Stage 1 Registered Report

Nature Human Behaviour

A global test of brief reappraisal interventions on emotions during the COVID-19 pandemic

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Abstract

The COVID-19 pandemic is increasing negative emotions and decreasing positive emotions globally. Left unchecked, these emotional changes may have a wide array of adverse impacts. To reduce negative emotions and increase positive emotions, we will examine the impact of reappraisal, a widely studied and highly effective form of emotion regulation. Participants from 55 countries (expected $N = 25,448$) will be randomly assigned to one of two brief reappraisal interventions (reconstrual or repurposing), an active control condition, or a passive control condition. We predict that both reappraisal interventions will reduce negative emotions and increase positive emotions relative to the control conditions. We further predict that reconstrual will decrease negative emotions more than repurposing, and that repurposing will increase positive emotions more than reconstrual. We hope to inform efforts to create a scalable intervention for use around the world to build resilience during the pandemic and beyond.

Introduction

The COVID-19 pandemic is increasing negative emotions and decreasing positive emotions around the globe[1-10]. Concurrently, individuals are reporting that COVID-19 is having a negative impact on their psychological functioning and mental health[4, 11, 12]. For example, individuals report sleeping less, consuming more alcohol or other drugs/substances, having trouble concentrating because their mind is occupied by COVID-19, and having more fights with their partner or loved ones, some escalating to domestic violence[1, 9, 13].

These disturbing trends are partly caused by heightened levels of negative emotion and diminished levels of positive emotion, which have been found to contribute to a number of negative psychological, behavioural, and health consequences. These include increased risk for anxiety and depressive disorders, as well as other forms of psychopathology[14]; impaired social connections[15]; increased substance use[16, 17, 18]; compromised immune system functioning[19, 20, 21]; disturbed sleep[22]; increased maladaptive eating[23, 24]; increased aggressive behaviour[25, 26]; impaired learning[27]; worse job performance[28, 29]; and impaired economic decision-making[30, 31].

As the COVID-19 pandemic unfolds around the world, we believe it is crucial to mitigate expected adverse outcomes by reducing negative emotions and increasing positive emotions. Such a change in emotions is central to increasing psychological resilience, a multifaceted concept that involves adaptive emotional responses in the face of adversity[32, 33, 34]. Reappraisal, an emotion regulation strategy that involves changing how one thinks about a situation with the goal of influencing one's emotional response[35], is a promising candidate as an intervention to increase psychological resilience, due to its adaptability, simplicity, and efficiency[34, 36, 37, 38]. In contrast to less effective emotion regulation strategies such as suppression, reappraisal generally leads to more successful regulation (d = 0.45, 95% Confidence Interval (CI) = [0.35, 0.56] in changing emotion experience in a meta-analysis[39]; see caveats about interpreting effect sizes in past research in the "Sampling plan" section below). In particular, over the short term, reappraisal leads to decreased reports of negative emotion and increased reports of positive

emotion[40, 41, 42], as well as corresponding changes both in peripheral physiological responses[43, 44, 45] and central physiological responses[46-53]. Over the longer term, reappraisal is associated with stronger social connections[54]; higher academic achievement[55, 56]; enhanced psychological well-being[57]; fewer psychopathological symptoms[58, 59]; better cardiovascular health[60, 61], and greater resilience during the COVID-19 pandemic[62].

Despite these shorter-term and longer-term benefits, most people do not reappraise consistently[63, 64], which has motivated efforts to teach people to use reappraisal (see reviews[65, 66]). For example, in the context of anxiety, reappraisal training led to reduced intrusive memories[67] and increased emotion regulation self-efficacy[68, 69]. Reappraisal training also led to long-lasting changes in the neural representation of unpleasant events[70].

Although demand characteristics are always a concern when examining the effects of reappraisal (given that one is teaching people to change their thinking in order to change how they're feeling, and then asking them how they feel)[71], the wide array of self-report and non-self-report outcomes that show reappraisal effects across studies increases confidence that these effects are real. It is also encouraging to note that reappraisal generally out-performs other types of emotion regulation such as suppression, even though demand characteristics appear comparable across regulation conditions[39]. In addition, evidence indicates that reappraisal interventions can influence emotional outcomes even in intensely challenging contexts in which people are often unmotivated to regulate their emotions[72]. For example, a brief reappraisal training conducted in the context of the Israeli-Palestinian conflict, and replicated in the context of the Colombian conflict[73], has been found to contribute to reduced intergroup anger and increased support for conciliatory political policies[74].

As part of the Psychological Science Accelerator (PSA) attempt to address pressing questions related to the psychological impact of COVID-19, the current study aims to use reappraisal interventions to enhance psychological resilience in response to the pandemic. To maximize the impact of these interventions, this project has a global reach of large, diverse samples via the PSA's network[75], and employs highly scalable methods that are translated for use around the world. In order to make stronger

and clearer inferences, our design includes two reappraisal interventions that are compared to two control conditions, an active control and a passive control.

For our reappraisal interventions, we examine two theoretically defined forms of reappraisal[76] -- namely reconstrual and repurposing. Reconstrual involves changing how a situation is construed or mentally represented in a way that changes the emotional responses related to the situation. Examples of reconstrual in response to COVID-19 are: *"Washing hands, avoiding touching my face, keeping a safe distance…There are simple and effective things I can do to protect myself and my loved ones from getting sick and to stop the spread of the virus"* and *"I know from world history that keeping calm and carrying on gets us through tough times."* Repurposing involves focusing on a potentially positive outcome that could come from the current situation in a way that changes the emotional response to it. Examples of repurposing in response to COVID-19 are: *"This situation is helping us realize the importance of meaningful social connections, and helping us understand who the most important people in our lives are"* and *"Medical systems are now learning to deal with amazing challenges, which will make them much more resilient in the future."* For our active control condition, we will ask participants to reflect on their thoughts and feelings as they unfold. Reflecting on one's thoughts and feelings has been found to have small but reliable salutary effects (d = 0.07, 95% CI = [0.05, 0.17] in improving psychological health that includes emotional responses in a meta-analysis[77, 78]). Examples of reflecting in response to COVID-19 are: *"I really wish we could find a vaccine soon"* and *"This situation is changing so fast, and I don't know how the future will develop."* By asking participants in this condition to actively use a strategy that is likely to have a positive effect, we sought to match expectancy and demand across reappraisal and active control conditions. For our passive control condition, we will ask participants to respond as they naturally do, which is a commonly used passive control condition in prior research on emotion regulation (for a meta-analysis[39]).

In comparing conditions, we chose to distinguish between negative and positive emotional responses, as previous evidence suggests that the two are clearly separable[79, 80]. Specifically, we hypothesized that our reappraisal interventions would lead to reduced negative emotional responses

(hypothesis 1; The Design Table provides further detail about this and each subsequent hypothesis) and increased positive emotional responses (hypothesis 2) compared to both control conditions combined. While both reconstrual and repurposing strategies involve changing thinking, we hypothesized that reconstrual would lead to greater decreases in negative emotional responses than repurposing (hypothesis 3) and that repurposing would lead to greater increases in positive emotional responses than reconstrual (hypothesis 4). We theorized that reconstruing one's situation should primarily decrease negative emotions because it typically focuses on ameliorating the problem at hand. Reconstrual is most similar to a previously studied subtype of reappraisal called reappraising emotional stimulus, which has been mainly investigated on negative emotions and has a $d = 0.38$, 95% CI = [0.21, 0.55] in changing emotion experience[39]. Repurposing one's situation, by contrast, should primarily increase positive emotions because it usually calls to mind positive experiences. Repurposing is similar to a few previously examined types of reappraisals such as benefit finding and positive reappraisal, both of which are primarily associated with positive outcomes[81, 82] (the "Sampling plan" section below provides further detail).

In testing these hypotheses, we plan to employ orthogonal contrasts that make two primary comparisons, while keeping all other comparisons exploratory (Table 1 provides further detail). The first comparison will contrast both the reappraisal conditions combined with both the active control condition and the passive control condition combined for negative (hypothesis 1) and positive (hypothesis 2) emotions. The second comparison will contrast the reconstrual and repurposing interventions for negative (hypothesis 3) and positive (hypothesis 4) emotions. One attractive feature of comparisons between reappraisal conditions is that there is no reason to assume that demand or expectancies would differ across these reappraisal conditions.

