i}}) + \beta_{42}\,(\overline{\text{CTRL}}_{\text{i}}) + \text{r}_{4\text{i}}$$

Table S1

Fixed Effect Estimates (β_{11}) Reflecting Associations between Well-Being and REAP-CTRL Slopes with Alternate Within-Person Model Specifications

	Supplementary Model 1				Supplementary Model 2				Supplementary Model 3			
		95% CI				95% CI				95% CI		
Well-Being Measure	Est. (*SE*)	*LL*	*UL*	*p*	Est. (*SE*)	*LL*	*UL*	*p*	Est. (*SE*)	*LL*	*UL*	*p*
Depression	0.056 (0.019)	0.018	0.094	.005	0.051 (0.020)	0.012	0.090	.011	0.057 (0.020)	0.018	0.096	.005
Anxiety	0.059 (0.017)	0.024	0.093	.001	0.051 (0.020)	0.011	0.090	.013	0.046 (0.019)	0.008	0.085	.018
Stress	0.071 (0.017)	0.037	0.105	< .001	0.068 (0.019)	0.030	0.106	< .001	0.068 (0.017)	0.034	0.102	< .001
Neuroticism	0.058 (0.019)	0.020	0.096	.004	0.053 (0.022)	0.009	0.097	.019	0.052 (0.022)	0.008	0.097	.023
Social Anxiety	0.051 (0.018)	0.015	0.087	.007	0.047 (0.021)	0.005	0.088	.028	0.033 (0.020)	–0.006	0.072	.091
Self-Esteem	–0.052 (0.021)	–0.094	–0.010	.017	–0.044 (0.023)	–0.090	0.002	.062	–0.036 (0.023)	–0.082	0.010	.120

Note. Approximate *df* = 71 for all models.

Alternate Between-Person Model Specifications

For the second set of supplementary analyses, we maintained the same within-person model as in our main analyses and specified different between-person models, as shown below in Supplementary Models 4–7. All within-person predictors were person-mean centered.

Supplementary Model 4

Between-person model does not include $\overline{\text{CTRL}}$ (mean controllability) as a predictor.

Within-person model:

$$\text{REAP}_{ti} = \pi_{0i} + \pi_{1i}(\text{CTRL}_{ti}) + \pi_{2i}(\text{Time}_{ti}) + \pi_{3i}(\text{REAP}_{t-1i}) + e_{ti}$$

Between-person model:

$$\pi_{0i} = \beta_{00} + \beta_{01}\,(z\text{Well-Being}_i) + r_{0i}$$
$$\pi_{1i} = \beta_{10} + \beta_{11}\,(z\text{Well-Being}_i) + r_{1i}$$
$$\pi_{2i} = \beta_{20} + \beta_{21}\,(z\text{Well-Being}_i) + r_{2i}$$
$$\pi_{3i} = \beta_{30} + \beta_{31}\,(z\text{Well-Being}_i) + r_{3i}$$

Supplementary Model 5

Between-person model additionally includes $\overline{\text{REAP}}$ (mean reappraisal) as a predictor.

Within-person model:

$$\text{Reappraisal}_{ti} = \pi_{0i} + \pi_{1i}(\text{controllability}_{ti}) + \pi_{2i}(\text{time}_{ti}) + \pi_{3i}(\text{reappraisal}_{t-1i}) + e_{ti}$$

Between-person model:

$$\pi_{0i} = \beta_{00} + \beta_{01}\,(z\text{Well-Being}_i) + \beta_{02}\,(\overline{\text{CTRL}}_i) + \beta_{03}\,(\overline{\text{REAP}}_i) + r_{0i}$$
$$\pi_{1i} = \beta_{10} + \beta_{11}\,(z\text{Well-being}_i) + \beta_{12}\,(\overline{\text{CTRL}}_i) + \beta_{13}\,(\overline{\text{REAP}}_i) + r_{1i}$$
$$\pi_{2i} = \beta_{20} + \beta_{21}\,(z\text{Well-being}_i) + \beta_{22}\,(\overline{\text{CTRL}}_i) + \beta_{23}\,(\overline{\text{REAP}}_i) + r_{2i}$$
$$\pi_{3i} = \beta_{00} + \beta_{31}\,(z\text{Well-being}_i) + \beta_{32}\,(\overline{\text{CTRL}}_i) + \beta_{33}\,(\overline{\text{REAP}}_i) + r_{3i}$$

Supplementary Model 6

Between-person model additionally includes $\overline{\text{REAP}}$ (mean reappraisal), Age and Gender as predictors.

