nature portfolio

https://doi.org/10.1038/s41562-021-01173-x

Supplementary information

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

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Supplementary Information

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Supplementary Table 1. Sample size per country/region. Countries/regions were assessed by the question "From which country are you taking this survey?". Countries/regions are ordered by decreasing sample size without exclusion. We preregistered to exclude participants who: (1) answered both multiple choice manipulation check questions incorrectly, and (2) completed fewer than 50% of the questions in the study. We additionally excluded nine duplicate IDs. There were 1,317 missing values to the country/region question in the sample without exclusion (i.e., people did not answer this question), and 534 missing values to the country/region question in the sample after exclusion.

Number	Country/region	Sample size before exclusion	Sample size after preregistered exclusion	Number excluded (%)
1	Japan - JPN	2923	2485	438 (14.98%)
2	United States of America - USA	2622	2474	148 (5.64%)
3	Poland - POL	1614	1332	282 (17.47%)
4	Croatia - HRV	915	785	130 (14.21%)
5	Armenia - ARM	880	348	532 (60.45%)
6	Kenya - KEN	749	430	319 (42.59%)
7	Australia - AUS	730	671	59 (8.08%)
8	France - FRA	728	568	160 (21.98%)
9	Nigeria - NGA	726	433	293 (40.36%)
10	United Kingdom - GBR	636	542	94 (14.78%)
11	Egypt - EGY	634	376	258 (40.69%)
12	Hungary - HUN	613	569	44 (7.18%)
13	Germany - DEU	593	544	49 (8.26%)
14	South Africa - ZAF	585	299	286 (48.89%)
15	China - CHN	572	464	108 (18.88%)

16	Italy - ITA	557	487	70 (12.57%)
17	Chile - CHL	548	449	99 (18.07%)
18	Austria - AUT	494	413	81 (16.4%)
19	Sweden - SWE	493	427	66 (13.39%)
20	Turkey - TUR	441	349	92 (20.86%)
21	Philippines - PHL	433	339	94 (21.71%)
22	Costa Rica - CRI	432	238	194 (44.91%)
23	Mexico - MEX	424	372	52 (12.26%)
24	Czechia - CZE	415	341	74 (17.83%)
25	Slovakia - SVK	394	332	62 (15.74%)
26	Romania - ROU	394	316	78 (19.8%)
27	Slovenia - SVN	390	266	124 (31.79%)
28	Russia - RUS	379	306	73 (19.26%)
29	Portugal - PRT	358	253	105 (29.33%)
30	Netherlands - NLD	347	323	24 (6.92%)
31	Brazil - BRA	340	228	112 (32.94%)
32	Norway - NOR	329	222	107 (32.52%)
33	Switzerland - CHE	328	263	65 (19.82%)
34	Pakistan - PAK	316	231	85 (26.9%)
35	South Korea - KOR	315	282	33 (10.48%)
36	Ireland - IRL	296	194	102 (34.46%)
37	Canada - CAN	268	259	9 (3.36%)
38	North Macedonia - MKD	265	150	115 (43.4%)
39	Belgium - BEL	222	214	8 (3.6%)

40	Israel - ISR	183	164	19 (10.38%)
41	Greece - GRC	169	136	33 (19.53%)
42	Finland - FIN	158	122	36 (22.78%)
43	New Zealand - NZL	156	147	9 (5.77%)
44	Bulgaria - BGR	151	123	28 (18.54%)
45	Argentina - ARG	138	88	50 (36.23%)
46	Serbia - SRB	137	86	51 (37.23%)
47	Colombia - COL	132	96	36 (27.27%)
48	Taiwan - TWN	116	73	43 (37.07%)
49	Hong Kong - HKG	89	82	7 (7.87%)
50	Singapore - SGP	85	84	1 (1.18%)
51	Morocco - MAR	83	51	32 (38.55%)
52	India - IND	73	51	22 (30.14%)
53	Iran - IRN	69	59	10 (14.49%)
54	Malaysia - MYS	38	35	3 (7.89%)
55	Bangladesh - BGD	32	17	15 (46.88%)
56	Bosnia and Herzegovina - BIH	30	27	3 (10%)
57	Thailand - THA	15	8	7 (46.67%)
58	Ecuador - ECU	14	9	5 (35.71%)
59	Spain - ESP	12	5	7 (58.33%)
60	Saudi Arabia - SAU	11	10	1 (9.09%)
61	Cyprus - CYP	9	8	1 (11.11%)
62	Indonesia - IDN	7	6	1 (14.29%)

63	United Arab Emirates - ARE	7	6	1 (14.29%)
64	Peru - PER	6	4	2 (33.33%)
65	Luxembourg - LUX	5	4	1 (20%)
66	Viet Nam - VNM	4	4	0 (0%)
67	Denmark - DNK	4	3	1 (25%)
68	Ukraine - UKR	4	3	1 (25%)
69	Kazakhstan - KAZ	3	2	1 (33.33%)
70	Montenegro - MNE	3	2	1 (33.33%)
71	Belarus - BLR	2	2	0 (0%)
72	Panama - PAN	2	2	0 (0%)
73	Qatar - QAT	2	2	0 (0%)
74	Sri Lanka - LKA	2	2	0 (0%)
75	Nicaragua - NIC	2	1	1 (50%)
76	Malawi - MWI	2	0	2 (100%)
77	Malta - MLT	2	0	2 (100%)
78	Guam - GUM	1	1	0 (0%)
79	Jamaica - JAM	1	1	0 (0%)
80	Kosovo - XKS	1	1	0 (0%)
81	Kuwait - KWT	1	1	0 (0%)
82	Lebanon - LBN	1	1	0 (0%)
83	Macao - MAC	1	1	0 (0%)
84	Mauritius - MUS	1	1	0 (0%)
85	Myanmar - MMR	1	1	0 (0%)
86	New Caledonia - NCL	1	1	0 (0%)

87	Oman - OMN	1	1	0 (0%)
88	Trinidad and Tobago - TTO	1	1	0 (0%)
89	Venezuela - VEN	1	1	0 (0%)
90	Cambodia - KHM	1	0	1 (100%)
91	Estonia - EST	1	0	1 (100%)
92	Georgia - GEO	1	0	1 (100%)
93	Latvia - LVA	1	0	1 (100%)
94	Lithuania - LTU	1	0	1 (100%)

Supplementary Table 2. Sample size per month. We preregistered to exclude participants who: (1) answered both multiple choice manipulation check questions incorrectly, and (2) completed fewer than 50% of the questions in the study. We additionally excluded nine duplicate IDs.