One potential concern about the current design is that the emotion regulation interventions may reduce preventive health behaviours (e.g., keeping social distance and washing hands) that could potentially be motivated by negative emotions. However, research on the connection between emotions and health behaviour suggests that increased negative emotions such as fear do not seem to be a strong motivator to change one's health behaviour[83]. Furthermore, positive emotions augmented by the

reappraisal interventions may contribute to a greater tendency to undertake health behaviours[84, 85]. For example, positive emotions can lead to higher medication adherence[86]. To ensure that our interventions do not adversely impact any relevant health behaviours, we will take two steps. First, during the instructions, we will clarify that in some cases negative emotions such as fear and sadness may be helpful, and that it is up to each person to determine when an emotion is unhelpful or not and to downregulate only those emotions that are unhelpful. Second, in order to make sure that our training does not lead to reduced vigilance, we will specifically measure and examine intentions for following stay-at-home orders and washing hands in exploratory analyses.

In addition, we will conduct other exploratory analyses. Among other things, these analyses will test the impact of our reappraisal interventions on negative and positive anticipated emotions and intentions to enact potentially harmful versus beneficial behaviours associated with these emotions (details described in the measure section below), and assess whether the effects of our reappraisal interventions, if any, are moderated by motivation to use the given strategy[71], belief in the effectiveness of the given strategy[87], demographics (gender[39]; socioeconomic status[88, 89]; or country[90] (particularly in light of the differing levels of impact of COVID-19 in any given country at any given point in time).

Methods

Ethics information and participants

This study is one of three studies in the PSA COVID-19 Rapid Project. The other two studies investigate the effects of loss and gain message framing and self determination theory-guided message framing, respectively. The other two studies will be reported elsewhere. The study will be conducted online, and participants will click a single data collection link that will lead to either the current study or the other two studies in the COVID-19 Rapid Project. A comprehensive summary of the PSA COVID-19

Rapid Project—including descriptions of the study selection procedure, the other selected studies, the internal peer review process, and implementation plans—can be found at https://psyarxiv.com/x976j/.

Participants will be recruited by the PSA network. At the time of Stage 1 submission, 194 research groups from 55 countries speaking 42 languages have signed up to recruit 25,448 participants to complete the current study (not counting participants for the other two studies in the PSA COVID-19 Rapid Project), and 4,050 of them will be recruited through semi-representative paneling (based on sex, age, and sometimes ethnicity) from the following countries: Egypt, Kenya, Nigeria, South Africa, Mexico, United States, Austria, Romania, Russia, Sweden, Switzerland, United Kingdom, China, Japan, and South Korea (270 participants per country). The remaining participants will be recruited through the research groups by convenience sampling. Each research group will obtain approval from their local Ethics Committee or IRB to conduct the study, will explicitly indicate that their institution does not require approval for the researchers to conduct this type of task, or will explicitly indicate that the current study is covered by a pre-existing approval. Although the specifics of the consent procedure will differ across research groups, all participants will provide informed consent. At the time of Stage 1 submission, 135 research groups from 41 countries have ethics approval to collect data from 15,997 participants. Other research groups are currently seeking ethics approval. The style and the amount of compensation vary with local conventions (a common practice in PSA). More information regarding participant compensation and final sample size will be updated via the pre-print (https://psyarxiv.com/x976j/).

Procedure

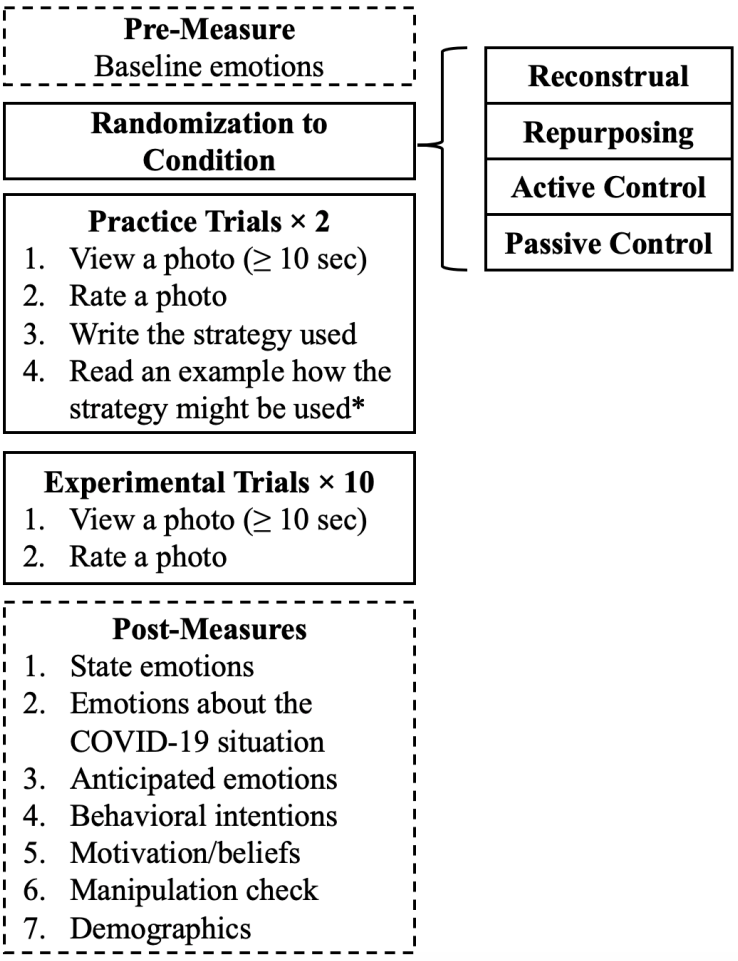

Figure 1. Overview of the experiment. *Participants in the passive control condition will not have the fourth step in the practice trials.

An overview of the experiment is depicted in Figure 1.

Pre-measure. Before reading the instructions, participants will report emotions they feel in the moment (details for all study measures are described in the next section). These ratings will constitute a baseline emotional measure.

Randomization to condition. Following the pre-measure, participants will be randomly assigned to one of four between-subjects experimental conditions: two reappraisal intervention conditions (reconstrual and repurposing), one active control condition, and one passive control condition. Because

the study will be conducted online, data collection will be performed blind to the conditions of the participants. The content of the instructions in each condition will differ, but the lengths will be matched except for the passive control condition, which has a shorter set of instructions.

Participants in the two reappraisal intervention conditions (reconstrual and repurposing) and the active control condition will receive the following instructions: "In this study, we will show you photographs related to COVID-19 from various news sources. Our goal is to better understand how people respond to such photos, which may include feelings of fear, anger, and sadness. Sometimes emotions like these are helpful. At other times, however, these emotions can be unhelpful to us. Researchers have found that when people think their emotions are unhelpful, they can take steps to influence their emotions."

In the reconstrual condition, participants will be told that (emphasis in original) "One strategy that some people find helpful for influencing their emotions is *rethinking*. This strategy involves changing one's thinking in order to change one's emotions. This strategy is based on the insight that **different ways of interpreting or thinking about any situation can lead to different emotions**. This means that finding new ways of thinking about a situation can change how you feel about the situation. For example, consider someone who stays at home under lockdown due to COVID-19 and is feeling anxious, sad, or angry. In this case, *rethinking* might involve realizing that the situation is only temporary because dedicated people across the world are working hard to find a vaccine." Participants will then be given four examples of how rethinking might be employed for the COVID-19 situation (Example 1: "I know from world history that keeping calm and carrying on gets us through tough times." Example 2: "Scientists across the world are working hard to find treatment and vaccines. Throughout history, humans have been resourceful in finding solutions to new challenges." Example 3: "Washing hands, avoiding touching my face, keeping a safe distance…There are simple and effective things I can do to protect myself and my loved ones from getting sick and to stop the spread of the virus." Example 4: "In the past, people have overcome many challenges that seemed overwhelming at the time, and we will overcome COVID-19 related challenges too.").

In the repurposing condition, participants will be told that (emphasis in original) "One strategy that some people find helpful for influencing their emotions is *refocusing*. This strategy involves changing one's thinking in order to change one's emotions. This strategy is based on the insight that **finding something good in even the most challenging situations can lead to different emotional responses**. This means that refocusing on whatever good aspects may be found in a situation can change how you feel about the situation. For example, consider someone who stays at home under lockdown due to COVID-19 and is feeling anxious, sad, or angry. In this case, *refocusing* might involve realizing that staying at home gives them time to do things that they may not have been able to do before, like reading, painting, and spending time with family." Participants will then be given four examples of how refocusing might be employed for the COVID-19 situation (Example 1: "This situation is helping us realize the importance of meaningful social connections, and helping us understand who the most important people in our lives are." Example 2: "Medical systems are now learning to deal with amazing challenges, which will make them much more resilient in the future." Example 3: "Even though we are physically apart, we are finding creative ways to stay connected and our hearts are more connected than ever." Example 4: "I have been inspired by the way that frontline health care workers have responded with resilience, generosity, determination, and deep commitment.").