Within-person model:

$$\text{REAP}_{ti} = \pi_{0i} + \pi_{1i}(\text{CTRL}_{ti}) + \pi_{2i}(\text{time}_{ti}) + \pi_{3i}(\text{REAP}_{t-1i}) + e_{ti}$$

Between-person model:

$$\pi_{0i} = \beta_{00} + \beta_{01}\,(z\text{Well-Being}_i) + \beta_{02}\,(\overline{\text{CTRL}}_i) + \beta_{03}\,(\overline{\text{REAP}}_i) + \beta_{04}\,(\text{Age}_i) + \beta_{05}\,(\text{Gender}_i) + r_{0i}$$
$$\pi_{1i} = \beta_{10} + \beta_{11}\,(z\text{Well-Being}_i) + \beta_{12}\,(\overline{\text{CTRL}}_i) + \beta_{13}\,(\overline{\text{REAP}}_i) + \beta_{14}\,(\text{Age}_i) + \beta_{15}\,(\text{Gender}_i) + r_{1i}$$
$$\pi_{2i} = \beta_{20} + \beta_{21}\,(z\text{Well-Being}_i) + \beta_{22}\,(\overline{\text{CTRL}}_i) + \beta_{23}\,(\overline{\text{REAP}}_i) + \beta_{24}\,(\text{Age}_i) + \beta_{25}\,(\text{Gender}_i) + r_{2i}$$
$$\pi_{3i} = \beta_{30} + \beta_{31}\,(z\text{Well-being}_i) + \beta_{32}\,(\overline{\text{CTRL}}_i) + \beta_{33}\,(\overline{\text{REAP}}_i) + \beta_{34}\,(\text{Age}_i) + \beta_{35}\,(\text{Gender}_i) + r_{3i}$$

Supplementary Model 7

Between-person model includes all well-being measures, as well as $\overline{\text{REAP}}$ (mean reappraisal), Age and Gender as simultaneous predictors.

Within-person model:

$$\text{REAP}_{ti} = \pi_{0i} + \pi_{1i}(\text{CTRL}_{ti}) + \pi_{2i}(\text{Time}_{ti}) + \pi_{3i}(\text{REAP}_{t-1i}) + e_{ti}$$

Between-person model:

$$\pi_{0i} = \beta_{00} + \beta_{01}\,(z\text{Depression}_i) + \beta_{02}\,(z\text{Anxiety}_i) + \beta_{03}\,(z\text{Stress}_i) + \beta_{04}\,(z\text{Neuroticism}_i) + \beta_{05}\,(z\text{Social Anxiety}_i) + \beta_{06}\,(z\text{Self-Esteem}_i) + \beta_{07}\,(\overline{\text{CTRL}}_i) + \beta_{08}\,(\overline{\text{REAP}}_i) + \beta_{09}\,(\text{Age}_i) + \beta_{010}\,(\text{Gender}_i) + r_{0i}$$
$$\pi_{1i} = \beta_{10} + \beta_{11}\,(z\text{Depression}_i) + \beta_{12}\,(z\text{Anxiety}_i) + \beta_{13}\,(z\text{Stress}_i) + \beta_{14}\,(z\text{Neuroticism}_i) + \beta_{15}\,(z\text{Social Anxiety}_i) + \beta_{16}\,(z\text{Self-Esteem}_i) + \beta_{17}\,(\overline{\text{CTRL}}_i) + \beta_{18}\,(\overline{\text{REAP}}_i) + \beta_{19}\,(\text{Age}_i) + \beta_{110}\,(\text{Gender}_i) + r_{1i}$$
$$\pi_{2i} = \beta_{20} + \beta_{21}\,(z\text{Depression}_i) + \beta_{22}\,(z\text{Anxiety}_i) + \beta_{23}\,(z\text{Stress}_i) + \beta_{24}\,(z\text{Neuroticism}_i) + \beta_{25}\,(z\text{Social Anxiety}_i) + \beta_{26}\,(z\text{Self-Esteem}_i) + \beta_{27}\,(\overline{\text{CTRL}}_i) + \beta_{28}\,(\overline{\text{REAP}}_i) + \beta_{29}\,(\text{Age}_i) + \beta_{210}\,(\text{Gender}_i) + r_{2i}$$
$$\pi_{3i} = \beta_{30} + \beta_{31}\,(z\text{Depression}_i) + \beta_{32}\,(z\text{Anxiety}_i) + \beta_{33}\,(z\text{Stress}_i) + \beta_{34}\,(z\text{Neuroticism}_i) + \beta_{35}\,(z\text{Social Anxiety}_i) + \beta_{36}\,(z\text{Self-Esteem}_i) + \beta_{37}\,(\overline{\text{CTRL}}_i) + \beta_{38}\,(\overline{\text{REAP}}_i) + \beta_{39}\,(\text{Age}_i) + \beta_{310}\,(\text{Gender}_i) + r_{3i}$$

