You changed my mind: Immediate and enduring impacts of social emotion regulation.

Razia S. Sahi[1*], Elizabeth M. Gaines[1], Siyan G. Nussbaum[1], Daniel Lee[1], Matthew D. Lieberman[1], Naomi I. Eisenberger[1], & Jennifer A. Silvers[1*]

[1]University of California Los Angeles, Department of Psychology, Los Angeles, CA, USA

Please note that this is an unpublished pre-print (draft version 13-JUNE-2023) currently in press at *Emotion*. © 2023, American Psychological Association. This paper is not the copy of record and may not exactly replicate the final, authoritative version of the article. Please do not copy or cite without authors' permission. The final article will be available, upon publication, via its DOI: 10.1037/emo0001284

*Correspondence should be addressed to RSS (rsahi1@ucla.edu) or JAS (silvers@ucla.edu) Department of Psychology, Pritzker Hall, University of California, Los Angeles, Los Angeles, California 90095 USA

Author note: This research was supported by funds from the UCLA Faculty Career Development Award to Dr. Jennifer Silvers and the American Psychological Foundation COGDOP Graduate Student Scholarship and UCLA Dissertation Year Fellowship to Razia Sahi. We are grateful for the efforts of Audrey Lai, Evie Lee, and Joy Forster in data collection and maintenance. The authors declare no conflicts of interest. The material presented in this submission has not been published and is not under consideration elsewhere. The pre-registration, de-identified data, and analysis scripts for this project are publicly available on Open Science Framework: https://osf.io/a9jvf/

ABSTRACT

As social creatures, our relationships with other people have tremendous downstream impacts on health and wellbeing. However, we still know surprisingly little about how our social interactions regulate how we think and feel through life's challenges. Getting help from other people to change how one thinks about emotional events – known as "social reappraisal" – can be more effective in down-regulating negative affect than reappraising on one's own, but it is unknown whether this regulatory boost from social support persists when people face the same events alone in the future. In a pre-registered study of 120 young adults (N = 60 same-gender dyads, gender split sample) involving in-lab emotion regulation tasks and a follow-up task online approximately 1 day later, we found that participants responded less negatively to aversive images that were socially regulated (i.e., reappraised with the help of a friend) both immediately and over time, as compared to images that had been previously solo regulated (i.e., reappraised on one's own) or not regulated (i.e., passively viewed). Interestingly, the regulatory boost from social support observed both in the lab and at follow-up was driven by women dyads. This work highlights one important mechanism explaining how support from others can facilitate emotional wellbeing: by changing peoples' lasting impressions of distressing events, interactions with others can help prepare them to cope with future exposure to those events on their own, underscoring how valuable others' perspectives can be when navigating ongoing emotional stressors.

Keywords: emotion regulation, social support, interpersonal emotion regulation, reappraisal, gender

As social creatures, our relationships with other people have tremendous downstream impacts on health and wellbeing, often buffering us against the deleterious effects of physical and mental health challenges (Beckes & Coan, 2011; Berkman et al., 2000; Uchino et al., 2018). However, we still have limited knowledge about how our interactions with close others can shape how we think and feel through distressing situations (Niven, 2017; Reeck et al., 2016; Zaki & Williams, 2013). Recent research has demonstrated that changing how we think about negative events to change how we feel about them – known as cognitive reappraisal (Gross, 2015) – is a more effective emotion regulation strategy when a friend helps us change our perspective than when we try to rethink the situation on our own (Sahi, Ninova, & Silvers, 2021). In other words, a friend's perspective can help us change how we interpret negative events to cope with them more effectively. But what happens when we must face the same negative events later and our friend is not around to help? The present study examined whether people responded less negatively when re-encountering aversive stimuli that were previously socially regulated (i.e., reappraised with help) as compared to solo regulated (i.e., reappraised on one's own). Given prior mixed findings regarding gender differences in both social support and emotion processing (e.g., Neff & Karney, 2005; Shields et al., 2006), we tested this question in a gender-split sample of young adult same-gender friend pairs and assessed whether gender moderated social regulatory outcomes.

Immediate and enduring effects of reappraisal

Cognitive reappraisal has been shown to effectively down-regulate subjective (i.e., self-report), neural (e.g., amygdala responsivity) and physiological (e.g., autonomic arousal) responses to negative events as they are happening (Buhle et al., 2014; Gross, 2015; Ochsner et al., 2004). It also has enduring effects such that individuals show reduced negative affect when

re-encountering aversive stimuli that were previously reappraised (i.e., up to 15 minutes later) (Erk et al., 2010; MacNamara et al., 2011; Silvers et al., 2015). Additionally, reappraisal seems to improve with practice, such that reappraising a stimulus multiple times, versus one time, is associated with better outcomes when passively encountering the stimulus again 1 week later (Denny et al., 2015). Indeed, clinical treatment programs such as cognitive-behavioral therapy utilize reappraisal techniques over time to help individuals suffering from a range of psychopathologies (e.g., depression, anxiety, substance use disorders) (Beck et al., 2005; Dimidjian & Davis, 2009).

While this emotion regulation strategy is helpful, it has limited benefits for some populations. For example, adolescents and depressed populations demonstrate lower attenuation of negative affect while actively reappraising than healthy adults, and exhibit little to no enduring effects of reappraisal when passively viewing stimuli again (Erk et al., 2010; Silvers et al., 2015). Recent research demonstrated that support from a friend potentiated the efficacy of reappraisal, highlighting social support as a potential mechanism for ameliorating emotion dysregulation. Specifically, this work demonstrated that reappraising with help from a friend (i.e., social reappraisal) was more effective than reappraising independently, and that this effect was not driven by the quality of reappraisals (i.e., the reappraisals from a friend were not qualitatively better than the reappraisals participants came up with on their own) or social buffering (i.e., hearing the friends' voice independently of reappraisal did not buffer against negative affect; Sahi, Ninova, & Silvers, 2021). Additionally, some work suggests that social reappraisal can have enduring effects, for example by reducing the impact of re-watching an upsetting video two days after reappraising with a partner (Nils & Rimé, 2012).

If getting a friend's perspective can more effectively regulate one's emotions than trying to reappraise on one's own, it is possible that people will respond less negatively to socially regulated stimuli than solo regulated stimuli when re-encountering them in the future. We care deeply about other peoples' opinions and perspectives (Lieberman & Eisenberger, 2009), such that having a friend reframe distressing events might better facilitate lasting changes to our impressions of those events. This social regulatory process could illuminate one way that social interactions enhance wellbeing: by changing our perspectives of negative events, our social interactions can prepare us to cope with future exposure to those events on our own. Systematic mapping of such self (i.e., on one's own) and social (i.e., with help from someone else) regulatory mechanisms also stands to improve future interventions aimed at improving emotional health and wellbeing.

Gender differences in emotion and social support

Prior research comparing social reappraisal to reappraising on one's own only examined women friend pairs (Sahi, Ninova, & Silvers, 2021). Existing research on gender differences in emotion and social support are very mixed, leaving open the possibility that gender might moderate social emotion regulation outcomes. Women are stereotyped to be more emotional than men (Shields, 2002), with some research suggesting that women display and report more emotions, and exhibit greater physiological arousal and neural responsivity to emotional stimuli (e.g., Bradley et al., 2001; Brody, 1997; Cahill et al., 2004). However, many additional studies have found no gender differences in these emotional reactivity metrics (e.g., Kelly et al., 2008; Vrana & Rollock, 2002). Regarding emotion regulation, and reappraisal more specifically, previous research shows no gender differences in reappraisal frequency (Gross & John, 2003), with some evidence that reappraisal might be less effortful for men (McRae et al., 2008). When

it comes to relationships, women have been found to value social connection, intimacy, and emotional support to a greater extent than men who show a preference for shared activities (Duck & Wright, 1993; Felmlee et al., 2012; Fox et al., 1985; Guimond et al., 2006). However, research also suggests that while women may be more responsive to support needs than men, there are no differences in capacity for support (Neff & Karney, 2005). Thus, while women may be more likely to engage in supportive behaviors, it remains unclear how social emotion regulation may be differentially effective across genders.