Month in 2020	Sample size before exclusion	Sample size after preregistered exclusion	Number excluded (%)
May	2235	1901	334 (14.94%)
June	3827	2849	978 (25.56%)
July	3170	2500	670 (21.14%)
August	8630	6513	2117 (24.53%)
September	5285	4470	815 (15.42%)
October	4842	3411	1431 (29.55%)

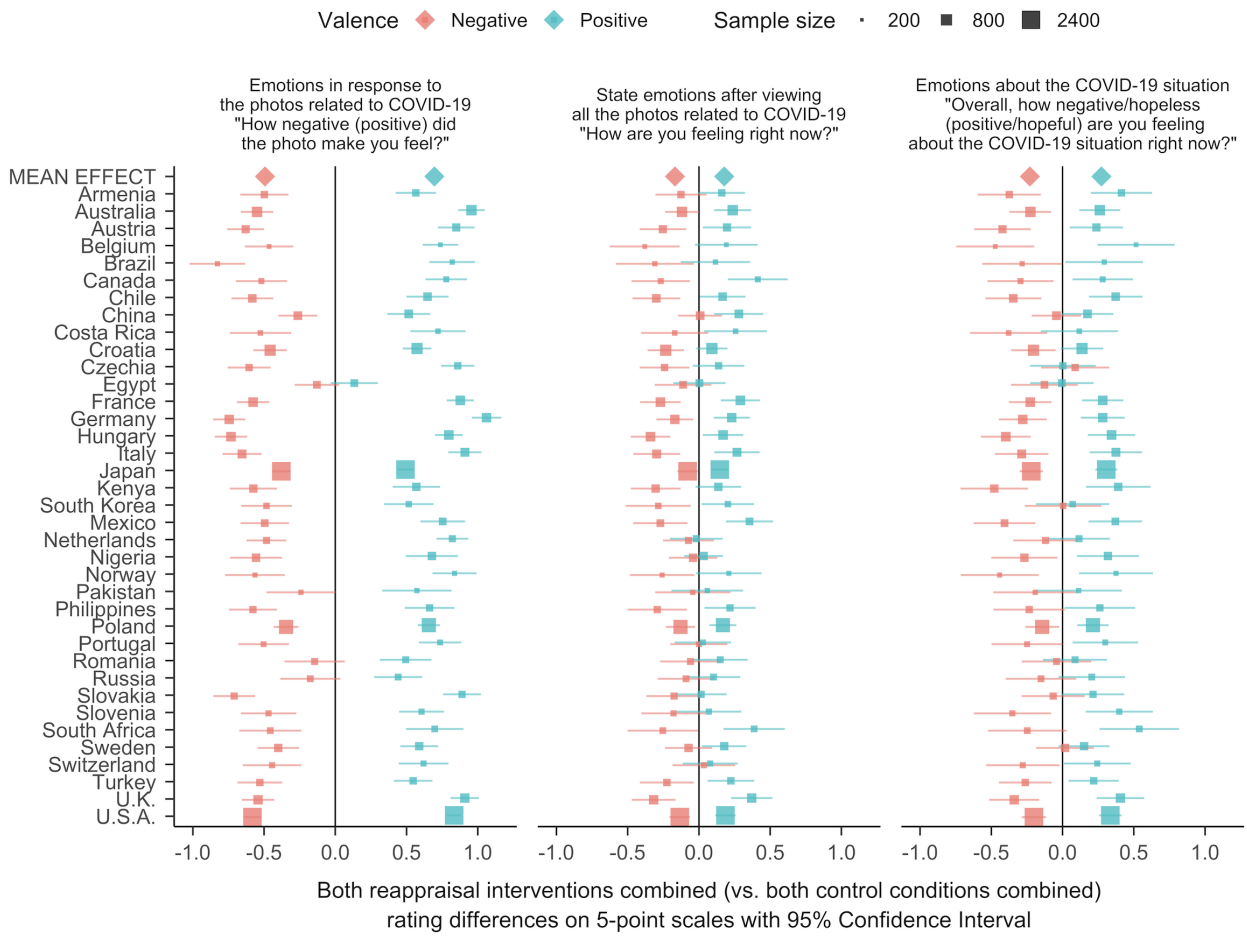
Supplementary Table 3. Effect sizes, frequentist statistics, and Bayes factors for each preregistered hypothesis using the full sample (no exclusions except for duplicate IDs).

Hypothesis	*B* (*SE*)	by-country/region standard deviation of *B*	*t* statistic (df)	Holm's adjusted *P* value	Cohen's *d* [95% CI]	log(BF_{10}) [under robustness check]	verbal interpretation of log(BF_{10})[3]
Reappraisal interventions (vs. control) would reduce negative emotions in response to the photos (hypothesis 1a).	0.503 (0.020)	0.119	25.119 (54.25)	< 0.001	0.384 [0.354, 0.415]	29.50 [29.51]	log(BF) > 2 represents "extreme evidence in favour of H_A" 2 > log(BF) > 1.5 represents "very strong evidence in favour of H_A" 1.5 > log(BF) > 1 represents "strong evidence in favour of H_A" 1 > log(BF) > 0.5 represents "moderate evidence in favour of H_A" 0.5 > log(BF) > -0.5 represents "inconclusive evidence" -0.5 > log(BF) > -1 represents "moderate evidence in favour of H_0" -1 > log(BF) > -1.5 represents "strong evidence in favour of H_0" -1.5 > log(BF) > -2 represents "very strong evidence in favour of H_0"
Reappraisal interventions (vs. control) would reduce negative state emotions (hypothesis 1b)	0.183 (0.013)	0.066	14.034 (37.29)	< 0.001	0.309 [0.267, 0.355]	15.33 [14.87]	
Reappraisal interventions (vs. control) would reduce negative emotions about the COVID-19 situation (hypothesis 1c)	0.239 (0.019)	0.083	12.45 (30.92)	< 0.001	0.237 [0.199,0.275]	15.32 [12.81]	
Reappraisal interventions (vs. control) would increase positive emotions in response to the photos	0.686 (0.025)	0.168	27.390 (60.37)	< 0.001	0.567 [0.526, 0.608]	34.70 [34.91]	