Table S2

Fixed Effect Estimates (β_{11}) Reflecting Associations between Well-Being and REAP-CTRL Slopes with Alternate Between-Person Model Specifications

	Supplementary Model 4[a]				Supplementary Model 5[b]				Supplementary Model 6[c]				Supplementary Model 7[d]			
		95% CI				95% CI				95% CI				95% CI		
Well-Being Measure	Est. (*SE*)	*LL*	*UL*	*p*	Est. (*SE*)	*LL*	*UL*	*p*	Est. (*SE*)	*LL*	*UL*	*p*	Est. (*SE*)	*LL*	*UL*	*p*
Depression	0.046 (0.020)	0.005	0.086	.029	0.061 (0.017)	0.027	0.094	< .001	0.068 (0.017)	0.034	0.102	< .001	0.074 (0.024)	0.026	0.121	.003
Anxiety	0.042 (0.020)	0.002	0.081	.039	0.048 (0.018)	0.012	0.084	.009	0.051 (0.017)	0.017	0.085	.004	0.028 (0.019)	–0.011	0.066	.161
Stress	0.058 (0.018)	0.022	0.095	.002	0.057 (0.017)	0.024	0.090	< .001	0.049 (0.018)	0.014	0.084	.007	0.026 (0.027)	–0.029	0.081	.354
Neuroticism	0.054 (0.020)	0.014	0.094	.009	0.043 (0.019)	0.006	0.081	.025	0.033 (0.019)	–0.006	0.071	.092	–0.023 (0.029)	–0.081	0.034	.421
Social Anxiety	0.030 (0.019)	–0.008	0.067	.120	0.028 (0.018)	–0.007	0.064	.116	0.021 (0.020)	–0.018	0.060	.284	–0.048 (0.033)	–0.113	0.018	.152
Self-Esteem	–0.034 (0.023)	–0.079	0.012	.143	–0.035 (0.021)	–0.078	0.008	.109	–0.031 (0.021)	–0.073	0.010	.134	–0.010 (0.032)	–0.074	0.054	.750

Note.
[a] approximate $df = 72$
[b] approximate $df = 70$
[c] approximate $df = 68$
[d] estimates for Supplementary Model 7 are from a single model including all well-being measures as simultaneous predictors, with approximate $df = 63$

Results of analyses for Situation Modification

We ran multilevel models equivalent to our main analyses (see pp.8-9 of the manuscript for model equations) but with *situation modification* as the outcome predicted by person-centred controllability, controlling for lagged *situation modification* and the linear effect of time. First, a model without any between-person (Level-2) predictors revealed that, on average, the within-person association between situation-modification and controllability (SITMOD-CTRL slope) was not significantly different from zero (β_{10} = 0.018, SE = 0.024, 95% CI [–0.029, 0.065], p = .450). Thus, for the average person, the use of situation modification was unrelated to controllability across contexts in daily life. Furthermore, as shown in Table S3 (below), none of the well-being measures were related to within-person SITMOD-CTRL slopes (see β_{11} estimates in Table S3). Thus, well-being was not related to the within-person association between situation modification and controllability.

Table S3.

Fixed Effect Estimates Reflecting Associations between Well-Being with Mean Situation Modification Use (β_{01}) and SITMOD-CTRL Slopes (β_{11})

	Associations with Mean Situation Modification (β_{01})				Associations with SITMOD-CTRL Slope (β_{11})			
Well-Being Measure	Est. (*SE*)	*LL*	*UL*	*p*	Est. (*SE*)	*LL*	*UL*	*p*
Depression	2.468 (2.156)	-1.831	6.766	.256	0.042 (0.028)	-0.014	0.097	.141
Anxiety	1.602 (2.277)	-2.939	6.143	.484	0.002 (0.020)	-0.038	0.042	.938
Stress	5.607 (1.982)	1.655	9.559	.006	0.034 (0.025)	-0.016	0.083	.179
Neuroticism	4.828 (2.330)	0.181	9.475	.042	0.016 (0.023)	-0.029	0.062	.474
Social Anxiety	3.523 (2.296)	-1.055	8.101	.129	0.033 (0.022)	-0.011	0.077	.145
Self-Esteem	–2.031 (2.302)	-6.621	2.558	.380	0.007 (0.022)	-0.036	0.050	.746

Note. For all multilevel model estimates, approximate df = 71.
SITMOD-CTRL Slope = model estimated within-person association between momentary situation modification and person-centered controllability in daily life (i.e., strategy-situation fit).