Title

Change the Things You Can: Emotion Regulation Is More Beneficial for People From Lower Than From Higher Socioeconomic Status

Journal

Emotion, 17(1)

ISSN

1528-3542

Authors

Troy, Allison S
Ford, Brett Q
McRae, Kateri
et al.

Publication Date

2017-02-01

DOI

10.1037/emo0000210

Peer reviewed

Published in final edited form as:

Emotion. 2017 February ; 17(1): 141–154. doi:10.1037/emo0000210.

Change the things you can: Emotion regulation is more beneficial for people from lower than from higher socioeconomic status

Allison S. Troy,
Franklin and Marshall College

Brett Q. Ford,
University of California, Berkeley

Kateri McRae,
University of Denver

Pareezad Zarolia, and
University of Denver

Iris Mauss
University of California, Berkeley

Abstract

Emotion regulation is central to psychological health, and several emotion-regulation strategies have been identified as beneficial. However, new theorizing suggests the benefits of emotion regulation should depend on its context. One important contextual moderator might be socioeconomic status (SES), because SES powerfully shapes people's ecology: lower SES affords less control over one's environment and thus, the ability to *self*-regulate should be particularly important. Accordingly, effectively regulating one's emotions (e.g., using cognitive reappraisal) could be more beneficial in lower (vs. higher) SES contexts. Three studies (N=429) tested whether SES moderates the link between cognitive reappraisal ability (CRA; measured with surveys and in the laboratory) and depression. Each study and a meta-analysis of the three studies revealed that CRA was associated with less depression for lower-SES but not higher-SES individuals. Thus, CRA may be uniquely beneficial in lower-SES contexts. More broadly, the effects of emotion regulation depend upon the ecology within which it is used.

Keywords

emotion regulation; cognitive reappraisal; socioeconomic status; context; psychological health

Correspondence concerning this article should be addressed to Allison S. Troy, Franklin & Marshall College, Lancaster, PA 17603, U.S.A. phone: (717) 291-3833, atroy@fandm.edu.

Author Contributions

A.S. Troy, B.Q. Ford, K. McRae, P. Zarolia, and I.B. Mauss designed the research. A.S. Troy, B.Q. Ford, and P. Zarolia performed data collection. A.S. Troy and B.Q. Ford performed the data analysis. A.S. Troy, B.Q. Ford, and I.B. Mauss wrote the manuscript. K. McRae and P. Zarolia provided feedback on data analysis and critical revisions. All authors approved the final version of the manuscript for submission.

Emotion regulation is critically implicated in psychological health (Aldao, Nolen-Hoeksema, & Schweizer, 2009; Kring & Werner, 2004). For example, cognitive reappraisal, a strategy characterized by reframing an emotional situation in order to change its emotional impact (Gross & John, 2003), has been consistently linked to positive psychological outcomes including greater well-being, satisfaction with life, and self-esteem, as well as lower anxiety and depressive symptoms (Aldao, et al., 2009; Gross & John, 2003; Troy, Wilhelm, Shallcross, & Mauss, 2010). Importantly, however, multiple theoretical accounts suggest that no psychological process is universally beneficial for all people in all contexts (Lazarus, 1993; Mischel, 1968). Rather, the benefits of a particular emotion regulation strategy should be determined by interactions between individuals and their environments (Aldao, 2013; Bonanno & Burton, 2013; Cheng, 2001; Lazarus, 1993; Troy, Shallcross, & Mauss, 2013). This raises the question of whether there are contexts in which reappraisal is particularly beneficial, and other contexts in which reappraisal may be less beneficial or even harmful.

Socioeconomic status (SES) may be a particularly powerful moderator of the link between emotion regulation and psychological health because people from different SES backgrounds occupy different social environments. SES is typically defined by the conditions of one's life, including financial and educational resources, as well as one's perceived standing (Kraus, Piff, Mendoza-Denton, Rheinschmidt, & Keltner, 2012). Relative to those who are higher in SES, those who are lower in SES have less access to material resources and, as a consequence, have fewer choices and more external constraints placed on their behaviors and decisions (Kraus et al., 2012; Lachman & Weaver, 1998; Snibbe & Markus, 2005). These considerations all point to control over one's environment as one of the key psychological features of SES: lower-SES (vs. higher-SES) individuals have less control over the situations they face (Lachman & Weaver, 1998). As others do (Snibbe & Markus, 2005), we discuss SES as a context rather than as an attribute of the individual, because SES is so profoundly associated with the social context

The contextual features associated with SES may shape the benefits of emotion regulation: because lower-SES contexts tend to be characterized by lower levels of control over one's environment, being able to effectively regulate one's emotions may be particularly important, because greater control is possible over one's emotions compared to one's environment (Chen & Miller, 2012; Forsythe & Compas, 1987; Folkman, 1984; Park, Folkman, & Bostrom, 2001). Conversely, in higher-SES contexts, where direct control over the situation is possible, the ability to use effective emotion regulation may be less important – or even harmful – for psychological health. That is, in more controllable contexts, it may be more important to take action on the situation than to regulate one's emotions. In fact, using emotion regulation to make oneself feel better about the situation may reduce the motivation or resources needed to take direct action on the situation. Some empirical evidence has provided initial support for these hypotheses concerning the moderating effects of controllability: Troy and colleagues found that people who were high in cognitive reappraisal ability (CRA) were less depressed than those low in CRA if they were facing relatively uncontrollable stressors, but were *more* depressed if they were facing relatively controllable stressors (Troy et al., 2013).

In sum, given that SES powerfully influences the amount of control one has over one's circumstances, effective emotion regulation may be more important for the psychological health of those lower in SES, relative to those higher in SES. For those lower in SES, CRA may serve as a critical protective factor, with higher CRA contributing to increased psychological health and lower CRA contributing to significant psychological health costs. For those higher in SES, on the other hand, CRA may not be associated with psychological health.

The Current Investigation

In the present investigation, we sought to test whether SES moderates the relationship between cognitive reappraisal ability (CRA) and psychological health, such that the benefits of CRA on depression would be greater in lower-SES compared to higher-SES contexts. The present investigation has five notable features. First, much of the existing research on reappraisal has employed self-report measures of reappraisal *use* (Gross & John, 2003 While *attempting to use* an effective strategy like reappraisal could be helpful, the theoretical model described here suggests that the *ability* to use reappraisal successfully should be a particularly important contributor to psychological health, above and beyond reappraisal use (cf. Troy, et al., 2010). In other words, people should benefit from the ability to successfully reduce their negative emotions using reappraisal above and beyond their (potentially unsuccessful) attempts to use reappraisal. Thus, the present three studies focused on the ability to use reappraisal to reduce negative emotions rather than self-reports of habitual reappraisal use. Second, rather than relying solely on self-reported CRA, we used both survey and laboratory challenge measures of CRA using validated procedures (Troy et al., 2010). Third, while there are many indicators of psychological health, we focused on one particularly important facet of psychological health that has been consistently linked to lower SES: depression (Dohrenwend et al., 1992). Fourth, lower SES is consistently linked to heightened stress (Adler et al., 1994; Baum, Garofalo, & Yali, 1999). Therefore, it is important to consider SES as a moderator in its own right – separate from the effects of stress. To ensure that the hypothesized interactions between SES and CRA predicted depression over and above the effects of stress, we controlled for the effects of stress in our analyses. Lastly, to begin examining the robustness of the obtained effects, we examined our hypotheses in three studies with different samples and different measures of CRA, and took a meta-analytic approach across them.

Study 1

This study was designed to examine the hypothesis that SES moderates the link between CRA and depression while ruling out the potentially confounding effects of life stress.

Method

Participants and procedure—Adults residing in the United States were recruited via Mechanical Turk (see Buhrmester, Kwang, & Gosling, 2011) to complete online questionnaire measures of SES, CRA, life stress, and depression. Participants were excluded from participating if they were under the age of 18 or were using an IP address coming from outside of the United States. The questionnaires were piloted to take about fifteen minutes to

complete. Three hundred thirty three individuals accessed the online questionnaires from M-Turk. Individuals who did not finish the questionnaires (i.e., who had missing data on at least one entire questionnaire), who did not have any variance in their answers across measures, or who took less than three minutes to complete the questionnaires were not included in analyses. This left a final sample size of 301 for data analysis (52% male, M_{age} = 36.62, SD_{age} = 13.5; age *range* = 19–74 years). In terms of race, 84% of the final sample identified as Caucasian, 6% as Asian or Pacific Islander, 6% as African American, 2% as "other", 1% as Native American or Alaskan Native, and 1% indicated that they identified with multiple races. In terms of ethnicity, 92% of the sample identified as not-Hispanic/Latino, 4% identified as Hispanic/Latino, 3% chose multiple ethnicities, 1% declined to indicate their ethnicity. All participants provided online consent to participate in the study, and then completed a demographics questionnaire (including questions about SES as described below) followed (in order) by each of the measures described below. Participants were compensated 50 cents for their participation. We did not begin data analysis until the data collection was complete.

Measures

Socioeconomic status (SES)—Like others (Dubois, Rucker & Galinsky, 2015, Study 2; Piff et al. 2010, Study 4; Vinokur et al., 1996), we measured SES with current annual family income, which was rated on a 1 ("$10,000 or below") to 12 ("$200,000 or above") scale (M=5.27, SD=3.06, range: 1–12; see Table 1 for distribution of income). Here, and in Studies 2 and 3, we asked participants to report income using a scale rather than absolute income because many people do not know or are not willing to report their exact absolute income.[1]

Cognitive reappraisal ability (CRA)—As in previous research (Goldin, Ziv, Jazaieri, Werner, Kraemer, Heimberg, & Gross, 2012), cognitive reappraisal ability was assessed with an 8-item self-report measure that was adapted from Gross & John's (2003) Emotion Regulation Questionnaire (ERQ). The items from the reappraisal subscale of the ERQ, which asks about frequency of reappraisal use, were modified in order to assess one's *ability* to use reappraisal (sample item: "When I really want to, I am very capable of controlling my emotions by changing the way I'm thinking about the situation I'm in."). All responses were made on a 1 ("strongly disagree") to 7 ("strongly agree") scale, and a total CRA score was calculated by taking a mean of the 8 items (M=5.12, SD=1.21, α=.95).