In the active control condition, participants will be asked to reflect on their emotions as they unfold. This condition is inspired by the literature on expressive writing and experimental disclosure, which shows that asking people to reflect about their very deepest thoughts and feelings can improve psychological health[77, 78]. By having an active control condition, which is likely to lead to some benefit to participants, we can make stronger inferences regarding the impact of reappraisal interventions relative to a potentially useful strategy designed to equate demand characteristics and expectancies. In the instructions, participants will be told that (emphasis in original) "One strategy that some people find helpful for influencing their emotions is *reflecting*. This strategy involves allowing oneself to freely experience and reflect on one's thoughts and feelings. This strategy is based on the insight that **reflecting on your thoughts and feelings about any situation can lead to different emotional responses**. This

means that exploring your thoughts and emotions can change how you feel about the situation. For example, consider someone who stays at home under lockdown due to COVID-19 and is feeling anxious, sad, or angry. In this case, *reflecting* might involve allowing oneself to experience these feelings and be fully immersed in the lockdown experience, reflecting on the meaning this situation has for the person and their loved ones." Participants will then be given four examples of how reflecting might be employed for the COVID-19 situation (Example 1: "This situation is changing so fast, and I don't know how the future will develop." Example 2: "People are struggling to cope with these unprecedented and overwhelming challenges." Example 3: "Someone I love might get sick and there might not even be ventilators to help them." Example 4: "I really wish we could find a vaccine soon.").

To reinforce what they have learned, participants in the two reappraisal conditions and the active control condition will then be asked to summarize, in 1-2 sentences, the strategy they have just learned. This text response is collected only for exploratory purposes and will not be used in confirmatory analysis.

In the passive control condition, participants will receive the following instructions: "In this study, we will show you photographs related to COVID-19 from various news sources. Our goal is to better understand how people respond to such photos, which may include feelings of fear, anger, and sadness. As you view these photographs, please respond as you naturally would." Having a passive control condition will allow us to have clear interpretations in the case that we find no significant difference in our contrast between both the reappraisal conditions combined and both the control conditions combined. If this is the case, we will compare each reappraisal condition against the passive control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses.

Practice trials. After receiving instructions by condition, participants will be asked to practice the strategy in two trials designed to facilitate their understanding of the strategy. The practice trials will include providing ratings and written responses to two photographs (per prior research[91]). The

photographs in this study were selected by our research team from major media news sources (CNN, New York Times, The Guardian, and Reuters) and present situations in Asia, Europe, and North America. They were rated by our team to evoke either sadness or anxiety above the midpoint on a 7-point scale ranging from "not at all" to "very" and to score close to or above the midpoint on a 7-point scale ranging from "not at all" to "very" on the question "How much do you recommend using this picture?" (photographs available at https://osf.io/8bjnz/). In each practice trial, participants will see a negative photo related to the COVID-19 situation (e.g., an exhausted doctor, medical workers in hazmat suits) and a reminder above the photo to use the strategy that was presented to them. In the reconstrual condition, the reminder is "As you view the photo, draw on the examples we gave you earlier in order to **interpret the situation in a new way.**" In the repurposing condition, the reminder is "As you view the photo, draw on the examples we gave you earlier in order to **focus on any good you can find in the situation**." In the active control condition, the reminder is "As you view the photo, draw on the examples we gave you earlier in order to **reflect on your thoughts and feelings.**" In the passive control condition, the reminder is "As you view the photo, **respond as you naturally would.**" After ten seconds, participants will be asked to rate their emotions in response to the photo using two corresponding unipolar 5-point Likert scales, one for negative emotion and one for positive emotion. These ratings are designed to familiarize participants with the task, and will not be used in the confirmatory analyses. After each photo, participants in the two reappraisal conditions and the active control condition will be asked to write (in text) how they applied the strategy while observing the photo. Participants in the passive control condition will be asked to write (in text) anything that comes naturally to their mind about the photo. The text response is also collected only for exploratory purposes and will not be used in the confirmatory analysis. Participants in the two reappraisal conditions and the active control condition will then be given one example of how the photo might be viewed (examples vary by condition). Note that the two reappraisal conditions and the active control condition are designed to be matched for demand characteristics and expectancy.

Experimental trials. Following the two practice trials, participants will view additional photos related to the COVID-19 situation in ten experimental trials. Participants in the two reappraisal conditions and the active control condition will be asked to use the strategy that they practiced, and participants in the passive control condition will be asked to respond naturally. All participants will see exactly the same ten photos, but the order of the presentation will be randomized across the ten experimental trials. Each photo will be presented to participants with the same reminder used in the practice trials. After observing each photo for ten seconds, participants will be asked to rate both their negative and positive emotions in response to the photo using the same 5-point Likert scales from the practice trials.

Post-measures. In the final section of the study, participants will complete several measures, including (1) negative and positive state emotions, (2) negative and positive emotions about the COVID-19 situation, (3) negative and positive anticipated emotions, (4) behavioural intentions, (5) motivation/beliefs, (6) manipulation check, and (7) demographic questions.

Measures

Baseline emotions. To assess baseline emotion, we will ask participants how they are feeling right now at the beginning of the session on a 5-point scale ranging from 1 (not at all) to 5 (extremely) (All response options will be labelled and numbers will not be displayed to participants for clarity). For negative baseline emotions, we will measure five items on fear, anger, sadness, distrust, and stress from the modified Differential Emotions Scale[92]. For positive baseline emotions, we will measure five items on hope, gratitude, love, inspiration, and serenity from the modified Differential Emotions Scale[92] (details for all scoring rules described in the Analysis Plan section). We will also measure three items on loneliness[93] and three items on social connectedness[94]. These six items also will be included in the assessment of post-photo state emotions and in the assessment of anticipated emotions (at each assessment point, these six items will be used in exploratory analyses).

Negative emotional responses. In order to capture descriptively rich, nuanced data, we will measure negative emotional responses in four ways. The first way is to measure negative emotions in response to the photos. For each photo, we will ask participants how negative the photo made them feel using a unipolar scale ranging from 1 (not at all) to 5 (extremely). The second way is to measure negative state emotions after viewing all ten photos. We will ask participants "how you are feeling right now" with the same set of items used to measure baseline emotions, which include five negative state emotions of fear, anger, sadness, distrust, and stress. The third way is to measure negative emotions about the COVID-19 situation. We will ask participants how negative/hopeless they are feeling about the COVID-19 situation right now on a unipolar scale ranging from 1 (not at all) to 5 (extremely). The fourth way is to measure negative anticipated emotions, which will be an exploratory outcome. We will ask participants "In the next week, to what extent, if at all, do you think you will feel each of the following?" with the same set of items used to measure baseline emotions, which include five negative anticipated emotions of fear, anger, sadness, distrust, and stress.

Positive emotional responses. Following a parallel procedure, we will measure positive emotional responses in four ways. The first way is to measure positive emotions in response to the photos. For each photo, we will ask participants how positive the photo made them feel using a unipolar scale ranging from 1 (not at all) to 5 (extremely). The second way is to measure positive state emotions after viewing all ten photos. We will ask participants "how you are feeling right now" with the same set of items used to measure baseline emotions, which include five positive state emotions of hope, gratitude, love, inspiration, and serenity. The third way is to measure positive emotions about the COVID-19 situation. We will ask participants how positive/hopeful they are feeling about the COVID-19 situation right now on a unipolar scale ranging from 1 (not at all) to 5 (extremely). The fourth way is to measure positive anticipated emotions, which will be an exploratory outcome. We will ask participants "In the next week, to what extent, if at all, do you think you will feel each of the following?" with the same set of items used to measure baseline emotions, which include five positive anticipated emotions of hope, gratitude, love, inspiration, and serenity.

