



# “Think of the situation in a positive light”: A look at cognitive reappraisal, affective reactivity and health☆<sup>1</sup>

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## ABSTRACT

**Rationale:** How individuals regulate their emotions is critical for maintaining health and well-being. For example, reframing a stressful situation in a positive light, a form of cognitive reappraisal, is beneficial for both physical and mental health as well as subjective well-being. However, it is currently unclear why this relationship exists. One potential mechanism could be how one emotionally reacts to stressors in daily life, termed affective reactivity.

**Objective:** The current study examined longitudinal associations that spanned 20 years between cognitive reappraisal and health outcomes and subjective well-being and if affective reactivity mediated this relationship.

**Methods:** Participants completed waves 1–3 of the Midlife in the United States (MIDUS) Survey series and were asked various questions about their general health and well-being. Each wave was approximately 10 years apart. A subset of participants from MIDUS II completed the National Study of Daily Experiences (NSDE II), an 8-day daily diary asking about their everyday experiences. The final sample consisted of 1814 participants.

**Results:** Results found that cognitive reappraisal was significantly associated with future health and well-being outcomes, and negative affective reactivity significantly mediated this relationship. Those who engaged more in cognitive reappraisal tended to be less affectively reactive to stressful events 10 years later, leading to having better health and well-being outcomes 20 years later.

**Conclusion:** Findings from this study could better inform stress and well-being interventions by strengthening cognitive reappraisal strategies to target reducing affective reactivity to stressors which should then benefit long-term health and well-being.

Individuals navigating difficult situations are often told to “think of the situation in a positive light”. This advice refers to a particular emotion regulation strategy within cognitive reappraisal (Gross, 2001) that has been associated with positive physical and mental health benefits (e.g., Garnefski and Kraaij, 2006; Gross and John, 2003; Haga et al., 2007; Nezlek and Kuppens, 2008; Riepenhausen et al., 2022; Shapero et al., 2019). However, the reason why this relationship exists is unclear. One pathway that may explain the associations between cognitive reappraisal and health are changes in affect on days people experience stressors, termed affective reactivity (Charles et al., 2009). We propose that affective reactivity will be a pathway linking cognitive reappraisal and physical/mental health and subjective well-being. The present study uses three waves of a longitudinal study across 20 years to examine (1) the associations between cognitive reappraisal and future

physical/mental health and subjective well-being and (2) affective reactivity as a pathway mediating this relationship. First, we will review the literature on associations between cognitive reappraisal and physical and mental health and subjective well-being outcomes. Then, we will discuss the role of affective reactivity in shaping future health and well-being. Finally, we will consider affective reactivity as a mediator in the reappraisal/health relationship and the theoretical rationale linking these variables together.

## 1. Cognitive reappraisal: an emotion regulation strategy

People do not passively experience emotions. Instead, they act on them in an attempt to change the way they experience an emotional response (Gross, 1999). This process is called emotion regulation and it

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refers to how people try to shape and choose to express their emotions (Gross, 1998a). It can also be viewed as an action taken to shift current emotions towards a desired emotion (Tamir et al., 2020). Emotion regulation is integral to health functioning because how an individual chooses to regulate their emotions can have social and psychological consequences (Gross et al., 2006). For example, individuals who engage in cognitive reappraisal function better in emotional and interpersonal settings and show decreased emotional reactions in response to negative events changing their expressed behavior compared to those who do not engage in cognitive reappraisal (Daches Cohen and Rubinsten, 2022; Gross et al., 2006).

Within the umbrella of emotion regulation, there are many different strategies that can be used to regulate emotions. One strategy that is particularly beneficial is cognitive reappraisal (Gross, 2001). Cognitive reappraisal refers to altering emotions by changing the way one thinks about a potentially emotion-eliciting situation (Gross, 2008; McRae et al., 2012). As an antecedent-focused form of emotion regulation, we use cognitive reappraisal to shape our emotional responses to a situation before our responses become fully activated (Gross, 2001). Cognitive reappraisal is also considered to be a secondary control strategy which refers to altering the way one thinks about a situation instead of attempting to change the situation itself (Wrosch et al., 2000). An individual experiencing a stressful event could reframe the situation in a more positive light which would then decrease the emotional response given to the stressful event, protecting their emotional health (Wrosch et al., 2000). Cognitive reappraisal is also associated with decreased physiological activation in response to a stressful event which provides positive benefits for an individual's physical health (Gross, 1998b; Gross and John, 2003; Huang et al., 2023).

### 1.1. Cognitive reappraisal and association with mental health & subjective well-being

Cognitive reappraisal is an important strategy involved in mental health. The tendency to engage in cognitive reappraisal is associated with better mental health and subjective well-being (Gross, 1998a). For example, individuals with high levels of cognitive reappraisal also exhibit lowered depression, increased positive affect, self-esteem, and psychological adjustment as well as better interpersonal functioning compared to those low in cognitive reappraisal (Garnefski and Kraaij, 2006; Gross and John, 2003; Nezlek and Kuppens, 2008; Shapero et al., 2019). Furthermore, using cognitive reappraisal strategies is positively related to well-being and has been shown to predict higher levels of positive well-being outcomes as well as being positively related to resilience-related outcomes (Gross and John, 2003; Haga et al., 2007; Riepenhausen et al., 2022). Research has also demonstrated that individuals high in cognitive reappraisal are more stress-resilient and experience less self-reported state anxiety while reporting higher self-reported state euphoria compared to those low in cognitive reappraisal (Carlson et al., 2012).

### 1.2. Cognitive reappraisal and association with physical health

Cognitive reappraisal is also associated with physical health, although this relationship has been less studied. Stressful events lead to wear-and-tear on physiological processes due to negative emotional responses to stressful events (Hawkey et al., 2005). This wear-and-tear, also known as allostatic load, can result in the development of chronic health conditions (Mattei et al., 2010). Since cognitive reappraisal is associated with less negative emotional responses to stressful events, this could have positive physical health benefits. In fact, cognitive reappraisal is indirectly associated with lower allostatic load and less metabolic and inflammatory dysregulation (Ellis et al., 2019). Studies demonstrate that those high in cognitive reappraisal have attenuated blood pressure, increased heart rate variability, improved autonomic nervous system response, greater cardiac output and ventricular

contractility, and less total peripheral resistance in response to an anger-inducing experiment compared to those low in cognitive reappraisal (Denson et al., 2011; Huang et al., 2023; Mauss et al., 2007; Memedovic et al., 2010). These studies have established a link between cognitive reappraisal and concurrent physical health, but no study has examined longitudinal associations with future physical health. Cognitive reappraisal is associated with physical health indicators, but it is unknown if cognitive reappraisal is associated with future physical health outcomes later in life.

### 1.3. Affective reactivity

Why might cognitive reappraisal be associated with physical and mental health outcomes? One mechanism that may account for the link between cognitive reappraisal and health outcomes is how an individual reacts to stressful events in their daily lives. Individuals tend to report increased negative affect on days when they experience a stressful event and this magnitude of change in negative affect on days when the stressor occurs is termed negative affective reactivity (Charles et al., 2009). For example, on days when a person experiences a stressor such as an argument with a loved one, their negative affect will likely increase in response to this event. Affect refers to the feeling a person is experiencing at any particular point in time (Larsen and Prizmic, 2004). Regulating an individual's affect in response to daily stressful events is beneficial because it can decrease the impact of lingering emotions and moods on later behavior and experiences (Larsen and Prizmic, 2004). Decreasing negative reactions to daily stressors is important for health and well-being because having increased affective reactivity results in poorer physical/mental health and subjective well-being compared to having no increase in affective reactivity (Charles et al., 2013; Piazza et al., 2013).