The current study

In this pre-registered study of 120 young adults (N = 60 same-gender dyads), participants completed two previously utilized in-lab emotion regulation tasks: a solo and social task. In these tasks, participants rated images that they (i) passively viewed (i.e., not regulated), (ii) solo regulated (i.e., reappraised on one's own), or (iii) socially regulated (i.e., reappraised with the help of a friend). Approximately one day later, they completed an online follow-up task from home where they passively viewed randomized images from each of these conditions again (i.e., with no cues) and rated them. We hypothesized that participants would respond less negatively to images that were socially regulated both immediately (i.e., in-lab) and over time (i.e., at follow-up), as compared to images that had been previously solo regulated or not regulated. We anticipated that these effects would be consistent across genders.

Method

Transparency and openness. All procedures were approved by the local IRB committee and informed consent was obtained from all participants. Our sample size, study design, and hypotheses were pre-registered prior to data collection. This pre-registration, alongside de-

identified data and analysis scripts, are hosted on Open Science Framework (OSF; https://osf.io/a9jvf/; Sahi & Silvers, 2023).

Sample size. The rationale for our pre-registered sample size of 60 dyads is based on a power analysis that was conducted on previously published data (Sahi, Ninova, & Silvers, 2021a). Using the 'pwr' package (Champely, 2020) in R (R Core Team, 2022) with power of .8, a significance level of .05, and a Cohen's D of .53 derived from the existing dataset, we found that approximately 30 dyads would be sufficient to observe an immediate difference (i.e., during the task) between regulating emotions alone and regulating with help from others. Because we did not know what kind of effect size to expect for an enduring difference between these conditions (i.e., at follow-up) or potential gender differences in these effects, we doubled the recommended sample size for a total of 60 dyads with 30 dyads for each gender.

Exclusion criteria. Participants individually completed email screenings to ensure their eligibility before coming to the lab. Prospective participants who had previously participated in a similar reappraisal study in the lab, were not proficient in English, reported having a developmental disability or neurological disorder, diagnosed behavioral or psychological issues, or uncorrected vision or hearing (i.e., characteristics that might interfere with ability to complete the task) were not enrolled in the study. Participants were between 18 and 39 years of age. Young adulthood is a time where friendships are particularly salient, shaping individuals' identities and appraisals of the world, making it an appropriate developmental period for our research questions (Arnett, 2015; Welborn et al., 2016). Participants were screened to ensure they had a same-gender friend they felt close to (i.e., at least a 6 on one of the following questions: (1) "How much support do you receive from this person on a regular basis?" and (2) "How significant is this relationship in your life?") to participate with.

Participants. Pairs of friends (N = 64 dyads, N = 128 participants) were recruited from the University of California campus through flyers, emails, and the university subject pool. Three dyads were excluded due to technical difficulties during the session, and one dyad was excluded due to difficulties understanding and completing the tasks, leaving a final sample of 60 dyads (N = 120 participants). Our sample was gender-split, such that we had an equal number of same-gender dyads that identified as women or men. None of our participants reported a non-binary or gender non-conforming identity. One person reported that they did not identify with their sex assigned at birth. The mean age of this sample was 20.83 years (range: 18 – 31 years), and the sample was approximately 53% Asian, 13% White/Caucasian, 3% Hispanic/Latinx, and 3% Black/African American. The remaining participants identified as multiracial or another identity.

Questionnaires. We collected several measures relating to social and emotional tendencies and qualities, including measures of relationship quality (modified Inventory of Peer Attachment: Armsden & Greenberg, 1987),[1] general support-giving and compassion (Social Provisions Scale: Cutrona & Russell, 1987; 2-Way Social Support Scale: Shakespeare-Finch & Obst, 2011; Interpersonal Regulation Questionnaire: Williams et al., 2018; Dispositional Positive Emotions Scale: Shiota et al., 2006), mood and regulation (Mini-Mood and Anxiety Symptom Questionnaire: Casillas, & Clark, 2000; Perceived Stress Scale: Cohen et al., 1983; Emotion Regulation Questionnaire: Gross & John, 2003), childhood experiences (Childhood Trauma Questionnaire: Bernstein et al., 2003), and conformity/social desirability (Crowne & Marlowe, 1960; Steinberg & Monahan, 2007). We also included two unpublished scales, including an extended-emotion regulation questionnaire (including self and social regulation components) and an affect labeling questionnaire. Both participants completed the same set of questionnaires.

[1] The Inventory of Peer Attachment was modified to focus on how participants in the study felt about the friend they participated with (for details see Supplementary Table 1).

These measures were collected for exploratory purposes and are only assessed here in relation to gender differences in social-emotional variables.

In-Lab Procedure. In each dyad that enrolled in the study, one participant was assigned as the "experiencer" and the other participant was the "helper." For dyads who signed up for the study directly (i.e., via email), participants were randomly assigned to their roles ($N = 46$, 52% women). For those who signed up via the university subject pool, the participant who signed up for the longer time slot was assigned to be the experiencer, with their friend as the helper ($N = 14$, 43% women). Although most participants were recruited directly (77%), we checked to ensure no important differences were observed in our results between these two methods of recruitment (see Supplemental Materials: Recruitment Differences). Upon arriving at the lab, the friend pairs were given their respective roles and consented by an experimenter together. Both participants were briefly walked through their tasks, including the in-lab and follow-up tasks for the experiencer and the audio recording task for the helper. Then, they were separated for the remainder of the study.

Experiencer. First, the experiencer completed questionnaires. Next, they completed a brief training using Microsoft PowerPoint designed to prepare them for the social and solo emotion regulation tasks. As part of this training, experiencers saw sample negative images, talked through the different cues (i.e., look/reinterpret/listen), and practiced reinterpreting out loud.[2] To account for possible demand characteristics resulting from our instructions, we maintained specific language around "attempting to decrease negative affect" across the solo and social regulation conditions. For the "reinterpret" cue of the solo task, participants were

[2] While experiencers completed the questionnaires and task training, which took around 20 minutes in total, the helper made audio recordings that would be spliced into the social emotion regulation task. Further details regarding how the helper and experiencer tasks were staggered are included in the protocol shared with our OSF materials.

instructed to use reappraisal to attempt to decrease their negative response to the images. For the "listen" cue of the social task, participants were instructed to listen to their friend use reappraisal to attempt to decrease their negative response to the images.

After the training, experiencers completed two emotion regulation tasks in E-Prime. In between the two tasks, they took a 5-minute break to watch a non-emotional distraction video (i.e., "How It's Made: Magnets"). After they completed the in-lab tasks, experiencers were asked about their perceptions of the study and reminded that they would receive an email the next day with a link to the follow-up task that resembled the in-lab task. Participants were not aware during the in-lab tasks that they would be viewing many of the same images again during the follow-up.