Behavioural intentions. In addition to the emotional responses that are central to our four confirmatory hypotheses in this study, we will also examine exploratory outcomes concerning behavioural intentions. Such intentions matter because they have been shown to predict actual behaviours[95, 96]. Following protocols from Fishbein and Ajzen[97], we will ask participants to indicate on a 7-point scale ranging from 1 (extremely unlikely) to 7 (extremely likely) their intentions to engage in each of 10 different behaviours within the next week. Five of the items concern potentially harmful behaviour, which we chose based on documented links between negative emotions and substance use, aggressive behaviour, and excessive information seeking[17, 25, 98]. Items include: drinking too much alcohol, using too much tobacco (e.g., smoking/vaping) or other recreational drugs, yelling at someone, taking anger out online, and spending too much time on media. The other five items concern beneficial behaviour, which we chose based on evidence that positive emotions contribute to more health behaviours[84, 85]. Items include: eating healthy food, getting enough physical activity, practicing healthy sleep habits (*for example, going to bed and waking at regular hours*), washing hands regularly for at least 20 seconds, and following a stay-at-home order stringently (*if there isn't an order in your region now, assume that one is imposed*).

Motivation/beliefs. We will measure both the motivation to use the emotion regulatory strategy and the belief in the effectiveness of the emotion regulatory strategy as exploratory moderators[71, 87]. We will ask "Recall the instructions we gave you for viewing the photos. To what extent, if at all, do you agree or disagree with the following statements?" Motivation to use the emotion regulatory strategy will be measured with the item: "I tried my hardest to follow the instructions I was given while viewing the photos." Belief in the effectiveness of the emotion regulatory strategy employed by participants will be measured with the item "I believed that following the instructions would influence my emotions." Participants will rate their answers using a 7-point scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Manipulation check. We plan to evaluate participants' attention to our instructions and photos using two multiple-choice questions. The first question will ask participants to choose the instructions

they had at the beginning of the survey from among four options. The second question will ask participants to choose the photo that was not shown to them in the survey from among three options.

For exploratory purposes, we will also ask how often participants actually used each approach when viewing the photographs and their global change of emotions compared to the beginning of the study. Participants will be asked, "When viewing the ten photographs related to COVID-19 earlier, how often did you use each of the following approaches?" and rate four approaches: "responding as I naturally would," "reflecting on my thoughts and feelings," "interpreting the situation in a new way," and "focusing on any good I could find in the situation." Participants will rate their answers using a 5-point scale ranging from 1 (never) to 5 (always). To measure global change of emotion, participants will be asked, "Overall, compared to the beginning of this study, how negative do you feel right now?" using a 5-point scale ranging from 1 (much more negative) to 5 (much less negative) and "Overall, compared to the beginning of this study, how positive do you feel right now?" using a 5-point scale ranging from 1 (much more positive) to 5 (much less positive).

Demographics. At the end of the study, participants will complete a general survey that includes demographic questions and some questions related to COVID-19 shared by all three studies in the PSA COVID-19 Rapid Project. Details about the general survey can be found at https://osf.io/7axc4/.

Order of items. For measures above, items belonging to the negative category (i.e., negative emotional responses and intentions for harmful behaviour) and to the positive category (i.e., positive emotional responses and intentions for beneficial behaviour) will be presented in a counterbalanced order within each measure across participants. In other words, half of the participants will always rate an item from the negative category first and then an item from the positive category, whereas the other half will always rate an item from the positive category first and then an item from the negative category. For measures that have multiple items, items belonging to the negative category will be randomized within the negative category, and items belonging to the positive category will be randomized within the positive category. When the same set of items used to measure baseline emotions is repeated, the set will have the same order for every given participant.

Analysis plan

Pre-processing

Exclusion. We plan to exclude (1) participants who answer both multiple choice manipulation check questions incorrectly, and (2) participants who complete fewer than 50% of the questions in the study.

Reliability of measures. For items from the modified Differential Emotions Scale[92], we plan to create overall negative emotion scores at each time point by averaging the five negative emotions (fear, anger, sadness, distrust, and stress) and overall positive emotion scores at each time point by averaging the five positive emotions (hope, gratitude, love, inspiration, and serenity) if the average inter-item correlation is above .40 for negative emotions and for positive emotions, respectively. If the average inter-item correlation is below .40, we will conduct an exploratory factor analysis with oblique rotation and maintain factors with an eigenvalue above 1.00. If no factors have an eigenvalue above 1, we will report results by item rather than as a composite.

Missing data. We will drop incomplete cases on an analysis-by-analysis basis. Given our sampling plan described below, we should have power of 0.95 or above.

Outliers. In order to be maximally conservative, we will not define or identify outliers.

Analytic plan for hypotheses

Since negative emotional responses and positive emotional responses are separable[79, 80], we will examine negative emotional responses and positive emotional responses separately. To control family-wise error rates in multiple comparisons, we will use the Holm-Bonferroni method within each of the four hypotheses separately. For all analyses testing negative emotional responses (hypothesis 1 and hypothesis 3), we plan to control for the participants' negative baseline emotions. As originally intended by the scale[92], we plan to create an overall negative baseline emotion score by averaging the five negative

emotions (fear, anger, sadness, distrust, and stress). For all analyses testing positive emotional responses (hypothesis 2 and hypothesis 4), we plan to control for the participants' positive baseline emotions. As originally intended by the scale[92], we plan to create an overall positive baseline emotion score by averaging the five positive emotions (hope, gratitude, love, inspiration, and serenity). To account for the nested structure in our data (e.g., participant nested by country), we will fit multilevel models with the condition using the contrast in Table 1, random by-country slopes, and random by-country intercepts. If a model fails to converge, we plan to explore other reasonable models[99] and report results of all explored models in an appendix.

Although we use the frequentist approach for confirmatory analyses, we will also report Bayes factors (BF) for every result to gain information about the strength of evidence provided by the data comparing the null and alternative hypotheses[100]. If we get non-significant results from the frequentist approach, we will use BF to help us interpret non-significant results and differentiate between insensitive results and those that reveal good enough evidence supporting the null-hypothesis. We will set these evidence thresholds to BF_{10} to > 10 for H_1 and < 1/10 for H_0. If BFs do not cross the evidence thresholds, we think our sample size is sufficiently large that inconclusive results at this sample size would be an important message for the field. We will use informed priors for the alternative model: a one-tailed Cauchy distribution with a mode of zero and a scale $r = 0.18$ (hypotheses 1 and 2), $r = 0.17$ (hypothesis 3), and $r = 0.25$ (hypothesis 4) on the standardized effect size using the BayesFactor package in R for the analysis[101]. These priors are based on the lowest available estimates of effect sizes in past research (See the "Sampling plan" section for more information). To model variance, the package will use a non-informative prior, which should not influence the value of the BF due to being represented equally in H_0 and H_1. To probe the robustness of our conclusions, we will report Robustness Regions for each Bayes factor, which can specify the range of expected effect sizes used when in the alternative model that would support the same conclusion. Robustness Regions will be notated as RR[min, max], where min indicates the smallest scaling factor and max indicates the largest scaling factor that would lead us to the same conclusion as the originally chosen scaling factor[102].

Tests for hypotheses 1 and 3

Overall, we expect that reappraisal interventions (vs. control) will reduce negative emotional responses (hypothesis 1), and that reconstrual will lead to greater decreases in negative emotional responses than repurposing (hypothesis 3). We will test hypothesis 1 and hypothesis 3 using two orthogonal contrasts (Table 1). The first contrast is between both reappraisal conditions combined and both control conditions combined for hypothesis 1. The second contrast is between the reconstrual condition and the repurposing condition for hypothesis 3. Negative emotional responses are measured in four ways (negative emotions in response to the photos, negative state emotions after viewing the photos, negative emotions about the COVID-19 situation, and negative anticipated emotions). We have confirmatory hypotheses regarding the first three outcomes and will examine negative anticipated emotions in the exploratory analysis. Therefore, hypothesis 1 can be subdivided into hypotheses 1a to 1c, and hypothesis 3 can be subdivided into hypotheses 3a to 3c. We will consider a hypothesis to be supported if at least 1 of the 3 sub-hypotheses is significant after Holm-Bonferroni correction (controlling for 3 comparisons within each hypothesis). If we find non-significant results for any sub-hypothesis, we will compare each reappraisal condition against the passive control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses.

Testing effects on negative emotions in response to the photos: We expect that reappraisal interventions (vs. control) will reduce negative emotions in response to the photos (hypothesis 1a), and reconstrual will lead to greater decreases in negative emotional responses in response to the photos than repurposing (hypothesis 3a). We will model ratings of negativity in response to each photo in the experimental trials as a function of the fixed effects of condition using our contrast. We will include by-participant random intercepts, by-country random intercepts, as well as by-country random slopes for each contrast.

