Emotion

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Emotional Experiences and Psychological Well-Being in 51 Countries During the COVID-19 Pandemic

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The COVID-19 pandemic presents challenges to psychological well-being, but how can we predict when people suffer or cope during sustained stress? Here, we test the prediction that specific types of momentary emotional experiences are differently linked to psychological well-being during the pandemic. Study 1 used survey data collected from 24,221 participants in 51 countries during the COVID-19 outbreak. We show that, across countries, well-being is linked to individuals' recent emotional experiences, including calm, hope, anxiety, loneliness, and sadness. Consistent results are found in two age, sex, and ethnicity-representative samples in the United Kingdom ($n = 971$) and the United States ($n = 961$) with preregistered analyses (Study 2). A prospective 30-day daily diary study conducted in the United Kingdom ($n = 110$) confirms the key role of these five emotions and demonstrates that emotional experiences precede changes in well-being (Study 3). Our findings highlight differential relationships between specific types of momentary emotional experiences and well-being and point to the cultivation of calm and hope as candidate routes for well-being interventions during periods of sustained stress.

Keywords: emotion, well-being, stress, COVID-19 pandemic

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All the data are shared on Open Science Framework (https://osf.io/s5puc/).

Rui Sun served as lead for conceptualization, data curation, formal analysis, project administration, resources, validation, writing–original draft, review, and editing, and data collection. Claude Julien Bajada contributed equally to formal analysis. Yang Liu served as lead for formal analysis and served in a supporting role for writing–original draft, review, and editing. Claude-Hélène Mayer served in a supporting role for data collection. Maria Constantinou served as lead for visualization and served in a supporting role for writing–original draft, review, and editing. Chengcheng Li served in a supporting role for writing–original draft, review, and editing. Ashley Foster-Estwick served in a supporting role for data collection. Valeria Vitale served in a supporting role for formal analysis and methodology. Lusanda Sekaja served in a supporting role for writing–original draft. Milad Hadchity served in a supporting role for data collection. Anita Deak served in a supporting role for writing–original draft. Evgeniya Vedernikova served in a supporting role for conceptualization, methodology, and writing–original draft. Lauri Nummenmaa served in a supporting role for writing–original draft. Milica Nikolic served in a supporting role for conceptualization and writing–original draft. Wai Kai Hou and Michiko Yoshie served in a supporting role for writing–original draft, review, and editing. Jacob Israelashvili served in a supporting role for conceptualization and formal analysis. Roza G. Kamiloğlu served as lead for visualization and served in a supporting role for conceptualization. Akerke Makhmud served in a supporting role for data collection. Peter S. Lunga served in a supporting role for writing–original draft. Kumba Philip-Joe served in a supporting role for data collection. Disa Sauter served as lead for conceptualization, funding acquisition, investigation, supervision, writing–original draft, review, and editing, contributed equally to project administration, and served in a supporting role for formal analysis. Rui Sun and Disa Sauter contributed equally to methodology. Claude Julien Bajada and Disa Sauter contributed equally to visualization. Alisa Balabanova, Claude Julien Bajada, Mariia Kriuchok, Silja-Riin Voolma, Mirna Đurić, Maria Constantinou, Mariam Chichua, Chengcheng Li, Kurt Borg, Carin Hill, Rishabh Kaushal, Ketaki Diwan, Valeria Vitale, Tiarah Engels, Rabiah Aminudin, Irina Ursu, Tengku Nila Fadhlia, Yi-jung Wu, Lusanda Sekaja, Anita Deak, Shahira Sharaf, Pau Figueras, Anthony Kaziboni, Aoife Whiston, Kalliopi Ioumpa, Alfredo Montelongo, Lisanne Pauw, Gabriela Pavarini, Evgeniya Vedernikova, TuongVan Vu, Lauri Nummenmaa, Yong-Qi Cong, Milica Nikolic, Andrea Olguin, Wai Kai Hou, Jacob Israelashvili, Hyunjin J. Koo, Samaneh Khademi, Chinwendu G. Ukachukwu, Damian Omari Juma, Roza G. Kamiloğlu, Peter S. Lunga, Carlotta Rieble, Muhammad Rizwan, Mai Helmy, Laura Vuillier, Kunalan Manokara, Enzo C. Quezada, Delgermend Tserendamba, Michiko Yoshie, Amy H. Du, Pála Björk Kúld, Kalifa Damani, Annabella Osei-Tutu, and Disa Sauter contributed equally to data collection. Lisanne Pauw and Laura Vuillier contributed equally to writing–original draft. Lisanne Pauw, Milica Nikolic, and Laura Vuillier contributed equally to writing–review and editing.

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To date, there have been more than 500 million confirmed cases of COVID-19 and over six million confirmed deaths (World Health Organization, 2022). In addition to physical disease and death, the pandemic is also linked to substantive deteriorations in psychological well-being (Aknin et al., 2022). Given the psychological toll of COVID-19 and other sustained collective stressors, it is essential to gain insight into the factors associated with well-being during periods of heightened stress (Holmes et al., 2020). Here, we conduct a large-scale examination of a candidate factor shaping well-being: momentary emotional experiences.

Many elements that contribute to well-being tend to remain relatively consistent over time and are difficult to change (Eid & Diener, 2004). These include both individual-level factors like income and society-level factors like country-level wealth and inequality. However, well-being is also affected by transient states that fluctuate considerably (Houben et al., 2015). Of particular importance to well-being is one's recent emotional experiences. Here, we use the commonly applied definition of emotion proposed by Keltner and Gross (1999): "episodic, relatively short-term, biologically-based patterns of perception, experience, physiology, action, and communication that occur in response to specific physical and social challenges and opportunities" (p. 468). We acknowledge that there are various theories on what emotions are, and there may not be a consensus on its definition (Fehr & Russell, 1984, p. 464). Yet regardless of how emotions are theorized to emerge, they can exert causal influence (Barrett, 2012). In the present study, we examine whether specific emotions are systematically related to well-being. Here we adopt the idea that well-being reflects people's global evaluation of their life (Diener et al., 2003), while emotions are relatively short term (Keltner & Gross, 1999). We thus did not regard the experience of positive emotion and/or lack of negative emotion as indexing psychological well-being per se.