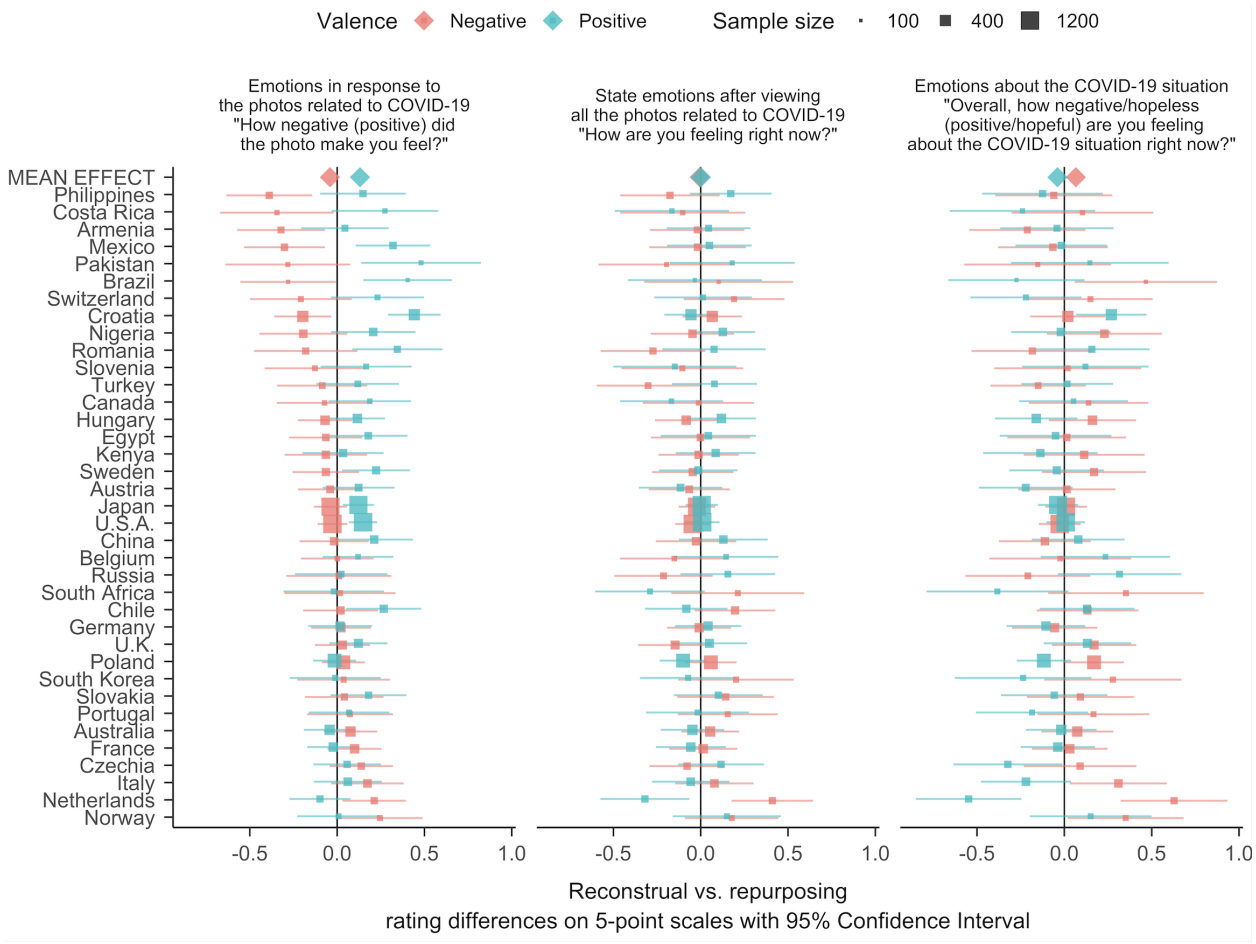
(hypothesis 2a)							-2 > log(BF) represents "extreme evidence in favour of H_0"
Reappraisal interventions (vs. control) would increase positive state emotions (hypothesis 2b)	0.176 (0.012)	0.064	14.110 (42.97)	< 0.001	0.323 [0.278, 0.369]	15.73 [15.27]	
Reappraisal interventions (vs. control) would increase positive emotions about the COVID-19 situation (hypothesis 2c)	0.261 (0.018)	0.072	14.604 (32.27)	< 0.001	0.264 [0.228, 0.300]	15.32 [15.02]	
Reconstrual would lead to greater decreases in negative emotional responses in response to the photos than repurposing (hypothesis 3a).	-0.049 (0.022)	0.099	2.272 (35.00)	0.059	-0.037 [-0.005, -0.071]	0.14 [-0.58]	
Reconstrual would lead to greater decreases in negative state emotions than repurposing (hypothesis 3b)	-0.004 (0.016)	0.069	-0.255 (27.94)	0.800	-0.007 [-0.061, 0.048]	-1.09 [-1.89]	

Reconstrual would lead to greater decreases in negative emotions about the COVID-19 situation than repurposing (hypothesis 3c)	0.069 (0.021)	0.041	3.25 (29.97)	0.008	0.068 [0.026, 0.112]	-0.41 [0.42]	
Repurposing would lead to greater increases in positive emotions in response to the photos than reconstrual (hypothesis 4a)	0.130 (0.021)	0.105	6.178 (48.11)	< 0.001	0.107 [0.073, 0.142]	5.02 [4.49]	
Repurposing would lead to greater increases in positive state emotions than reconstrual (hypothesis 4b)	-0.005 (0.011)	Random slopes by country/ region were not included for the model to converg e	-0.503 (20,470)	0.615	-0.009 [-0.048, 0.029]	-1.35 [-1.99]	
Repurposing would lead to greater increases in positive emotions about the COVID-19 situation than reconstrual (hypothesis 4c)	-0.046 (0.026)	0.106	-1.789 (36.09)	0.164	-0.047 [-0.099, 0.005]	-0.41 [-0.97]	

Note: We excluded nine duplicate IDs as including them would bias by-individual random effects. The signs of *B*, *t* statistic, and Cohen's *d* are adjusted such that positive (negative) values indicate being consistent (inconsistent) with the direction specified in each respective hypothesis. For hypotheses 1-2, *B* reflects the difference on the original 5-point scales between the average of the means of the two control conditions and the average of the means of the two reappraisal intervention conditions. For hypotheses 3-4, *B* reflects the difference on the original 5-point scales between the mean of the reconstrual condition and the mean of the repurposing condition. Degrees of freedom vary due to random slopes[1]. Cohen's *d* is calculated as the raw mean difference divided by the square root of the pooled variance of all the random components.



Supplementary Figure 1. Effect sizes of both reappraisal interventions (vs. both control conditions combined) on six primary outcomes by country/region in alphabetical order.



Supplementary Figure 2. Effect sizes of reconstrual vs. repurposing on six primary outcomes by country/region in alphabetical order.

Supplementary Methods

Details of analytical models in exploratory analyses

We fit multilevel models throughout and followed the same strategy regarding random effects in preregistered analysis. Some models needed adjustment in order to converge[1], and we report below the final model used for the results reported in the main text.

Pairwise comparisons of conditions on primary outcomes.

We modeled each outcome as a function of the fixed effects of the condition as a dummy variable with the passive control condition as the reference level. We controlled for the participants' negative baseline emotions for negative emotional outcomes. We controlled for the participants' positive baseline emotions for positive emotional outcomes.

Supplementary Table 4. Model specification for pairwise comparisons of conditions on primary outcomes.

Outcomes	Random effects in the model
Negative emotions in response to the photos, Positive emotions in response to the photos	We included by-participant random intercepts and by-country/region random intercepts. By-country/region random slopes were not included for the model to converge.
Negative emotions about the COVID-19 situation, Positive emotions about the COVID-19 situation	We included by-country/region random intercepts and by-country/region random slopes.
Negative state emotions, Positive state emotions	We included by-country/region random intercepts. By-country/region random slopes were not included for the model to converge.

Supplementary Table 5. Model specification for exploratory outcomes.

Outcomes	Multilevel model specification
Intention to follow stay-at-home orders, Positive anticipated emotions	We modeled each outcome as a function of the fixed effects of the contrast 1 (between two reappraisal conditions combined and two control conditions combined). We included by-country/region random intercepts and by-country/region random slopes. The correlation between by-country/region random intercepts and by-country/region random slopes was not included for the model to converge.
Intention to wash hands	We modeled each outcome as a function of the fixed effects of the contrast 1 (between two

	reappraisal conditions combined and two control conditions combined). We included by-country/region random intercepts. By-country/region random slopes were not included for the model to converge.
Frequency of natural response Frequency of using reconstrual	We modeled each outcome as a function of the fixed effects of the condition as a dummy variable with the passive control condition as the reference level. We included by-country/region random intercepts and by-country/region random slopes.
Frequency of using repurposing Frequency of using reflecting	We modeled each outcome as a function of the fixed effects of the condition as a dummy variable with the passive control condition as the reference level. We included by-country/region random intercepts. By-country/region random slopes were not included for the model to converge.
Motivation to follow the given instructions, Belief that the given strategy could influence their emotions, Global change of negative emotions, Global change of positive emotions, Negative anticipated emotions	We modeled each outcome as a function of the fixed effects of the contrast 1 (between two reappraisal conditions combined and two control conditions combined). We included by-country/region random intercepts and by-country/region random slopes.