Habitual cognitive reappraisal use—To ensure that the hypothesized interaction between CRA and SES was present over and above the effects of habitual reappraisal use,

[1]There is much discussion about how best to measure SES, and there are several approaches to measuring it, including income, education, occupation, self-reported social rank, as well as various composites of these indicators (e.g., Adler et al., 1994; Kraus et al., 2012; Kraus & Stephens, 2012; Oakes & Rossi, 2003; Snibbe & Markus, 2005). In the present research, we examined income alone, education alone, a composite of education and income, as well as a composite of education, income, and occupation as indicators of SES. Each approach yielded similar results. However, the results were most consistent across the three studies when using income alone as our indicator of SES. This is understandable because income is the most direct measure of access to material resources (Kraus & Stephens, 2012), which in turn may be the strongest indicator of the critical feature of SES that should moderate effects of CRA: control over stressors in one's environment. Thus, while multiple indicators of SES should be tied to control, we believe income is one of the strongest socioeconomic determinants of environmental control. For these reasons, and because the present research was not meant to advance measurement of SES, we do not present or further discuss results for the different approaches to measuring SES.

we used the reappraisal subscale of the Emotion Regulation Questionnaire (Gross & John, 2003). This subscale consists of six questions that are answered on a 1 (“strongly disagree”) to 7 (“strongly agree”) scale. A total score was calculated for each person in the sample by calculating the mean of all six items (M=5.19, SD=1.15, α=.88).

Depressive symptoms—Current depressive symptoms were assessed with a 5-item version of the Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). Participants were asked to report the presence of symptoms experienced in the past week on a 0 (“rarely or none of the time”) to 3 (“most or all of the time”) scale. A total score was calculated by taking a sum of the 5 items (M=3.46, SD=3.34, α=.81). Sum scores in all three studies were not significantly skewed, therefore, they were not transformed.

Life stress—Life stress was assessed with a 4-item version of the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983). Participants were asked to indicate their perceptions of stress in the past two years on each item on a 1 (“Never”) to 5 (“Very Often”) scale (sample item: “In the past two years, how often have you felt difficulties were piling up so high that you could not overcome them?”). Total life stress scores were calculated by taking the mean across the 4 items (M=2.70, SD=.90, α=.78).

Analysis Strategy

In all of our primary results reported below (as well as in Study 2 and 3), we examined the interactions between CRA and SES while statistically controlling for life stress by entering it as a predictor in the regressions. Before creating interaction terms for CRA and SES, all independent variables were mean centered. To examine our primary hypothesis, a multiple regression was conducted with depressive symptoms entered as the dependent variable and life stress, CRA, SES, and the interaction between CRA and SES entered as the independent variables. Correlations between all study variables are shown in Table 2. All primary results are shown in Table 3.

Results

There were significant main effects of life stress and CRA (see Table 3). As predicted, there was also a significant interaction between SES and CRA. To examine this interaction, values ± 1 standard deviation on each predictor were plotted according to the procedures outlined by Aiken and West (1991; see Figure 1).

Simple slopes analyses revealed that higher CRA was associated with significantly fewer depressive symptoms for those low in SES, β=−.24, t(297)=−3.71, p<.001, but was not associated with depressive symptoms for those high in SES, β=−.07, t(297)=−.93, p=.35. Thus, there was a small-to-medium effect size observed for those low in SES, and a significantly smaller effect size for those high in SES.

To ensure that results were not driven by demographic confounds or by habitual cognitive reappraisal use, we added age, sex, race (binned as Caucasian versus Other – 84% vs. 16% in the present sample), and habitual reappraisal use individually as covariates to the model described above. In each model, the interaction between SES and CRA remained significant

or marginally significant (all βs ≥.09, all ps<.06). When not controlling for life stress, the interaction between SES and CRA was not significant, β=.04, t(297)=.80, p=.42, although the shape of the interaction was the same as that shown in Figure 1. Although it is not possible to definitely explain null results, this could have been due to the fact that there was a higher correlation between life stress and SES in this study than in the subsequent studies (see Table 2). Studies 2 and 3 were conducted to confirm that effects of SES replicated when controlling for life stress but also when not controlling for life stress.

Discussion

In Study 1, we found support for the hypothesized interaction between SES and CRA: while CRA appears to benefit people from lower SES, it appears inconsequential for people from higher SES. While the results of this study provide important preliminary support for the proposed model, it also has some limitations. Given the time constraints inherent in internet sampling, brief measures of depressive symptoms and life stress were used, which may have limited the reliability of these measures. In addition, Study 1 relied solely on self-reports of CRA, which may be subject to demand characteristics or limitations in introspection.

Study 2

Study 2 replicated and extended Study 1 by assessing the relationships between CRA, SES, and depression in a community sample of adult females. All participants in this study had recently experienced a stressful life event, which led to increased variability in our measures of life stress and depression and provided a stronger test of our hypothesis that CRA and SES interact to predict depressive symptoms over and above the effects of life stress. We also used a more in-depth measure of depressive symptoms – a measure of twenty current symptoms rather than five statements about general mood -- which constitutes a more valid and reliable measure of depression. Moreover, to obtain a more comprehensive assessment of life stress, we measured stress both subjectively (ratings of stress impact) and objectively (number of events encountered) by asking participants to rate the occurrence and impact of a wide range of stressful life events. This comprehensive measure of life stress provides a more valid measure of current life stress that is less likely to be confounded with current depressive symptoms and socioeconomic status. In contrast to Study 1, these more comprehensive measures of stress were not significantly correlated with our measure of socioeconomic status in either Studies 2 or 3 (see Table 2). Finally, rather than relying solely on self-reports of CRA, which might be subject to biases, we collected both a self-report and laboratory challenge measure of CRA.

Method

Participants and procedure—Because of known gender differences in emotional reactivity (Timmers, Fischer, & Manstead, 1998), exposure to stress (Turner, Jay, & William, 1989), and risk for depression (Kendler, Thornton, & Gardner, 2000), and to reduce variance within the sample that would limit the ability to address some of the core hypotheses being examined in the larger study, only female participants were recruited for Study 2 as part of a larger study on adjustment to stress. Portions of the data from this original study were reported in Troy et al. (2010). Troy et al. (2010) examined the interactive effects of stress

and CRA on depression, and thus there is overlap between the presently examined and the previously published data. However, the question examined in the present study is conceptually distinct from the previously examined one, and stress is featured as a statistical control rather than a predictor. Thus, the present results are distinct from the previously reported ones.

A total of 78 women (ages 20–62) participated in a laboratory session that took approximately 2.5 hours to complete. Sixty-eight women provided complete data on the questionnaires, leaving 68 participants for analyses involving self-reported CRA (M_{age} = 34.91, SD_{age} = 12.50; age *range* = 19–62 years). Due to time constraints (the lab task was administered last) and technical difficulties with computer software, 12 women did not complete the entire laboratory task[2], leaving 56 participants who provided complete data on the lab measure of CRA, (M_{age} = 35.47, SD_{age} = 12.51; age *range* = 20–62 years). Of the 68 participants completing the lab session, 77% identified as White, 6% as Asian/Pacific Islander, 6% as Black, and 11% indicated that they were "other" when asked to identify their race. For ethnicity, 85% indicated they were not Hispanic/Latino, 9% indicated they were Hispanic/Latino, and 6% chose not to indicate their ethnicity.

Participants were recruited in the Denver Metropolitan Area through postings on online bulletins and flyers in the community for a larger study on stress. To qualify for the study, participants were required to have experienced a stressful life event during the past three months. During an eligibility screening on the phone, a stressful life event was defined to participants as an event that started within the past three months and exerted a significant, negative impact on participants' lives. Potential participants were excluded from the study if they (a) were hospitalized for emotional reasons in the past six months, (b) had attempted suicide in the past six months.

In addition to the measures described below, participants completed several other self-report questionnaires and cognitive tasks that are not reported here. All questionnaires were completed individually, on a private lab computer. The sample size was determined as part of the original study on adjustment to stress. Consequently, we did not begin analysis of data for the purpose of the present study before all data were collected.

Measures

SES—As in Study 1, SES was measured with one item targeting current annual family income (on a 1 "less than $10,000 per year" to 6 "$50,000 or above" scale; M=4.75, SD=1.54; see Table 1).

Self-reported CRA (CRA_{SR})—The same self-report measure of CRA reported in Study 1 was used in Study 2 (M=4.83, SD=1.27, α=.92).

Laboratory challenge measure of CRA (CRA_{Lab})—A standardized laboratory challenge measure of CRA was used following the procedure previously reported by Troy et

[2]These twelve participants did not differ from the rest of the sample on any of the measured variables reported in the present study, including demographic factors (all ps > .50).

al. (2010). A sadness induction involving four short film clips was presented to each participant. First, participants watched a two-minute neutral film clip in order to induce a comparable baseline across all participants. Next, participants were presented with three two-minute sad film clips pretested to evoke moderate amounts of sadness. The order of the three sad films was the same for all participants. Participants were simply asked to "watch the following film clip carefully" during the first sad film clip. During a subsequent sad film clip, participants were asked to think about the situation they were watching "in a more positive light" using the same instructions as in previous research ("reappraised film clip"; Troy et al., 2010). To avoid confounding emotion-regulation effects with habituation, regression to the mean, or effects specific to one film clip, participants were randomly assigned to use reappraisal either during the second or during the third sad film clip. There were no significant differences in CRA between experimental groups.

Immediately after each film clip, participants rated the greatest amount of sadness that they experienced during the film they just watched on a 9-point Likert scale. Because the reappraised film was not the same for all participants, sadness ratings were *z*-scored for each film clip so that CRA scores could be compared across individuals in different experimental groups. Change scores were then calculated by subtracting sadness ratings after the reappraised film clip from sadness ratings after the baseline sad film. Thus a greater score indicates greater CRA. In the current sample, M=.16, SD=1.03.

Habitual cognitive reappraisal use—As in Study 1, we used the six-item reappraisal subscale from the Emotion Regulation Questionnaire (Gross & John, 2003; M=5.02, SD=1.26, α = .89).

Depressive symptoms—Current depressive symptoms were measured using the Beck Depression Inventory (BDI; Beck & Steer, 1984), a self-report measure consisting of 21 items. All questions were answered on a 0 (no symptoms present) to 3 (extreme symptoms present) scale, and all items were summed to create a total depressive symptoms score. One question, which pertains to suicidal thoughts, was not included due to IRB concerns. Because the sample in this study was, on average, stressed, average BDI scores were elevated (M=13.39, SD=8.94, range: 0–45, α = .88).