Unsurprisingly, experiencing less negative and more positive emotions in one's daily life is associated with enhanced well-being (see Huppert, 2009). However, emotions are often experienced at finer levels of specificity (Cowen & Keltner, 2017): we do not just feel good, we feel triumphant or determined or calm. Similarly, we typically experience feeling bad as one of a variety of flavors: we feel angry, sad, or lonely. In addition, recent work has demonstrated that emotions that share the same valence (i.e., feeling positive or negative) can have dramatically different effects on behavior (e.g., Van Kleef, 2010; Pressman & Cross, 2018). For example, we do not tend to feel or behave in the same way when we are proud and when we are grateful, nor when we are angry and when we are bored. These experiential and behavioral differences between emotions may result in differentiable relationships with well-being. In the present work, we test this prediction empirically.

Research on the relationship between emotions and well-being has tended to collapse across all negative and positive emotions, or alternatively, to examine a single emotion. For example, the majority of interventions focusing on altering emotional experience have sought to broadly increase positive and decrease negative affect (King, 2008). Studies that have attempted to enhance well-being via specific emotions have primarily targeted negative emotions, especially anxiety (MacLeod & Clarke, 2015) and loneliness (Masi et al., 2011). More recent work has attempted to increase specific positive emotions, especially gratitude (Alkozei et al., 2018) and (self-)compassion (Barnard & Curry, 2011). The literature on emotion interventions shows some promise for such interventions as a route to enhancing well-being (Moskowitz et al., 2021). However, there is a dearth of evidence on the relative contributions of specific emotions to well-being (but see Barrett-Cheetham et al., Barrett-Cheetham et al., 2016). Without examining multiple emotions at the same time, we cannot know whether the absence of anxiety or sadness matters more than the presence of gratitude or feelings of calm. Here, we heed calls to go beyond the one-size-fits-all approach of positive and negative affect (Kirby et al., 2020) to examine which specific types of emotional experiences contribute to well-being during a period of sustained stress. We tested 20 individual emotions in the present work based on past research on the relationships between individual emotions and well-being (see Table 1).

Understanding the relative contributions of specific types of emotional experiences to well-being is key to guiding individual and societal efforts to enhance well-being. This is of particular importance in the context of chronic collective stress, which strains individual as well as structural support resources. Moreover, conditions of generalized stress are likely to become more frequent: Not only is the COVID-19 pandemic expected to continue to affect large parts of the world's population for years to come (Telenti et al., 2021), but other large-scale collective crises are predicted to occur intermittently due to climate change (Zhang et al., 2011).

In the present work, we conducted three studies during the outbreak of the COVID-19 pandemic. Study 1 consisted of survey data collected in 50 languages from 24,221 participants in April–May, 2020. Analyses were based on data from 51 countries, each with at least 200 participating individuals. Study 2 sought to replicate these findings with preregistered analyses of two samples from the United Kingdom and the United States that were nationally representative in terms of age, sex, and ethnicity. In Study 3, we probed the temporal effect of the relationship between differential emotional experiences and subsequent well-being with data from a prospective 30-day diary study. Together, these studies provide the first investigation into the relationships between a wide range of momentary emotional experiences and psychological well-being.

Study 1. Emotions and Well-Being in 51 Countries During the COVID-19 Pandemic

Method

Transparency and Openness

The present work followed the transparency and openness guidelines including data, code, and materials transparency (Studies 1–3); design and analysis transparency (Studies 1–3); and study and analysis plan registration (Study 2). All the data from Studies 1–3 are shared on Open Science Framework (https://osf.io/s5puc); interactive illustrations are available at https://covidemotions.shinyapps.io/shinymap/. Beyond the questions addressed here, we hope that these data will provide a useful resource for researchers interested in psychology, health, and public policy within and across countries during periods of collectively elevated stress.

Participants

The study received ethical approval (reference: 2020-SP-12098) from the Ethics Review Board of the Department of Social Psychology, University of Amsterdam. All participants consented to take part in the study. The survey was translated into 50 languages,

Table 1
Example Literature of the Relationship Between Each of the 20 Emotions and Well-Being

Emotion	Example literature
Admiration	Admiration is positively associated with eudaimonic well-being (Schindler, 2014)
Calm	Calm is associated with increased life satisfaction (Kaspereen, 2012)
Compassion	Compassion is associated with increased well-being (Neff & Seppälä, 2017)
Determination	Determination is linked to better well-being (Ryan & Deci, 2000)
Feeling moved	Feeling moved is associated with enhanced social connections, which is essential for well-being (Fiske, 2019)
Gratitude	Gratitude predicts enhanced psychological well-being (Wood et al., 2010) and reduces symptoms of psychopathology (Alkozei et al., 2018)
Hope	Hope maps onto enhanced well-being (Pleeging et al., 2021)
Love	(Romantic) love increases well-being (Oravecz et al., 2020; Poerio et al., 2015)
Relief	Feeling relieved positively predicts well-being (Plaut et al., 2012)
Sensory pleasure	Sensory pleasures are positively related to psychological well-being (Oishi et al., 2001)
Anger	Anger is linked to worse well-being (Kopper & Epperson, 1996)
Anxiety/worry	Anxiety is negatively correlated with both hedonic and eudaimonic well-being (Li et al., 2019)
Boredom	Boredom negatively correlates with life satisfaction (Chipperfield et al., 2003)
Confusion	Confusion is associated with maladjustment (Kerr et al., 2004)
Disgust	Disgust is related to mental health pathology (Curtis, 2011)
Fear	Fear is associated with mental health problems, including depression (Perrin et al. 2009; Roy-Byrne et al., 2006)
Frustration	Frustration negatively predicts well-being (Chen et al., 2015) and positively predicts psychological distress (Motenko, 1989)
Loneliness	Loneliness is associated with poor mental health (Hawkley & Cacioppo, 2010) and negatively predicts life satisfaction (Golden et al., 2009)
Regret	Regret is linked to increased psychological distress (Lecci et al., 1994) and depression (Bruine de Bruin et al., 2016)
Sadness	Sadness is associated with adverse mental health, in particular depression (American Psychiatric Association, 2013)

with each translation done by a native speaker and verified by at least one additional native speaker to ensure translation validity. Participants were recruited via media (e.g., newspapers), personal networks, and social media, including targeted group adverts.