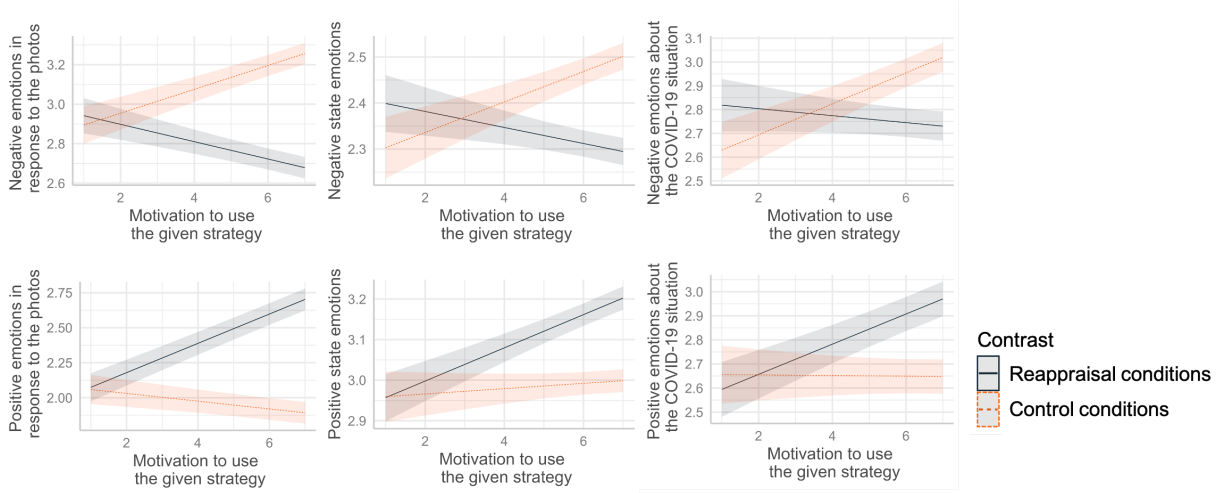
Supplementary Results

Results of moderators

We modeled each of the six primary outcomes (negative emotions in response to the photos, positive emotions in response to the photos, negative state emotions after viewing all the photos, positive state emotions after viewing all the photos, negative emotions about the COVID-19 situation, and positive emotions about the COVID-19 situation) as a function of the interaction between contrast 1 (two reappraisal conditions combined vs. the two control conditions combined) and each moderator. We controlled for the participants' negative baseline emotions for negative emotional outcomes. We controlled for the participants' positive baseline emotions for positive emotional outcomes. We included by-country/region random intercepts. We did not include by-country/region random slopes to avoid overly complex models, except for individualism. Because individualism is a country/region level variable, cross-level interactions should always include a random slope of the lower-level variable (i.e., contrast 1 in this case)[2].

Motivation to use the given strategy

Motivation to use the given strategy significantly interacted with reappraisal conditions for all six primary outcomes, such that greater motivation to use the given strategy amplified the differences between reappraisal conditions and control conditions (Supplementary Fig. 3 and Supplementary Table 6). As the simple slopes show, greater motivation to use the given strategy was associated with more negative emotional responses in the two control conditions, but not so in the two reappraisal conditions. Moreover, greater motivation to use the given strategy was associated with more positive emotional responses in the two reappraisal conditions, but not so or less so in the two control conditions.



Supplementary Figure 3. Primary outcomes by condition and motivation to use the given strategy. Effect plots revealed that greater motivation to use the given strategy amplified the differences between reappraisal conditions and control conditions for all six primary outcomes.

Supplementary Table 6. Frequentist statistics for interactions between reappraisal conditions and motivation to use the given strategy.

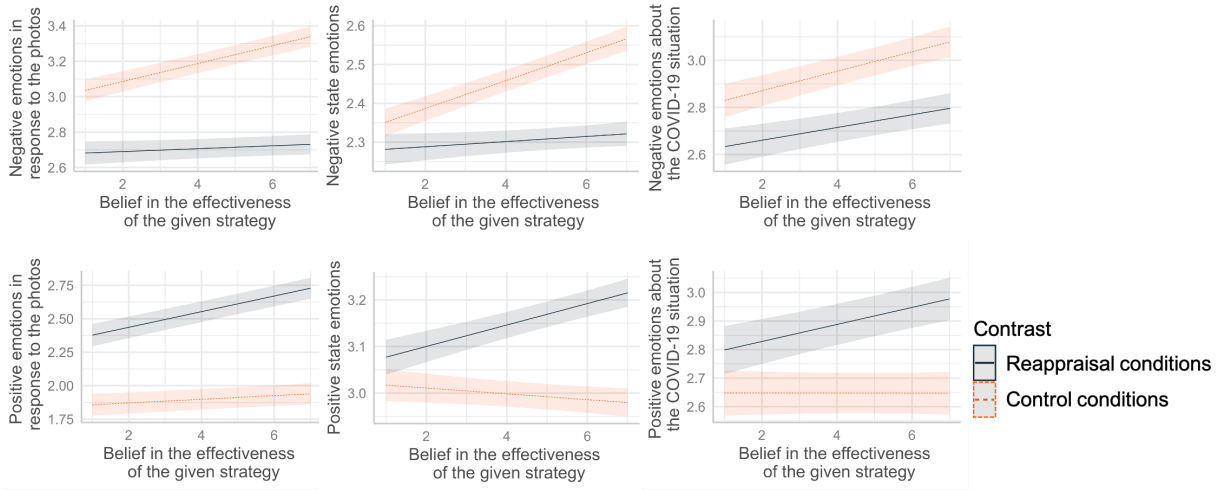
Outcome	*B* (*SE*) of the interaction term	*t* statistic (df) of the interaction term	Unadjusted *P* value	Simple slope of motivation to use the given strategy
Negative emotions in response to the photos	-0.104 (0.010)	10.272 (20,340)	< 0.001	Two reappraisal conditions combined: *B* = -0.044, *SE* = 0.007, 95% CI = [-0.058, -0.030] Two control conditions combined: *B* = 0.060, *SE* = 0.007, 95% CI = [0.046, 0.075]
Negative state emotions	0.050 (0.008)	6.488 (20,000)	< 0.001	Two reappraisal conditions combined: *B* = -0.017, *SE* = 0.005, 95% CI = [-0.028, -0.007] Two control conditions combined: *B* = 0.033, *SE* = 0.006, 95% CI = [0.022, 0.044]
Negative emotions about the COVID-19 situation	0.080 (0.013)	6.059 (20,200)	< 0.001	Two reappraisal conditions combined: *B* = -0.015, *SE* = 0.009, 95% CI = [-0.033, 0.003] Two control conditions combined: *B* = 0.065, *SE* = 0.010, 95% CI = [0.046,