### 1.4. Affective reactivity and association with physical/mental health & subjective well-being

People who generally have greater affective reactions to stressful events in their daily lives have poorer mental health outcomes. For example, individuals with heightened affective reactivity to daily stressors show an increased likelihood of reporting an affective disorder and greater affective distress in general 10 years later compared to those without heightened affective reactivity (Charles et al., 2013). Furthermore, increased affective reactivity to daily interpersonal stressors is a predictor of depressive symptoms (O'Neill et al., 2004). Additionally, having heightened affective reactivity to interpersonal events has been shown to be a pathway linking shorter-than-usual sleep and next day suicide ideation compared to those who do not have heightened affective reactivity (Hamilton et al., 2023). Experiencing negative affect frequently due to being reactive to stressful events is associated with decreased emotional well-being (Charles et al., 2013).

Likewise, people who generally have greater affective reactions to stressful events in their daily lives have poorer physical health outcomes. For example, greater affective reactivity to daily stressors is associated with an increased risk of having a chronic physical health condition 10 years later compared to no increase in affective reactivity (Piazza et al., 2013). Women who experience greater negative affective reactivity compared to those who don't when faced with minor daily stressors are at risk for increased inflammation (Sin et al., 2015). Negative affective reactivity also predicts mortality risk in individuals with at least one chronic illness (Chiang et al., 2018).

### 1.5. Affective reactivity & link to cognitive reappraisal

An affective reactivity view contends that if multiple individuals undergo the same stressful event, any individual differences in their negative affect reflects their differences in their reactions to that event (Gross et al., 1998). People can use cognitive reappraisal to down

regulate emotional reactions (Gross and John, 2003). Laboratory studies have shown that individuals who engage in cognitive reappraisal have less negative reactivity to lab stressors and stimuli. For example, Wolgast et al. (2011) found that participants who were in either a reappraisal or acceptance condition instead of a control condition had significant reductions of subjective distress and physiological reactions from watching a film clip that elicited aversive emotional states. Furthermore, reappraisal during stressful speeches was examined in comparison to suppression and researchers found that reappraisal led to less anxiety expression and affect (Egloff et al., 2006).

The relationship between cognitive reappraisal and stress reactivity has also been demonstrated in naturalistic studies. For example, cognitive reappraisal is associated with decreased affective reactivity in response to a daily negative event (Gunaydin et al., 2016). Additionally, those who engage in reappraisal experience more positive affect and less negative affect in their daily lives compared to those who do not engage in reappraisal (Richardson, 2017). A mixed methods study of both daily life and an in vivo lab experiment found that cognitive reappraisal attenuates the depressive symptoms that are associated with having increased emotional reactivity (Shapiro et al., 2019). These studies demonstrate that people higher in cognitive reappraisal are less reactive to stressors both in the lab and in daily life compared to those lower in cognitive reappraisal, but it is unknown if reactions to daily stressors mediates the relationship between cognitive reappraisal and health outcomes.

### 1.6. Current study

In the current study, we investigated associations between cognitive reappraisal and future physical and mental health and subjective well-being and if affective reactivity to daily stressors mediated that relationship in a longitudinal setting. There is a gap in the literature explaining why cognitive reappraisal is associated with health and well-being outcomes and this study examined affective reactivity as a potential pathway explaining this link. The present study used three waves of data to examine if cognitive reappraisal at Time 1 was associated with health and well-being outcomes at Time 3 (20 years after Time 1). We then examined if affective reactivity at Time 2 (10 years after Time 1) mediated that relationship. We hypothesized that having higher cognitive reappraisal at Time 1 would predict better health and well-being outcomes 20 years later. Additionally, we hypothesized that negative affective reactivity would be a pathway that partially explained the relationship between cognitive reappraisal and future health outcomes.

## 2. Methods

### 2.1. Sample and design

Participants completed waves 1–3 of the Midlife in the United States (MIDUS) Survey, a nationally representative survey in which participants were recruited to answer questions about their general health and well-being. This was a longitudinal study so that each wave of MIDUS was completed 10 years apart. The first wave (MIDUS I) was collected in 1995–1996, the second wave (MIDUS II) was collected in 2004–2006 and the third wave (MIDUS III) was collected in 2013–2014. The MIDUS was approved by the institutional review board of the University of Wisconsin. A subset of the MIDUS II participants participated in the National Study of Daily Experiences (NSDE II) at wave 2 of MIDUS which was a daily diary study in which participants were asked questions about their daily experiences for eight consecutive days. The NSDE was approved by the institutional review board of the Pennsylvania State University. Participants all provided informed consent prior to participating. A 20-year time window was chosen because each wave of MIDUS was approximately 10 years apart and following it over a few waves allowed us to see how these daily processes unfold to impact long-term health and well-being. The final sample consisted of 1814

participants, with ages ranging from 24 to 74 ( $M = 46.75$ ,  $SD = 12.17$ ). Multiple imputation was used for this study to account for missing data due to attrition from the longitudinal design. The method of mutation was Markov chain Monte Carlo. An additional set of analyses were run using 32 iterations to allow for the percentage of missing data, and the pattern of results remained the same. This manuscript reports the 10 iteration values.

An a priori power analysis was conducted using G\*Power 3.1.9.7 (Faul et al., 2009). Typical effect sizes in this area of research suggest we will find a small effect ( $f^2 = 0.02$ ). Based on an alpha of 0.05 and 80% power, a sample size of 485 participants is needed to detect a small effect. Given that the final sample size for this study is 1814 participants, we have sufficient power to detect small effects.

### 2.2. Measures

#### 2.2.1. Wave 1 cognitive reappraisal

Cognitive reappraisal was measured using the 4-item Positive Reappraisal Scale (Wrosch et al., 2000). Participants answered questions about how often they used positive reappraisal strategies to cope with various difficult situations including: “I find I usually learn something meaningful from a difficult situation”; “When I am faced with a bad situation, it helps to find a different way of looking at things”; “Even when everything seems to be going wrong, I can usually find a bright side to the situation”; and “I can find something positive, even in the worst situations”. Participants responded to these questions on a 4-point Likert scale that ranged from 1 (*not at all*) to 4 (*a lot*). The cognitive reappraisal score was calculated by averaging participants’ score across all items. This measure has been shown to have good internal consistency ( $\alpha = 0.78$ ; Wrosch et al., 2000).

#### 2.2.2. Wave 1 demographics

Sociodemographic variables were included such as age, gender (0 = male, 1 = female), race (0 = Non-White, 1 = White), and education (0 = no college, 1 = college education).

#### 2.2.3. Wave 2 daily stressors

Daily stressors were measured using the Daily Inventory of Stressful Events (DISE; Almeida et al., 2002). Participants were asked if they experienced any number of stressors in the past 24 h including: having an argument or disagreement with anyone; avoiding an argument; having something stressful happen at work or school; having something stressful happen at home; experiencing discrimination; something stressful happening to a close friend or relative; and anything else that people would consider stressful. The number of daily stressors a participant had was summed for each day. Given the skewed nature of the data (participants reported experiencing two or more stressors on only 10% of days), participants were categorized as either having experienced a stressor on a given day (1) or not (0).