Life stress—Stressful events were measured with the 46-item Life Experiences Survey (LES; Sarason, Johnson, & Siegel, 1978). This scale assessed whether or not a variety of stressful events occurred in the last 6 months, as well as the negative impact of these events on one's life (Denisoff & Endler, 2000). Thus, the LES captures the perception of the impact of negative events ("stress impact" – a relatively subjective element; M=9.79, SD=6.93, Range: 0–25) as well as the number of negative events experienced ("number of negative events" – a relatively objective element; M=3.10, SD=2.50, Range: 0–10).

Results

Self-reported CRA (CRA_{SR})—Results are shown in Table 3. There were significant main effects of stress impact, CRA_{SR}, and SES, and a significant two-way interaction between CRA_{SR} and SES.

As shown in Figure 2, simple slopes analyses revealed that higher CRA_{SR} was associated with significantly fewer depressive symptoms for those low in SES, β=−.79, t(63)=−3.68, p<.001, but CRA_{SR} was not associated with depressive symptoms for those high in SES, β= −.07, t(63)=−.50, p=.62. Thus, we observed a large effect size for the relationship between CRA_{SR} and depressive symptoms for those low in SES, and a smaller null effect size for those high in SES.

To ensure that results were not driven by demographic differences or by habitual cognitive reappraisal use, we added age, race (binned as Caucasian versus Other – 77% versus 23% in the present sample), and reappraisal use individually as covariates to the model described above. In each model, the interaction between SES and CRA_{SR} remained significant, βs > . 27, ps < .03, and the shape of the interaction was the same as that depicted in Figure 2.

In addition, because life stress can be assessed both by its subjective impact and also by the number of stressful life events that have occurred, we re-ran the analyses described above, this time controlling for the number of negative events encountered. The interaction between CRA_{SR} and SES remained significant, β=.27, t(63)=2.26, p=.03, and the shape of the interaction was the same as that depicted in Figure 2.

Lastly, when not controlling for the impact of stress or number of stressful life events, the interaction between SES and CRA_{SR} was still significant, β=.28, t(63)=2.29, p=.03, and the shape of the interaction was the same as that depicted in Figure 2.

Laboratory challenge measure of CRA (CRA_{Lab})—The same regression models described above were run, this time using the lab-based measure of CRA_{Lab}, rather than the self-reported measure of CRA. Results are shown in Table 3. When controlling for stress impact, there was a significant effect of SES. The SES x CRA_{Lab} interaction was marginally significant (p=.09).

As shown in Figure 3, the shape of this interaction is the same as that found with self-reported CRA. Higher CRA_{Lab} was associated with significantly fewer depressive symptoms for those low in SES, β=−.39, t(52)=−2.12, p=.04, but CRA_{Lab} was not associated with depressive symptoms for those high in SES, β=.04, t(52)=.22, p=.83. Thus, we observed a medium effect size for the relationship between CRA_{Lab} and depressive symptoms for those low in SES, and a significantly smaller null effect size for those high in SES.

When controlling for the number of negative events rather than their impact, the interaction of SES and CRA_{Lab} also remained marginally significant, β=.26, t(52)=1.92, p=.06, and the shape of the interaction is the same as that shown in Figure 3. The interaction remained marginally significant when not controlling for stress impact, and when adding age and race individually as covariates to the model, βs > .23, ps ≤.08.

Discussion

Study 2 replicated the finding that SES moderates the relationship between self-reported CRA and depression in a community sample of female participants exposed to elevated life

stress. For those lower in SES, CRA acted as a buffer against decreased psychological health while for those higher in SES, CRA was inconsequential.

Although the pattern of results was the same for the self-report versus the laboratory challenge measure of CRA, the interaction between CRA and SES was only marginally significant when using the laboratory measure of CRA. This may have been due to reduced power in this sample. In addition, there appears to be one theoretically important feature of the laboratory measure: While the self-report measure of CRA assessed one's perceived ability to regulate negative emotions *in general* (including anger, anxiety, and sadness), the film clips used for the laboratory task elicited primarily sadness. Thus, the laboratory task tapped into a narrower ability – the ability to use reappraisal to regulate *sadness* rather than negative emotions more generally – and may thus not have fully captured the critical construct. Study 2 also used a less fine-grained measure of SES (only 6 options to choose from, rather than 12 in Study 1), which limited variance in SES at the higher end of the distribution and may have limited our statistical power.

Study 3

In Study 3 we sought to address the limitations described above and to replicate the findings of Studies 1 and 2 in another community sample of women exposed to recent life stress who completed both self-report and laboratory measures of CRA. Importantly, the laboratory measure of CRA used in Study 3 measured the ability to regulate negative emotions in general, rather than just the ability to regulate sadness. To improve upon the measurement of SES in Study 2, we also used a more fine-grained measure of family income that provided more variance and statistical power. As in Study 2, we also measured both subjective and objective elements of life stress to ensure that our results were present over and above both important aspects of life stress.

Method

Participants and procedure—Adult women who had experienced a stressful life event in the preceding six weeks were recruited to participate in a study on adjustment to stress. Portions of the data from the larger study are reported in Davis et al. (2014; Study 2). This study focused on predictors, outcomes, and research questions different from the present one. Sixty participants (M_{age} = 28.27, SD_{age} = 4.10; age *range* = 19–35) provided complete data for all of the self-report measures. Twelve participants were unable to schedule a lab time or did not show up for their scheduled lab time, which left 48 participants who provided complete data on the laboratory measure of CRA (M_{age} = 28.29, SD_{age} = 4.09; age *range* = 19–35).[3] Of the 60 participants who completed the self-report measures, 82% identified as Caucasian, 7% as multiple races, 5% as African American, 3% as American Indian or Alaskan Native, 2% as Asian or Pacific Islander, and 1% chose not to indicate their race. In terms of ethnicity, 77% identified as not Hispanic/Latino, 12% identified as Hispanic/Latino, 8% identified with multiple ethnicities, and 3% chose not to identify their

[3]These twelve participants did not differ from the rest of the sample on any of the measured variables reported in the present study, including demographic factors (all *p*s > .20).

ethnicity. In addition to the measures described below, participants completed several other self-report questionnaires and cognitive tasks that are not reported here.

Participants were recruited in the Denver Metropolitan Area through postings on online bulletins for a larger study on stress. Potential participants were not included in the study if they (a) were hospitalized for emotional reasons, (b) had recently attempted suicide, (c) had drug dependency, (d) had past diagnosis of Borderline Personality Disorder (BPD), (e) were below age 18 or above age 35, or (f) were disqualified for any non-MRI compatible conditions (e.g. metal in body, left-handed, etc.).

Participants first completed an initial phone screening interview to assess eligibility. Next, eligible participants completed questionnaires online. Approximately 20 days after completing questionnaires (M=19.5 days, SD=9.8), participants came to a lab session to complete the CRA task described below, which took place in the context of fMRI assessment at The University of Colorado Health Sciences Center. Upon completion of the session, participants were debriefed and paid $40. All procedures were in compliance with the local IRB.

The sample size was determined as part of the original study on adjustment to stress. Consequently, we did not begin analysis of data for the purpose of the present study before all data were collected.

Measures

SES—As in Studies 1 and 2, SES was measured with one item assessing current annual family income (on a 1 “less than $10,000 per year” to 12 “$200,000 or above” scale; M=5.85, SD=3.20; see Table 1).

Self-reported CRA (CRA_{SR})—The same self-report measure used in Studies 1 and 2 was used for Study 3 (M=4.89, SD=1.01, α=.88).

Laboratory challenge measure of CRA (CRA_{Lab})—A standardized laboratory paradigm was used to measure cognitive reappraisal ability during the lab session (McRae, Hughes, Chopra, Gabrieli, Gross, & Ochsner, 2010). This procedure used standardized negative images from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2001). Before beginning, participants were trained to 1) look at, react naturally, and not reappraise images that followed the instruction to “LOOK” and 2) decrease their negative emotions to images that followed the instruction to “CHANGE”. Examples of reappraisals were provided (e.g., “the situation is not as bad as it first seemed” or “he/she is feeling better now”). To ensure that participants understood the instructions and that learning effects did not influence results, all participants were required to generate at least two correct reappraisals during the training period before advancing to the task. Half of the baseline neutral and reactivity trials were assessed in blocks with the type of regulation discussed here (to decrease negative emotion); the other half were distributed throughout blocks for a second type of regulation unrelated to the present investigation (to increase positive emotion but not to decrease negative emotion).

During the task, neutral and negative IAPS images were presented. Neutral images always followed the instruction to “LOOK”. Half of the negative images followed the instruction to “LOOK”, and the other half of the negative images followed the instruction to “CHANGE”. Assignment of negative images to the “LOOK” and “CHANGE” conditions was counterbalanced across participants. For each trial, a screen with the instruction to “RELAX” was presented for two seconds, an instruction to “LOOK” or “CHANGE” was presented for an average of two seconds (*SD*=674.59 ms), a neutral or negative image was presented for seven seconds, the questions “Rate current NEGATIVE feeling?” “Rate current AROUSAL?” and “Rate current POSITIVE feeling?” along with a 4-point rating scale were presented for 3.5 seconds each. Ratings of positive emotion and arousal were not relevant to the present hypotheses, and we thus do not report results for them. Eighty-four trials were presented for each participant (28 trials each of LOOK for a neutral image, LOOK for a negative image, and CHANGE for a negative image).

Participants’ ratings of how negative they felt after each image were used to calculate CRA. Specifically, an average was taken for how negative participants felt after the negative images in which they were instructed to LOOK (α=.99 across the 28 trials), and how negative they felt after the negative images in which they were instructed to CHANGE (α=.99 across the 28 trials). A difference score was then calculated between these two averages such that higher values indicated that participants had greater reductions in their negative emotion when instructed to use cognitive reappraisal (i.e., better CRA; *M*=0.51, *SD*=0.39).

Habitual cognitive reappraisal use—As in Studies 1 and 2, we used the six-item reappraisal subscale from the Emotion Regulation Questionnaire (Gross & John, 2003; *M*=4.64, *SD*=1.05, α=.92).

Depressive symptoms—As in Study 2, current depressive symptoms were measured using the Beck Depression Inventory (BDI; Beck & Steer, 1984). Because the sample in this study was, on average, stressed, average BDI scores were elevated (*M*=14.73, *SD*=9.16, range: 0–36, α =.88).