				0.084]
Positive emotions in response to the photos	-0.132 (0.009)	-14.693 (20,340)	< 0.001	Two reappraisal conditions combined: *B* = 0.105, *SE* = 0.006, 95% CI = [0.092, 0.117] Two control conditions combined: *B* = -0.028, *SE* = 0.007, 95% CI = [-0.041, -0.015]
Positive state emotions	-0.034 (0.007)	-4.765 (19,960)	< 0.001	Two reappraisal conditions combined: *B* = 0.041, *SE* = 0.005, 95% CI = [0.031, 0.051] Two control conditions combined: *B* = 0.007, *SE* = 0.005, 95% CI = [-0.004, 0.017]
Positive emotions about the COVID-19 situation	-0.064 (0.013)	-5.082 (20,210)	< 0.001	Two reappraisal conditions combined: *B* = 0.063, *SE* = 0.009, 95% CI = [0.045, 0.080] Two control conditions combined: *B* = -0.001, *SE* = 0.009, 95% CI = [-0.020, 0.017]

Belief in the effectiveness of the given strategy

Belief in the effectiveness of the given strategy significantly interacted with reappraisal conditions for five out of our six primary outcomes (all except negative emotions about the COVID-19 situation), such that greater belief amplified the differences between reappraisal conditions and control

conditions (Supplementary Fig. 4 and Supplementary Table 7). As the simple slopes show, greater belief in the effectiveness of the given strategy was associated with more negative emotional responses in the two control conditions, but not so or less so in the two reappraisal conditions. Moreover, greater belief in the effectiveness of the given strategy was associated with more positive emotional responses in the two reappraisal conditions, but not so or less so in the two control conditions.



Supplementary Figure 4. Primary outcomes by condition and belief in the effectiveness of the given strategy. Effect plots revealed that greater belief in the effectiveness of the given strategy amplified the differences between the reappraisal conditions and control conditions for five out of our six primary outcomes (all except negative emotions about the COVID-19 situation).

Supplementary Table 7. Frequentist statistics for interactions between reappraisal conditions and belief in the effectiveness of the given strategy.

Outcome	*B* (*SE*) of the interaction term	*t* statistic (df) of the interaction term	Unadjusted *P* value	Simple slope of belief in the effectiveness of the given strategy
Negative emotions in response to the photos	-0.042 (0.006)	6.964 (20,350)	< 0.001	Two reappraisal conditions combined: *B* = 0.008, *SE* = 0.005, 95% CI = [-0.001, 0.017] Two control conditions combined: *B* = 0.050, *SE* = 0.004, 95% CI = [0.042, 0.059]
Negative state emotions	0.029 (0.005)	6.334 (20,020)	< 0.001	Two reappraisal conditions

				combined: *B* = 0.007, *SE* = 0.004, 95% CI = [-0.0002, 0.014] Two control conditions combined: *B* = 0.036, *SE* = 0.003, 95% CI = [0.030, 0.042]
Negative emotions about the COVID-19 situation	0.014 (0.008)	1.807 (20,220)	0.071	There was no need to examine simple effects as the interaction term was not statistically significant.
Positive emotions in response to the photos	-0.045 (0.005)	-8.241 (20,350)	< 0.001	Two reappraisal conditions combined: *B* = 0.059, *SE* = 0.004, 95% CI = [0.050, 0.067] Two control conditions combined: *B* = 0.014, *SE* = 0.004, 95% CI = [0.007, 0.021]
Positive state emotions	-0.029 (0.004)	-6.776 (19,980)	< 0.001	Two reappraisal conditions combined: *B* = 0.023, *SE* = 0.003, 95% CI = [0.017, 0.029] Two control conditions combined: *B* = -0.006, *SE* = 0.003, 95% CI = [-0.012, -0.001]

Positive emotions about the COVID-19 situation	-0.030 (0.008)	-3.955 (20,230)	< 0.001	Two reappraisal conditions combined: *B* = 0.030, *SE* = 0.006, 95% CI = [0.019, 0.041] Two control conditions combined: *B* = -0.0001, *SE* = 0.005, 95% CI = [-0.010, 0.010]

Individualism

Past research suggests that participants from cultures with dialectical beliefs about negative emotions are less motivated to up-regulate positive emotions and down-regulate negative emotions, and that dialectical beliefs about negative emotions are more prevalent in Eastern (primarily East Asian) countries/regions than in Western (primarily North American) countries/regions[3]. While the available literature does not provide a validated index of where countries/regions fall on prevalence of dialectical beliefs about negative emotions, there are widely-used indices of individualism, a conceptually similar dimension. In the present analysis, we drew on Hofstede's individualism index[4] and examined the extent to which it might moderate effects of the intervention.

Individualism significantly interacted with reappraisal conditions for two out of the six primary outcomes, such that both reappraisal interventions combined (vs. both control conditions combined) had larger effects in more individualistic cultures in increasing positive emotions in response to the photos and increasing positive emotions about the COVID-19 situation (Supplementary Table 8). As with other analytical models in the moderation analysis section, we controlled for negative (positive) baseline emotions for negative (positive) emotional outcomes, so the moderation was not driven by differences in baseline emotions.

Supplementary Table 8. Frequentist statistics for interactions between reappraisal conditions and individualism.

Outcome	*B* (*SE*) of the interaction term	*t* statistic (df) of the interaction term	Unadjusted *P* value	Simple slope of individualism
Negative emotions in response to the photos	0.002 (0.001)	1.979 (37.23)	0.055	There was no need to examine simple effects as the interaction term was not statistically significant.
Negative state emotions	0.001 (0.001)	1.127 (28.95)	0.269	There was no need to examine simple effects as

				the interaction term was not statistically significant.
Negative emotions about the COVID-19 situation	0.0005 (0.001)	0.560 (22.25)	0.581	There was no need to examine simple effects as the interaction term was not statistically significant.
Positive emotions in response to the photos	-0.003 (0.001)	-3.464 (38.42)	0.001	Two reappraisal conditions combined: *B* = -0.003, *SE* = 0.001, 95% CI = [-0.006, -0.0003] Two control conditions combined: *B* = -0.006, *SE* = 0.001, 95% CI = [-0.009, -0.004]
Positive state emotions	-0.001 (0.0005)	-2.031 (27.73)	0.052	There was no need to examine simple effects as the interaction term was not statistically significant.
Positive emotions about the COVID-19 situation	-0.001 (0.001)	-2.383 (14.93)	0.031	Two reappraisal conditions combined: *B* = 0.0007, *SE* = 0.002, 95% CI = [-0.002, 0.004] Two control conditions combined: *B* = -0.0007, *SE* = 0.002, 95% CI = [-0.004, 0.002]

Gender

We coded gender as a dummy variable with females as the reference level. Given past research, we focused on the contrast between females and males below.