#### 2.2.4. Wave 2 daily negative affect

Daily negative affect was assessed using scales developed for the MIDUS study (Mroczek and Kolarz, 1998; Watson and Clark, 1994). Participants were asked how often they experienced different negative affective states each day. Specifically, participants were asked how much of the time over the past 24 h they felt negative adjectives including: restless or fidgety, nervous, worthless, so sad nothing could cheer them up, everything was an effort, hopeless, lonely, afraid, jittery, irritable, ashamed, upset, angry, and frustrated to assess their daily negative affect. Participants rated their response to each item on a 5-point scale ranging from 0 (*none of the time*) to 4 (*all of the time*). Daily negative affect scores were averaged across these items. This measure has been shown to have good internal consistency ( $\alpha$  ranged from 0.84 to 0.87; Watson et al., 1988).

### 2.2.5. Wave 2 negative affective reactivity

Negative affective reactivity was calculated based on the measures daily negative affect and daily stressors. Specifically, negative affective reactivity is the within-person slope that represents the difference in levels of negative affect on days with stressors versus days without stressors. In line with previous research, affective reactivity scores were calculated using a two-level multilevel model with days with stressors entered as a predictor of negative affect for each participant (e.g., Bolger et al., 1989; Leger et al., 2021). Level 2 models were adjusted for between-person stressor exposure. This method calculated each participant's negative affective reactivity slope while controlling for average stressor exposure. The following models were generated using SAS PROC MIXED:

$$\text{Level 1 : } NA_{ij} = \beta_{0j} + \beta_{1j}(\text{Stressor Day}_{ij}) + r_{ij}$$

$$\text{Level 2 : } \beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Average Stress}_j) + \mu_{0j}$$

$$\beta_{1j} = \gamma_{10} + \mu_{1j}$$

### 2.2.6. Wave 1 and 3 depression

Depression was assessed using Composite International Diagnostic Interview Short From scales from MIDUS (CIDI-SF; Kessler et al., 1998; Wang et al., 2000). Participants were asked if they felt sad, blue, or depressed and how often (*almost every day, for at least most of the day, for two weeks or more in a row*) during the past twelve months and were asked if they had experienced any depressed affect or anhedonia symptoms.

### 2.2.7. Wave 1 and 3 anxiety

Anxiety was assessed using Composite International Diagnostic Interview Short From scales from MIDUS (CIDI-SF; Kessler et al., 1998; Wang et al., 2000). Participants were asked how much they worry (*every day, just about every day, or most days*) over the past twelve months. They were also asked about how many symptoms of anxiety they experienced on most days including: restless because of worry; keyed up or on edge; irritable because of worry; had trouble falling asleep; had trouble staying asleep because of worry; had trouble keeping focus on the task at hand; had trouble remembering things because of worry; low on energy; tired easily because of worry; and had sore or aching muscles because of tension.

### 2.2.8. Wave 1 and 3 self-rated mental health

Participants were asked a question about their self-rated mental health "In general, would you say your mental or emotional health is excellent, very good, good, fair, or poor?" with the scale ranging from 1 (*excellent*) to 5 (*poor*) using a scale created for MIDUS. Higher numbers indicate poorer self-rated mental health.

### 2.2.9. Wave 1 and 3 subjective well-being

Subjective well-being was assessed via life satisfaction. Participants were asked to rate their satisfaction with their life overall, work, health, relationship with spouse/partner, and relationship with their children (Prenoda and Lachman, 2001). The scale ranged from 0 (*the worst possible*) to 10 (*the best possible*). All scores were averaged together.

### 2.2.10. Wave 1 and 3 chronic conditions

Individuals were asked if they had experienced 27 different chronic conditions including: asthma; tuberculosis; other lung problems; arthritis rheumatism, or other bone or joint disease; sciatica, lumbago, or recurring backache; persistent skin trouble; thyroid disease; hay fever; recurring stomach trouble, indigestion, or diarrhea; urinary or bladder problems; being constipated all or most of the time; gallbladder trouble; persistent foot trouble; trouble with varicose veins requiring medical treatment; AIDS or HIV infection; lupus or other autoimmune disorders; persistent trouble with your gums or mouth; persistent

trouble with your teeth; high blood pressure; migraine headaches; chronic sleeping problems; diabetes or high blood sugar; multiple sclerosis, epilepsy, or other neurological disorders; stroke; ulcer; hernia or rupture; and piles or hemorrhoids in the past 12 months (Marmot et al., 1997). The number of chronic conditions a participant had was summed.

### 2.2.11. Wave 1 and 3 functional limitations

Individuals were also asked questions about their ability to perform tasks using a scale created for MIDUS (Katz et al., 1963; Ware Jr and Sherbourne, 1992). Participants were asked questions about their basic activity of daily living including: bathing or dressing oneself; climbing one flight of stairs; and walking one block. This measure has been shown to have good internal consistency ( $\alpha = 0.84$ ). Participants were also asked questions about their instrumental activity of daily living including: lifting or carrying groceries; climbing several flights of stairs; bending, kneeling, or stooping; walking more than a mile; walking several blocks; vigorous activities such as running; and moderate activities such as bowling. This measure has been shown to have good internal consistency ( $\alpha = 0.94$ ). Participants rated how their health affected their ability to perform the various tasks ranging from 1 (*not at all*) to 4 (*a lot*). Scores on activity and instrumental activity of daily living were averaged together to create one score per participant.

### 2.2.12. Wave 1 and 3 self-rated physical health

Participants were asked a question about their self-rated physical health "In general, would you say your physical health is excellent, very good, good, fair, or poor?" with the scale ranging from 1 (*excellent*) to 5 (*poor*) using a scale created for MIDUS. Higher numbers indicate poorer self-rated physical health.

## 2.3. Analysis plan

First, descriptive statistics and correlations among variables using bivariate correlations were calculated. All variables were checked for outliers. Assumptions were also checked and many variables violated the assumptions, but were unable to be corrected via nonlinear transformations thus original variables were retained for ease of interpretation. This will be addressed in the limitations section. To test our first hypothesis, linear regressions were conducted with cognitive reappraisal predicting self-rated mental health, depression, anxiety, subjective well-being, chronic conditions, functional limitations, and self-rated physical health. All models were adjusted for the sociodemographic variables (age, gender, race, education) as well as controlling for wave 1 health variables. To test our second hypothesis, mediation models were conducted for cognitive reappraisal, affective reactivity and health outcomes to determine if affective reactivity mediated the relationship between cognitive reappraisal and physical/mental health and subjective well-being. Using Preacher and Hayes (2008) PROCESS macro, 10,000 bootstrapping tests were used to measure the indirect effect of affective reactivity on the association between cognitive reappraisal and health and well-being outcomes with 95% confidence intervals. If zero was not included in the confidence interval, the results were considered statistically significant. All continuous variables were converted to standardized units and beta values were reported for each variable of interest. Data analysis scripts and output are available here: [https://osf.io/kbqmw/?view\\_only=bd46cfba00d44b4e8db70803631eb684](https://osf.io/kbqmw/?view_only=bd46cfba00d44b4e8db70803631eb684).