Life stress—As in Study 2, life stress was measured with the 46-item Life Experiences Survey (LES; Sarason, Johnson, & Siegel, 1978), which included measures of the impact of negative events (*M*=11.00, *SD*=7.37, Range: 0–31) as well as the number of negative events encountered in the preceding six months (*M*=5.75, *SD*=5.20, Range: 0–27).

Results

Self-report measure of CRA (CRA_{SR})—As summarized in Table 3, there was a marginal main effect of CRA_{SR} on depressive symptoms. There were no other significant main effects, and no interaction between CRA_{SR} and SES in predicting depressive symptoms.

Lab measure of CRA (CRA_{Lab})—As summarized in Table 3, there was a significant interaction between CRA_{Lab} and SES. As shown in Figure 4, the relationship between CRA_{Lab} and depressive symptoms depended on SES: as in the previous two studies, the negative relationship between CRA_{Lab} and depressive symptoms was stronger for

participants lower in SES, β=−.29, t(43)=−1.41, p=.17, than for those higher in SES, β=.32, t(43)=1.57, p=.12. Although neither slope presented in Figure 4 is significantly different than zero, the significant interaction indicates that the slopes are significantly different from each other: for those lower in SES, there was a small-to-medium effect of CRA_{Lab} on depressive symptoms in the negative direction, while for those higher in SES there was a small-to-medium effect in the positive direction.

As in Studies 1 and 2, we re-ran our primary analyses controlling separately for the effects of age and race (binned as Caucasian versus Other – 82% versus 18% in the present sample). In both cases, the interaction reported in Table 3 remained unchanged (all βs > .34, all ps≤. 04). When controlling for the effects of habitual cognitive reappraisal use, the interaction was marginally significant (β=.28, p<.06), and the shape of the interaction was unchanged. We also re-ran the analyses described above, controlling for the number of negative events encountered, rather than the negative impact of stress. The interaction between CRA_{Lab} and SES was still significant, β=.38, t(43)=2.47, p=.02. When not controlling for the impact of stress or number of stressful life events, the interaction between SES and CRA_{Lab} was still significant, β =.37, t(44)=2.59, p=.01. In each case, the shape of the interaction was the same as that shown in Figure 4.

Discussion

Using a laboratory measure of CRA in a community sample of female participants exposed to elevated life stress, we replicated the finding that CRA interacts with SES to predict depression. This interaction was present over and above the effects of two measures of life stress. Overall, the pattern of results was consistent with Studies 1 and 2: the negative relationship between CRA and depression was stronger for those lower in SES than for those higher in SES.

We did not replicate the results of Studies 1 and 2 when using the self-report measure of CRA. As in Study 2, the small sample size in the present study may have reduced power. To produce a more comprehensive analysis of our results across all three studies, we conducted a meta-analysis of all the observed interactions, which are presented below.

Meta-Analysis of the Three Studies

As recommended by Cumming (2012), we adopted a meta-analytic approach to the results of the three studies. Specifically, we adopted a meta-regression approach (Kim, 2011) to generate standardized regression coefficients and their 95% confidence intervals for the regression results reported. Although meta-analyses are often conducted to compare results across investigators, the present three studies used different measures and different samples to test our hypotheses. Thus, a meta-analytic approach is ideal for examining the replicability of effects across our studies (Braver, Thoemmes, & Rosenthal, 2014).

The present three studies allowed for the examination of results using different measures of CRA in samples with different levels of depression and life stress. As shown in Table 1, levels of SES were comparable across the three studies in terms of the mean and range of incomes, with participants ranging from very low (<$10,000 per year) to very high (>

$200,000 per year) family income. Mean income across Studies 1 and 3 was comparable, $t(386)=-0.58$, $p=.56$, $\eta^2=.01$. When the income scales for Studies 1 and 3 were collapsed across options 7–12 so that all three studies were on the same scale, mean income across the three studies was again comparable, $F(2, 455)=2.14$, $p=.12$, $\eta^2=.001$. Studies 2 and 3 were both conducted in Denver, CO, and thus income carried similar implications for SES in these two studies. One might question whether Study 1 is comparable, since its sample was a national MTurk sample. However, given all three studies represented a wide range of incomes (from poverty to wealth, according to the U.S. Department of Health and Human Services, 2009), and given that range in incomes is a key moderating factor, potential differences in mean income do not appear to impact the interpretation of the meta-analysis across studies.

Results

Figure 5 shows the meta-analysis results for the observed interactions between SES and CRA in predicting depression symptoms. When examining self-report measures of CRA (Panel A), the hypothesized interaction was significant in two of the three studies and in the meta-analysis. When examining the laboratory measures of CRA (Panel B), the hypothesized interaction was significant in one of the two studies, was marginally significant in the second study, and was significant in the meta-analysis.

Figures 6 and 7 show the meta-analysis results for the simple effects corresponding to each of the observed interactions across the three studies. To calculate simple effects, the multiple regression results described above were used to generate estimated means for values ± 1 standard deviation on SES according to the procedures outlined by Aiken and West (1991). This allowed us to examine the direction of the observed interactions in each study and to test our hypothesis that the negative relationship between CRA and depressive symptoms would be strongest in lower SES, relative to higher SES, individuals. The results of the meta-analysis provide the standardized regression coefficients for the relationship between CRA and depression symptoms for lower versus higher SES.

Figure 6, which depicts the simple effects when using self-report measures of CRA, shows the predicted pattern of results. For those lower in SES (Panel A), two out of the three studies and the meta-analysis show a significant negative relationship between CRA and depressive symptoms. On the other hand, for those higher in SES (Panel B), all three studies and the meta-analysis show no significant relationship between CRA and depressive symptoms (though the relationship is marginally significant in one study and the meta-analysis). Overall, the meta-analysis suggests a small to medium effect size for those low in SES ($M=-.27$, $SE=.06$, 95% CI = [−.38, −.15]), and a small and non-significant effect size for those high in SES ($M=-.10$, $SE=.06$, 95% CI = [−.21, .02]). Indeed, the estimated effect size for those high in SES was less than half the size of the effect for low SES.

Figure 7 depicts the simple effects when using laboratory measures of CRA. The pattern was similar to that depicted in Figure 6. For those lower in SES (Panel A), one study and the meta-analysis found significant negative relationships between CRA and depressive symptoms. Conversely, for those higher in SES (Panel B), neither study nor the meta-analysis showed a significant relationship between CRA and depressive symptoms. Overall,

the meta-analysis suggested a medium effect size for those lower in SES (M=−.34, SE=.14, 95% CI = [−.61, −.07]), and a small and nonsignificant effect size for those higher in SES (M=.16, SE=.14, 95% CI = [−.11, .43]).

General Discussion

In the present research, we tested whether the benefits of emotion regulation depend on a person's sociocultural context. Given that lower (versus higher) SES affords less personal control over the environment (Kraus et al., 2012; Lachman & Weaver, 1998; Snibbe & Markus, 2005), SES should be a crucial moderator of the effects of emotion regulation, and effective emotion regulation should be especially important in lower-SES contexts. We tested this hypothesis with cognitive reappraisal, a form of emotion regulation that is especially effective at reducing negative emotion (Gross & John, 2003). Across three studies, we found support for this hypothesis using both self-report and laboratory-based measures of cognitive reappraisal ability (CRA), as well as when controlling for life stress. Thus, differences in income are important for understanding the benefits of emotion regulation: individuals with lower SES may benefit more from the ability to successfully regulate emotions, while individuals with higher SES may not experience such benefits.

The present three studies were comparable in terms of mean income levels (see Table 1), and each study included people from a wide range of incomes – from poverty at the low end through wealthy at the high end. Indeed, according to federal poverty guidelines (U.S. Department of Health and Human Services, 2009), if we assume an average family size of 4, nearly 20% of Samples 1 and 3, and about 10% of Sample 2 were living below the federal poverty threshold of $22,050 per year. In addition, nearly 10% of the participants in Samples 1 and 3 reported relative wealth (incomes over $100,000 per year; in Sample 2, we did not capture differences in income above $50,000). These data suggest that what moderates the effects of reappraisal ability on psychological health is not just relative income within our present samples, but rather, absolute income relative to national income levels.

Given that many past studies have found consistent positive relationships between cognitive reappraisal and psychological health (Gross & John, 2003), some may find it surprising that there was no significant effect of CRA on depressive symptoms for those high in SES. Importantly, however, past meta-analyses have revealed only small-to-medium effect sizes for the relationship between reappraisal and psychological health (Aldao et al., 2010), which suggests the presence of moderators. The current investigation corroborates that SES is such a moderator.

Theoretical Implications

The present results provide support for person-by-situation accounts of emotion regulation, which suggest that particular strategies like cognitive reappraisal are not universally beneficial or harmful. Instead, the adaptiveness of an emotion regulation strategy depends upon the context within which it is used (Aldao, 2013; Bonanno & Burton, 2013; Kashdan & Rottenberg, 2010; Troy et al., 2013). For example, although reappraisal tends to be beneficial on average (Aldao et al. 2010), it appears to be less beneficial or even maladaptive in relatively controllable stressful contexts (Troy et al., 2013). The emotional intensity of a

situation also appears to be an important moderator of the effects of reappraisal (Sheppes & Gross, 2011).

The present results also add to a growing literature emphasizing the pervasive influence of culture as a moderator of the effects of emotion regulation (Butler, Lee, & Gross, 2009; Le & Impett, 2013; Mesquita & Albert, 2007). Within middle-class U.S. culture, exerting control over one's environment (versus one's self) is generally emphasized (Heckhausen & Schulz, 1995; Morling, Kitayama, & Miyamoto, 2002). However, research and theorizing suggest that the sociocultural context influences how much someone values controlling their environment: those lower in SES are more likely to value secondary control strategies, or changing oneself to adjust to the environment (Chen & Miller, 2010; Kraus et al., 2012; Snibbe & Markus, 2005). Our results take this important idea one step further: in addition to *valuing* secondary control strategies like cognitive reappraisal more, lower-SES individuals also seem to *benefit* from these strategies more than higher-SES individuals. Because they have fewer resources available to change the environment directly (Chen & Miller, 2010), individuals low in SES may derive particularly important psychological benefits from being able to successfully regulate their emotions.