Helper. The helpers began by completing a brief relationship salience task where they were instructed to: "Take a moment to think about some memories that you have with the friend you came with today. When you are finished, please pick one memory and write a paragraph describing it." This task has been used in prior work to make a close other who was not physically present more salient (Guassi Moreira et al., 2018). After this task, the helper recorded 18 reinterpretations from the script generated by the research team (e.g., "That person will recover from the accident."). Each reinterpretation was one sentence and took about four seconds to read out loud. Helpers were instructed to read the reinterpretations in a natural way so that the reinterpretations of the images would feel helpful to their friend as they viewed negative images. After the helper completed the recordings, they filled out questionnaires. At the end of the study, helpers were asked about their perceptions of the study. Since the at-home rating task for experiencers would involve seeing the images from the in-lab emotion regulation tasks again, we asked the helpers not to disclose to their friends that they were reading the reinterpretations from

a script until the experiencers finished this task approximately 1 day later. The helpers did not complete an at-home follow-up task.

Follow-Up Procedure. Twenty-four hours after the in-lab session, experiencers received a personalized link by email that took them to the at-home rating task in Qualtrics. Participants were told that they would view and rate negative images, including some of the images they saw in lab. In reality, they did not see any new images (i.e., all of the images in the at-home rating task were from the in-lab tasks). Participants were asked to complete the task in one sitting (approximately 10 minutes) in a private quiet place as soon as possible after receiving the link. Once they finished this task, we asked participants about their impressions of the follow-up task, and then informed them that their friends were reading from a script during the social emotion regulation task in the lab. We asked them whether they had discussed the scripted nature of the reinterpretations with their friend prior to the follow-up. 65% of participants responded 'No' (did not discuss the script with their friend), 17% said 'Yes', and 18% said 'Sort of' with an option to explain (e.g., they figured out the scripted nature of the study on their own). Participants were provided with additional compensation for completing the follow-up. Participants completed the follow-up task approximately 39 hours on average (SD = 0.96, Range = 24 – 149 hours) after the in-lab session ended, and only 1 dyad did not complete the follow-up (N = 59).

Social and Solo Emotion Regulation Tasks. We utilized the social and solo emotion regulation tasks from previously published research (Sahi, Ninova, & Silvers, 2021). Details of how these tasks were originally developed are included in Supplemental Materials ("Task Development"). The social and solo tasks included three conditions with 18 trials each: negative-regulate, negative-look, and neutral-look. In line with the original paradigm, there was no neutral-regulate condition, yielding an incomplete 2 (valence: negative vs. neutral) x 2 (cue: look

vs. regulate) x 2 (task: solo vs. social) design with 6 conditions total. Each trial began with a cue (2 s). Across solo and social tasks, the "look" cue indicated that participants should look and let themselves respond naturally to the image. In the regulation condition of the solo task, the "reinterpret" cue indicated that participants should think about the image in a way that would reduce their negative emotional response to it (e.g., "They look upset with each other, but they can come to an agreement"). In the regulation condition of the social task, the "listen" cue indicated participants should listen to their friend reinterpreting the image. After the cue, participants saw a negative or neutral image (8 s for the solo task; 9 s for the social task to allow participants to see the image for 1 s before listening to the audio clip).[3] After viewing the image and responding to it according to the cue, participants provided a negative affect rating (i.e., "How bad do you feel?") on a 4-point rating scale from "1 = not bad at all" to "4 = very bad" (3 s) (Figure 1A). A brief jittered fixation cross was included between each image and rating and between each trial. The solo and social tasks were presented in counterbalanced order, with trials from each condition randomized within the task.

The reinterpretations that participants heard during the listen trials were pre-recorded by their friends and spliced into the social emotion regulation task rather than read live. Importantly, these reinterpretations were read from a script that was generated in previous research for the purpose of standardizing the reinterpretations participants would listen to across dyads. These scripted reinterpretations have been shown to be no different from the kinds of reinterpretations

[3] In line with prior work using this paradigm (Sahi, Ninova, & Silvers, 2021), participants saw the negative image for one second longer in the social regulation condition than in the solo regulation condition (i.e., 9 s total versus 8 s). Since reappraising an image independently likely entails an initial appraisal of the image followed by reappraisal that makes it less aversive, this design choice aimed to provide experiencers with time to take in the image (for one second) before hearing the reinterpretation from their friend. However, this choice does introduce a confound (i.e., a systematic difference between the two conditions) that should be noted. Future research might consider capping the total image presentation time for both social and solo regulation to 8 seconds, while maintaining 1 second before playing the audio clip during social regulation (i.e., 1 second to watch, 7 seconds to listen and respond)."

participants use when regulating on their own in terms of how effectively they down-regulate negative affect on average (Sahi, Ninova, & Silvers, 2021). Participants were not informed that their friends were reading from a script.

At-Home Rating Task. Building on this established paradigm, we created a follow-up task to be completed from home online approximately one day after the in-lab task. In this task, participants were re-presented with negative images they passively viewed, socially regulated, or solo regulated in the lab. Each participant saw all images from the corresponding version of the social regulation (social-negative-regulate) and solo regulation (solo-negative-regulate) conditions (18 images each) completed in the lab, as well as 18 images that were not regulated (9 from social-negative-look and 9 from solo-negative-look; selected to be roughly equivalent to the other conditions in terms of negative affect based on pilot study ratings – for details see Supplemental Materials: Task Development). These 54 trials would be presented in random order, each with an image and two questions: (i) "When you look at this image, how bad do you feel?" with a 4-point rating scale from "1 = not bad at all" to "4 = very bad" and (ii) "Have you seen this image before?" with a 5-point rating scale from "Very confident that I have seen this before" to "Very confident that I have <u>not</u> seen this before" (FeldmanHall et al., 2021). Importantly, there was no cue to look or reinterpret presented with these images at follow-up, such that participants were rating the images based on their natural responses to them at the time (Figure 1B). Timing was not tightly regulated in this follow-up task to allow more flexibility in completing it from home (i.e., no auto-advancing of the trials in case distractions occurred), except that each trial was presented for a minimum of four seconds to allow some time to take in the image and prevent rapid click-throughs.

Analyses. All analyses were conducted using the statistical software R (Version 4.1.2). In line with previously published work comparing social and solo emotion regulation (Sahi, Ninova, & Silvers, 2021), we utilized linear mixed-effects models (i.e., multilevel regression models) with participant ID as the group level variable (i.e., trials nested within participants). Mixed-effects models offer several analytic advantages: (a) they account for non-independence of errors stemming from our repeated-measures design; (b) they provide more modeling flexibility than other approaches such as repeated-measures ANOVA; and (c) they are better at accounting for missing data, such as trials missed by participants, than approaches like repeated-measures ANOVA, which uses list-wise deletion (Snijders & Bosker, 2012). Our models originally included version of the task (i.e., our pre-rated images were paired with different cues in each version of the task to check for baseline differences in images used across conditions) and which task participants completed first (solo vs. social) as predictors of no interest (p's > 0.05).

Immediate effects of social emotion regulation. We first examined whether prior work in women demonstrating that social regulation was more effective than solo regulation (Sahi, Ninova, & Silvers) replicated in the current mixed-gender sample. In line with this previous work, we analyzed the data for this question in two stages: (i) as a manipulation check, we first tested whether negative images were associated with more negative affect than neutral images in the look trials; and (ii) we assessed whether cue (regulate vs. look), task (solo vs. social), and the interaction between them were associated with negative affect during the negative image trials. We followed up on significant interactions with Tukey-adjusted pairwise comparisons. We also analyzed whether social and solo regulation efficacy (the difference between negative-look and

negative-regulate for each task) were associated within individuals by calculating the Pearson correlation coefficient between these difference scores.