We expected to find a relationship such that higher cognitive reappraisal would be associated with better physical/mental health and subjective well-being. We proposed that those higher in cognitive reappraisal would be less affectively reactive to daily stressors and consequently have better health outcomes and well-being. We predicted that those who were lower in cognitive reappraisal would be more affectively reactive to stressors, therefore having poorer health outcomes and well-being. We also proposed that affective reactivity would be a significant pathway that explained or mediated the association between cognitive reappraisal and health and well-being outcomes.

### 3. Results

#### 3.1. Descriptive statistics

Participants had to have participated in NSDE II and reported at least one stressor in order to have been included resulting in 1814 participants. The participants were mostly White (90%), college educated (71%), and female (57%). Cognitive reappraisal was significantly negatively correlated with negative affective reactivity ( $r = -0.14, p < .001$ ). Those who engaged more in cognitive reappraisal was associated with having decreased negative affective reactivity. Furthermore, those who engaged more in cognitive reappraisal at wave 1 were significantly associated with less depressive symptoms, less anxiety, better self-rated mental health, fewer chronic conditions, fewer functional limitations and better self-rated physical health at wave 3. See [Table 1](#) for further descriptive statistics and initial correlations among variables.

#### 3.2. Cognitive reappraisal and health outcomes

To test our first hypothesis, linear regressions were conducted with cognitive reappraisal predicting each of the health outcomes. All models were adjusted for the sociodemographic variables as well as controlling for wave 1 health variables. Regression analyses indicated that greater engagement in cognitive reappraisal at wave 1 was significantly associated with self-rated mental health, depression, subjective well-being, self-rated physical health, chronic conditions, and functional limitations (see [Table 2](#) and [Table 3](#)). Those who engaged in cognitive reappraisal at higher rates had better self-rated mental health, fewer depressive symptoms, better subjective well-being, better self-rated physical health, fewer chronic conditions and fewer functional limitations.

##### 3.2.1. Mediation analyses: negative affective reactivity

**Mental Health and Well-being Outcomes.** Four models of mental health and well-being were tested between cognitive reappraisal at wave 1 and self-rated mental health, anxiety, depression, and subjective well-being at wave 3 (see [Fig. 1](#)). All models were adjusted for sociodemographic variables, baseline health and well-being outcomes and baseline negative affective reactivity. The total effect of cognitive reappraisal on self-rated mental health was significant (self-rated mental health:  $\beta = -0.07, 95\% \text{ CI } [-0.12, -0.03], p = .002$ ). The total effect of cognitive

reappraisal on anxiety, depression and subjective well-being were non-significant (anxiety:  $\beta = -0.01, 95\% \text{ CI } [-0.05, 0.03], p = .57$ ; depression:  $\beta = -0.04, 95\% \text{ CI } [-0.08, 0.01], p = .13$ ; subjective well-being:  $\beta = 0.05, 95\% \text{ CI } [0.003, 0.09], p = .06$ ). The direct effect of cognitive reappraisal on self-rated mental health was also significant (self-rated mental health:  $\beta = -0.06, 95\% \text{ CI } [-0.10, -0.01], p = .01$ ). The direct effect of cognitive reappraisal on anxiety, depression and subjective well-being were non-significant (anxiety:  $\beta = 0.01, 95\% \text{ CI } [-0.03, 0.05], p = .61$ ; depression:  $\beta = -0.02, 95\% \text{ CI } [-0.06, 0.03], p = .48$ ; subjective well-being:  $\beta = 0.03, 95\% \text{ CI } [-0.01, 0.07], p = .15$ ). Additionally, the indirect effect of cognitive reappraisal on all four mental health outcomes through negative affective reactivity was significant (self-rated mental health:  $\beta = -0.02, 95\% \text{ CI } [-0.03, -0.005]$ ; anxiety:  $\beta = -0.02, 95\% \text{ CI } [-0.04, -0.01]$ ; depression:  $\beta = -0.02, 95\% \text{ CI } [-0.03, -0.01]$ ; subjective well-being:  $\beta = 0.01, 95\% \text{ CI } [0.001, 0.02]$ ). For a meaningful metric of effect size ([Wen and Fan, 2015](#)), the ratio of the indirect effect to the total effect ( $P_M$ ) has been included for all variables (self-rated mental health  $P_M = 0.29$ ; anxiety  $P_M = 2$ ; depression  $P_M = 0.5$ ; subjective well-being  $P_M = 0.2$ ). This indicates that the relationship between greater cognitive reappraisal and better self-rated mental health, less anxiety, fewer depressive symptoms, and greater subjective well-being were mediated by negative affective reactivity.

**Physical Health Outcomes.** Three models of physical health were tested between cognitive reappraisal at wave 1 and self-rated physical health, chronic conditions, and functional limitations at wave 3 (see [Fig. 1](#)). The total effect of cognitive reappraisal on self-rated physical health, chronic conditions and functional limitations were significant (self-rated physical health:  $\beta = -0.06, 95\% \text{ CI } [-0.10, -0.02], p = .02$ ; chronic conditions:  $\beta = -0.06, 95\% \text{ CI } [-0.10, -0.02], p = .004$ ; functional limitations:  $\beta = -0.05, 95\% \text{ CI } [-0.08, -0.01], p = .02$ ). The direct effect of cognitive reappraisal on self-rated physical health and chronic conditions were also significant (self-rated physical health:  $\beta = -0.05, 95\% \text{ CI } [-0.09, -0.01], p = .05$ ; chronic conditions:  $\beta = -0.05, 95\% \text{ CI } [-0.09, -0.01], p = .02$ ). The direct effect of cognitive reappraisal on functional limitations was non-significant ( $\beta = -0.03, 95\% \text{ CI } [-0.07, 0.004], p = .10$ ). Additionally, the indirect effect of cognitive reappraisal on all three physical health outcomes through negative affective reactivity was significant (self-rated physical health:  $\beta = -0.01, 95\% \text{ CI } [-0.02, -0.01]$ , chronic conditions:  $\beta = -0.01, 95\% \text{ CI } [-0.02, -0.01]$ , and functional limitations:  $\beta = -0.01, 95\% \text{ CI } [-0.02, -0.01]$ ).

**Table 1**  
Descriptive statistics and correlations among variables.

	M%/SD	2	3	4	5	6	7	8	9	10	11	12	13
1. Wave 1 Cognitive Reappraisal	3.18 0.61	<u>-0.14</u>	<u>-0.18</u>	<u>-0.08</u>	<i>-0.05</i>	<u>-0.19</u>	<u>-0.11</u>	<u>-0.13</u>	<i>-0.06</i>	0.04	<i>0.06</i>	<i>-0.04</i>	<i>-0.01</i>
2. Wave 2 Negative Affective Reactivity	0.17 0.12	-	<u>0.35</u>	<u>0.32</u>	<u>0.32</u>	<u>-0.37</u>	<u>0.22</u>	<u>0.26</u>	<u>0.22</u>	<u>-0.11</u>	0.05	<i>-0.08</i>	<b>0.08</b>
3. Wave 3 Self-rated Mental Health	2.43 0.99		-	<u>0.35</u>	<u>0.25</u>	<u>-0.51</u>	<u>0.59</u>	<u>0.37</u>	<u>0.37</u>	0.00	<i>0.06</i>	<i>-0.06</i>	<u>-0.16</u>
4. Wave 3 Depression	0.77 1.72			-	<u>0.41</u>	<u>-0.36</u>	<u>0.27</u>	<u>0.29</u>	<u>0.22</u>	<u>-0.09</u>	<b>0.08</b>	<i>-0.08</i>	<i>-0.05</i>
5. Wave 3 Anxiety	0.20 0.79				-	<u>-0.24</u>	<u>0.15</u>	<u>0.22</u>	<u>0.15</u>	<u>-0.07</u>	<b>0.07</b>	<u>-0.09</u>	<u>-0.08</u>
6. Wave 3 Subjective Well-being	7.71 1.34					-	<u>-0.52</u>	<u>-0.38</u>	<u>-0.40</u>	<u>-0.15</u>	0.01	0.05	<u>0.08</u>
7. Wave 3 Self-rated Physical Health	2.60 1.05						-	<u>0.44</u>	<u>0.58</u>	<b>0.08</b>	0.02	<u>-0.08</u>	<u>-0.17</u>
8. Wave 3 Chronic Conditions	3.55 3.18							-	<u>0.52</u>	<u>0.13</u>	<u>0.14</u>	<i>-0.06</i>	<u>-0.11</u>
9. Wave 3 Functional Limitations	1.74 0.77								-	<u>0.31</u>	<u>0.15</u>	<i>-0.04</i>	<u>-0.21</u>
10. Age	46.75 12.17									-	<i>-0.02</i>	0.05	<u>-0.07</u>
11. Gender (ref = male)	57%										-	<i>-0.01</i>	<u>-0.01</u>
12. Race (ref = non-White)	90%											-	<u>-0.02</u>
13. Education (ref = no college)	71%												-