Testing effects on negative state emotions: We expect that reappraisal interventions (vs. control) will reduce negative state emotions (hypothesis 1b), and reconstrual will lead to greater decreases in negative state emotions than repurposing (hypothesis 3b). Similar to creating the overall negative baseline emotion score, we plan to create an overall negative state emotion score by averaging the five negative emotions (fear, anger, sadness, distrust, and stress). We will model the overall negative state emotion score as a function of the fixed effects of condition using our contrast. We will include by-country random intercepts, as well as by-country random slopes for each contrast.

Testing effects on negative emotions about the COVID-19 situation: We expect that reappraisal interventions (vs. control) will reduce negative emotions about the COVID-19 situation (hypothesis 1c), and reconstrual will lead to greater decreases in negative emotions about the COVID-19 situation than repurposing (hypothesis 3c). We will model negative emotions about the COVID-19 situation as a function of the fixed effects of condition using our contrast. We will include by-country random intercepts, as well as by-country random slopes for each contrast.

Tests for hypotheses 2 and 4

Overall, we expect that reappraisal interventions (vs. control) will increase positive emotional responses (hypothesis 2), and repurposing will lead to greater increases in positive emotional responses than reconstrual (hypothesis 4). We will test hypothesis 2 and hypothesis 4 using two orthogonal contrasts (Table 1). The first contrast is between both reappraisal conditions combined and both control conditions combined for hypothesis 2. The second contrast is between the reconstrual condition and the repurposing condition for hypothesis 4. Positive emotional responses are measured in four ways (positive emotions in response to the photos, positive state emotions after viewing the photos, positive emotions about the COVID-19 situation, and positive anticipated emotions). We have confirmatory hypotheses regarding the first three outcomes and will examine positive anticipated emotions in an exploratory analysis. Therefore, hypothesis 2 can be subdivided into hypotheses 2a to 2c, and hypothesis 4 can be subdivided into

hypotheses 4a to 4c. We will consider a hypothesis to be supported if at least 1 of the 3 sub-hypotheses is significant after Holm-Bonferroni correction (controlling for 3 comparisons within each hypothesis). If we find non-significant results for any sub-hypothesis, we will compare each reappraisal condition against the passive control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses.

Testing effects on positive emotions in response to the photos: We expect that reappraisal interventions (vs. control) will increase positive emotions in response to the photos (hypothesis 2a), and repurposing will lead to greater increases in positive emotions in response to the photos than reconstrual (hypothesis 4a). We will model ratings of positivity in response to each photo in the experimental trials as a function of the fixed effects of condition using our contrast. We will include by-participant random intercepts, by-country random intercepts, as well as by-country random slopes for each contrast.

Testing effects on positive state emotions: We expect that reappraisal interventions (vs. control) will increase positive state emotions (hypothesis 2b), and repurposing will lead to greater increases in positive state emotions in response to the photos than reconstrual (hypothesis 4b). Similar to creating the overall positive baseline emotion score, we plan to create an overall positive state emotion score by averaging the five positive emotions (hope, gratitude, love, inspiration, and serenity). We will model the overall positive state emotion score as a function of the fixed effects of condition using our contrast. We will include by-country random intercepts, as well as by-country random slopes for each contrast.

Testing effects on positive emotions about the COVID-19 situation: We expect that reappraisal interventions (vs. control) will increase positive emotions about the COVID-19 situation (hypothesis 2c), and repurposing will lead to greater increases in positive emotions about the COVID-19 situation than reconstrual (hypothesis 4c). We will model positive emotions about the COVID-19 situation as a function of the fixed effects of condition using our contrast. We will include by-country random intercepts, as well as by-country random slopes for each contrast.

Exploratory analyses

We will conduct a series of exploratory analyses to address supplemental questions regarding our hypotheses, including, but not limited to: (1) Are there any differences in other pairwise comparisons in testing hypotheses 1 - 2? (2) Are there emotion-specific effects of reappraisal[103]? (3) Are the effects on emotions subjectively detectable by participants[104]? Do the effects of strategy use vary by (4) motivation to use the strategy[71]; (5) beliefs in the strategy's effectiveness[87]; or (6) the participant's country of residence[90]?

We will investigate the impacts of strategy use on other outcomes, including, but not limited to: (1) positive and negative anticipated emotions; (2) intentions to enact potentially harmful versus beneficial behaviours; and (3) loneliness and social connectedness.

Sampling plan

Expected effect sizes. In order to compare effect sizes across studies, below we report Cohen's *d*s, which in some cases were transformed or calculated from the results reported in the original studies (see the Supplementary Information for details). Several caveats are in order regarding the effect sizes that follow. First, meta-analyses tend to overestimate effect sizes, although the size of overestimation varies considerably across studies and sometimes shows no overestimation[105]. Second, most prior studies were conducted in the lab, whereas the current study will be conducted online. Third, the current crisis is likely to lead to strong emotional responses, especially for participants who are facing financial or health-related setbacks, although strong negative emotions also motivate people to regulate emotions more[64]. These caveats suggest uncertainty in effect sizes.

In general, reappraisal has an average effect size of $d = 0.45$, 95% CI = [0.35, 0.56] in changing emotion experience relative to passive control conditions (i.e., no instruction, instructions to experience naturally, instructions to not regulate in a certain manner, or instructions to enhance or maintain the focal emotion) (meta-analysis[39]; It finds no evidence of publication bias). Experimental disclosure and

expressive writing, which inspired the instruction in the active control condition, have an average effect size of $d = 0.07$, 95% CI = [0.05, 0.17] in improving psychological health (including emotional responses), relative to engaging in non-treatment neutral activities (e.g., describing what they have done in the past 24 hours) or no activities (meta-analysis[77]; It finds evidence of publication bias). These works suggest the lowest available estimate of the effect size to be $d = 0.18$ (subtracting the upper bound of 95% CI $d = 0.17$ for experimental disclosure and expressive writing from the lower bound of 95% CI of $d = 0.35$ for the reappraisal interventions) between our reappraisal interventions and the control conditions for hypothesis 1 and hypothesis 2.

In relation to the comparison between reconstrual and repurposing, although prior research has not used the same theoretical framework[76] to empirically contrast reconstrual and repurposing as we do in the current study, research on closely related constructs can provide estimates of effect sizes. Reconstrual is most similar to a previously studied subtype of reappraisal called "reappraising emotional stimulus" in Webb, Miles, & Sheeran's meta-analysis[39], which has a $d = 0.38$, 95% CI = [0.21, 0.55] in changing emotion experience (this effect size is primarily for negative emotions, as all but one study examined negative emotions). Repurposing is similar to the construct "benefit finding" (perceiving positive consequences that resulted from a traumatic event), which is associated with positive well-being, $d = 0.45$, 95% CI = [0.37, 0.52], but not global distress, $d = 0.00$, 95% CI = [-0.04, 0.04] (meta-analysis[81]). Repurposing is also similar to the subtype of reappraisal called "positive reappraisal," which is more effective in increasing positive thoughts than other types of reappraisals, $d = 0.49$, 95% CI = [0.25, 0.72] relative to detached reappraisal[106]. These works suggest the lowest available estimate of the effect size to be $d = 0.17$ (subtracting the upper bound of 95% CI $d = 0.04$ for the association between benefit finding and global distress from the lower bound of 95% CI of $d = 0.21$ for "reappraising emotional stimulus" in Webb, Miles, & Sheeran[39]) between reconstrual and repurposing in changing negative emotions for hypothesis 3, and $d = 0.25$ (the lower bound of 95% CI of positive reappraisal in increasing positive thoughts than detached reappraisal in Shiota & Levenson[106]) between reconstrual and repurposing in changing positive emotions for hypothesis 4.

Sample size. For practical reasons, sample size was primarily decided based on the availability of resources among members of the PSA. At the time of submission, the present project is expected to be completed by approximately 25,448 participants in total, or 8,482 participants per condition.

Adjusted alpha levels. The tests of each hypothesis involve three comparisons, with α for the smallest p-value = 0.017 (0.05/3), α for the second-smallest p-value = 0.025 (0.05/2), and α for the largest p-value = 0.05 (Holm-Bonferroni corrections).