Enduring effects of social emotion regulation. Since the follow-up task only had three conditions (unregulated negative images, solo regulated negative images, and socially regulated negative images), we tested whether condition shaped negative affect during the follow-up task, with the social regulation condition as the reference group (i.e., social vs. solo regulation, social vs. no regulation). We followed up with Tukey-adjusted pairwise comparisons to assess differences between each pair of conditions. To clarify, these analyses investigated how the conditions differed from each other at follow-up (i.e., differences at the second timepoint), rather than how conditions changed from in-lab task to follow-up (i.e., changes across time).

We followed up on these analyses with two sets of supplementary analyses. First, although most participants (65%) reported that they did not discuss the scripted nature of the reinterpretations before the follow-up task, a percentage of the participants did discuss the scripted reinterpretations (17%), with another subset reporting that they somewhat knew about the script (18%; e.g., guessed it on their own). Since knowing that the reinterpretations during the in-lab social regulation task were scripted could affect how participants felt about the images at follow-up, we re-ran our analyses of the follow-up data controlling for this variable and found that our results were consistent (see "Supplemental Materials: Scripted Reinterpretations at Follow-Up" for details). Second, to ensure that differences in negative affect at follow-up were not primarily driven by differences in whether participants remembered the images from the lab, we conducted analyses with participants' ratings of confidence in their memories of each image at follow-up. We found that although socially regulated images were recalled more confidently than solo regulated images, the effects of condition on negative affect at follow-up were

consistent when controlling for participants' confidence in their memories of the images (see "Supplemental Materials: Memory Confidence at Follow-Up" for details).

Gender differences in social emotion regulation. For comprehensiveness, we first assessed baseline gender differences and found that men reported less negative affect than women when passively looking at negative images (see "Supplemental Materials: Gender Differences" for full analyses and results). Since baseline differences in emotional reactivity to negative images would equally affect the social and solo regulation conditions, and all conditions used different image sets, these findings would not affect our subsequent analyses (i.e., contrasting social regulation to the other conditions by gender).

Turning to our primary question regarding how gender may shape social emotion regulation outcomes, we tested for gender differences in the contrast between (i) social regulation versus no regulation, and (ii) social regulation versus solo regulation. In line with previous work (Sahi, Ninova, & Silvers, 2021), and as part of our planned analyses described above, we did not expect any differences across genders in response to the look-negative trials from the social and solo tasks. Thus, we used a condition variable with three levels – social regulation (negative-regulate-social), solo regulation (negative-regulate-solo), and no regulation (negative-look, including trials from both social and solo) to test these two contrasts for the in-lab tasks in a single model. The model included condition, gender, and the interaction between them as predictors of negative affect during the in-lab tasks. We similarly tested for potential gender differences at follow-up by using follow-up condition (i.e., socially regulated negative images, solo regulated negative images, and unregulated negative images), gender, and the interaction between them as predictors of negative affect during the follow-up task. In both

models, we set social regulation as the reference group for condition, and women as the reference group for gender.

Because the condition variables in these two models had 3 levels, these models would yield 2 main effects of condition (i.e., social regulation vs. no regulation for women, social regulation vs. solo regulation for women), 1 main effect of gender (the difference between men and women on average), and 2 interaction terms between condition and gender. Because we were interested in contrasting all conditions for both genders, we planned to follow up with Tukey-adjusted pairwise comparisons regardless of whether we found significant interaction terms for both models.

Exploratory associations between gender and relationship quality/social support variables. We explored gender differences in the relationship quality and social support questionnaires using point-biserial correlations (which yields the same *p*-values as independent samples t-tests) and followed up with exploratory analyses to see whether any of these social support variables might have explained our gender effects. We found that men reported lower relationship quality and social support in their relationships than women (Supplementary Table 2), but these associations did not statistically explain gender differences in the tasks (see full analyses and results under Supplementary Materials: Gender Differences).

Results

Manipulation check of negative versus neutral images.

Participants reported higher negative affect on average when passively viewing negative images ($M = 2.44$, $SD = 1.00$) versus neutral images ($M = 1.11$, $SD = 0.39$), $b = -1.32$, $t(4115.19) = -61.72$, $p < .001$, 95% CI = [-1.36, -1.28].

Social regulation was more immediately effective than solo regulation.

During the negative image trials (i.e., negative-look and negative-regulate for the social and solo tasks), participants reported significantly lower negative affect on the regulate trials (M = 1.65, SD = 0.80) than the look trials (M = 2.44, SD = 1.00), b = -0.85, $t(4085) = -23.67$, $p < .001$, 95% CI = [-0.92, -0.78]. There was no main effect of task (i.e., social vs. solo) on negative affect, b = -0.00, $t(4085) = 0.08$, $p = .94$, 95% CI = [-0.07, 0.07], but there was a significant interaction between cue and task, b = 0.13, $t(4085) = 2.48$, $p = .01$, 95% CI = [0.03, 0.23], such that participants reported lower negative affect on the regulation trials from the social task (M = 1.59, SD = 0.75) than the solo task (M = 1.71, SD = 0.83), $z = -3.59$, $p < .001$, but there was no difference between passively viewing the negative images from the social and solo tasks (i.e., the no regulation conditions from each task), $z = -0.08$, $p = .94$ (Figure 1C).

Social and solo regulation efficacy were correlated across individuals.

Social emotion regulation efficacy (the difference between average negative affect on negative-look-helper trials versus negative-regulate-helper trials) and solo emotion regulation efficacy (the difference between average negative affect on negative-look-solo trials versus negative-regulate-solo trials) were significantly correlated across individuals, r = 0.52, $t(58) = 4.65$, $p < .001$, CI = [0.31, 0.68], such that those who saw the greatest benefits from solo regulation, on average, also saw the greatest benefits from social regulation, on average.

Social regulation was more effective at follow-up than solo regulation.

In examining the effect of condition (unregulated negative images, solo regulated, or socially regulated – with the latter as the reference group) on negative affect during the follow-up task, we found a significant difference in negative affect between the images that had been previously socially regulated versus not regulated, b = 0.24, $t(3110) = 7.02$, $p < .001$, 95% CI = [0.17, 0.30], and those that had been previously socially regulated versus solo regulated, b =

0.08, $t(3110) = 2.45$, $p = .01$, 95% CI = [0.02, 0.15]. Pairwise comparisons additionally indicated a significant difference in negative affect between the images that had been previously solo regulated versus not regulated, $z = -4.56$, $p < .001$. Images that were not regulated in the lab were associated with the highest negative affect at follow-up ($M = 2.16$, $SD = 0.97$), followed by those that were solo regulated, ($M = 2.01$, $SD = 0.91$), and finally those that were socially regulated, ($M = 1.93$, $SD = 0.88$) (Figure 1D).

Social regulation was more effective than no regulation for both genders, but it was only more effective than solo regulation for women at both timepoints.

In examining whether gender moderated the effect of condition (i.e. social regulation, solo regulation, no regulation) on negative affect during the in-lab tasks, we found that social regulation was associated with significantly lower negative affect than solo regulation, $b = 0.24$, $t(4084.52) = 4.70$, $p < .001$, 95% CI = [0.14, 0.34], and no regulation, $b = 1.00$, $t(4084.34) = 22.80$, $p < .001$, 95% CI = [0.91, 1.08], with women as the reference group. There was no main effect of gender, $b = 0.05$, $t(81.01) = 0.42$, $p = 0.68$, 95% CI = [-0.17, 0.26], but there was a significant interaction between gender and social versus solo regulation, $b = -0.22$, $t(4084.39) = -3.07$, $p = .002$, 95% CI = [-0.36, -0.08], as well as between gender and social regulation versus no regulation, $b = -0.29$, $t(4084.37) = -4.71$, $p < .001$, 95% CI = [-0.41, -0.17].