Note. Italicized is significant at  $p < 0.05$ , bold is significant at  $p < 0.01$ , underlined is significant at  $p < 0.001$ .

**Table 2**  
Ordinary least squares regression models predicting wave 3 mental health and subjective well-being outcomes.

Variables	Self-rated Mental Health		Depression		Anxiety		Subjective well-being	
	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI
Cognitive Reappraisal	-0.08***	[-0.13, -0.03]	-0.05*	[-0.10, -0.002]	-0.02	[-0.07, 0.03]	0.05*	[0, 0.1]
Age	0	[-0.01, 0.004]	-0.01*	[-0.01, 0]	-0.003 <sup>†</sup>	[-0.01, 0.001]	0.004 <sup>†</sup>	[0, 0.01]
Gender (ref = male)	0.08	[-0.02, 0.18]	0.11*	[0.01, 0.22]	0.09 <sup>†</sup>	[-0.01, 0.18]	0.05	[-0.06, 0.17]
Race (ref = non-White)	-0.06	[-0.27, 0.14]	-0.06	[-0.27, 0.14]	0.02	[-0.24, 0.28]	-0.001	[-0.18, 0.18]
Education (ref = no college)	0.01	[-0.02, 0.04]	0.03*	[0, 0.07]	0.03 <sup>†</sup>	[-0.002, 0.06]	-0.01	[-0.04, 0.03]
Wave 1 Baseline	-0.36****	[-0.41, -0.31]	0.26****	[0.21, 0.31]	0.38****	[0.33, 0.43]	0.46****	[0.41, 0.52]

Note. <sup>†</sup> $p < 0.10$ , \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ , \*\*\*\* $p < 0.0001$ .

**Table 3**  
Ordinary least squares regression models predicting wave 3 physical health outcomes.

Variables	Self-rated Physical Health		Chronic Conditions		Functional Limitations	
	$\beta$	95% CI	$\beta$	95% CI	$\beta$	95% CI
Cognitive Reappraisal	-0.07**	[-0.13, -0.02]	-0.07**	[-0.12, -0.03]	-0.06**	[-0.10, -0.02]
Age	0.004 <sup>†</sup>	[0, 0.01]	0.01*	[0.001, 0.01]	0.02****	[0.01, 0.02]
Gender (ref = male)	-0.02	[-0.11, 0.08]	0.13*	[0.02, 0.23]	0.18****	[0.09, 0.27]
Race (ref = non-White)	-0.04	[-0.24, 0.16]	-0.04	[-0.24, 0.17]	0.04	[-0.12, 0.19]
Education (ref = no college)	-0.001	[-0.03, 0.03]	0.002	[-0.03, 0.03]	-0.01	[-0.04, 0.02]
Wave 1 Baseline	-0.45****	[-0.49, -0.40]	0.52****	[0.48, 0.56]	0.48****	[0.43, 0.53]

Note. <sup>†</sup> $p < 0.10$ , \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ , \*\*\*\* $p < 0.0001$ .

For a meaningful metric of effect size (Wen and Fan, 2015), the ratio of the indirect effect to the total effect ( $P_M$ ) has been included for all variables (self-rated physical health  $P_M = 0.17$ ; chronic conditions  $P_M = 0.17$ ; functional limitations  $P_M = 0.2$ ). This indicates that the relationship between greater cognitive reappraisal and better self-rated physical health, fewer chronic conditions and fewer functional limitations were significantly mediated by negative affective reactivity.

**4. Discussion**

Cognitive reappraisal is related to physical and mental health outcomes (Garnefski and Kraaij, 2006; Gross and John, 2003; Haga et al., 2007; Nezlek and Kuppens, 2008; Shapero et al., 2019) but a pathway explaining this link had yet to be tested. The current study looked at the role of negative affective reactivity as a possible pathway explaining the associations between cognitive reappraisal and health and well-being outcomes. Cognitive reappraisal was significantly associated with health and well-being outcomes longitudinally 20 years later. Greater engagement in cognitive reappraisal was associated with better self-rated mental health, fewer depressive symptoms, better subjective well-being, better self-rated physical health, fewer chronic conditions and fewer functional limitations compared to lower engagement in cognitive reappraisal. Furthermore, negative affective reactivity significantly mediated the relationship between cognitive reappraisal and self-rated mental health, anxiety, depression, subjective well-being, self-rated physical health, chronic conditions and functional limitations. These results indicate that those who were better at engaging in cognitive reappraisal were less reactive emotionally to stressful events 10 years later, leading to better health and well-being outcomes 20 years later.