A total of 29,744 participants from 157 countries[1] took part in the study in April–May, 2020. Following previous research (Hensel et al., 2022), we focused our analyses on data from countries with at least 200 participants, leaving 26,684 participants from 51 countries. To remove potentially careless answers, we excluded participants based on the following criteria: participants were removed if (a) their average response time was shorter than 2 s per item, or (b) they provided 11 or more consecutive identical answers to the emotion questions, or (c) they had 11 or more missing values out of the 20 emotion questions (Curran, 2016; Huang et al., 2012). Data from 24,221 participants were retained. The dataset from Iran only contained 195 participants after data cleaning. However, given the dearth of research on emotions and well-being in Iran, we nevertheless included this sample in the analysis. For all statistical models, we applied a listwise removal strategy; consequently, the number of observations differs across models. The number of observations in each model is reported in each results table. Participants were between 16 and 101 years old ($M_{age} = 37.20$, $SD = 14.16$). Participants' demographic information in each country is reported in Table S1 in the online supplemental materials.

Materials

We sought to broadly sample specific positive and negative emotions that could potentially be relevant to well-being. Emotional experiences were measured using the question: "In the past week, to what extent did you experience the following emotions? (*not at all* = 0; *very much* = 6)," for the 20 emotions: admiration, calm, compassion, determination, feeling moved, gratitude, hope, love, relief, sensory pleasure (such as smell, sound, touch, etc.), anger, anxiety/worry, boredom, confusion, disgust, fear, frustration, loneliness, regret, and sadness. The order of presentation of the emotions was randomized.

We sought to assess well-being broadly, including both negative and positive facets. Based on previous research and existing definition of well-being, 10 items were used to measure well-being: one question measuring evaluative well-being (satisfaction with life), two questions measuring eudaimonic well-being (flourishing), two questions measuring resilience, and one item each measuring stress, tiredness, depression, mental health, and physical health (Block & Block, 1980; Diener et al., 1985; Ryff, 1989; Wilson & Cleary, 1995). Participants were instructed to indicate their well-being in the present moment. Detailed information on the well-being measures can be found in the "Study 1 Well-being measures" section in the online supplemental materials.

Control Variables

When testing the relationships between momentary emotional experiences and well-being, we took into account several stable features that are relevant to psychological well-being: age, gender, education, and subjective socioeconomic status (SES). Specifically, younger individuals, women, and those with less education have been shown to experience more stress and reduced well-being during the COVID-19 pandemic (Kowal et al., 2020), and people with lower SES have been found to be disproportionally influenced by COVID-19, including in terms of mental health (Patel et al., 2020).

We also included three domains of country-level features: COVID-19-related measures (COVID-19-related deaths, government policy stringency), global indices (GDP [Gross Domestic Product] and Gini Index), and cultural values (collectivism, individualism, tightness/looseness). The number of COVID-19-related deaths per million was used as an index of the severity of the outbreak in each country. Policy stringency was included because

[1] For simplicity, we use "countries" to refer to countries, districts, and special regions.

laxer policy measures in relation to the COVID-19 pandemic have been found to be associated with higher levels of psychological distress (Hensel et al., 2022; Jacobson et al., 2020). We also took into account country-level wealth (GDP) and inequality (Gini Index), because people in more affluent countries are on average happier than those in poorer countries (de Neve et al., 2018), and economic inequality is generally associated with worse well-being (Okulicz-Kozaryn & Mazelis, 2017). Finally, we included measures of cultural norms and values: collectivism/individualism (the extent to which the self is primarily seen in relation to the group (Triandis, 1989) and tightness/looseness (the strength of and adherence to social norms; Gelfand et al., 2011), as they have been found to be associated with well-being (Gelfand et al., 2021; Harrington et al., 2015).

Analyses and Results

Assessing the Well-Being Factor Structure

We first assessed the underlying factor structure of the well-being measures by conducting an exploratory item factor analysis (Wirth & Edwards, 2007) using Mplus 8.4 (Muthén & Muthén, 2017). Items with less than 10 response categories were treated as ordered categorical variables. Exploratory item factor analysis suggested that the four-factor model attained a sufficiently good fit (CFI = 0.98, RMSEA = 0.03, SRMR = 0.01). The four factors, each of which was defined by the items in the subsequent parenthesis, were labeled *Wellness* (both eudaimonic items and satisfaction with life), *Resilience* (both resilience items), *Health* (the mental health item and physical health item), and *Distress* (the items measuring stress, tiredness, and depression). The magnitude of interfactor correlations ranged from 0.37 to 0.74. The Cronbach's α of Wellness, Resilience, Health, and Distress was 0.83, 0.82, 0.74, and 0.82, respectively. Further details on the factor structure can be found in Tables S4–S5 in the online supplemental materials.

Descriptive Information

These data offer a rich, granular map of the emotional experiences and well-being of 24,221 participants from 51 countries during a period of high sustained stress. We found that overall, emotional experiences of love, compassion, hope, and gratitude were common in participants' daily life (Figures 1A and 2), as were feelings of anxiety, boredom, frustration, and sadness (Figures 1B and 2). As can be seen in Figures 2 and 3, the average self-reported score was higher for positive emotions ($M = 3.53$, $SD = 1.03$) as compared to negative emotions ($M = 2.67$, $SD = 1.34$), indicating that even during a period of sustained high stress, people on average experience more positive than negative emotions in their daily lives. Well-being levels per country are shown in Figure 4 (see also Figure S6 in the online supplemental materials for medians and 25%–75% quantiles), and detailed descriptive statistics of participants' demographic information, emotion, and well-being scores by country are reported in Tables S1–S3 in the online supplemental materials.