For women, social regulation was associated with less negative affect than solo regulation, $z = -4.70$, $p < .001$, and solo regulation was associated with less negative affect than no regulation, $z = 17.21$, $p < .001$ (social versus no regulation: $z = -22.80$, $p < .001$). Meanwhile for men, both social and solo regulation were more effective than no regulation (respectively: $z = -15.98$, $p < .001$; $z = -15.57$, $p < .001$), but there was no difference between social and solo regulation, $z = -0.36$, $p = .93$ (Figure 2A).

In examining whether gender moderated the effect of condition (i.e., socially regulated images, solo regulated images, no regulation) on negative affect during the follow-up task, we found that socially regulated images were associated with significantly lower negative affect than solo regulated images, $b = 0.13$, $t(3108.38) = 2.74$, $p = .006$, 95% CI = [0.04, 0.23], and unregulated images, $b = 0.26$, $t(3108.09) = 5.36$, $p < .001$, 95% CI = [0.16, 0.35]. There was no main effect of gender, $b = -0.04$, $t(67.66) = -0.28$, $p = .78$, 95% CI = [-0.31, 0.23], nor was there a significant interaction between gender and either contrast (social versus solo: $b = -0.10$, $t(3108.22) = -1.43$, $p = .15$, 95% CI = [-0.23, 0.04]; social versus unregulated: $b = -0.04$, $t(3108.06) = -0.63$, $p = .53$, 95% CI = [-0.18, 0.09]). However, because we were interested in the contrasts between all conditions for both genders, we proceeded with Tukey-adjusted pairwise comparisons.

For women, socially regulated images were associated with less negative affect than solo regulated images, $z = -2.74$, $p = .02$, and solo regulated images were associated with less negative affect than unregulated images, $z = -2.62$, $p = .02$ (social versus no regulation: $z = -5.36$, $p < .001$). Meanwhile for men, both social and solo regulated images were more effective than unregulated images (respectively: $z = -4.57$, $p < .001$; $z = -3.82$, $p < .001$), but there was no difference between social and solo regulation, $z = -0.75$, $p = .73$ (Figure 2B).

Discussion

Changing how one thinks can change how one feels about emotional events, both in the moment and over time. Getting help from other people to change how one thinks can potentiate the efficacy of this strategy in the moment, but prior work had not examined whether these relative gains persisted when re-encountering negative events on one's own. In the present study, we found that participants responded less negatively to images that were socially regulated (i.e., reappraised

with the help of a friend) both immediately and at follow-up, as compared to images that had been previously solo regulated (i.e., reappraised on one's own) or not regulated (i.e., passively viewed). These findings provide critical insight into how other people can shape the way we think and feel to help us cope with re-occurring stressors.

Social emotion regulation has enduring effects.

Building on previous work demonstrating that solo regulation can have lasting effects on how we respond to negative events (Erk et al., 2010; MacNamara et al., 2011; Silvers et al., 2015), and that social emotion regulation can be more immediately effective than solo regulation (Sahi, Ninova, & Silvers, 2021), we showed that social emotion regulation can have more enduring effects than solo regulation. Thus, the benefits of such social support are not just a short-term fix for emotional distress: these effects can last to help us navigate future situations on our own. These findings complement prior theoretical and empirical work on the regulatory roles of close relationships, including attachment research (Mikulincer & Shaver, 2019), suggesting that our interactions with close others may enhance our abilities to navigate negative emotions independently. Additionally, these findings align with research on social influence demonstrating how other peoples' opinions can shape the way individuals represent external stimuli (e.g., the attractiveness of faces, the desirability of food; Martin et al., 2018; Zaki et al., 2011). Indeed, it is possible that social emotion regulation combines the rewards of social connection with the power of social influence to facilitate regulatory processes (Sahi, Eisenberger, & Silvers, 2023).

We demonstrated that the effects of social emotion regulation endured approximately 1 day later, but it will be important to assess whether these effects persist beyond this time frame. In line with work looking at the effects of emotion regulation training over time (Denny, 2020), and research showing that reappraisals of stressors can be contagious in social contexts (Oveis et

al., 2020), it is possible that in everyday life social reappraisals get reenforced across multiple interactions, potentially extending the enduring impacts of social emotion regulation. Notably, reappraisals can also up-regulate negative affect by reinforcing negative interpretations of stimuli (e.g., MacNamara et al., 2011), underscoring how social regulation has the power to diminish or enhance wellbeing in a context-dependent way. Additionally, some work has shown that social reappraisal from a stranger can effectively down-regulate negative affect (Sahi, Ninova, & Silvers, 2021; Morawetz et al., 2021), though not as effectively as social reappraisal from a friend or reappraising independently (Morawetz et al., 2021), highlighting the importance of relationship closeness in social regulatory benefits.

Social emotion regulation may provide a greater boost in women than men.

Social regulation was more effective both immediately and at follow-up than no regulation for both genders, but social regulation was only more effective than solo regulation for women. Exploratory analyses (see Supplemental Materials) suggested that although there were significant gender differences in relationship quality and general social support, they did not account for gender-related task differences. Prior work has shown less engagement of cognitive control regions (e.g., prefrontal cortex) with greater decreases in brain regions associated with emotional responding (e.g., amygdala) during reappraisal in men as compared to women (McRae et al., 2008), suggesting that reappraisal might be less effortful for men. If solo regulation is easier for men, they may benefit less than women from the regulatory "boost" offered by social support. Women have also exhibited more positive-refocusing and activation in reward-related regions (e.g., ventral striatum) during reappraisal than men (McRae et al., 2008), which may suggest that rewarding experiences like getting support from a close other (Lieberman & Eisenberger, 2009) benefit women more than men. Future research can unpack

how gender differences in emotion socialization across development, or other individual differences (Sahi et al., 2022), shape social emotion regulation processes, as beliefs about social roles can affect how people experience, communicate, and regulate emotions in relationships (Felmlee et al., 2012; Shields et al., 2006).

Limits on Generalizability

Young adulthood presents a ripe developmental period for examining social influences, particularly from friendships, on emotion (Arnett, 2015). However, this demographic feature of our sample limits the generalizability of our findings; future research can examine other ages and relationship types to assess potential variability in social emotion regulation effects. Although we built on the existing literature to assess gender differences between same-gender dyads, we did not assess mixed-gender dyads or non-binary individuals, which may allow us to further tease apart whether our gender effects could be driven by the gender of the support-giver, support-receiver, or other relationship dynamics. Our sample was predominantly from two racial/ethnic groups on a college campus: Asian and White (53% and 13%, respectively; 66% total). Future research in more diverse samples can help identify possible effects of factors like identity, cultural norms, or socioeconomic status.

Conclusions

Our social relationships are critical for navigating stress and negative emotions. We replicated recent research demonstrating that getting help from friends to reframe negative stimuli is more effective than trying to reframe alone (Sahi, Ninova, & Silvers, 2021), and extended this work to show that these effects last: socially regulated stimuli are perceived less negatively than solo regulated stimuli approximately one day later. These findings indicate that by changing our lasting impressions of distressing events, our friends can help us better contend

with those events in the future when we face them on our own. Such work demonstrates how social relationships can shape emotion regulation processes, and underscores how valuable others' perspectives can be when making sense of emotional experiences. Finally, we found that gender can shape social emotion regulation processes and provided several avenues for unpacking this association in future work. Collectively, these findings inform social, developmental, and clinical research aimed at unpacking social influences on cognitive and affective states, as well as research aimed at developing interventions for emotion dysregulation.