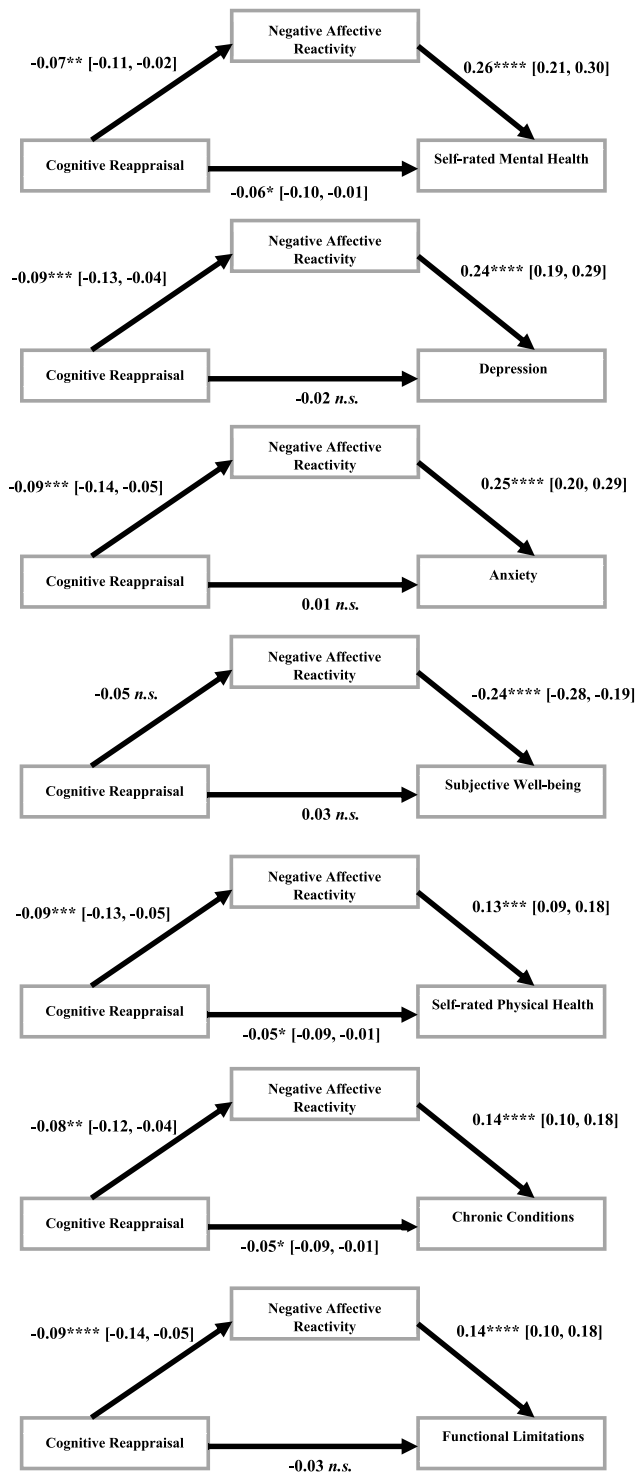
The current study adds support to the literature on the relationship between cognitive reappraisal and health outcomes. Those who engaged more in cognitive reappraisal were associated with having better health outcomes compared to those who didn't engage in cognitive reappraisal as much (Garnefski and Kraaij, 2006; Gross and John, 2003; Haga et al., 2007; Nezlek and Kuppens, 2008; Shapero et al., 2019). However, one important distinction of this study is that it examined the role of cognitive reappraisal and health outcomes longitudinally. A majority of the existing research on cognitive reappraisal and physical health are lab-related tasks and the current study may be the first to examine how

cognitive reappraisal is associated with physical health in the future 20 years later. Results demonstrated that cognitive reappraisal was significantly associated with long-term physical health outcomes and not only regarding immediate lab manipulations which is a novel finding.

Furthermore, the current study also provides a glimpse into why cognitive reappraisal might be related to health and well-being outcomes. Those who engaged more in cognitive reappraisal compared to those who didn't engage as much in cognitive reappraisal had less of an increase in negative emotions on days with stressful events. How one responds and reacts to stressful events can have a significant impact on their health and well-being (Charles et al., 2013; Piazza et al., 2013). Engaging in cognitive reappraisal may shape how one emotionally reacts to stressful events thus affecting the impact it has on their health and well-being. A potential reason why we see this relationship could be due to cognitive reappraisal being used to down-regulate negative emotions (Gross and John, 2003). Down-regulation occurs when one decreases their emotional reaction to an event (i.e., affective reactivity) potentially by reframing the event in a more positive way. Down-regulating emotional reactions to stressful events can be beneficial to health outcomes due to decreasing the impact of lingering emotions and moods that then play a role in future health outcomes (Charles et al., 2013; Larsen and Prizmic, 2004; Piazza et al., 2013).

Another potential reason why we found these results being mediated through affective reactivity could be that affective reactivity dysregulates allostatic load which can result in the development of chronic conditions (Mattei et al., 2010). Allostatic load has been consistently linked with being associated with poorer health outcomes and is described as the "cumulative burden of chronic stress" (Guidi et al., 2021). Allostatic overload happens when there are not enough resources for a person to be able to cope with chronic stress and life events. Engaging in cognitive reappraisal adds an additional resource for individuals to use to cope with stress, perhaps mitigating the effects of allostatic overload. Therefore, if one doesn't have the extra resource or ability to engage in cognitive reappraisal, this could lead to having increased affective reactivity which builds on this wear-and-tear on the system from allostatic overload and over time resulting in the development of poorer physical and mental health outcomes.

There are some limitations of the current study that should be addressed. Most of the participants in the current study were White, well-educated and of middle-class income. Due to this, the findings



Note. \*p < .05, \*\*p ≤ .01, \*\*\*p ≤ .001, \*\*\*\*p ≤ .0001. All coefficients are standardized.

Fig. 1. Mediation Models of Cognitive Reappraisal, Affective Reactivity, and Health and Well-being Outcomes

Note. \*p < 0.05, \*\*p ≤ 0.01, \*\*\*p ≤ 0.001, \*\*\*\*p ≤ 0.0001. All coefficients are standardized.

cannot be generalized among those of other races or those with lower education and lower socioeconomic standing. Future work would be wise to expand the current findings to underrepresented populations. Underrepresented populations tend to have less access to resources, so it could be that they engage more in cognitive reappraisal due to having less control over their situation, but future research would need to

explore this further. These relationships could also be impacted by other variables currently not measured in the study, including factors related to work circumstances and economic environment. Additionally, the amount of variance that was accounted for by the indirect effect of affective reactivity was small so while affective reactivity was one pathway linking cognitive reappraisal and health and well-being outcomes, there are likely other pathways as well that future research should explore. Some assumption violations (e.g., residual normality, form of relation, homoscedasticity) were also reported particularly for negative affective reactivity, depression, anxiety, subjective well-being, chronic conditions, and functional limitations. Nonlinear transformations were conducted to try to correct the variables and the pattern of results did not change so the original variables were retained for ease of interpretation. However, these violations were unable to be corrected so results should be interpreted with caution.

The current study enhanced our understanding of the links between cognitive reappraisal and future health by examining the role of affective responses to daily stressful events. Utilizing longitudinal data also allowed us to examine how an individual's cognitive reappraisal is associated with physical/mental health and subjective well-being 20 years later through affective reactivity 10 years later. Using a daily diary design, we were able to see the dynamic nature of how one responds to stress on a day-to-day basis. Furthermore, baseline data from wave 1 of MIDUS allowed us to adjust for pre-existing physical and mental health outcomes as well as subjective well-being which strengthens the results of this study.

Results from this study may also inform stress and well-being interventions. For example, if an individual is high in cognitive reappraisal and is then more likely to reframe a stressful event into a more positive way, they may be less affectively reactive to daily stressful events. Therefore, strengthening cognitive reappraisal strategies might be a good way for interventions to target reducing affective reactivity to stressors which should benefit long-term physical/mental health and subjective well-being.

Consistent with previous literature (Garnefski and Kraaij, 2006; Gross and John, 2003; Haga et al., 2007; Nezlek and Kuppens, 2008; Shapero et al., 2019), cognitive reappraisal was significantly associated with health and well-being outcomes. As a novel finding, negative affective reactivity mediated the relationship between cognitive reappraisal and future health and well-being outcomes. In conclusion, those who engaged more in cognitive reappraisal tended to be less affectively reactive to stressful events 10 years later, leading to having better health and well-being outcomes 20 years later. The way in which one views and reacts to stressful events, both cognitively and emotionally, shape the development of future health outcomes.

#### CRediT authorship contribution statement

**Jessica Maras:** Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Kate A. Leger:** Writing – review & editing, Supervision, Conceptualization.

#### Data availability

MIDUS and NSDE are publicly available datasets.