Model Setup

Because of the data structure with individuals (Level 1) being nested in countries (Level 2), we employed multilevel regression models to test which emotions would predict well-being during the COVID-19 pandemic. Each of the well-being outcomes was first analyzed with an unconditional means model (i.e., a model with no predictors) to estimate within- versus between-country variance. Some variability was found across countries for all four facets of well-being (see Figure 4) with 4%–7% of the variability explained by variance between countries, justifying the usage of multilevel models. Intraclass correlation coefficients per well-being outcome are displayed in Table S6 in the online supplemental materials. Regression analyses were conducted separately for each of the four well-being facets as outcomes. Level 1 predictors were standardized using grand mean and grand standard deviation. Level 2 predictors were standardized across the 51 countries before they were entered into the models.

In the first step of the multilevel regression models, the demographic variables age, gender, education, and SES were included as Level 1 fixed-effect control variables, with country (Level 2) as random intercept. In the second step, we added the 20 emotions at the same time into the model as fixed-effect predictors; since all 20 emotions were added simultaneously, the regression coefficients are "partial" effects that gauge the unique contribution of each predictor (the nonpartial relationships are reported as zero-order correlations; see the Further Analyses section). The variance inflation factors were below 5 for all models, indicating that there were no issues of multicollinearity. We then allowed independent random slopes for all 20 emotions in each model, that is, we allowed the emotion and well-being relationship to be different in each country. Adding random slopes of the emotions significantly improved the models. See Tables S7–S10 in the online supplemental materials for statistical details.

Primary Results—Distinct Emotions and Well-Being

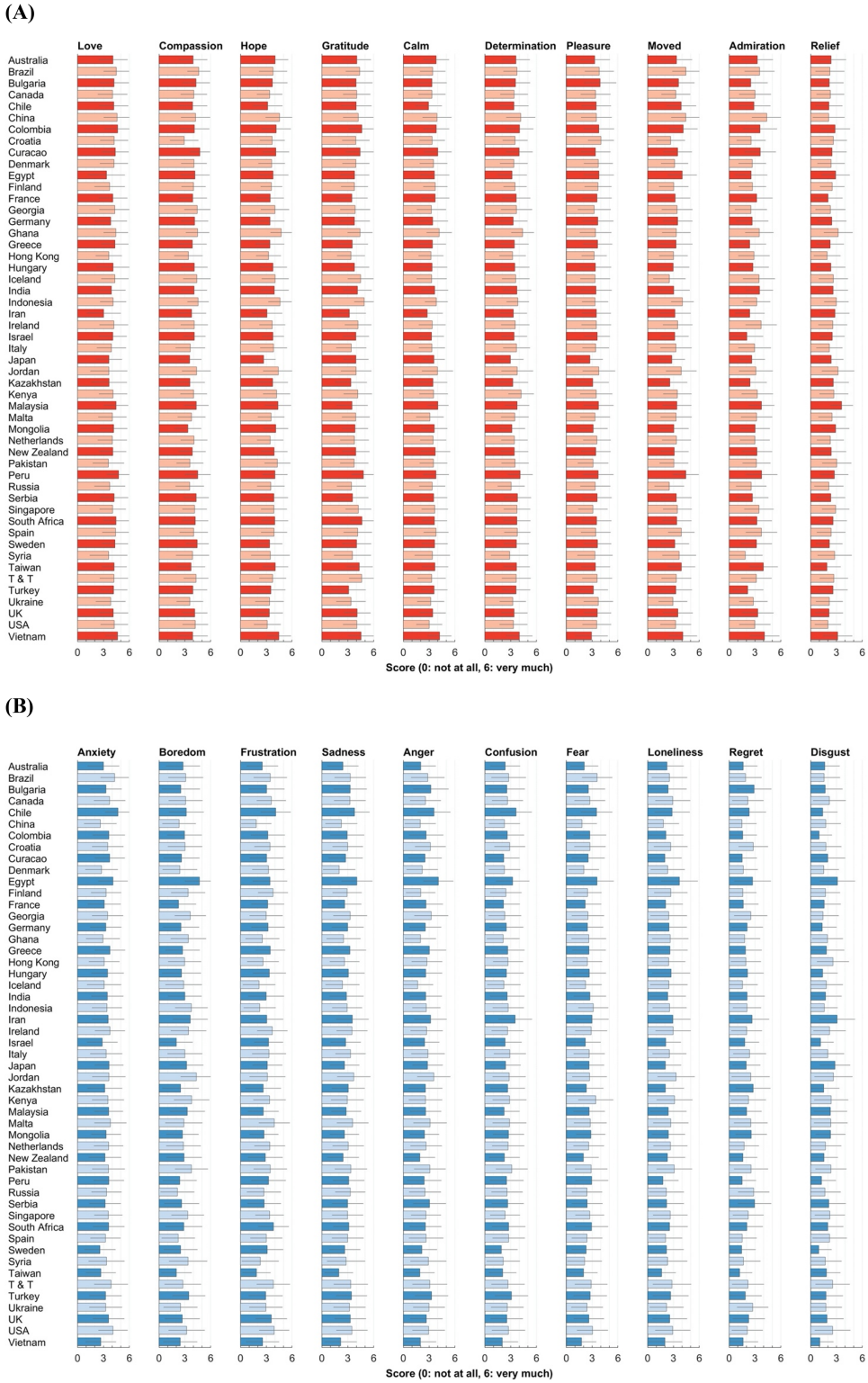
Substantial variance of well-being was explained by the control variables and the 20 emotions (wellness: 51.8%; resilience: 35.6%; health: 35.9%; distress: 50.6%). Many emotions were statistically significant predictors of well-being, thanks to the large sample size. We therefore focus on emotions with standardized coefficients above 0.05 (Funder & Ozer, 2019) as the most important emotions for well-being. The results are visualized in Figure 5, illustrating the extent to which experiences of different types of emotions predict each facet of well-being. The key positive emotions were *calm*, *hope*, *determination*, and *love*, which were all positively associated with wellness, resilience, and health. Calm and hope were also negatively associated with distress. The key negative emotions relating to well-being were *anxiety*, *frustration*, *loneliness*, *regret*, and *sadness*, which were all negatively associated with wellness and health, and positively associated with distress. Regret, sadness, and fear were also negatively associated with resilience. These results provide support for the notion that emotions differentially relate to well-being.