Figures

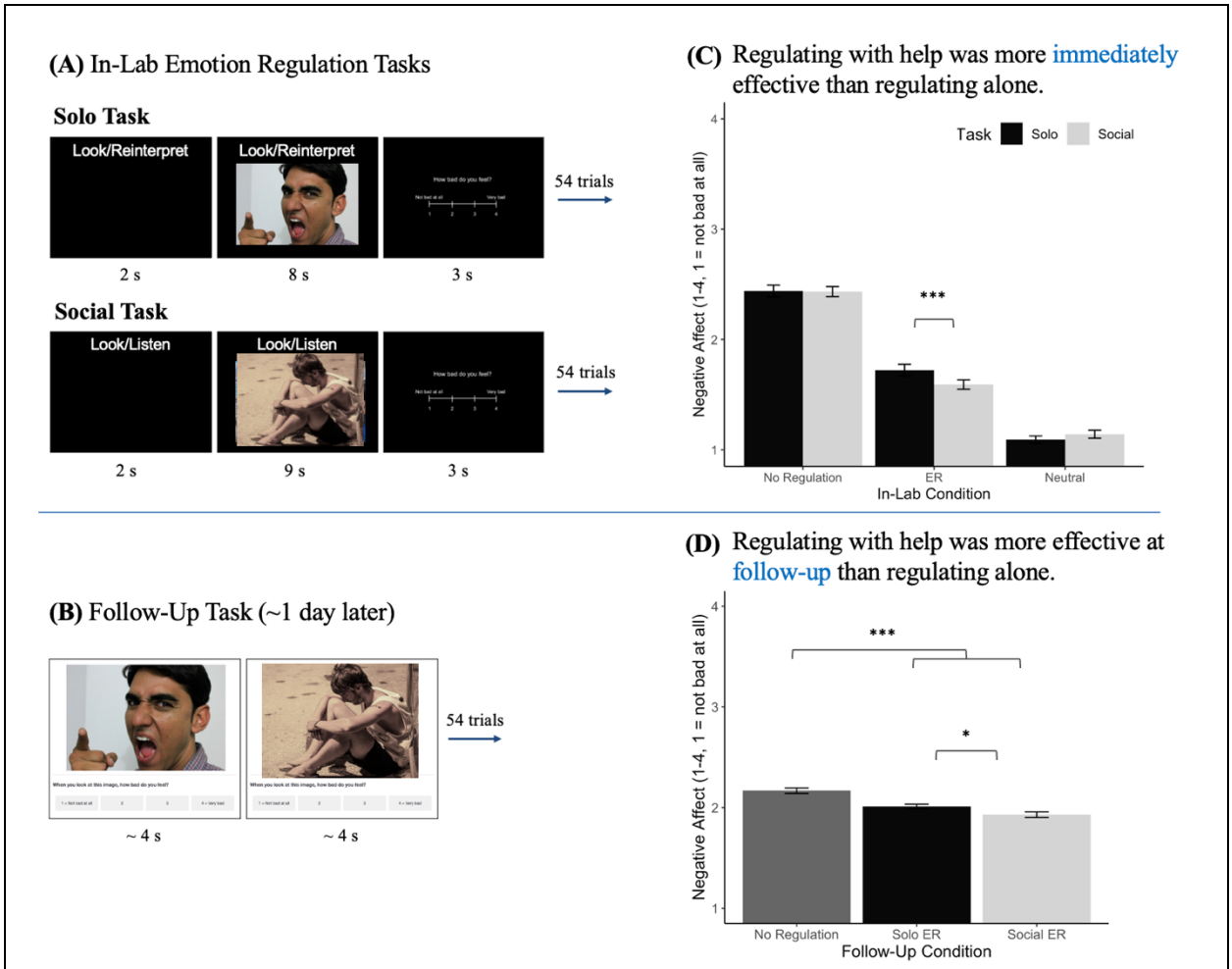

Figure 1. We used the "solo" and "social" emotion regulation (ER) tasks from previously published work (Sahi, Ninova, & Silvers, 2021). **(A)** The solo task began with a 2 s cue to "look" or "reinterpret" followed by an image presentation for 8 s, and a rating screen for 3 s. The social task followed a similar procedure, except that instead of seeing a cue to "reinterpret" they saw a cue to "listen" and the image was presented for 1 s before the audio clip played (9 s total). **(B)** The follow-up task was administered online at home approximately 1 day later. This task randomly presented images that were previously presented in the solo or social tasks, including images that were reinterpreted or passively viewed, with a rating scale (no cue). **(C)** We found that regulating with help was associated with lower negative affect during the in-lab tasks than reappraising alone, $p < .001$. **(D)** We additionally found that regulating with help was associated with lower negative affect at follow-up than reappraising alone, $p = .01$, and that both forms of regulation (i.e., solo and social) were associated with lower negative affect at follow-up than images that were not regulated in the lab, $p < .001$. *Note*: the images shown in this figure, taken from the Open Affective Standardized Image Set (Kurdi, Lozano, & Banaji, 2017), are samples not used in the actual task. $p < .05$ = *, $p < .01$ = **, $p < .001$ = ***