Power analysis. We conducted a simulation study to estimate power for a variety of potential effect sizes ($|d|$ = 0.05 to 0.29, separated by increments of 0.02), number of countries ($N_{country}$ = 30, 35, 40, 45, 50, 55, 60), within-country sample sizes (N = 200, 400, 600, 800), by-country intercept variances ($\sigma^2_{intercept}$ = 0.05, 0.30, 0.55, 0.80), and by-country slope variances (σ^2_{slope} = 0.01, 0.02, 0.03, 0.04) at α = .017. The lowest level of intercept variances in our simulation was chosen on the basis of an ongoing multi-country project tracking rates of depression ($\sigma^2_{intercept}$ = 0.04) and worries about the COVID-19 ($\sigma^2_{intercept}$ = 0.06) across countries during the COVID-19 outbreak[107] (See the Supplemental Information for details). The lowest level of slope variances in our simulation was chosen on the basis of the average slope variance (σ^2_{slope} < 0.01) in a large multi-site, multi-country project involving 28 psychological manipulations[108]. The slope variances capture the variability of the effect of psychological manipulations, and there is no apparent reason to expect that the effect of reappraisal interventions on emotions is more variable than most other psychological manipulations in Klein et al.[108]. In fact, appraisal theories of emotion argue that the relationship between appraisals and emotions is culturally universal[109], suggesting low variability. As one example to show that similar appraisals associate with similar emotional experiences, we find the associations vary little across countries between perceived insufficient government response and depression (σ^2_{slope} = 0.003) and between perceived insufficient government response and worries (σ^2_{slope} = 0.003) during the COVID-19 pandemic[107] (See the Supplemental Information for details), consistent with the observation of low slope variances (σ^2_{slope} < 0.01) in Klein et al.[108]. Despite expecting low variability from empirical findings and theories, we tested a variety of

intercept variances and slope variances in our power simulation, some of which were much higher than those in the Klein et al.[108] and Fetzer et al.[107] to be maximally conservative. We conducted 1000 simulations for each set of simulation parameters using the simr package[110] using computing power harnessed through the Open Science Grid[111, 112].

We show abbreviated results for our simulation study in Figure 2 and comprehensive results at https://osf.io/mf5z4/. Across simulations, power did not change much across the intercept variances that we tested. We estimate that 400 participants in each of 35 countries (total N = 14,000) would provide over 95% power to detect an effect size of $|d|$ = 0.15 across the slope variances that we tested, even when the slope variability is much higher than what we observed in the past evidence. As prior research suggests effect sizes above $|d|$ = 0.17 (see the "Expected effect sizes" section above) and we have ethics approvals to collect data from 41 countries and 15,997 participants at the time of Stage 1 submission (with a target to collect data from 55 countries and 25,448 participants), our sample size should provide over 95% power for testing our hypotheses. We believe our study is highly likely to detect any useful effects caused by our interventions.

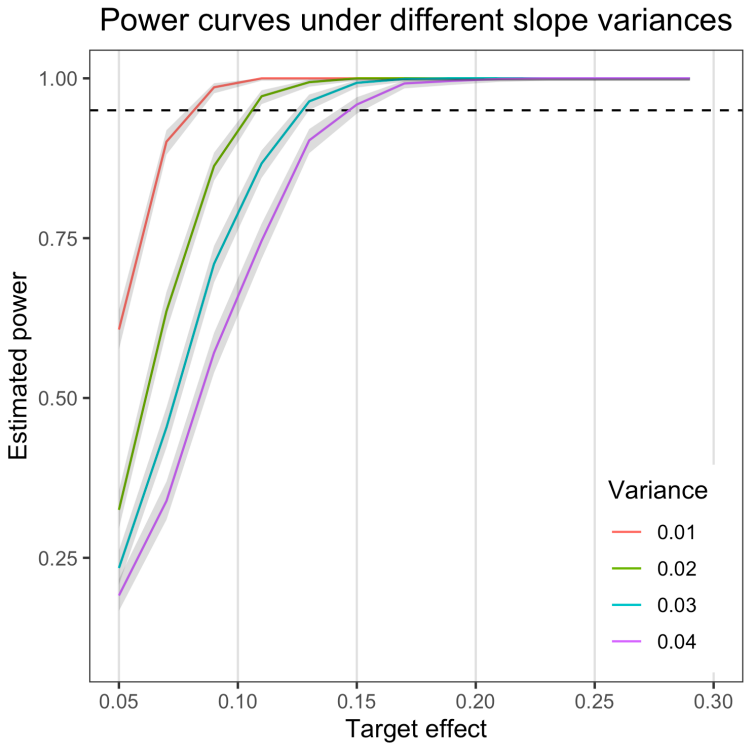

Figure 2. Power curves across different levels of variance in the by-country slopes. Lines represent the estimated power across 1000 simulated datasets; envelopes are Monte Carlo 95% confidence intervals. Power curves represent results for 35 countries with 400 participants each, with $\sigma^2_{intercept} = 0.05$.

Data Availability

All data and materials will be made openly available on the Open Science Framework (OSF) website (https://osf.io/4yf9d/).

Code Availability

All analysis code (completed in R) will be made openly available on the Open Science Framework (OSF) website (https://osf.io/4yf9d/).

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Acknowledgements

This work was supported by a grant from the American Psychological Society (granted to the Psychological Science Accelerator). Further financial support was provided by the Psychological Science Accelerator and a special crowdfunding campaign initiated by the Psychological Science Accelerator. We would like to thank Amazon Web Services for help with server needs. We also thank Leibniz Institute for Psychology (ZPID) for help with data collection via the organization and implementation of semi-representative panels, and Prolific for offering discounted recruitment. Finally, this research was supported by resources provided by the Open Science Grid, which is supported by the National Science Foundation award 1148698, and the U.S. Department of Energy's Office of Science. Beyond those roles already acknowledged, the funders had no role in study design, data collection and analysis, decision to publish or preparation of the manuscript.

Author contributions

K.W., A.G., C.A.D., J.S.L., and J.J.G. designed research. K.W. wrote the initial draft. K.W., A.G., C.A.D., J.S.L., J.J.G., J.K.M., and P.F. reviewed and edited the manuscript. J.K.M. coordinated the implementation of the project with the PSA consortium. P.F. conducted the power analysis and managed the OSF repository of the project. L.D., B.A., and B.P. contributed to the analysis plan. E.B. coded the experimental tasks. The rest of the authors from PSA consortium provided comments on the manuscript. All authors listed in the PSA consortium will contribute to either data collection and/or translation and will review and approve the final manuscript.

Competing interests

The authors declare no competing interests.

Table 1. Contrast structure of testing hypotheses 1 - 4 (with unit-weighting).

	Active Control	Passive Control	Reconstrual	Repurposing
Contrast 1 (hypotheses 1-2)	1/2	1/2	-1/2	-1/2
Contrast 2 (hypotheses 3-4)	0	0	1/2	-1/2

Table 2. Design table

Question	**Hypothesis**	**Sampling plan (e.g. power analysis)**	**Analysis Plan[abc]**	**Interpretation given to different outcomes**
Will reappraisal interventions (vs. control) reduce negative emotions in response to the photos?	Reappraisal interventions (vs. control) will reduce negative emotions in response to the photos (hypothesis 1a).	Prior works suggest the lowest available estimate of the effect size to be $d = 0.18$ between our reappraisal interventions and the control conditions for hypothesis 1 and hypothesis 2. Our power simulation suggests that 400 participants in each of 35 countries (total N = 14,000) would provide over 95% power to detect an effect size of $d \geq$	We will model ratings of negativity in response to each photo in the experimental trials as a function of the fixed effects of condition using our contrast 1 in Table 1 and control for the participants' negative baseline emotions. We will include by-participant random intercepts, by-country random intercepts, as well	If the ratings are significantly lower (higher) in the reappraisal conditions than the control conditions, we will conclude finding evidence for (against) hypothesis 1a. If the difference between reappraisal conditions and control conditions is not significantly different from 0, we will compare each reappraisal condition against the passive

Question	Hypothesis	Sampling plan (e.g. power analysis)	Analysis Plan[abc]	Interpretation given to different outcomes
		0.15 across the slope variances that we tested. For practical reasons, sample size was primarily decided based on the availability of resources among members of the PSA. At the time of submission, we expect to recruit approximately 25,448 participants in total and have ethics approval to collect data from 15,997 participants (other research groups are currently seeking ethics approval).	as by-country random slopes for each contrast. If we find non-significant results, we will compare each reappraisal condition against the passive control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses.	control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses. For any non-significant results, we will interpret the Bayes factor.
Will reappraisal interventions (vs. control) reduce negative state emotions?	Reappraisal interventions (vs. control) will reduce negative state emotions (hypothesis 1b)	Prior works suggest the lowest available estimate of the effect size to be $d = 0.18$ between our reappraisal interventions and the control conditions for hypothesis 1 and hypothesis 2. Our power simulation suggests that 400 participants in each of 35 countries (total N = 14,000) would provide over 95% power to detect an	We plan to create an overall negative state emotion score by averaging the five negative emotions (fear, anger, sadness, distrust, and stress). We will model the overall negative state emotion score as a function of the fixed effects of condition using our contrast 1 in Table 1 and control for the participants'	If the score is significantly lower (higher) in the reappraisal conditions than the control conditions, we will conclude finding evidence for (against) hypothesis 1b. If the difference between reappraisal conditions and control conditions is not significantly different from 0, we will compare each reappraisal condition