The contrast between female and male significantly interacted with reappraisal conditions for four out of our six primary outcomes (all except negative emotions about the COVID-19 situation and positive emotions about the COVID-19 situation), such that both reappraisal interventions combined (vs. both control conditions combined) had larger effects for females than for males (Supplementary Table 9). As with other analytical models in the moderation analysis section, we controlled for negative (positive) baseline emotions for negative (positive) emotional outcomes, so the moderation was not driven by differences in baseline emotions.

Supplementary Table 9. Frequentist statistics for interactions between reappraisal conditions and the contrast between females and males.

Outcome	*B* (*SE*) of the interaction term	*t* statistic (df) of the interaction term	Unadjusted *P* value	Simple effect of two reappraisal conditions combined (vs. two control conditions combined)
Negative emotions in response to the photos	-0.186 (0.022)	-8.387 (20,730)	< 0.001	Among females: *B* = -0.566, *SE* = 0.013, 95% CI = [-0.592, -0.540] Among males: *B* = -0.381, *SE* = 0.018, 95% CI = [-0.415, -0.346]
Negative state emotions	-0.106 (0.017)	-6.272 (20,390)	< 0.001	Among females: *B* = -0.211, *SE* = 0.010, 95% CI = [-0.230, -0.191] Among males: *B* = -0.105, *SE* = 0.014, 95% CI = [-0.131, -0.078]
Negative emotions about the COVID-19 situation	-0.052 (0.029)	-1.832 (20,560)	0.067	There was no need to examine simple effects as the interaction term was not statistically significant.

Positive emotions in response to the photos	0.202 (0.020)	10.206 (20,730)	< 0.001	Among females: *B* = 0.777, *SE* = 0.012, 95% CI = [0.754, 0.801] Among males: *B* = 0.575, *SE* = 0.016, 95% CI = [0.544, 0.606]
Positive state emotions	0.034 (0.016)	2.138 (20,340)	0.033	Among females: *B* = 0.187, *SE* = 0.009, 95% CI = [0.168, 0.205] Among males: *B* = 0.153, *SE* = 0.013, 95% CI = [0.128, 0.178]
Positive emotions about the COVID-19 situation	-0.005 (0.027)	-0.166 (20,570)	0.868	There was no need to examine simple effects as the interaction term was not statistically significant.

Socioeconomic status

Socioeconomic status was measured in three ways: employment status, subjective socioeconomic status, and education level.

Employment status was assessed by the question, "How would you describe your current employment?" with four response options:

a. I am employed and earning an income
b. I am employed, but not currently earning an income
c. I am employed but earning an income outside of a formal job
d. I am not employed and not earning an income

We coded employment status as a dummy variable with "I am not employed and not earning an income" as the reference level. Employment status significantly interacted with reappraisal conditions for four out of the six primary outcomes (all except negative emotions about the COVID-19 situation and positive emotions about the COVID-19 situation), such that both reappraisal interventions combined (vs. both control conditions combined) had larger effects for people who were not employed and not earning an income (vs. people who were employed and earning an income, and vs. people who were not employed but earning an income outside a formal job) (Supplementary Table 10). As with other analytical models in the moderation analysis section, we controlled for negative (positive) baseline emotions for negative (positive) emotional outcomes, so the moderation was not driven by differences in baseline emotions.

Both subjective socioeconomic status and education level had statistically significant interactions with reappraisal conditions on positive emotions in response to the photos, but not for the other five primary outcomes (Supplementary Tables 11, 12).

Supplementary Table 10. Frequentist statistics for interactions between reappraisal conditions and employment status.

Outcome	Interaction term	*B* (*SE*) of the interaction term	*t* statistic (df) of the interaction term	Unadjusted *P* value	Simple effect of two reappraisal conditions combined (vs. two control conditions combined)
Negative emotions in response to the photos	Reappraisal interventions and the contrast between "I am employed and earning an income" and "I am not employed and not earning an income"	-0.052 (0.024)	-2.171 (20,680)	0.030	Among those who answered "I am employed and earning an income": *B* = -0.481, *SE* = 0.016, 95% CI = [-0.512, -0.450] Among those who answered "I am not employed and not earning an income": *B* = -0.533, *SE* = 0.018, 95% CI = [-0.568, -0.497]
	Reappraisal interventions and the contrast between "I am employed, but not currently earning an income" and "I am not employed and not earning an income"	-0.052 (0.047)	-1.094 (20,670)	0.274	There was no need to examine simple effects as the interaction term was not statistically significant.

	Reappraisal interventions and the contrast between “I am not employed but earning an income outside a formal job” and “I am not employed and not earning an income”	-0.031 (0.034)	-0.921 (20,680)	0.357	There was no need to examine simple effects as the interaction term was not statistically significant.
Negative state emotions	Reappraisal interventions and the contrast between “I am employed and earning an income” and “I am not employed and not earning an income”	-0.053 (0.018)	-2.939 (20,340)	0.003	Among those who answered “I am employed and earning an income”: *B* = -0.153, *SE* = 0.012, 95% CI = [-0.177, -0.130] Among those who answered “I am not employed and not earning an income”: *B* = -0.207, *SE* = 0.014, 95% CI = [-0.234, -0.180]
	Reappraisal interventions and the contrast between “I am employed, but not currently earning an income” and “I am not employed and not earning an income”	-0.056 (0.036)	-1.549 (20,330)	0.121	There was no need to examine simple effects as the interaction term was not statistically significant.

	Reappraisal interventions and the contrast between “I am not employed but earning an income outside a formal job” and “I am not employed and not earning an income”	-0.051 (0.026)	-1.973 (20,340)	0.048	Among those who answered “I am not employed but earning an income outside a formal job”: *B* = -0.156, *SE* = 0.022, 95% CI = [-0.199, -0.113] Among those who answered “I am not employed and not earning an income”: *B* = -0.207, *SE* = 0.014, 95% CI = [-0.234, -0.180]
Negative emotions about the COVID-19 situation	Reappraisal interventions and the contrast between “I am employed and earning an income” and “I am not employed and not earning an income”	-0.023 (0.031)	-0.739 (20,510)	0.460	There was no need to examine simple effects as the interaction term was not statistically significant.
	Reappraisal interventions and the contrast between “I am employed, but not currently earning an income” and “I am not employed and not earning an income”	-0.039 (0.062)	-0.640 (20,500)	0.522	There was no need to examine simple effects as the interaction term was not statistically significant.

	Reappraisal interventions and the contrast between “I am not employed but earning an income outside a formal job” and “I am not employed and not earning an income”	-0.003 (0.044)	-0.060 (20,510)	0.952	There was no need to examine simple effects as the interaction term was not statistically significant.
Positive emotions in response to the photos	Reappraisal interventions and the contrast between “I am employed and earning an income” and “I am not employed and not earning an income”	0.057 (0.021)	2.665 (20,670)	0.008	Among those who answered “I am employed and earning an income”: *B* = 0.692, *SE* = 0.014, 95% CI = [0.664, 0.720] Among those who answered “I am not employed and not earning an income”: *B* = 0.749, *SE* = 0.016, 95% CI = [0.717, 0.780]
	Reappraisal interventions and the contrast between “I am employed, but not currently earning an income” and “I am not employed and not earning an income”	0.041 (0.042)	0.963 (20,660)	0.336	There was no need to examine simple effects as the interaction term was not statistically significant.