Practical Implications

The present results carry important implications for improving psychological health. Notably, individuals from lower-SES backgrounds are at greater risk for psychological problems, including depression (Adler et al., 1994). The present results suggest that cognitive reappraisal, and emotion regulation more generally, may be an important protective factor in lower-SES contexts. Conversely, low levels of CRA may constitute an important risk factor for those who are lower in SES. Although ideally we should keep stress and inequality from occurring in the first place, this is not always possible. Thus, increasing resilience through cognitive reappraisal – a learnable skill (Denny & Ochsner, 2014) – provides a cost-effective and promising target for prevention and intervention for those lower in SES. Importantly, the direct link between SES and CRA across the three present studies was inconsistent and, for the most part, not significant. Thus, the present data do not suggest that those lower in SES are any worse *or* better at reappraisal, on average. Instead, lower-SES individuals seem to *benefit* more from higher CRA. Consequently, interventions targeting individuals low in SES and low in CRA may be most effective at increasing psychological health.

Our results also suggest that CRA is less consequential for psychological health for individuals high in SES. For these individuals, taking direct action to change their environment – rather than regulating the self – may be more strongly tied to psychological health. Interestingly, the results of Study 3 indicate that higher levels of CRA may actually be associated with *more* depression. These findings are consistent with past research that found that CRA is associated with worse outcomes in highly controllable contexts (Troy et al., 2013), perhaps because heightened levels of self-regulation may prevent one from taking direct action to solve a problem. The present studies did not include measures of active coping such as problem solving, and thus we are not able to examine this hypothesis directly. Given that the positive relationship between CRA and depression for those high in

SES was only a statistical trend present in one of the three studies, it is not presently warranted to conclude that CRA is *harmful* for high-SES individuals. Therefore, the hypothesis that self-regulation could lead to worse outcomes for higher-SES individuals should be further studied in future research.

Our findings are also broadly consistent with the shift and persist model (Chen & Miller, 2012), which proposes that shifting one's perspective on stressful events (a process akin to reappraisal) is an important contributor to physical health, and that this is the case more so for lower-SES than for higher-SES individuals. Recent empirical tests of this model have found that lower-SES individuals who shift and persist are protected against the negative physical health effects of stress (Chen, Lee Cavey, & Ho, 2013; Chen, et al., 2012). The measure of 'shifting and persisting' used in this area of research does not directly tap reappraisal ability, but rather the tendency to "shift" (reappraise) *and* "persist" (persevering with optimism for the future). Nonetheless, these findings suggest the possibility that reappraisal might be beneficial not just for lower-SES individuals' psychological but also their physical health.

Limitations and Future Directions

There are some important limitations of the present studies. All three studies were cross-sectional, which prevents us from drawing causal conclusions about the relationships between CRA, SES, and depression. For instance, it may be that depression and SES interact to predict CRA, rather than the other way around. Although we believe that our proposed model is the most parsimonious and consistent with theorizing and previous research, in which SES and CRA are *predictors* of outcomes like depression, we cannot definitively rule out this alternate explanation. We also sought to rule out some key confounds in the present study, including life stress, age, and race. However, there may still be unmeasured aspects of SES that drive our results. Future studies using longitudinal designs would provide stronger evidence for our proposed model.

Some characteristics of our samples also led to limitations. Although Studies 2 and 3 were community samples, they both involved adult females who were all exposed to recent life stress. These features limit the generalizability of the findings from Studies 2 and 3, although Study 1 offers converging evidence from a non-stressed sample of men and women. In addition, because Studies 2 and 3 were multi-method laboratory studies that were much more labor intensive, the sample sizes were smaller, which limited statistical power. It is important to interpret these smaller laboratory studies in the context of the larger MTurk sample obtained for Study 1.

Our results remained significant when controlling for minority status (Caucasian versus other). However, given that the cell sizes for minority participants were low in each of our three samples, it is impossible for us to more methodically examine how race/ethnicity may moderate the effects of reappraisal. This is important to note, because past research has found that reappraisal is negatively associated with psychological health among individuals experiencing high levels of oppression based on their ethnicity (Perez & Soto, 2011; Yoo & Lee, 2005). Given that SES, race/ethnicity, and oppression tend to overlap, it will be important for future research to consider how these contexts may exert differential or

additive effects on the relationships between emotion regulation and psychological health, and to identify important boundary conditions for the positive effects of reappraisal.

The meta-analysis we conducted across the three studies yielded results consistent with our hypotheses. However, the hypothesized interactions did not replicate in every measure of CRA in each individual study. While it is impossible to definitively explain null results, the presence of both sampling and measurement error in each of our studies could have led to variance in findings across studies even though there is a true effect present (Stanley & Spence, 2014). However, the variability in our findings could also be due to an additional moderating variable or confounds not accounted for in the present study. Additional future studies using larger samples are needed to further confirm the present results. However, the meta-analytic approach taken here, documenting a consistent pattern of results across multiple types of samples and multiple measures of CRA (N=429), lends support to the conclusion that CRA is more beneficial in lower compared to higher-SES contexts.

In the present studies, we focused on one theoretically important aspect of SES – income – because we believe that one's income should be most strongly tied to the hypothesized mechanism underlying our reported relationships: control over one's environment. Unfortunately, the present studies did not include direct measures of controllability, so we were unable to test this key mechanism. It will be important for future research to directly examine the role of controllability in modulating the effects of CRA on psychological health. In addition, SES is a multi-faceted construct. While we believe that income is one important aspect of SES, it will be important for future work to systematically examine other facets of SES, including subjective SES.

We also chose to focus on one key emotion regulation strategy – cognitive reappraisal – because it has been shown to be an effective way to change emotional experiences across studies (see Webb, Sheeran & Miles, 2012 for a meta-analysis). From the point of view of our model, however, we believe that *any* strategy that allows an individual to successfully regulate their emotional experiences would show the same patterns we reported here. Thus, it will be important for future research to examine other emotion regulation strategies in order to test this hypothesis.

Concluding Comment

The ability to regulate one's emotions effectively using cognitive reappraisal has been consistently linked to positive psychological health outcomes. Both theoretical and empirical accounts, however, suggest that it is important to consider the context in which emotion regulation strategies are used. Socioeconomic status (SES) is a powerful and integral part of one's ecology. In particular, it is associated with the amount of control one has over one's environment. The present three studies provide support for the hypothesis that effective emotion regulation is a particularly important contributor to psychological health in lower-SES contexts, but is much less consequential in higher-SES contexts.

Acknowledgments

The authors thank Bethany Ciesielski and Tchiki Davis for their help with data collection for Study 3, the Greater Good Science Center (Berkeley, CA) and Affective Science Training Fellowship (5T32MH020006) for research

support to B.Q.F, the John F. Templeton Foundation for research support to K. M. and I. B. M., start up funds from Franklin and Marshall College to A.S.T., and grant AG031967 from the National Institute on Aging to I. B. M.

References

Adler NE, Boyce T, Chesney MA, Cohen S, Folkman S, Kahn RL, Syme SL. Socioeconomic status and health: The challenge of the gradient. American Psychologist. 1994; 49(1):15.doi: 10.1037/0003-066X.49.1.15 [PubMed: 8122813]

Aiken, LS., West, SG. Multiple regression: Testing and interpreting interactions. Newbury Park, CA: Sage; 1991.

Aldao A, Nolen-Hoeksema S, Schweizer S. Emotion regulation strategies and psychopathology: A meta analysis. Clinical Psychology Review. 2010; 30:217–237. DOI: 10.1016/j.cpr.2009.11.004 [PubMed: 20015584]

Aldao A. The future of emotion regulation research: Capturing context. Perspectives on Psychological Science. 2013; 8:155–172. DOI: 10.1177/1745691612459518 [PubMed: 26172497]

Baum A, Garofalo JP, Yali A. Socioeconomic status and chronic stress: Does stress account for SES effects on health? Annals of the New York Academy of Sciences. 1999; 896(1):131–144. [PubMed: 10681894]

Beck AT, Steer RA. Internal consistencies of the original and revised Beck Depression Inventory. Journal of Clinical Psychology. 1984; 40:1365–1367. doi: 10.1002/1097-4679(198411)40:6<1365::AID-JCLP2270400615>3.0.CO; 2-D. [PubMed: 6511949]

Bonanno GA, Burton CL. Regulatory flexibility: An individual differences perspective on coping and emotion regulation. Perspectives on Psychological Science. 2013; 8(6):591–612. DOI: 10.1177/1745691613504116 [PubMed: 26173226]

Braver SL, Thoemmes FJ, Rosenthal R. Continuously cumulating meta-analysis and replicability. Perspectives on Psychological Science. 2014; 9(3):333–342. DOI: 10.1177/1745691614529796 [PubMed: 26173268]

Buhrmester M, Kwang T, Gosling SD. Amazon's Mechanical Turk a new source of inexpensive, yet high-quality, data? Perspectives on Psychological Science. 2011; 6(1):3–5. DOI: 10.1177/1745691610393980 [PubMed: 26162106]

Butler EA, Lee TL, Gross JJ. Does expressing your emotions raise or lower your blood pressure? The answer depends on cultural context. Journal of Cross-Cultural Psychology. 2009; 40(3):510–517. DOI: 10.1177/0022022109332845 [PubMed: 25505801]

Cheng C. Assessing coping flexibility in real-life and laboratory settings: A multimethod approach. Journal of Personality and Social Psychology. 2001; 80(5):814–833. DOI: 10.1037//0022-3514.80.5.814 [PubMed: 11374752]

Chen E, Lee WK, Cavey L, Ho A. Role models and the psychological characteristics that buffer low-socioeconomic-status youth from cardiovascular risk. Child Development. 2013; 84(4):1241–1252. DOI: 10.1111/cdev.12037 [PubMed: 23278857]

Chen E, Miller GE, Lachman ME, Gruenwald TL, Seeman TE. Protective factors for adults from low childhood socioeconomic circumstances: The benefits of shift-and-persist for allostatic load. Psychosomatic Medicine. 2012; 74:178–186. [PubMed: 22286848]

Chen E, Miller GE. "Shift-and-persist" strategies: Why low socioeconomic status isn't always bad for health. Perspectives on Psychological Science. 2012; 7(2):135–158. DOI: 10.1177/1745691612436694 [PubMed: 23144651]

Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. Journal of Health and Social Behavior. 1983; 24:385–396. [PubMed: 6668417]

Cumming, G. Understanding the new statistics: Effect sizes, confidence intervals, and meta-analysis. Routledge; 2012.