Question	Hypothesis	Sampling plan (e.g. power analysis)	Analysis Plan[abc]	Interpretation given to different outcomes
		effect size of $d \geq 0.15$ across the slope variances that we tested. For practical reasons, sample size was primarily decided based on the availability of resources among members of the PSA. At the time of submission, we expect to recruit approximately 25,448 participants in total and have ethics approval to collect data from 15,997 participants (other research groups are currently seeking ethics approval).	negative baseline emotions. We will include by-country random intercepts, as well as by-country random slopes for each contrast. If we find non-significant results, we will compare each reappraisal condition against the passive control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses.	against the passive control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses. For any non-significant results, we will interpret the Bayes factor.
Will reappraisal interventions (vs. control) reduce negative emotions about the COVID-19 situation?	Reappraisal interventions (vs. control) will reduce negative emotions about the COVID-19 situation (hypothesis 1c)	Prior works suggest the lowest available estimate of the effect size to be $d = 0.18$ between our reappraisal interventions and the control conditions for hypothesis 1 and hypothesis 2. Our power simulation suggests that 400	We will model negative emotions about the COVID-19 situation as a function of the fixed effects of condition using our contrast 1 in Table 1 and control for the participants' negative baseline emotions. We will	If the ratings are significantly lower (higher) in the reappraisal conditions than the control conditions, we will conclude finding evidence for (against) hypothesis 1c. If the difference between reappraisal conditions and

Question	Hypothesis	Sampling plan (e.g. power analysis)	Analysis Plan[abc]	Interpretation given to different outcomes
		participants in each of 35 countries (total N = 14,000) would provide over 95% power to detect an effect size of $d \geq 0.15$ across the slope variances that we tested. For practical reasons, sample size was primarily decided based on the availability of resources among members of the PSA. At the time of submission, we expect to recruit approximately 25,448 participants in total and have ethics approval to collect data from 15,997 participants (other research groups are currently seeking ethics approval).	include by-country random intercepts, as well as by-country random slopes for each contrast. If we find non-significant results, we will compare each reappraisal condition against the passive control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses.	control conditions is not significantly different from 0, we will compare each reappraisal condition against the passive control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses. For any non-significant results, we will interpret the Bayes factor.
Will reappraisal interventions (vs. control) increase positive emotions in response to the photos?	Reappraisal interventions (vs. control) will increase positive emotions in response to the photos (hypothesis 2a)	Prior works suggest the lowest available estimate of the effect size to be $d = 0.18$ between our reappraisal interventions and the control conditions for hypothesis 1 and hypothesis 2. Our power simulation	We will model ratings of positivity in response to each photo in the experimental trials as a function of the fixed effects of condition using our contrast 1 in Table 1 and control for the participants'	If the ratings are significantly higher (lower) in the reappraisal conditions than the control conditions, we will conclude finding evidence for (against) hypothesis 2a. If the difference between reappraisal

Question	Hypothesis	Sampling plan (e.g. power analysis)	Analysis Plan[abc]	Interpretation given to different outcomes
		suggests that 400 participants in each of 35 countries (total N = 14,000) would provide over 95% power to detect an effect size of $d \geq 0.15$ across the slope variances that we tested. For practical reasons, sample size was primarily decided based on the availability of resources among members of the PSA. At the time of submission, we expect to recruit approximately 25,448 participants in total and have ethics approval to collect data from 15,997 participants (other research groups are currently seeking ethics approval).	positive baseline emotions. We will include by-participant random intercepts, by-country random intercepts, as well as by-country random slopes for each contrast. If we find non-significant results, we will compare each reappraisal condition against the passive control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses.	conditions and control conditions is not significantly different from 0, we will compare each reappraisal condition against the passive control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses. For any non-significant results, we will interpret the Bayes factor.
Will reappraisal interventions (vs. control) increase positive state emotions?	Reappraisal interventions (vs. control) will increase positive state emotions (hypothesis 2b)	Prior works suggest the lowest available estimate of the effect size to be $d = 0.18$ between our reappraisal interventions and the control conditions for hypothesis 1 and hypothesis 2. Our	We plan to create an overall positive state emotion score by averaging the five positive emotions (hope, gratitude, love, inspiration, and serenity). We will model the overall	If the score is significantly higher (lower) in the reappraisal conditions than the control conditions, we will conclude finding evidence for (against) hypothesis 2b.

Question	Hypothesis	Sampling plan (e.g. power analysis)	Analysis Plan[abc]	Interpretation given to different outcomes
		power simulation suggests that 400 participants in each of 35 countries (total N = 14,000) would provide over 95% power to detect an effect size of $d \geq 0.15$ across the slope variances that we tested. For practical reasons, sample size was primarily decided based on the availability of resources among members of the PSA. At the time of submission, we expect to recruit approximately 25,448 participants in total and have ethics approval to collect data from 15,997 participants (other research groups are currently seeking ethics approval).	positive state emotion score as a function of the fixed effects of condition using our contrast 1 in Table 1 and control for the participants' positive baseline emotions. We will include by-country random intercepts, as well as by-country random slopes for each contrast. If we find non-significant results, we will compare each reappraisal condition against the passive control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses.	If the difference between reappraisal conditions and control conditions is not significantly different from 0, we will compare each reappraisal condition against the passive control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses. For any non-significant results, we will interpret the Bayes factor.

Question	**Hypothesis**	**Sampling plan (e.g. power analysis)**	**Analysis Plan[abc]**	**Interpretation given to different outcomes**
Will reappraisal interventions (vs. control) increase positive emotions about the COVID-19 situation?	Reappraisal interventions (vs. control) will increase positive emotions about the COVID-19 situation (hypothesis 2c)	Prior works suggest the lowest available estimate of the effect size to be $d = 0.18$ between our reappraisal interventions and the control conditions for hypothesis 1 and hypothesis 2. Our power simulation suggests that 400 participants in each of 35 countries (total N = 14,000) would provide over 95% power to detect an effect size of $d \geq 0.15$ across the slope variances that we tested. For practical reasons, sample size was primarily decided based on the availability of resources among members of the PSA. At the time of submission, we expect to recruit approximately 25,448 participants in total and have ethics approval to collect data from 15,997 participants (other research groups are currently	We will model positive emotions about the COVID-19 situation as a function of the fixed effects of condition using our contrast 1 in Table 1 and control for the participants' positive baseline emotions. We will include by-country random intercepts, as well as by-country random slopes for each contrast. If we find non-significant results, we will compare each reappraisal condition against the passive control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses.	If the ratings are significantly higher (lower) in the reappraisal conditions than the control conditions, we will conclude finding evidence for (against) hypothesis 2c. If the difference between reappraisal conditions and control conditions is not significantly different from 0, we will compare each reappraisal condition against the passive control condition and compare the active control condition against the passive control condition in the exploratory analysis to determine whether each strategy has a non-zero impact relative to individuals' natural responses. For any non-significant results, we will interpret the Bayes factor.

Question	Hypothesis	Sampling plan (e.g. power analysis)	Analysis Plan[abc]	Interpretation given to different outcomes
		seeking ethics approval).		
Will reconstrual lead to greater decreases in negative emotional responses in response to the photos than repurposing?	Reconstrual will lead to greater decreases in negative emotional responses in response to the photos than repurposing (hypothesis 3a).	Prior works suggest the lowest available estimate of the effect size to be $d = 0.17$ between reconstrual and repurposing in changing negative emotions for hypothesis 3. Our power simulation suggests that 400 participants in each of 35 countries (total N = 14,000) would provide over 95% power to detect an effect size of $d \geq 0.15$ across the slope variances that we tested. For practical reasons, sample size was primarily decided based on the availability of resources among members of the PSA. At the time of submission, we expect to recruit approximately 25,448 participants in total and have ethics approval to collect data from	We will model ratings of negativity in response to each photo in the experimental trials as a function of the fixed effects of condition using our contrast 2 in Table 1 and control for the participants' negative baseline emotions. We will include by-participant random intercepts, by-country random intercepts, as well as by-country random slopes for each contrast.	If the ratings are significantly lower (higher) in the reconstrual condition than the repurposing condition, we will conclude finding evidence for (against) hypothesis 3a. If the difference between reconstrual and repurposing is not significantly different from 0, we will interpret the Bayes factor.