	Reappraisal interventions and the contrast between "I am not employed but earning an income outside a formal job" and "I am not employed and not earning an income"	0.114 (0.030)	3.769 (20,670)	< 0.001	Among those who answered "I am not employed and not earning an income": *B* = 0.749, *SE* = 0.016, 95% CI = [0.717, 0.780] Among those who answered "I am not employed but earning an income outside a formal job": *B* = 0.635, *SE* = 0.026, 95% CI = [0.584, 0.685]
Positive state emotions	Reappraisal interventions and the contrast between "I am employed and earning an income" and "I am not employed and not earning an income"	-0.050 (0.017)	2.963 (20,290)	0.003	Among those who answered "I am employed and earning an income": *B* = 0.161, *SE* = 0.011, 95% CI = [0.139, 0.183] Among those who answered "I am not employed and not earning an income": *B* = 0.211, *SE* = 0.013, 95% CI = [0.186, 0.236]
	Reappraisal interventions and the contrast	0.030 (0.034)	0.880 (20,280)	0.379	There was no need to examine simple effects

	between “I am employed, but not currently earning an income” and “I am not employed and not earning an income”				as the interaction term was not statistically significant.
	Reappraisal interventions and the contrast between “I am not employed but earning an income outside a formal job” and “I am not employed and not earning an income”	0.083 (0.024)	3.464 (20,290)	< 0.001	Among those who answered “I am not employed but earning an income outside a formal job”: *B* = 0.128, *SE* = 0.020, 95% CI = [0.088, 0.168] Among those who answered “I am not employed and not earning an income”: *B* = 0.211, *SE* = 0.013, 95% CI = [0.186, 0.236]
Positive emotions about the COVID-19 situation	Reappraisal interventions and the contrast between “I am employed and earning an income” and “I am not employed and not earning an income”	-0.001 (0.030)	-0.035 (20,510)	0.972	There was no need to examine simple effects as the interaction term was not statistically significant.
	Reappraisal interventions and the contrast	0.017 (0.059)	0.289 (20,510)	0.773	There was no need to examine simple effects

	between “I am employed, but not currently earning an income” and “I am not employed and not earning an income”				as the interaction term was not statistically significant.
	Reappraisal interventions and the contrast between “I am not employed but earning an income outside a formal job” and “I am not employed and not earning an income”	0.008 (0.042)	0.198 (20,520)	0.843	There was no need to examine simple effects as the interaction term was not statistically significant.

Supplementary Table 11. Frequentist statistics for interactions between reappraisal conditions and subjective socioeconomic status.

Outcome	*B* (*SE*) of the interaction term	*t* statistic (df) of the interaction term	Unadjusted *P* value	Simple slope of subjective socioeconomic status
Negative emotions in response to the photos	0.008 (0.006)	1.268 (20,480)	0.205	There was no need to examine simple effects as the interaction term was not statistically significant.
Negative state emotions	-0.001 (0.005)	-0.226 (20,130)	0.821	There was no need to examine simple effects as the interaction term was not statistically significant.

Negative emotions about the COVID-19 situation	0.005 (0.008)	0.588 (20,300)	0.557	There was no need to examine simple effects as the interaction term was not statistically significant.
Positive emotions in response to the photos	-0.011 (0.006)	-2.007 (20,470)	0.045	Two reappraisal conditions combined: B = -0.0004, SE = 0.004, 95% CI = [-0.009, 0.008] Two control conditions combined: B = -0.012, SE = 0.004, 95% CI = [-0.020, -0.004]
Positive state emotions	-0.002 (0.004)	-0.480 (20,080)	0.631	There was no need to examine simple effects as the interaction term was not statistically significant.
Positive emotions about the COVID-19 situation	-0.0004 (0.008)	-0.055 (20,310)	0.956	There was no need to examine simple effects as the interaction term was not statistically significant.

Supplementary Table 12. Frequentist statistics for interactions between reappraisal conditions and education level.

Outcome	*B* (*SE*) of the interaction term	*t* statistic (df) of the interaction term	Unadjusted *P* value	Simple slope of education level
Negative emotions in response to the photos	-0.007 (0.007)	-1.016 (20,690)	0.309	There was no need to examine simple effects as the interaction term was not statistically significant.
Negative state emotions	-0.008 (0.005)	-1.556 (20,350)	0.120	There was no need to examine simple effects as the interaction term was not statistically significant.
Negative emotions about the COVID-19 situation	-0.006 (0.009)	-0.718 (20,520)	0.473	There was no need to examine simple effects as the interaction term was not statistically significant.
Positive emotions in response to the photos	0.020 (0.006)	3.228 (20,690)	0.001	Two reappraisal conditions combined: B = 0.003, SE = 0.005, 95% CI = [-0.007, 0.012] Two control conditions combined: B = 0.023, SE = 0.005, 95% CI = [0.014, 0.032]

Positive state emotions	-0.003 (0.005)	-0.622 (20,300)	0.534	There was no need to examine simple effects as the interaction term was not statistically significant.
Positive emotions about the COVID-19 situation	0.007 (0.009)	0.759 (20,530)	0.448	There was no need to examine simple effects as the interaction term was not statistically significant.

Lockdown status

Lockdown status was assessed by the question, "Different cities and regions around the world are placing different levels of restrictions on their residents to slow the spread of COVID-19. Which of these options best describes the restrictions that are currently in place in your area?." Participants chose one out of the three following options:

a. Total lockdown – Non-essential businesses and schools are closed and the government either legally mandates or strongly advises that citizen stay inside their residence unless they leave to buy food, medicine, or essential goods

b. Partial lockdown – Non-essential businesses are open, but the government has closed schools and prohibited public gatherings

c. No lockdown – Businesses, schools and gatherings are open and the government has not mandated any quarantine measures

We coded lockdown status as a dummy variable with no lockdown as the reference level. Lockdown status had only one significant interaction out of the six primary outcomes, such that both reappraisal interventions combined (vs. both control conditions combined) had larger effects to reduce negative state emotions for people who faced partial lockdown than for people who faced no lockdown (Supplementary Table 13).

Supplementary Table 13. Frequentist statistics for interactions between reappraisal conditions and lockdown status.