“Think of the Situation in a Positive Light”: A Look at Cognitive Reappraisal, Affective Reactivity and Health (Original data) (OSF)

#### References

- Almeida, D.M., Wethington, E., Kessler, R.C., 2002. The daily inventory of stressful events: an interview-based approach for measuring daily stressors. *Assessment* 9 (1), 41–55. <https://doi.org/10.1177/1073191102091006>.
- Bolger, N., DeLongis, A., Kessler, R.C., Schilling, E.A., 1989. Effects of daily stress on negative mood. *J. Pers. Soc. Psychol.* 57, 808–818. <https://doi.org/10.1037/0022-3514.57.5.808>.

- Carlson, J.M., Dikeçligil, G.N., Greenberg, T., Mujica-Parodi, L.R., 2012. Trait reappraisal is associated with resilience to acute psychological stress. *J. Res. Pers.* 46 (5), 609–613. <https://doi.org/10.1016/j.jrp.2012.05.003>.
- Charles, S.T., Piazza, J.R., Luong, G., Almeida, D.M., 2009. Now you see it, now you don't: age differences in affective reactivity to social tensions. *Psychol. Aging* 24 (3), 645–653. <https://doi.org/10.1037/a0016673>.
- Charles, S.T., Piazza, J.R., Mogle, J., Sliwinski, M.J., Almeida, D.M., 2013. The wear and tear of daily stressors on mental health. *Psychol. Sci.* 24 (5), 733–741. <https://doi.org/10.1177/0956797612462222>.
- Chiang, J.J., Turiano, N.A., Mroczek, D.K., Miller, G.E., 2018. Affective reactivity to daily stress and 20-year mortality risk in adults with chronic illness: findings from the Nation Study of Daily Experiences. *Health Psychol.* 37 (2), 170–178. <https://doi.org/10.1037/hea0000567>.
- Daches Cohen, L., Rubinsten, O., 2022. Math anxiety and deficient executive control: does reappraisal modulate this link? *Ann. N. Y. Acad. Sci.* 1513 (1), 108–120. <https://doi.org/10.1111/nyas.14772>.
- Denson, T.F., Grisham, J.R., Moulds, M.L., 2011. Cognitive reappraisal increases heart rate variability in response to an anger provocation. *Motiv. Emot.* 35, 14–22. <https://doi.org/10.1007/s11031-011-9201-5>.
- Egloff, B., Schmukle, S.C., Burns, L.R., Schwerdtfeger, A., 2006. Spontaneous emotion regulation during evaluated speaking tasks: associations with negative affect, anxiety expression, memory, and physiological responding. *Emotion* 6 (3), 356–366. <https://doi.org/10.1037/1528-3542.6.3.356>.
- Ellis, E.M., Prather, A.A., Grenen, E.G., Ferrer, R.A., 2019. Direct and indirect associations of cognitive reappraisal and suppression with disease biomarkers. *Psychol. Health* 34 (3), 336–354. <https://doi.org/10.1080/08870446.2018.1529313>.
- Faul, F., Erdfelder, E., Buchner, A., Lang, Albert-Georg, 2009. Statistical power analyses using G\*Power 3.1: tests for correlation and regression analyses. *Behav. Res. Methods* 41, 1149–1160. <https://doi.org/10.3758/BRM.41.4.1149>.
- Garnefski, N., Kraaij, V., 2006. Relationships between cognitive emotion regulation strategies and depressive symptoms: a comparative study of five specific samples. *Pers. Individ. Differ.* 40 (8), 1659–1669. <https://doi.org/10.1016/j.paid.2005.12.009>.
- Gross, J.J., 1998a. The emerging field of emotion regulation: an integrative review. *Rev. Gen. Psychol.* 2 (3), 271–299. <https://doi.org/10.1037/1089-2680.2.3.271>.
- Gross, J.J., 1998b. Antecedent- and response-focused emotion regulation: divergent consequences for experience, expression, and physiology. *J. Pers. Soc. Psychol.* 74 (1), 224–237. <https://doi.org/10.1037/0022-3514.74.1.224>.
- Gross, J.J., 1999. Emotion regulation: past, present, future. *Cognit. Emot.* 13 (5), 551–573. <https://doi.org/10.1080/026999399379186>.
- Gross, J.J., 2001. Emotion regulation in adulthood: timing is everything. *Curr. Dir. Psychol. Sci.* 10 (6), 214–219. <https://doi.org/10.1111/1467-8721.00152>.
- Gross, J.J., 2008. Emotion regulation. In: Lewis, M., Haviland-Jones, J.M., Barrett, L.F. (Eds.), *Handbook of Emotions*. The Guilford Press, pp. 497–512.
- Gross, J.J., John, O.P., 2003. Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. *J. Pers. Soc. Psychol.* 85 (2), 348–362. <https://doi.org/10.1037/0022-3514.85.2.348>.
- Gross, J.J., Richards, J.M., John, O.P., 2006. Emotion regulation in everyday life. In: Snyder, D.K., Simpson, J., Hughes, J.N. (Eds.), *Emotion Regulation in Couples and Families: Pathways to Dysfunction and Health*. American Psychological Association, pp. 13–35. <https://doi.org/10.1037/11468-001>.
- Gross, J.J., Sutton, S.K., Ketelaar, T., 1998. Relations between affect and personality: support for the affect-level and affective-reactivity views. *Pers. Soc. Psychol. Bull.* 24 (3), 279–288. <https://doi.org/10.1177/0146167298243005>.
- Guidi, J., Lucente, M., Sonino, N., Fava, G.A., 2021. Allostatic load and its impact on health: a systematic review. *Psychother. Psychosom.* 90 (1), 11–27. <https://doi.org/10.1159/000510696>.
- Gunaydin, G., Selcuk, E., Ong, A.D., 2016. Trait reappraisal predicts affective reactivity to daily positive and negative events. *Front. Psychol.* 7 (1000) <https://doi.org/10.3389/fpsyg.2016.01000>.
- Haga, S.M., Kraft, P., Corby, E., 2007. Emotion regulation: antecedents and well-being outcomes of cognitive reappraisal and expressive suppression in cross-cultural samples. *J. Happiness Stud.* 10, 271–291. <https://doi.org/10.1007/s10902-007-9080-3>.
- Hamilton, J.L., Tsypes, A., Zelazny, J., Sewall, C.J.R., Rode, N., Merranko, J., Brent, D.A., Goldstein, T.R., Franzen, P.L., 2023. Sleep influences daily suicidal ideation through affective reactivity to interpersonal events among high-risk adolescents and young adults. *JCPP (J. Child Psychol. Psychiatry)* 64 (1), 27–38. <https://doi.org/10.1111/jcpp.13651>.
- Hawley, L.C., Berntson, G.G., Engeland, C.G., Marucha, P.T., Masi, C.M., Cacioppo, J.T., 2005. Stress, aging, and resilience: can accrued wear and tear be slowed? *Canadian Psychology/Psychologie Canadienne* 46 (3), 115–125. <https://doi.org/10.1037/h0087015>.
- Huang, Q., Zhang, H., Zhou, R., 2023. Stress reappraisal improves the autonomic nervous system response of test anxious individuals: evidence from heart rate variability. *Neurosci. Lett.* 812 <https://doi.org/10.1016/j.neulet.2023.137372>.