Control Variables and Well-Being

In line with other work (Aknin et al., 2022), we also found that women, younger individuals, and people with lower education and lower subjective SES had poorer well-being during the present pandemic (Tables S7–S10 in the online supplemental materials). For country-level variables, no significant effects were found beyond individual-level predictors for GDP or economic inequality (Table S9 in the online supplemental materials), nor for number of deaths (Table S9 in the online supplemental materials) or cultural

Figure 1

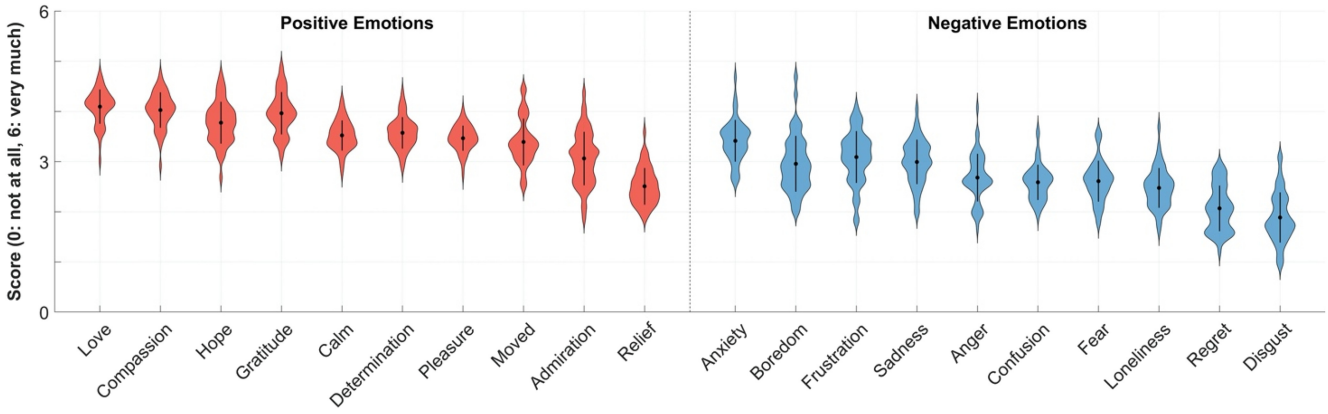
Emotions Experienced During the COVID-19 Pandemic in 51 Countries



Note. Mean (bars) and standard deviations (error bars) of the positive (A) and negative (B) emotion scores for each country. T&T = Trinidad and Tobago. See the online article for the color version of this figure.

Figure 2

Distribution of Country Mean Scores Per Emotion for the 51 Countries Used in the Regression Model



Note. Error bars show standard deviations. See the online article for the color version of this figure.

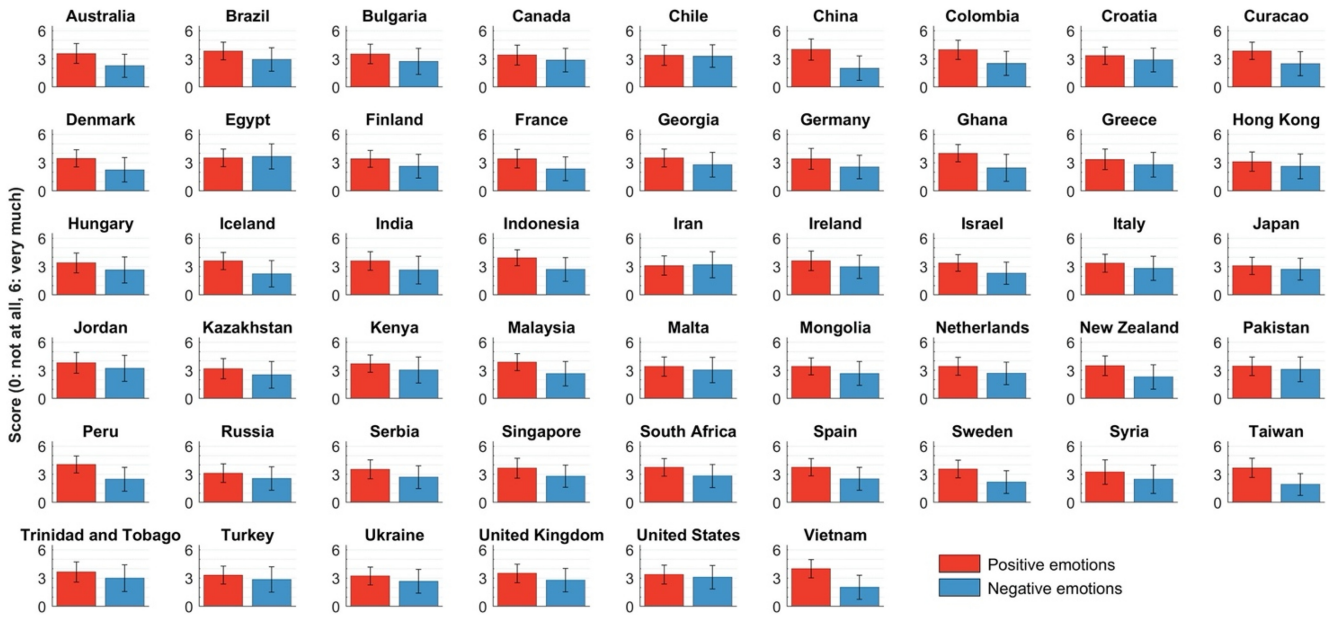
values (Table S10 in the online supplemental materials). In line with Hensel et al. (2022), we found that living in countries with more stringent measures in relation to COVID-19 was associated with higher resilience and less distress when holding other predictors constant (see Table S9 in the online supplemental materials for full statistical details).