Outcome	Interaction term	*B* (*SE*) of the interaction term	*t* statistic (df) of the interaction term	Unadjusted *P* value	Simple effect of two reappraisal conditions combined (vs. two control conditions combined)

Negative emotions in response to the photos	Reappraisal interventions and the contrast between no lockdown and partial lockdown	-0.001 (0.023)	-0.050 (20,180)	0.960	There was no need to examine simple effects as the interaction term was not statistically significant.
	Reappraisal interventions and the contrast between no lockdown and full lockdown	-0.047 (0.039)	-1.206 (20,190)	0.228	There was no need to examine simple effects as the interaction term was not statistically significant.
Negative state emotions	Reappraisal interventions and the contrast between no lockdown and partial lockdown	0.046 (0.017)	2.621 (19,860)	0.009	No lockdown: *B* = -0.146, *SE* = 0.013, 95% CI = [-0.172, -0.120] Partial lockdown: *B* = -0.192, *SE* = 0.011, 95% CI = [-0.214, -0.170]
	Reappraisal interventions and the contrast between no lockdown and full lockdown	0.031 (0.030)	1.058 (19,860)	0.290	There was no need to examine simple effects as the interaction term was not statistically significant.
Negative emotions about the COVID-19 situation	Reappraisal interventions and the contrast between no lockdown and partial	0.052 (0.030)	1.760 (20,010)	0.078	There was no need to examine simple effects as the interaction term was not

	lockdown				statistically significant.
	Reappraisal interventions and the contrast between no lockdown and full lockdown	0.033 (0.050)	0.658 (20,010)	0.511	There was no need to examine simple effects as the interaction term was not statistically significant.
Positive emotions in response to the photos	Reappraisal interventions and the contrast between no lockdown and partial lockdown	-0.006 (0.020)	-0.270 (20,160)	0.787	There was no need to examine simple effects as the interaction term was not statistically significant.
	Reappraisal interventions and the contrast between no lockdown and full lockdown	0.056 (0.034)	1.629 (20,170)	0.103	There was no need to examine simple effects as the interaction term was not statistically significant.
Positive state emotions	Reappraisal interventions and the contrast between no lockdown and partial lockdown	-0.013 (0.016)	-0.814 (19,800)	0.416	There was no need to examine simple effects as the interaction term was not statistically significant.
	Reappraisal interventions and the contrast between no lockdown and full lockdown	-0.046 (0.027)	-1.674 (19,800)	0.094	There was no need to examine simple effects as the interaction term was not

					statistically significant.
Positive emotions about the COVID-19 situation	Reappraisal interventions and the contrast between no lockdown and partial lockdown	0.028 (0.028)	0.973 (20,010)	0.331	There was no need to examine simple effects as the interaction term was not statistically significant.
	Reappraisal interventions and the contrast between no lockdown and full lockdown	-0.023 (0.048)	-0.480 (20,010)	0.632	There was no need to examine simple effects as the interaction term was not statistically significant.

Results for intentions to enact potentially harmful versus beneficial behaviours

We modeled ratings of likelihood for each of the ten intention questions as a function of the interaction between contrast 1 (two reappraisal conditions combined vs. the two control conditions combined) and the type of behavior as a dummy variable (with intention to wash hands as the reference level). We included by-participant random intercepts and by-country/region random intercepts.

As shown in Supplementary Table 14, pairwise comparisons revealed that both reappraisal interventions combined (vs. both control conditions combined) significantly reduced behavioral intentions to yell at someone, to take anger out online, to spend too much time on media, and significantly increased behavioral intention to practice healthy sleep habits. Both reappraisal interventions combined (vs. both control conditions combined) did not significantly impact behavioral intentions to wash hands regularly for at least 20 seconds, to follow stay-at-home orders stringently, to eat healthy food, to get enough physical activity, to drink too much alcohol, or to use too much tobacco (e.g., smoke/vape) or other recreational drugs.

Supplementary Table 14. Effect sizes on behavioral intentions between two reappraisal conditions combined and two control conditions combined.

Outcome	*B* (*SE*)	*z* statistic	Unadjusted *P* value
Behavioral intention to yell at someone	-0.093 (0.024)	-3.791	< 0.001
Behavioral intention to take anger out online	-0.064 (0.024)	-2.598	0.009
Behavioral intention to spend too much time on media	-0.052 (0.024)	-2.127	0.033
Behavioral intention to practice healthy sleep habits	0.060 (0.024)	2.445	0.015
Behavioral intention to wash hands regularly for at least 20 seconds	0.036 (0.024)	1.454	0.146
Behavioral intention to follow stay-at-home orders stringently	0.002 (0.024)	0.083	0.934
Behavioral intention to eat healthy food	0.043 (0.024)	1.740	0.082
Behavioral intention to get enough physical activity	0.032 (0.025)	1.318	0.188

Behavioral intention to drink too much alcohol	-0.015 (0.024)	-0.595	0.552
Behavioral intention to use too much tobacco (e.g., smoke/vape) or other recreational drugs	0.008 (0.024)	0.332	0.740

Results for loneliness and social connectedness

In the following analyses, we used multilevel models to model each outcome as a function of the contrast between two reappraisal conditions combined and two control conditions combined, with by-country/region random intercepts and by-country/region random slopes (except for one model noted below for it to converge). We controlled for baseline levels of loneliness when state loneliness and anticipated loneliness were dependent variables. We controlled for baseline levels of social connectedness when state social connectedness and anticipated social connectedness were dependent variables.

After viewing all the photos about the COVID-19 situation, we assessed participants on how lonely and socially connected they felt at that moment. We found that reappraisal interventions (vs. both control conditions combined) significantly reduced state loneliness and significantly increased state social connectedness (Supplementary Table 15).

To gain insight into the potential longer-term effects of reappraisal interventions, we assessed participants on how lonely and socially connected they anticipated they would feel the following week. We found that reappraisal interventions (vs. both control conditions combined) significantly reduced anticipated loneliness and significantly increased anticipated social connectedness (by-country random slopes were not included for this model to converge) (Supplementary Table 15).

Supplementary Table 15. Effect sizes on loneliness and social connectedness between two reappraisal conditions combined and two control conditions combined.

Outcome	*B* (*SE*)	*t* statistic (df)	Unadjusted *P* value	Cohen's *d* [95% CI]
State loneliness	-0.080 (0.010)	-8.282 (24.72)	< 0.001	-0.135 [-0.168, -0.102]
State social connectedness	0.084 (0.011)	7.740 (34.16)	< 0.001	0.154 [0.115, 0.194]
Anticipated loneliness	-0.075 (0.010)	-7.218 (32.25)	< 0.001	-0.113 [-0.146, -0.083]
Anticipated social connectedness	0.077 (0.008)	9.323 (20,380)	< 0.001	0.130 [0.102, 0.157]

Supplementary Table 16. Supporting claims in the "sampling plan" section.

Claims in the "Sampling plan" section	Source/Calculation
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, and instructions to enhance or maintain the focal emotion).	See Table 3 in Webb, Miles, & Sheeran[6].
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.	See Table 2 in Frattaroli[7]. We transformed the r-effect size into Cohen's d with https://www.psychometrica.de/effect_size.html.
Reconstrual is most similar to the subtype of reappraisal called "reappraising emotional stimulus" in Webb, Miles, & Sheeran's[6] meta-analysis, 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).	See Table 2 and Table 3 in Webb, Miles, & Sheeran[6].
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].	See Table 2 in Helgeson, Reynolds, & Tomich[8]. We transformed the r-effect size into Cohen's d with https://www.psychometrica.de/effect_size.html.
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[9].	See page 421 in Shiota & Levenson[9] for results on positive thoughts. We used the R package esc[10] to calculate the Cohen's d. See the "Sampling plan supporting evidence.R" R script at https://osf.io/mf5z4/.

The lowest level of intercept variances in our simulation was chosen on the basis of an ongoing multi-country/region 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[11]. 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 ($\sigma^2_{slope} = 0.003$) and between perceived insufficient government response and worries ($\sigma^2_{slope} = 0.003$) during the COVID-19 pandemic[11].	See the "Sampling plan supporting evidence.R" R script at https://osf.io/mf5z4/.

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