Davis TS, Mauss IB, Lumian D, Troy AS, Shallcross AJ, Zarolia P, Ford BQ, McRae K. Emotional reactivity and emotion regulation among adults with a history of self-harm: Laboratory self-report and fMRI evidence. Journal of Abnormal Psychology. 2014; 123:499–509. DOI: 10.1037/a0036962 [PubMed: 24865373]

Denny BT, Ochsner KN. Behavioral effects of longitudinal training in cognitive reappraisal. Emotion. 2014; 14(2):425.doi: 10.1037/a0035276 [PubMed: 24364856]

Dohrenwend BP, Levav I, Shrout P, Schwartz S, Naveh G, Link B, Skodol AE, Stueve A. Socioeconomic status and psychiatric disorders: The causation-selection issue. Science. 1992; 255:946–952. DOI: 10.1126/science.1546291 [PubMed: 1546291]

Dubois D, Rucker DD, Galinsky AD. Social class, power, and selfishness: When and why upper and lower class individuals behave unethically. Journal of Personality and Social Psychology. 2015; 108(3):436–449. DOI: 10.1037/pspi0000008 [PubMed: 25621858]

Folkman S. Personal control and stress and coping processes: A theoretical analysis. Journal of Personality and Social Psychology. 1984; 46:839–852. DOI: 10.1037/0022-3514.46.4.839 [PubMed: 6737195]

Forsythe CJ, Compas BE. Interaction of cognitive appraisals of stressful events and coping: Testing the goodness of fit hypothesis. Cognitive Therapy and Research. 1987; 11(4):473–485.

Goldin PR, Ziv M, Jazaieri H, Werner K, Kraemer H, Heimberg RG, Gross JJ. Cognitive reappraisal self-efficacy mediates the effects of individual cognitive-behavioral therapy for social anxiety disorder. Journal of Consulting and Clinical Psychology. 2012; 80(6):1034.doi: 10.1037/a0028555 [PubMed: 22582765]

Gross JJ, John OP. Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. Journal of Personality and Social Psychology. 2003; 85:348–362. DOI: 10.1037/0022-3514.85.2.348 [PubMed: 12916575]

Heckhausen J, Schulz R. A life-span theory of control. Psychological Review. 1995; 102:284–304. [PubMed: 7740091]

Kashdan TB, Rottenberg J. Psychological flexibility as a fundamental aspect of health. Clinical Psychology Review. 2010; 30:467–480. DOI: 10.1016/j.cpr.2010.03.001 [PubMed: 20381224]

Kim RS. Standardized regression coefficients as indices of effect sizes in meta-analysis. Electronic Theses, Treatises and Dissertations. 2011 Paper 3109.

Kraus MW, Piff PK, Mendoza-Denton R, Rheinschmidt ML, Keltner D. Social class, solipsism, and contextualism: how the rich are different from the poor. Psychological Review. 2012; 119(3): 546.doi: 10.1037/a0028756 [PubMed: 22775498]

Kraus MW, Stephens NM. A road map for an emerging psychology of social class. Social and Personality Psychology Compass. 2012; 6:642–656. DOI: 10.1111/j.1751-9004.2012.00453.x

Kring, AM., Werner, KH. Emotion regulation in psychopathology. In: Philippot, P., Feldman, RS., editors. The regulation of emotion. NY: LEA; 2004. p. 359-385.

Lachman ME, Weaver SL. The sense of control as a moderator of social class differences in health and well-being. Journal of personality and social psychology. 1998; 74(3):763. [PubMed: 9523418]

Lang, PJ., Bradley, MM., Cuthbert, BN. Technical Report. The University of Florida: The Center for Research in Psychophysiology; 2001. International Affective Picture System (IAPS). Instruction manual and affective ratings.

Lazarus RS. Coping theory and research: Past, present, and future. Psychosomatic Medicine. 1993; 55:234–247. [PubMed: 8346332]

Le BM, Impett EA. When holding back helps: Suppressing negative emotions during sacrifice feels authentic and is beneficial for highly interdependent people. Psychological Science. 2013; 24(9): 1809–1815. DOI: 10.1177/0956797613475365 [PubMed: 23846717]

Matthews KA, Gallo LC, Taylor SE. Are psychosocial factors mediators of socioeconomic status and health connections? Annals of the New York Academy of Sciences. 2010; 1186(1):146–173. DOI: 10.1111/j.1749-6632.2009.05332.x [PubMed: 20201872]

McRae K, Hughes B, Chopra S, Gabrieli JD, Gross JJ, Ochsner KN. The neural bases of distraction and reappraisal. Journal of Cognitive Neuroscience. 2010; 22(2):248–262. DOI: 10.1162/jocn.2009.21243 [PubMed: 19400679]

Mesquita, B., Albert, T. The cultural regulation of emotions. In: Gross, JJ., editor. Handbook of emotion regulation. New York: Guilford Press; 2007. p. 487-503.

Miller GE, Yu T, Chen E, Brody GH. Self-control forecasts better psychosocial outcomes but faster epigenetic aging in low-SES youth. Proceedings of the National Academy of Sciences. 2015; 112(33):10325–10330. DOI: 10.1073/pnas.1505063112

Mischel, W. Personality and assessment. New York: John Wiley and Sons; 1968.

Morling B, Kitayama S, Miyamoto Y. Cultural practices emphasize influence in the United States and adjustment in Japan. Personality and Social Psychology Bulletin. 2002; 28(3):311–323. DOI: 10.1177/0146167202286003

Park CL, Folkman S, Bostrom A. Appraisals of controllability and coping in caregivers and HIV+ men: Testing the goodness-of-fit hypothesis. Journal of Consulting and Clinical Psychology. 2001; 69(3):481. [PubMed: 11495177]

Perez CR, Soto JA. Cognitive reappraisal in the context of oppression: Implications for psychological functioning. Emotion. 2011; 11(3):675–680. DOI: 10.1037/a0021254 [PubMed: 21534660]

Piff PK, Kraus MW, Cheng BH, Keltner D. Having less, giving more: The influence of social class on prosocial behavior. Journal of Personality and Social Psychology. 2010; 99(5):771–784. DOI: 10.1037/a0020092 [PubMed: 20649364]

Radloff LS. The CES-D scale a self-report depression scale for research in the general population. Applied Psychological Measurement. 1977; 1(3):385–401.

Sarason IG, Johnson JH, Siegel JM. Assessing the impact of life changes: Development of the Life Experiences Survey. Journal of Consulting and Clinical Psychology. 1978; 46:932–946. DOI: 10.1037/0022-006X.46.5.932 [PubMed: 701572]

Sheppes G, Gross JJ. Is timing everything? Temporal considerations in emotion regulation. Personality and Social Psychology Review. 2011; 15(4):319–331. DOI: 10.1177/1088868310395778 [PubMed: 21233326]

Snibbe AC, Markus HR. You can't always get what you want: Educational attainment, agency, and choice. Journal of Personality and Social Psychology. 2005; 88(4):703.doi: 10.1037/0022-3514.88.4.703 [PubMed: 15796669]

Stanley DJ, Spence JR. Expectations for replications: Are yours realistic? Perspectives on Psychological Science. 2014; 9:305–318. DOI: 10.1177/1745691614528518 [PubMed: 26173266]

Troy AS, Shallcross AJ, Mauss IB. A person-by-situation approach to emotion regulation: Cognitive reappraisal can either help or hurt, depending on the context. Psychological Science. 2013; 24(12): 2505–2514. DOI: 10.1177/0956797613496434 [PubMed: 24145331]

Troy AS, Wilhelm FH, Shallcross AJ, Mauss IB. Seeing the silver lining: Cognitive reappraisal ability moderates the relationship between stress and depressive symptoms. Emotion. 2010; 10(6):783–795. DOI: 10.1037/a0020262 [PubMed: 21058843]

United States Department of Health and Human Services. The 2009 HHS federal poverty guidelines. 2009. Retrieved from http://aspe.hhs.gov/2009-hhs-poverty-guidelines

Vinokur AD, Price RH, Caplan RD. Hard times and hurtful partners: How financial strain affects depression and relationship satisfaction of unemployed persons and their spouses. Journal of Personality and Social Psychology. 1996; 71(1):166–179. [PubMed: 8708998]

Yoo HC, Lee RM. Ethnic identity and approach-type coping as moderators of the racial discrimination/well-being relation in Asian Americans. Journal of Counseling Psychology. 2005; 52:497–506. DOI: 10.1037/0022-0167.52.4.497

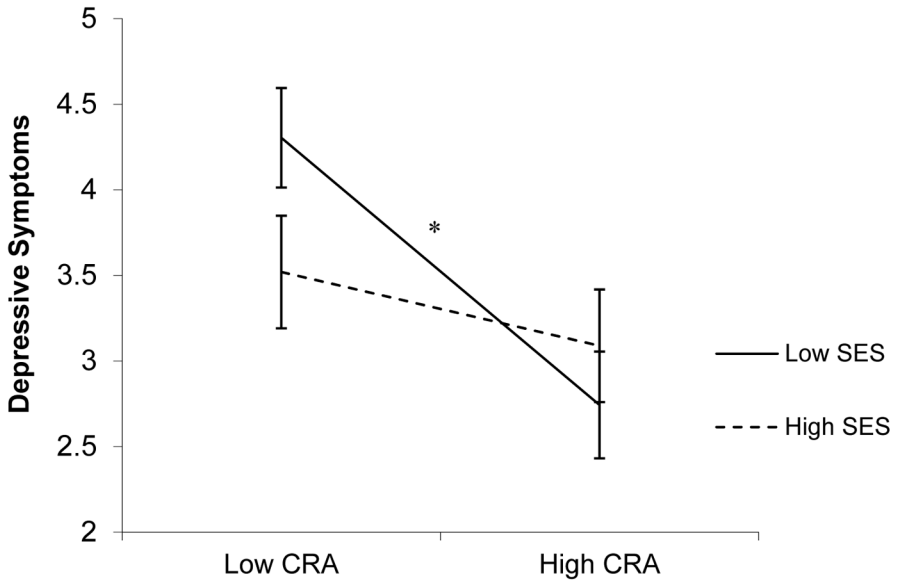

Figure 1.