Further Analyses

To test the robustness of our findings, we additionally used a fixed-effect approach to verify the multilevel regression results (Möhring, 2021), and to examine the cross-country (in)consistencies of the emotion-well-being relationships (note: the fixed-effect approach is different from fixed-effect in multilevel regression models). We found that calm, hope, and sadness displayed high cross-country consistency: the relationship between these emotions and well-being outcomes was in the same direction for all 51 countries. Substantial cross-country consistency was found for several additional emotions: For three out of four well-being outcomes, determination, love, loneliness, and regret were also consistent across all countries. The fixed-effect approach results are reported in Table S11 in the online supplemental materials, and we summarize the cultural consistency results in Table S12 in the online supplemental materials.

Figure 3

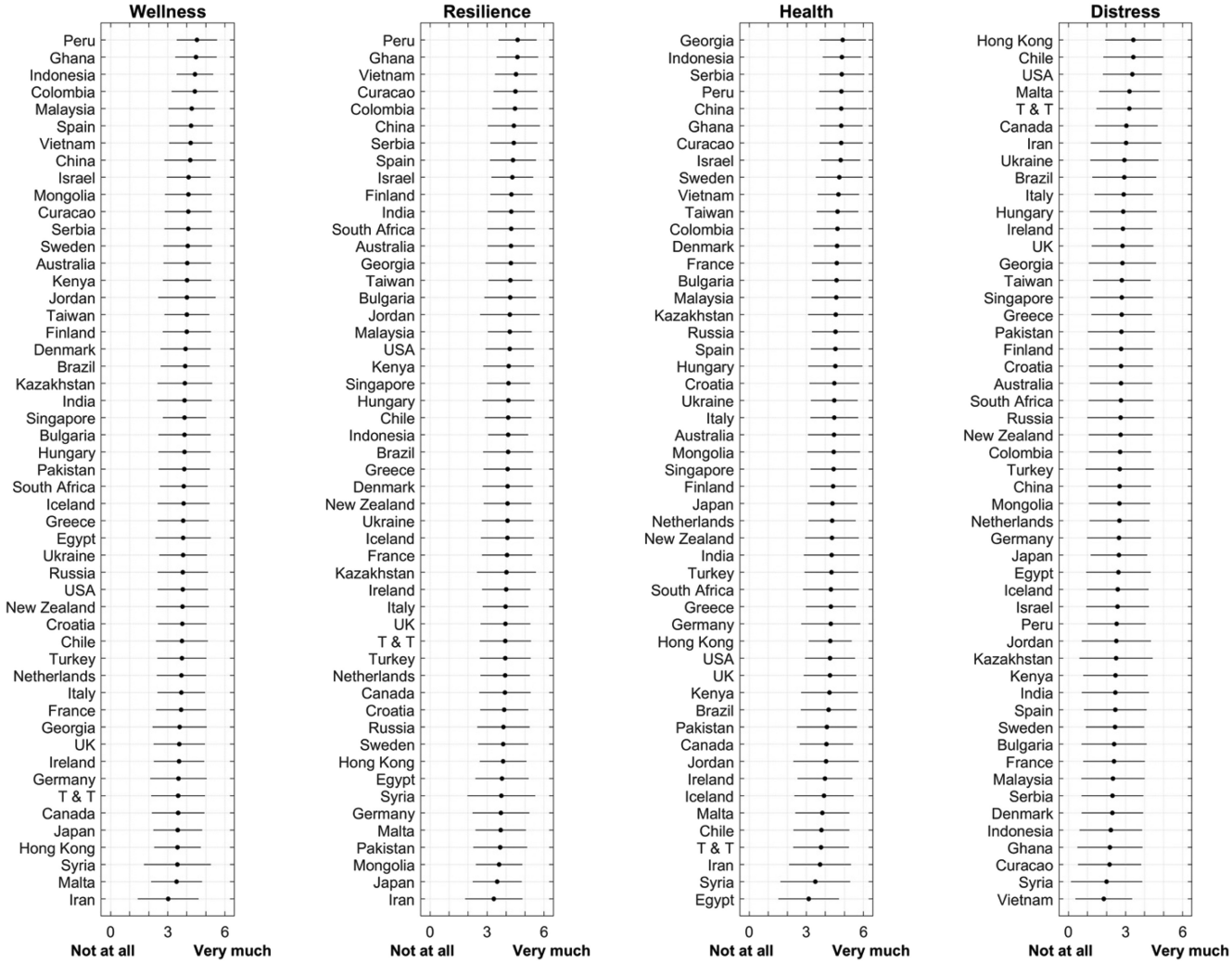
Average Positive (Left Bar) and Negative (Right Bar) Emotions During the COVID-19 Pandemic in Each Country



Note. The scores of the 10 positive/negative emotions were averaged to get a single positive/negative emotion value per participant. Bars show means, and error bars reflect standard deviation across participants per country. See the online article for the color version of this figure.

Figure 4

Facets of Well-Being, Showing Wellness, Resilience, Health, and Distress for Each of the 51 Countries Included in the Main Analyses



Note. Filled circles reflect means, and horizontal lines show standard deviation across participants per country. T&T = Trinidad and Tobago.