- Katz, S., Ford, A.B., Moskowitz, R.W., Jackson, B.A., Jaffe, M.W., 1963. Studies of illness in the aged: the index of ADL: a standardized measure of biological and psychosocial function. *J. Am. Med. Assoc.* 185 (12), 914–919. <https://doi.org/10.1001/jama.1963.03060120024016>.
- Kessler, R.C., Andrews, G., Mroczek, D., Ustun, B., Wittchen, H.U., 1998. The world health organization composite international diagnostic interview short-form (CIDI-SF). *Int. J. Methods Psychiatr. Res.* 7 (4), 171–185. <https://doi.org/10.1002/mpr.47>.
- Larsen, R.J., Prizmic, Z., 2004. Affect regulation. In: Baumeister, R.F., Vohs, K.D. (Eds.), *Handbook of Self-Regulation: Research, Theory, and Applications*. Guilford Press, New York, NY, pp. 40–61.
- Leger, K.A., Turiano, N.A., Bowling, W., Burriss, J.L., Almeida, D.M., 2021. Personality traits predict long-term physical health via affect reactivity to daily stressors. *Psychol. Sci.* 32 (5), 755–765. <https://doi.org/10.1177/0956797620980738>.
- Marmot, M.G., Bosma, H., Hemingway, H., Brunner, E., Stansfeld, S., 1997. Contribution of job control and other risk factors to social variations in coronary heart disease incidence. *Lancet* 350 (9073), 235–239. [https://doi.org/10.1016/S0140-6736\(97\)04244-X](https://doi.org/10.1016/S0140-6736(97)04244-X).
- Mattei, J., Demissie, S., Falcon, L.M., Ordovas, J.M., Tucker, K., 2010. Allostatic load is associated with chronic conditions in the Boston Puerto Rican Health Study. *Soc. Sci. Med.* 70 (12), 1988–1996. <https://doi.org/10.1016/j.socscimed.2010.02.024>.
- Mauss, I.B., Cook, C.L., Cheng, J.Y.J., Gross, J.J., 2007. Individual differences in cognitive reappraisal: experiential and physiological responses to an anger provocation. *Int. J. Psychophysiol.* 66 (2), 116–124. <https://doi.org/10.1016/j.ijpsycho.2007.03.017>.
- McRae, K., Ciesielski, B., Gross, J.J., 2012. Unpacking cognitive reappraisal: goals, tactics, and outcomes. *Emotion* 12 (2), 250–255. <https://doi.org/10.1037/a0026351>.
- Memedovic, S., Grisham, J.R., Denson, T.F., Moulds, M.L., 2010. The effects of trait reappraisal and suppression on anger and blood pressure in response to provocation. *J. Res. Pers.* 44 (4), 540–543. <https://doi.org/10.1016/j.jrp.2010.05.002>.
- Mroczek, D.K., Kolarz, C.M., 1998. The effect of age on positive and negative affect: a developmental perspective on happiness. *J. Pers. Soc. Psychol.* 75 (5), 1333–1349. <https://doi.org/10.1037/0022-3514.75.5.1333>.
- Nezlek, J.B., Kuppens, P., 2008. Regulating positive and negative emotions in daily life. *J. Pers.* 76 (3), 561–580. <https://doi.org/10.1111/j.1467-6494.2008.00496.x>.
- O'Neill, S.C., Cohen, L.H., Tolpin, L.H., Gunther, K.C., 2004. Affective reactivity to daily interpersonal stressors as a prospective predictor of depressive symptoms. *J. Soc. Clin. Psychol.* 23 (2) <https://doi.org/10.1521/jscp.23.2.172.31015>.
- Piazza, J.R., Charles, S.T., Sliwinski, M.J., Mogle, J., Almeida, D.M., 2013. Affective reactivity to daily stressors and long-term risk of reporting a chronic physical health condition. *Ann. Behav. Med.* 45 (1), 110–120. <https://doi.org/10.1007/s12160-012-9423-0>.
- Preacher, K.J., Hayes, A.F., 2008. *Assessing mediation in communication research*. In: London: The Sage Sourcebook of Advanced Data Analysis Methods for Communication Research, pp. 13–54.
- Prenda, K.M., Lachman, M.E., 2001. Planning for the future: a life management strategy for increasing control and life satisfaction in adulthood. *Psychol. Aging* 16 (2), 206–216. <https://doi.org/10.1037/0882-7974.16.2.206>.
- Richardson, C.M.E., 2017. Emotion regulation in the context of daily stress: impact on daily affect. *Pers. Individ. Differ.* 112, 150–156. <https://doi.org/10.1016/j.paid.2017.02.058>.
- Riepenhausen, A., Wackerhagen, C., Reppmann, Z.C., Deter, H.-C., Kalisch, R., Veer, I.M., Walter, H., 2022. Positive cognitive reappraisal in stress resilience, mental health, and well-being: a comprehensive systematic review. *Emotion Review* 14 (4), 310–331. <https://doi.org/10.1177/17540739221114642>.
- Shapero, B.G., Stange, J.P., McArthur, B.A., Abramson, L.Y., Alloy, L.B., 2019. Cognitive reappraisal attenuates the association between depressive symptoms and emotional response to stress during adolescence. *Cognit. Emot.* 33 (3), 524–535. <https://doi.org/10.1080/02699931.2018.1462148>.
- Sin, N.L., Graham-Engeland, J.E., Ong, A.D., Almeida, D.M., 2015. Affective reactivity to daily stressors is associated with elevated inflammation. *Health Psychol.* 34 (12), 1154–1165. <https://doi.org/10.1037/hea0000240>.
- Tamir, M., Vishkin, A., Gutentag, T., 2020. Emotion regulation is motivated. *Emotion* 20 (1), 115–119. <https://doi.org/10.1037/emo0000635>.
- Wang, P.S., Berglund, P., Kessler, R.C., 2000. Recent care of common mental disorder in the United States: prevalence and conformance with evidence-based recommendations. *J. Gen. Intern. Med.* 15 (5), 284–292. <https://doi.org/10.1046/j.1525-1497.2000.9908044.x>.
- Ware Jr., J.E., Sherbourne, C.D., 1992. The MOS 36-Item short-form health survey (SF-36): I. Conceptual framework and item selection. *Med. Care* 30 (6), 473–483.
- Watson, D., Clark, L.A., 1994. *The PANAS-X: Manual for the Positive and Negative Affect Schedule—Expanded Form*. The University of Iowa, Department of Psychological and Brain Sciences Publications.
- Watson, D., Clark, L.A., Tellegen, A., 1988. Development and validation of brief measures of positive and negative affect: the PANAS scales. *J. Pers. Soc. Psychol.* 54 (6), 1063–1070. <https://doi.org/10.1037/0022-3514.54.6.1063>.
- Wen, Z., Fan, X., 2015. Monotonicity of effect sizes: questioning kappa-squared as mediation effect size measure. *Psychol. Methods* 20 (2), 193–203. <https://doi.org/10.1037/met0000029>.
- Wolgast, M., Lundh, L., Viborg, G., 2011. Cognitive reappraisal and acceptance: an experimental comparison of two emotion regulation strategies. *Behav. Res. Ther.* 49 (12), 858–866. <https://doi.org/10.1016/j.brat.2011.09.011>.
- Wrosch, C., Heckhausen, J., Lachman, M.E., 2000. Primary and secondary control strategies for managing health and financial stress across adulthood. *Psychol. Aging* 15 (3), 387–399. <https://doi.org/10.1037/0882-7974.15.3.387>.