The interaction between self-reported cognitive reappraisal ability (CRA) and socioeconomic status (SES) on current depressive symptoms controlling for perceived stress in Study 1. Values depict estimates at ± 1 SD for CRA and SES. Asterisk indicates a slope that is significantly different from zero.

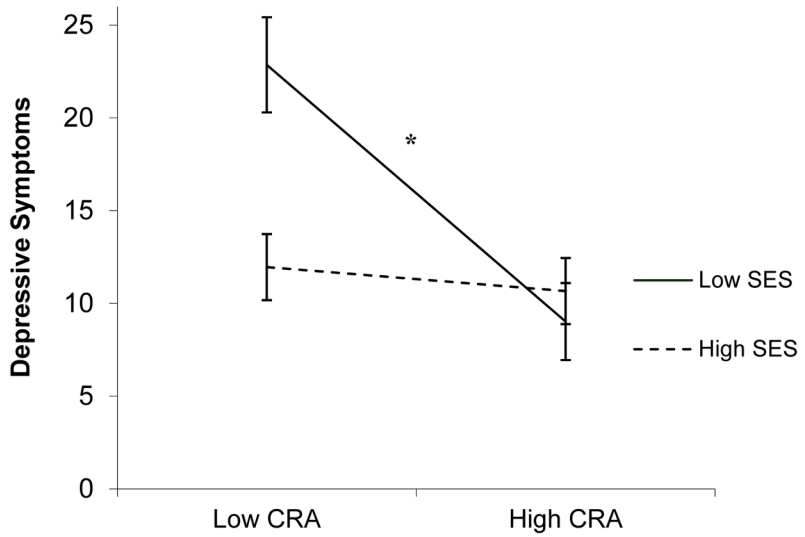

Figure 2.

The interaction between self-reported cognitive reappraisal ability (CRA) and socioeconomic status (SES) on current depressive symptoms controlling for stress impact in Study 2. Values depict estimates at ± 1 SD for CRA and SES. Asterisk indicates a slope that is significantly different from zero.

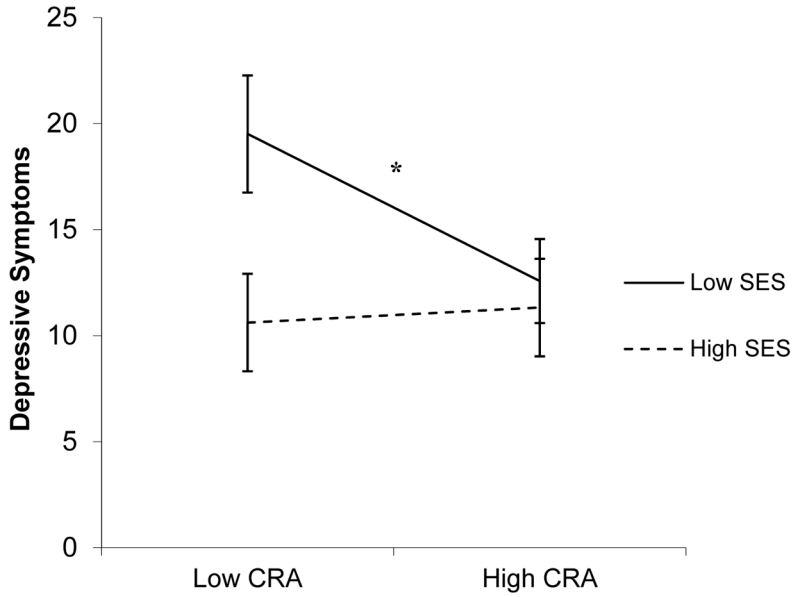

Figure 3.

The interaction between a lab measure of cognitive reappraisal ability (CRA) and socioeconomic status (SES) on current depressive symptoms controlling for stress impact in Study 2. Values depict estimates at ± 1 SD for CRA and SES. Asterisk indicates a slope that is significantly different than zero.

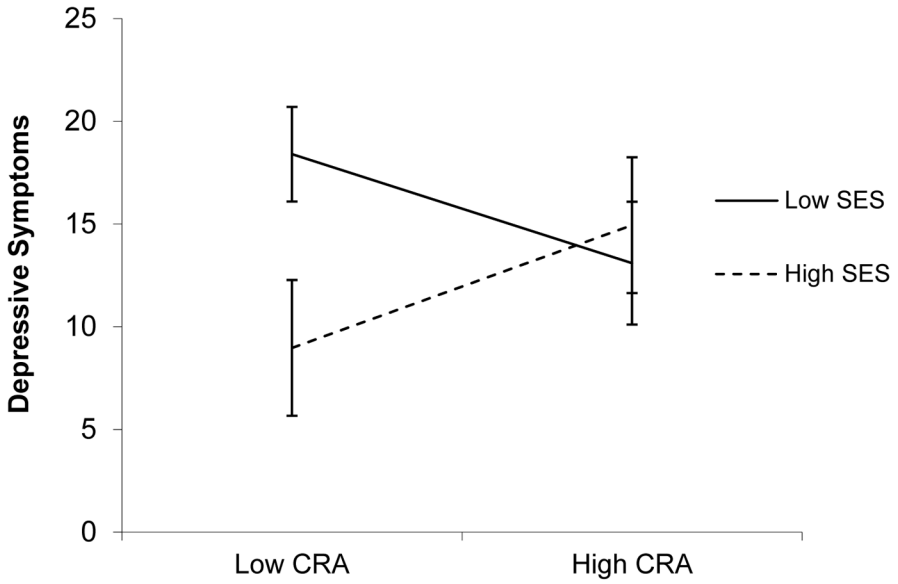

Figure 4.

The interaction between a lab measure of cognitive reappraisal ability (CRA) and socioeconomic status (SES) on current depressive symptoms controlling for stress impact in Study 3. Values depict estimates at ± 1 SD for CRA and SES. Asterisk indicates a slope that is significantly different than zero.

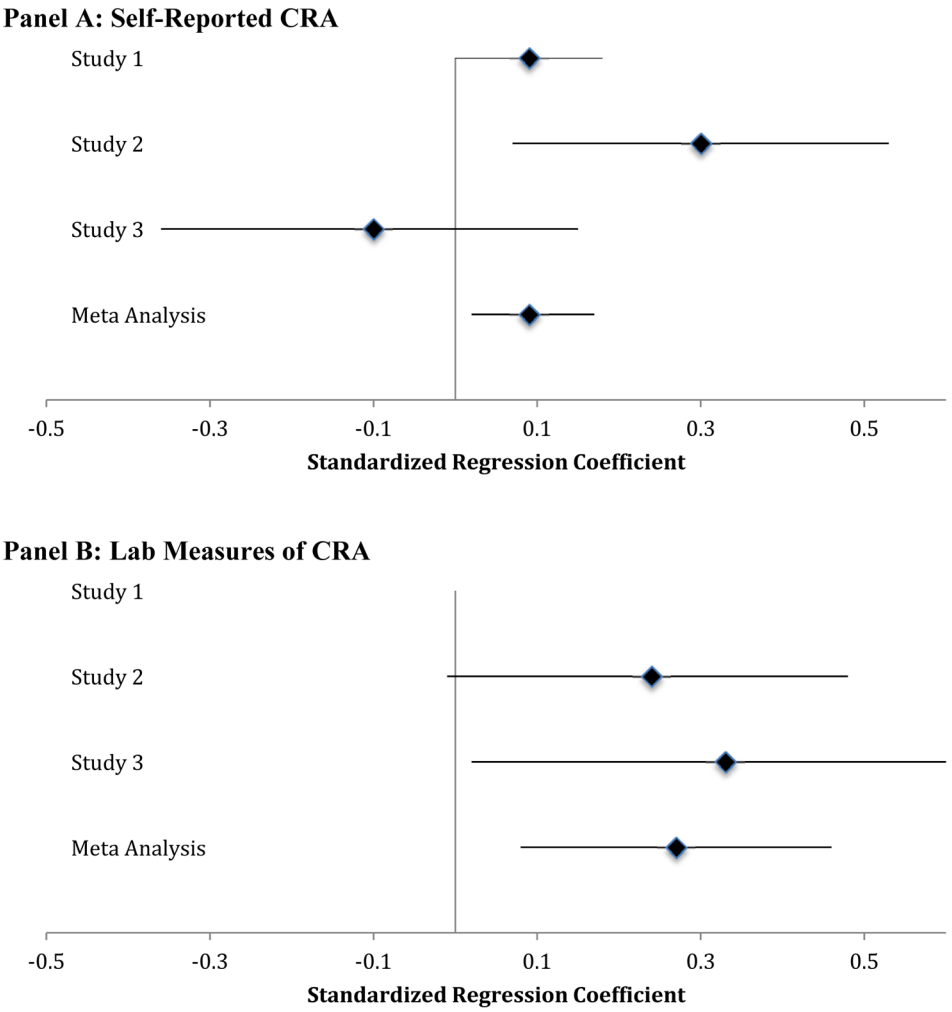

Figure 5.

Forest plot and 95% confidence intervals for the interaction between self-reported (Panel A) and lab-based measures of CRA (Panel B) and SES in predicting depressive symptoms across three studies. The reference line at zero depicts the inability to reject the null hypothesis that there is no interaction between self-reported CRA and SES.