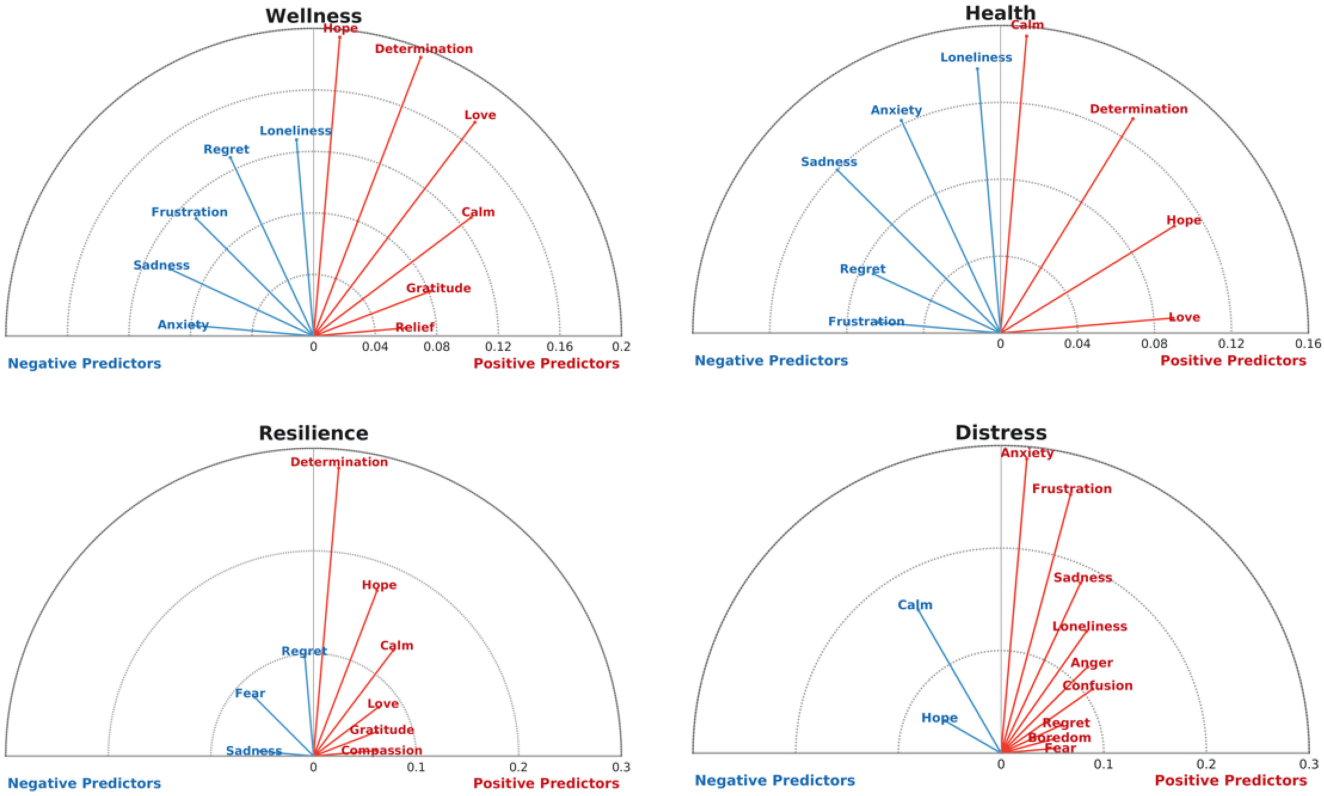
We also conducted robustness tests of our findings using exploratory structural equation modeling (ESEM) and split sample test–retest. We conducted ESEM to examine whether the key emotions form reasonable factors in predicting well-being facets. We did not conduct multigroup ESEM because there was little cross-country difference for both emotions and well-being measures. The ESEM results yielded analogous findings to those from the regression models. The results suggested that calm, determination, and hope (Emotion Factor 2) positively predicted wellness ($\beta = 0.54$), resilience ($\beta = 0.86$), and health ($\beta = 0.35$). Anxiety, fear, sadness, and calm (reverse scored) (Emotion Factor 3) positively predicted distress ($\beta = 0.25$). Calm and relief (Emotion Factor 7) negatively predicted distress ($\beta = -0.23$). Frustration, loneliness, regret, and sadness (Emotion Factor 8) negatively predicted wellness ($\beta = -0.34$) and positively predicted distress ($\beta = 0.23$).

To further test the reliability of the results, we reran the multilevel analyses using a split sample test–retest approach. We randomly selected half of the participants from each country as a test sample and the other half as a retest sample. The estimated parameters and variance explained by the test and retest models were highly consistent, further attesting to the robustness of the results. Detailed model fit as well as visualizations can be found in Figures S1–S5 in the online supplemental materials.

Finally, we conducted zero-order correlation analyses. In our original analyses, all 20 emotions were entered into the models at the same time, meaning that the regression coefficients were "partial" effects that gauged the unique contribution of each predictor. To test the relationship between each individual emotion and well-being facet without controlling for the other emotions, we ran zero-order correlations using Pearson correlation tests. The results of the zero-order correlations largely replicated the findings from the multilevel analyses. In particular, calm, determination, and hope were positively related to well-being, while anxiety, loneliness, frustration, and sadness were negatively related to well-being (in all of these cases, at least two out of

Figure 5

Radial Plots Showing Standardized Coefficients Above 0.05 for Individual-Level Factors for Each Dependent Variable



Note. The length of the lines reflects the standardized coefficients according to the radial axis. The angles of the lines have no meaning but for readability purposes. The left half shows factors that are negative predictors of the dependent variable, and the right half shows factors that are positive predictors of the dependent variable. See the online article for the color version of this figure.

four well-being facets had $r > .35$; see Table S14 in the online supplemental materials for all results).

In sum, the results from the ESEM, split sample test–retest, and zero-order correlations largely replicated our findings; full details can be found in the Further Analyses section in the online supplemental materials.