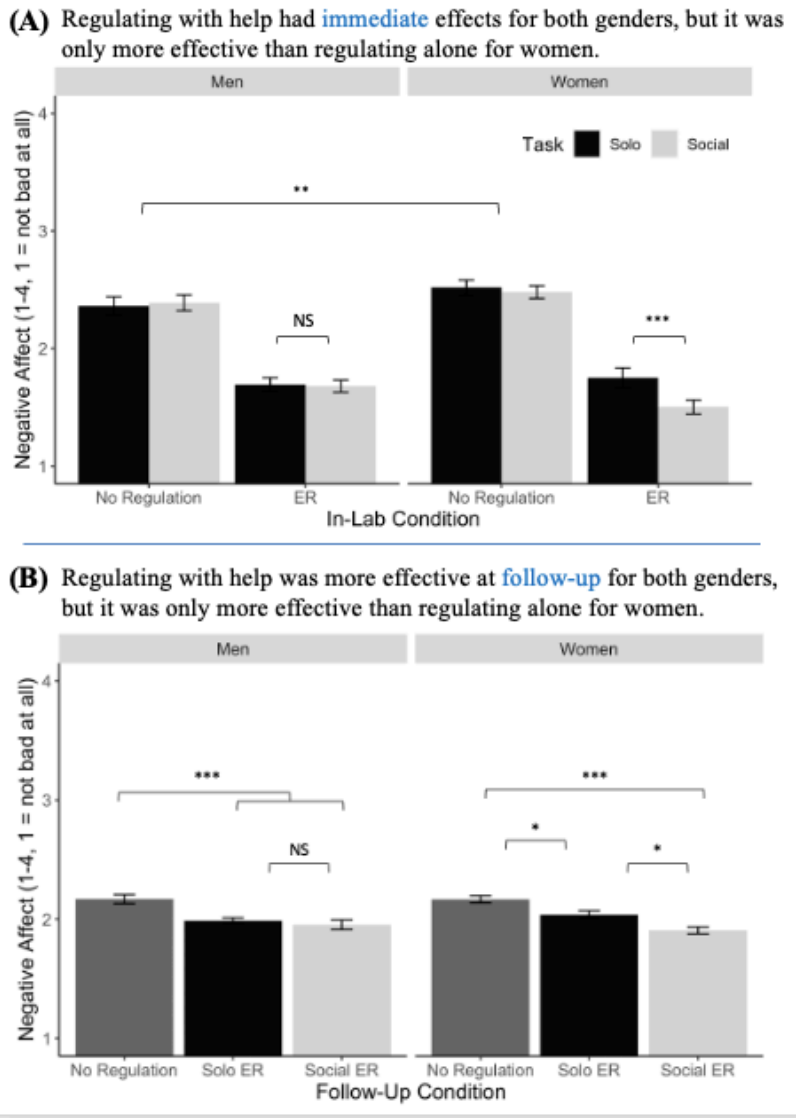

Figure 2. In exploring gender differences associated with social emotion regulation (ER) outcomes, we found that **(A)** regulating with help (i.e., social ER) was effective in down-regulating negative affect for both genders during the in-lab tasks, $p < .001$, but it was only associated with lower negative affect than regulating alone (i.e., solo ER) in women, $p < .001$. Additionally, men reported lower negative affect during the no regulation conditions (i.e., passively viewing negative images) than women on average, $p = .004$. Consistent with the in-lab pattern, **(B)** we found that regulating with help was effective in down-regulating negative affect for both genders at follow-up, $p < .001$, but it was only associated with lower negative affect than regulating alone at follow-up in women, $p < .05$. $p < .05$ = *, $p < .01$ = **, $p < .001$ = ***

References

Armsden, G. C., & Greenberg, M. T. (1987). The inventory of parent and peer attachment: Individual differences and their relationship to psychological well-being in adolescence. *Journal of Youth and Adolescence*, *16*(5), 427–454. https://doi.org/10.1007/BF02202939

Arnett, J. J. (2015). Emerging Adulthood: The Winding Road from the Late Teens through the Twenties. In *Emerging Adulthood: The Winding Road from the Late Teens through the Twenties*. https://doi.org/10.1093/acprof:oso/9780195309379.001.0001

Beck, A., Emery, G., & Greenberg, R. (2005). *Anxiety disorders and phoblas: A cognitive perspective*. Basic Books.

Beckes, L., & Coan, J. A. (2011). Social baseline theory: The role of social proximity in emotion and economy of action. *Social and Personality Psychology Compass*, *5*(12), 976–988. https://doi.org/10.1111/j.1751-9004.2011.00400.x

Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science and Medicine*, *51*(6), 843–857. https://doi.org/10.1016/S0277-9536(00)00065-4

Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Pogge, D., Ahluvalia, T., Stokes, J., Handelsman, L., Medrano, M., Desmond, D., & Zule, W. (2003). Development and validation of a brief screening version of the Childhood Trauma Questionnaire. *Child Abuse and Neglect*, *27*(2), 169–190. https://doi.org/10.1016/S0145-2134(02)00541-0

Bradley, M. M., Codispoti, M., Sabatinelli, D., & Lang, P. J. (2001). Emotion and Motivation II: Sex Differences in Picture Processing. *Emotion*, *1*(3), 300–319. https://doi.org/10.1037/1528-3542.1.3.300

Brody, L. R. (1997). Gender and emotion: Beyond stereotypes. *Journal of Social Issues*, *53*(2),

369–393. https://doi.org/10.1111/j.1540-4560.1997.tb02448.x

Buhle, J. T., Silvers, J. A., Wage, T. D., Lopez, R., Onyemekwu, C., Kober, H., Webe, J., & Ochsner, K. N. (2014). Cognitive reappraisal of emotion: A meta-analysis of human neuroimaging studies. *Cerebral Cortex*, *24*(11), 2981–2990. https://doi.org/10.1093/cercor/bht154

Cahill, L., Uncapher, M., Kilpatrick, L., Alkire, M. T., & Turner, J. (2004). Sex-related hemispheric lateralization of amygdala function in emotionally influenced memory: An fMRI investigation. *Learning and Memory*, *11*(3), 261–266. https://doi.org/10.1101/lm.70504

Casillas, A., & Clark, L. A. (2000). The Mini Mood and Anxiety Symptom Questionnaire (Mini-MASQ). *Poster Presented at the 72nd Annual Meeting of the Midwestern Psychological Association*.

Champely, S. (2020). *pwr: Basic Functions for Power Analysis* (R package version 1.3-0).

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. In *Journal of Health and Social Behavior*. www.mindgarden.com

Crowne, D. P., & Marlowe, D. (1960). A new scale of social desirability independent of psychopathology. *Journal of Consulting Psychology*, *24*(4), 349–354. https://doi.org/10.1037/h0047358

Cutrona, C. E., & Russell, D. W. (1987). The provisions of social relationships and adaptation to stress. In *Advances in personal relationships* (Vol. 1, Issue 1, pp. 37-67.). https://www.researchgate.net/publication/271507385

Denny, B. T. (2020). Getting better over time: A framework for examining the impact of emotion regulation training. *Emotion*, *20*(1), 110–114. https://doi.org/10.1037/emo0000641

Denny, B. T., Inhoff, M. C., Zerubavel, N., Davachi, L., & Ochsner, K. N. (2015). Getting over it: Long-lasting effects of emotion regulation on amygdala response. *Psychological Science*, *26*(9), 1377–1388. https://doi.org/10.1177/0956797615578863

Dimidjian, S., & Davis, K. J. (2009). Newer Variations of Cognitive-Behavioral Therapy: Behavioral Activation and Mindfulness-based Cognitive Therapy. *Current Psychiatry Reports*, *11*, 453–458.

Duck, S., & Wright, P. H. (1993). Reexamining gender differences in same-gender friendships: A close look at two kinds of data. *Sex Roles*, *28*(11–12), 709–727. https://doi.org/10.1007/BF00289989

Erk, S., Mikschl, A., Stier, S., Ciaramidaro, A., Gapp, V., Weber, B., & Walter, H. (2010). Acute and sustained effects of cognitive emotion regulation in major depression. *Journal of Neuroscience*, *30*(47), 15726–15734. https://doi.org/10.1523/JNEUROSCI.1856-10.2010

FeldmanHall, O., Montez, D. F., Phelps, E. A., Davachi, L., & Murty, V. P. (2021). Hippocampus guides adaptive learning during dynamic social interactions. *Journal of Neuroscience*, *41*(6), 1340–1348. https://doi.org/10.1523/JNEUROSCI.0873-20.2020

Felmlee, D., Sweet, E., & Sinclair, H. C. (2012). Gender Rules: Same- and Cross-Gender Friendships Norms. *Sex Roles*, *66*(7–8), 518–529. https://doi.org/10.1007/s11199-011-0109-z

Fox, M., Gibbs, M., & Auerbach, D. (1985). Age and gender dimensions of friendship. *Psychology of Women Quarterly*, *9*(4), 489–502. https://doi.org/10.1111/J.1471-6402.1985.TB00898.X

Gross, J. J. (2015). Emotion Regulation: Current Status and Future Prospects. *Http://Dx.Doi.Org/10.1080/1047840X.2014.940781*, *26*(1), 1–26.

https://doi.org/10.1080/1047840X.2014.940781

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, *85*(2), 348–362. https://doi.org/10.1037/0022-3514.85.2.348

Guassi Moreira, J. F., Tashjian, S. M., Galván, A., & Silvers, J. A. (2018). Parents Versus Peers: Assessing the Impact of Social Agents on Decision Making in Young Adults. *Psychological Science*, *29*(9), 1526–1539. https://doi.org/10.1177/0956797618778497

Guimond, S., Chatard, A., Martinot, D., Crisp, R. J., & Redersdorff, S. (2006). Social comparison, self-stereotyping, and gender differences in self-construals. *Journal of Personality and Social Psychology*, *90*(2), 221–242. https://doi.org/10.1037/0022-3514.90.2.221