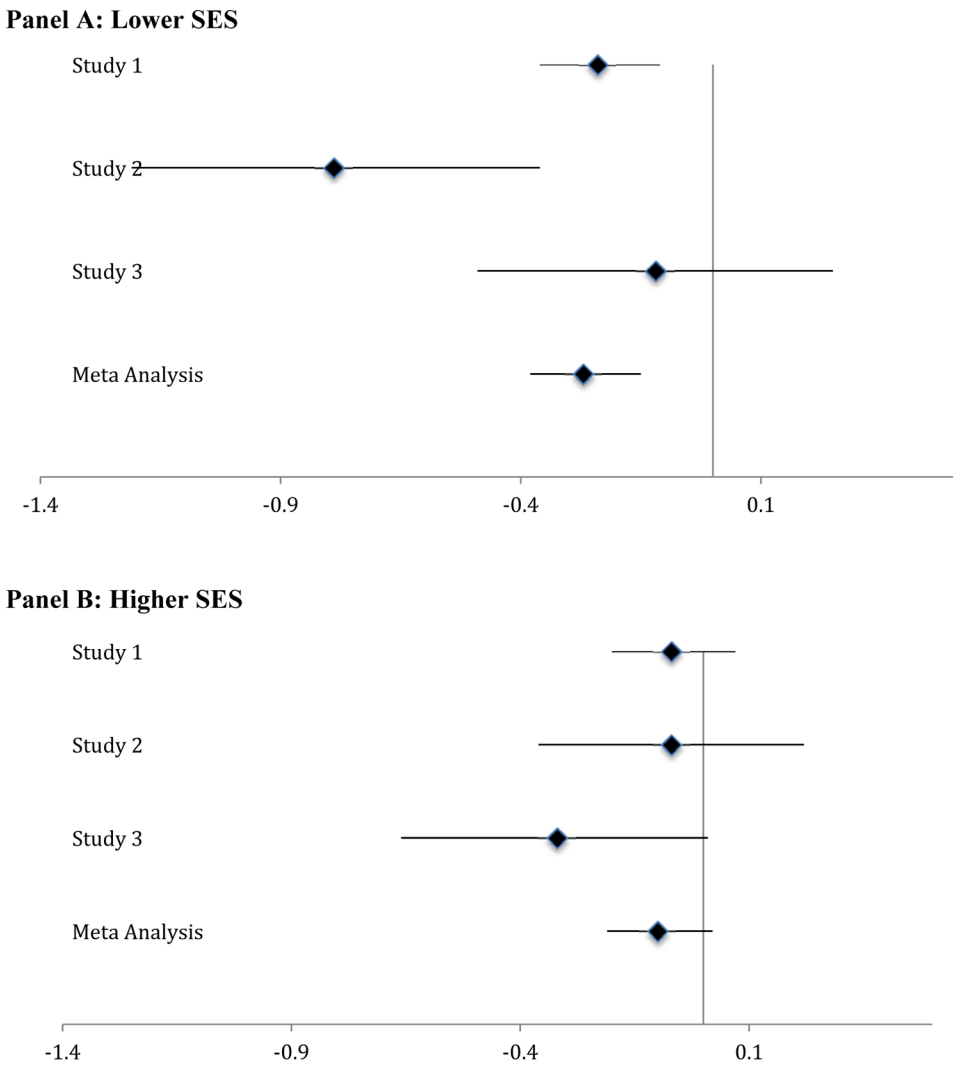

Figure 6.

Forest plot and 95% confidence intervals for the simple effect of self-reported CRA on depression symptoms for low SES (Panel A) versus high SES (Panel B). Values for low and high SES depict values ± 1 SD on SES. The reference line at zero depicts the inability to reject the null hypothesis that there is no relationship between CRA and depression symptoms for those either low or high in SES.

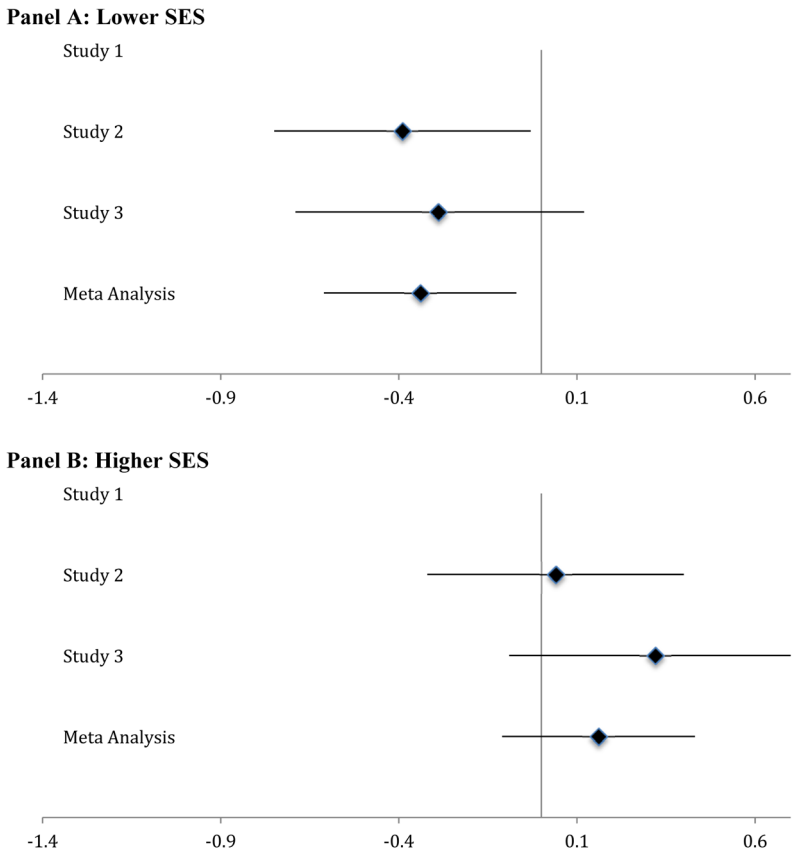

Figure 7.

Forest plot and 95% confidence intervals for the simple effect of lab measures of CRA on depression symptoms for low SES (Panel A) versus high SES (Panel B). Values for low and high SES depict estimated values ± 1 SD on SES. The reference line at zero depicts the inability to reject the null hypothesis that there is no relationship between CRA and depression symptoms for those either low or high in SES.

Table 1

Distribution of annual family income across three samples.

	Study 1	Study 2	Study 3
Mean (SD) Income	5.27 (3.06)	4.75 (1.54)	5.85 (3.20)
1 - < $10,000	9%	6%	5%
2 - $10,001 – $20,000	13%	4%	13.3%
3 - $20,001– $30,000	14%	12%	17%
4 - $30,001 – $40,000	12%	12%	8.3%
5 -$40,001 – $50,000	12%	19%	5%
6 - $50,001 – $60,000 *	7%	47%	10%
7 - $60,001 – $70,000	9%		5%
8 - $70,001 – $80,000	6%		13.3%
9 - $80,001 – $90,000	5%		8.3%
10 - $90,001 – $100,000	4%		3.3%
11 - $100,001 – $200,000	9%		8.3%
12 - Greater than $200,000	<1%		3.3%

Note:

* For Study 2, the highest option for this question was “above $50,000” per year.

Emotion. Author manuscript; available in PMC 2018 February 01.

Table 2

Correlations among study and variables in Studies 1, 2, and 3.

	SES (Income)	CRA_{SR}	CRA_{Lab}	Depressive Symptoms	Control Variables				
					Stress Severity	Number of Stressors	Reappraisal Use	Race	Age
Study 1									
SES (Income)			–			–			
CRA_{SR}	.13*		–			–			
Depressive Symptoms	−.18*	−.39*	–			–			
Control Variables									
Stress Severity	−.25*	−.44*	–	.60*		–			
Reappraisal Use	.13*	.80*	–	−.37*	−.36*	–			
Race	.02	.02	–	−.04	.02	–	.04		
Age	.01	.10	–	−.23*	−.16*	–	.21*	−.19*	
Sex	−.01	−.01	–	−.01	.02	–	.08	−.08	.27*
Study 2									
SES (Income)									
CRA_{SR}	−.13								
CRA_{Lab}	−.19	.18							
Depressive Symptoms	−.18	−.34*	−.14						
Control Variables									
Stress Severity	.03	−.08	−.15	.26*					
Number of Stressors	.22	.14	−.05	−.20	.52*				
Reappraisal Use	−.13	.77*	.19	−.40*	−.20	.06			
Race	−.38*	−.14	.09	.17	−.01	.02	−.11		
Age	−.09	−.06	−.17	.14	−.06	−.40*	.03	−.06	
Study 3									
SES (Income)									
CRA_{SR}	−.01								
CRA_{Lab}	.36*	.05							
Depressive Symptoms	−.16	−.27*	−.08						

	SES (Income)	CRA_{SR}	CRA_{Lab}	Depressive Symptoms	Control Variables				
					Stress Severity	Number of Stressors	Reappraisal Use	Race	Age
Control Variables									
Stress Severity	−.06	−.08	−.02	.10					
Number of Stressors	−.13	.02	−.10	.13	.58*				
Reappraisal Use	−.12	.67*	.01	−.39*	.02	.08			
Race	−.20	−.01	−.21	.07	.12	.30*	−.09		
Age	.04	−.16	.03	.16	−. 12	−.31*	−.20	−.15	

Note.

*$p < .05$;

SES = socioeconomic status, CRA_{SR} = self-report measure of cognitive reappraisal ability, CRA_{Lab} = laboratory measure of cognitive reappraisal ability; Reappraisal Use = the reappraisal scale of the emotion regulation questionnaire (ERQ). Race is coded as 0 = White, 1 = non-White. Sex is coded as 1 = male, 2 = female. A dash (–) indicates that data are not available for a given study.

Table 3

Current depressive symptoms as predicted by cognitive reappraisal ability (CRA), socioeconomic status (SES), and the interaction of CRA and SES. Life stress (perceived life stress in Study 1, impact of stressful life events in Studies 2 and 3) was statistically controlled for by entering it as a predictor in the regressions.

	β	*t*	sr^2	*p*
Study 1				
Self-reported CRA (*N*=301); R^2= .39				
Stress	.53	10.26	.22	.001
CRA	−.15	−2.98	.02	.003
SES	−.03	−.71	.001	.48
CRA x SES	.09	1.95	.01	.05
Study 2				
Self-reported CRA (*N*=68); R^2=.26				
Stress	.23	2.11	.05	.04
CRA	−.43	−3.65	.16	.001
SES	−.26	−2.83	.07	.02
CRA x SES	.30	2.53	.08	.01
Laboratory CRA (*N*=56); R^2=.13				
Stress	.11	.87	.01	.39
CRA	−.17	−1.31	.03	.20
SES	−.28	−2.03	.07	.05
CRA x SES	.24	1.72	.05	.09
Study 3				
Self-reported CRA (*N*=60); R^2=.13				
Stress	.17	1.27	.03	.21
CRA	−.22	−1.73	.05	.09
SES	−.12	−.96	.01	.34
CRA x SES	−.10	−.82	.01	.42
Laboratory CRA (*N*=48); R^2=.18				
Stress	.10	.64	.01	.53
CRA	.02	.12	.001	.90

	β	***t***	***sr^2***	***p***
SES	−.21	−1.33	.03	.19
CRA x SES	.33	2.14	.09	.04

Note: R^2 indicates total R^2 for each model. β indicates standardized Betas. sr^2 indicates the squared semi-partial correlation (unique variance explained) for each variable.