Question	Hypothesis	Sampling plan (e.g. power analysis)	Analysis Plan[abc]	Interpretation given to different outcomes
		15,997 participants (other research groups are currently seeking ethics approval).		
Will reconstrual lead to greater decreases in negative state emotions than repurposing?	Reconstrual will lead to greater decreases in negative state emotions than repurposing (hypothesis 3b)	Prior works suggest the lowest available estimate of the effect size to be $d = 0.17$ between reconstrual and repurposing in changing negative emotions for hypothesis 3. Our power simulation suggests that 400 participants in each of 35 countries (total N = 14,000) would provide over 95% power to detect an effect size of $d \geq 0.15$ across the slope variances that we tested. For practical reasons, sample size was primarily decided based on the availability of resources among members of the PSA. At the time of submission, we expect to recruit approximately 25,448 participants in total and have ethics approval to collect data from	We plan to create an overall negative state emotion score by averaging the five negative emotions (fear, anger, sadness, distrust, and stress). We will model the overall negative state emotion score as a function of the fixed effects of condition using our contrast 2 in Table 1 and control for the participants' negative baseline emotions. We will include by-country random intercepts, as well as by-country random slopes for each contrast.	If the score is significantly lower (higher) in the reconstrual condition than the repurposing condition, we will conclude finding evidence for (against) hypothesis 3b. If the difference between reconstrual and repurposing is not significantly different from 0, we will interpret the Bayes factor.

Question	Hypothesis	Sampling plan (e.g. power analysis)	Analysis Plan[abc]	Interpretation given to different outcomes
		15,997 participants (other research groups are currently seeking ethics approval).		
Will reconstrual lead to greater decreases in negative emotions about the COVID-19 situation than repurposing?	Reconstrual will lead to greater decreases in negative emotions about the COVID-19 situation than repurposing (hypothesis 3c)	Prior works suggest the lowest available estimate of the effect size to be $d = 0.17$ between reconstrual and repurposing in changing negative emotions for hypothesis 3. Our power simulation suggests that 400 participants in each of 35 countries (total N = 14,000) would provide over 95% power to detect an effect size of $d \geq 0.15$ across the slope variances that we tested. For practical reasons, sample size was primarily decided based on the availability of resources among members of the PSA. At the time of submission, we expect to recruit approximately 25,448 participants in total and have ethics approval to collect data from	We will model negative emotions about the COVID-19 situation as a function of the fixed effects of condition using our contrast 2 in Table 1 and control for the participants' negative baseline emotions. We will include by-country random intercepts, as well as by-country random slopes for each contrast.	If the ratings are significantly lower (higher) in the reconstrual condition than the repurposing condition, we will conclude finding evidence for (against) hypothesis 3c. If the difference between reconstrual and repurposing is not significantly different from 0, we will interpret the Bayes factor.

Question	Hypothesis	Sampling plan (e.g. power analysis)	Analysis Plan[abc]	Interpretation given to different outcomes
		15,997 participants (other research groups are currently seeking ethics approval).		
Will repurposing lead to greater increases in positive emotions in response to the photos than reconstrual?	Repurposing will lead to greater increases in positive emotions in response to the photos than reconstrual (hypothesis 4a)	Prior works suggest the lowest available estimate of the effect size to be $d = 0.25$ between repurposing and reconstrual in changing positive emotions for hypothesis 4. Our power simulation suggests that 400 participants in each of 35 countries (total N = 14,000) would provide over 95% power to detect an effect size of $d \geq 0.15$ across the slope variances that we tested. For practical reasons, sample size was primarily decided based on the availability of resources among members of the PSA. At the time of submission, we expect to recruit approximately 25,448 participants in total and have ethics approval to collect data from	We will model ratings of positivity in response to each photo in the experimental trials as a function of the fixed effects of condition using our contrast 2 in Table 1 and control for the participants' positive baseline emotions. We will include by-participant random intercepts, by-country random intercepts, as well as by-country random slopes for each contrast.	If the ratings are significantly higher (lower) in the repurposing condition than the reconstrual condition, we will conclude finding evidence for (against) hypothesis 4a. If the difference between repurposing and reconstrual is not significantly different from 0, we will interpret the Bayes factor.

Question	Hypothesis	Sampling plan (e.g. power analysis)	Analysis Plan[abc]	Interpretation given to different outcomes
		15,997 participants (other research groups are currently seeking ethics approval).		
Will repurposing lead to greater increases in positive state emotions in response to the photos than reconstrual?	Repurposing will lead to greater increases in positive state emotions in response to the photos than reconstrual (hypothesis 4b)	Prior works suggest the lowest available estimate of the effect size to be $d = 0.25$ between repurposing and reconstrual in changing positive emotions for hypothesis 4. Our power simulation suggests that 400 participants in each of 35 countries (total N = 14,000) would provide over 95% power to detect an effect size of $d \geq 0.15$ across the slope variances that we tested. For practical reasons, sample size was primarily decided based on the availability of resources among members of the PSA. At the time of submission, we expect to recruit approximately 25,448 participants in total and have ethics approval to collect data from	We plan to create an overall positive state emotion score by averaging the five positive emotions (hope, gratitude, love, inspiration, and serenity). We will model the overall positive state emotion score as a function of the fixed effects of condition using our contrast 2 in Table 1 and control for the participants' positive baseline emotions. We will include by-country random intercepts, as well as by-country random slopes for each contrast.	If the score is significantly higher (lower) in the repurposing condition than the reconstrual condition, we will conclude finding evidence for (against) hypothesis 4b. If the difference between repurposing and reconstrual is not significantly different from 0, we will interpret the Bayes factor.

Question	Hypothesis	Sampling plan (e.g. power analysis)	Analysis Plan[abc]	Interpretation given to different outcomes
		15,997 participants (other research groups are currently seeking ethics approval).		
Will repurposing lead to greater increases in positive emotions about the COVID-19 situation than reconstrual?	Repurposing will lead to greater increases in positive emotions about the COVID-19 situation than reconstrual (hypothesis 4c)	Prior works suggest the lowest available estimate of the effect size to be $d = 0.25$ between repurposing and reconstrual in changing positive emotions for hypothesis 4. Our power simulation suggests that 400 participants in each of 35 countries (total N = 14,000) would provide over 95% power to detect an effect size of $d \geq 0.15$ across the slope variances that we tested. For practical reasons, sample size was primarily decided based on the availability of resources among members of the PSA. At the time of submission, we expect to recruit approximately 25,448 participants in total and have ethics approval to collect data from	We will model positive emotions about the COVID-19 situation as a function of the fixed effects of condition using our contrast 2 in Table 1 and control for the participants' positive baseline emotions. We will include by-country random intercepts, as well as by-country random slopes for each contrast.	If the ratings are significantly higher (lower) in the repurposing condition than the reconstrual condition, we will conclude finding evidence for (against) hypothesis 4c. If the difference between repurposing and reconstrual is not significantly different from 0, we will interpret the Bayes factor.

Question	Hypothesis	Sampling plan (e.g. power analysis)	Analysis Plan[abc]	Interpretation given to different outcomes
		15,997 participants (other research groups are currently seeking ethics approval).		

[a] Exclusion. We plan to exclude:
(1) Participants who answer both multiple choice manipulation check questions incorrectly.
(2) Participants who complete fewer than 50% of the questions in the study.
[b] Reliability of measures. For items from the modified Differential Emotions Scale[92], we plan to create overall negative emotion scores at each time point by averaging the five negative emotions (fear, anger, sadness, distrust, and stress) and overall positive emotion scores at each time point by averaging the five positive emotions (hope, gratitude, love, inspiration, and serenity) if the average inter-item correlation is above .40 for negative emotions and for positive emotions, respectively. If the average inter-item correlation is below .40, we will conduct an exploratory factor analysis with oblique rotation and maintain factors with an eigenvalue above 1.00. If no factors have an eigenvalue above 1, we will report results by item rather than as a composite.
[c] Missing data. We will drop incomplete cases on an analysis-by-analysis basis.

Psychological Science Accelerator
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