Kelly, M. M., Tyrka, A. R., Anderson, G. M., Price, L. H., & Carpenter, L. L. (2008). Sex differences in emotional and physiological responses to the Trier Social Stress Test. *Journal of Behavior Therapy and Experimental Psychiatry*, *39*(1), 87–98. https://doi.org/10.1016/j.jbtep.2007.02.003

Lieberman, M. D., & Eisenberger, N. I. (2009). Pains and pleasures of social life. In *Science* (Vol. 323, Issue 5916, pp. 890–891). American Association for the Advancement of Science. https://doi.org/10.1126/science.1170008

MacNamara, A., Ochsner, K. N., & Hajcak, G. (2011). Previously reappraised: The lasting effect of description type on picture-elicited electrocortical activity. *Social Cognitive and Affective Neuroscience*, *6*(3), 348–358. https://doi.org/10.1093/scan/nsq053

Martin, R. E., Villanueva, Y., Stephano, T., Franz, P. J., & Ochsner, K. N. (2018). Social influence shifts valuation of appetitive cues in early adolescence and adulthood. *Journal of*

Experimental Psychology: General, *147*(10), 1521–1530. https://doi.org/10.1037/xge0000469

McRae, K., Ochsner, K. N., Mauss, I. B., Gabrieli, J. J. D., & Gross, J. J. (2008). Gender differences in emotion regulation: An fMRI study of cognitive reappraisal. *Group Processes and Intergroup Relations*, *11*(2), 143–162. https://doi.org/10.1177/1368430207088035

Mikulincer, M., & Shaver, P. R. (2019). Attachment orientations and emotion regulation. In *Current Opinion in Psychology* (Vol. 25, pp. 6–10). https://doi.org/10.1016/j.copsyc.2018.02.006

Morawetz, C., Berboth, S., & Bode, S. (2021). With a little help from my friends: The effect of social proximity on emotion regulation-related brain activity. *NeuroImage*, *230*, 117817. https://doi.org/10.1016/J.NEUROIMAGE.2021.117817

Neff, L. A., & Karney, B. R. (2005). Gender differences in social support: A question of skill or responsiveness? *Journal of Personality and Social Psychology*, *88*(1), 79–90. https://doi.org/10.1037/0022-3514.88.1.79

Nils, F., & Rimé, B. (2012). Beyond the myth of venting: Social sharing modes determine the benefits of emotional disclosure. *European Journal of Social Psychology*, *42*(6), 672–681. https://doi.org/10.1002/ejsp.1880

Niven, K. (2017). The four key characteristics of interpersonal emotion regulation. In *Current Opinion in Psychology* (Vol. 17, pp. 89–93). https://doi.org/10.1016/j.copsyc.2017.06.015

Ochsner, K. N., Ray, R. D., Cooper, J. C., Robertson, E. R., Chopra, S., Gabrieli, J. D. E., & Gross, J. J. (2004). For better or for worse: Neural systems supporting the cognitive down- and up-regulation of negative emotion. *NeuroImage*, *23*(2), 483–499. https://doi.org/10.1016/j.neuroimage.2004.06.030

Oveis, C., Gu, Y., Ocampo, J. M., Hangen, E. J., & Jamieson, J. P. (2020). Emotion Regulation Contagion: Stress Reappraisal Promotes Challenge Responses in Teammates. *Journal of Experimental Psychology: General*. https://doi.org/10.1037/xge0000757.supp

R Core Team. (2022). R: A language and environment computing. In *R Foundation for Statistical Computing*. https://www.r-project.org/

Reeck, C., Ames, D. R., & Ochsner, K. N. (2016). The social regulation of emotion: An integrative, cross-disciplinary model. In *Trends in Cognitive Sciences* (Vol. 20, Issue 1, pp. 47–63). https://doi.org/10.1016/j.tics.2015.09.003

Sahi, R. S., & Silvers, J. A. (2023). *Social Reappraisal Study: Enduring Effect.* OSF. osf.io/a9jvf

Sahi, Razia S., Ninova, E., & Silvers, J. A. (2021). With a little help from my friends: Selective social potentiation of emotion regulation. *Journal of Experimental Psychology: General*. https://doi.org/10.1037/xge0000853

Sahi, Razia S, Eisenberger, N. I., & Silvers, J. A. (2023). Peer facilitation of emotion regulation in adolescence. *Developmental Cognitive Neuroscience*, *62*, 1878–9293. https://doi.org/10.1016/j.dcn.2023.101262

Sahi, Razia S, He, Z., Silvers, J. A., & Eisenberger, N. I. (2022). One Size Does Not Fit All: Decomposing the Implementation and Differential Benefits of Social Emotion Regulation Strategies. *Emotion*. https://doi.org/10.1037/emo0001194

Shakespeare-Finch, J., & Obst, P. L. (2011). The development of the 2-way social support scale: A measure of giving and receiving emotional and instrumental support. *Journal of Personality Assessment*, *93*(5), 483–490. https://doi.org/10.1080/00223891.2011.594124

Shields, S. A. (2002). *Speaking from the Heart: Gender and the Social Meaning of Emotion*. https://doi.org/10.2307/3341953

Shields, S. A., Garner, D. N., Di Leone, B., & Hadley, A. M. (2006). Gender and Emotion. *Handbooks of Sociology and Social Research*, 63–83. https://doi.org/10.1007/978-0-387-30715-2_4/COVER

Shiota, M., Keltner, D., psychology, O. J.-T. journal of positive, & 2006, undefined. (2006). Positive emotion dispositions differentially associated with Big Five personality and attachment style. *Taylor & Francis*, *1*(2), 61–71. https://doi.org/10.1080/17439760500510833

Silvers, J. A., Shu, J., Hubbard, A. D., Weber, J., & Ochsner, K. N. (2015). Concurrent and lasting effects of emotion regulation on amygdala response in adolescence and young adulthood. *Developmental Science*, *18*(5), 771–784. https://doi.org/10.1111/desc.12260

Snijders, T., & Bosker, R. (2012). *Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling (2nd Edition)*. Sage Publishers. https://doi.org/10.1080/10705511.2013.797841

Steinberg, L., & Monahan, K. C. (2007). Age Differences in Resistance to Peer Influence. *Developmental Psychology*, *43*(6), 1531–1543. https://doi.org/10.1037/0012-1649.43.6.1531

Uchino, B. N., Bowen, K., de Grey, R. K., Mikel, J., & Fisher, E. B. (2018). Social support and physical health: Models, mechanisms, and opportunities. *Principles and Concepts of Behavioral Medicine: A Global Handbook*, 341–372. https://doi.org/10.1007/978-0-387-93826-4_12

Vrana, S. R., & Rollock, D. (2002). The role of ethnicity, gender, emotional content, and contextual differences in physiological, expressive, and self-reported emotional responses to imagery. *Cognition and Emotion*, *16*(1), 165–192.

https://doi.org/10.1080/02699930143000185

Welborn, B. L., Lieberman, M. D., Goldenberg, D., Fuligni, A. J., Galván, A., & Telzer, E. H. (2016). Neural mechanisms of social influence in adolescence. *Social Cognitive and Affective Neuroscience*, *11*(1), 100–109. https://doi.org/10.1093/SCAN/NSV095

Zaki, J., Schirmer, J., & Mitchell, J. P. (2011). Social influence modulates the neural computation of value. *Psychological Science*, *22*(7), 894–900. https://doi.org/10.1177/0956797611411057

Zaki, J., & Williams, C. (2013). Interpersonal emotion regulation. *Emotion*, *13*(5), 803–810. https://doi.org/10.1037/a0033839