Study 1: Discussion

Using a large-scale dataset collected during the outbreak of the COVID-19 pandemic in 51 countries, we tested the general prediction that different types of momentary emotional experiences differentially relate to psychological well-being. We examined the relationship of 10 positive and 10 negative emotions with both positive and negative aspects of psychological well-being. Four key positive emotions (calm, hope, determination, and love), and five key negative emotions (anxiety, frustration, loneliness, regret, and sadness) were strong predictors of psychological well-being. Moreover, they displayed high cross-country consistency in their relationships with psychological well-being, suggesting that these associations generalize across cultural contexts. These findings provide initial evidence that specific types of momentary emotional experiences are key to psychological well-being. Due to time constraints, we were not able to include back- or team translations of the survey (Beaton et al., 2000; Epstein et al., 2015). However, the cross-cultural and cross-language consistency results in the results of Study 1 point to the different language versions having been largely understood in a consistent manner by our participants.

Study 2. Preregistered Analysis

Study 1 was exploratory in nature, and participants were recruited predominantly via the snowballing method, meaning that the samples were neither representative nor gender balanced. We therefore sought to test the robustness of the patterns of results from Study 1 in a preregistered replication with two independent samples that were nationally representative in terms of age, sex, and ethnicity. Specifically, Study 2 used the same survey items and response formats as in Study 1, allowing us to test the replicability of the findings that feelings of calm, determination, love, hope, anxiety, frustration, sadness, and loneliness would be related to well-being.[2]

[2] When we formulated the preregistration, approximately half of the data had been collected for Study 1. We ran preliminary analysis of 20 emotions and well-being using regression analysis based on the partial data in Study 1. In the results of the preliminary analysis, regret was not one of the key emotions. Therefore, we did not hypothesize a key role for regret in Study 2.

Method

Participants

Study 2 received the same ethical approval as in Study 1. Two samples that were nationally representative in terms of age, gender, and ethnicity were recruited through the research survey panel Prolific.co. Note that Prolific uses quota sampling, which is a nonprobability sampling method. There is thus no guarantee that the sample is representative of the general population in terms of other features than those reported here. One sample was recruited from the United Kingdom and one from the United States, with the aim to sample 1,000 participants in each. The data were collected from May 14 to 19, 2020, during the outbreak of the first wave of the COVID-19 pandemic in the United Kingdom and the United States. The materials in Study 2 were the same as in Study 1.

The hypothesis and analysis plan were preregistered at (https://aspredicted.org/vd352.pdf). Following the application of our preregistered data cleaning criteria, 971 U.K. participants (M_{age} = 46.91, SD_{age} = 15.72; 508 women) and 961 U.S. participants (M_{age} = 45.92, SD_{age} = 16.28; 494 women) were retained in the analyses.

Analyses and Results

Assessing the Well-Being Factor Structure

Following our preregistered analysis plan, we first assessed the well-being factor structure. Parameter estimation was configured like the one applied in the analysis of the data in Study 1, except that no adjustment for cluster sampling was needed. The same four-factor structure as in Study 1 was found in the U.K. sample (CFI = 0.99, RMSEA = 0.08, SRMR = 0.01) and the U.S. sample (CFI = 0.99, RMSEA = 0.07, SRMR = 0.01). We preregistered a two-factor well-being structure based on analyses of part of the global dataset. However, the four-factor well-being structure had a better model fit for both the dataset in Study 1 and these two preregistered datasets and was therefore adopted. Detailed analysis methods and comparisons of factor structures are reported in Section B "Factor analysis for well-being outcomes" and in Table S16 in the online supplemental materials.

Descriptive Information

Descriptive statistics of participants' emotional experiences and well-being are reported in Table S15 (B) in the online supplemental materials.

Primary Results—Distinct Emotions and Well-Being

We followed the preregistered analysis plan, first adding individual-level control variables into the models, and then the 20 emotions. The results from both the U.K. and U.S. samples provide clear, consistent support for the majority of our predictions based on Study 1. Specifically, for six of the eight emotions that we hypothesized to be main predictors of well-being (calm, determination, hope, anxiety, loneliness, and sadness), we found converging evidence with Study 1 in both the United Kingdom and the United States. Specifically, calm and determination positively predicted wellness, resilience, and health; hope positively predicted wellness and resilience; anxiety, loneliness, and sadness negatively predicted wellness, resilience and health; calm and hope negatively, and anxiety, loneliness and sadness positively, predicted distress. Detailed results can be found in Table S18 in the online supplemental materials.

However, we did not find evidence for key roles of momentary experiences of love or frustration for well-being in these two samples. Moreover, in the preregistration, we did not predict regret to be an emotion that would be especially important for well-being, but we found that feelings of regret predicted all four well-being outcomes in the U.S. sample and two well-being outcomes in the U.K. sample (wellness and distress).

Control Variables and Well-Being

Across the U.K. and the U.S. samples, participants with higher SES reported enhanced psychological well-being (wellness, resilience, and health). We did not find age to relate to psychological well-being. Finally, we found some gender differences: compared to women, men reported lower distress (in the U.K. sample) and higher resilience (in the U.S. sample). Detailed analyses and results are reported in Tables S18–S20 in the online supplemental materials.

Study 2: Discussion

Study 2 tested the robustness of the specific emotion-well-being relationships found in Study 1, employing preregistered hypotheses and analyses, applied to samples that were representative in terms of age, sex, and ethnicity. The results support most of the predicted relationships. As hypothesized, momentary experiences of calm, determination, hope, anxiety, sadness, and loneliness were key emotions for both positive and negative facets of well-being in these two samples. We did not, however, find support in Study 2 for love and frustration being key predictors of psychological well-being. Overall, the consistency of the findings across samples supports the robustness of the patterns of results.

Study 3. Testing a Temporal Relationship Between Emotions and Well-Being

Studies 1 and 2 provide clear support for differential relationships between specific emotional experiences and well-being. Our theorizing conceptualizes the emotional experiences as shaping subsequent well-being, but in Studies 1 and 2, the measures of emotions and well-being were collected concurrently, precluding conclusions about their temporal relationship. For emotional experiences to predict subsequent well-being, they must precede the changes in well-being. To empirically test this notion, we examined the temporal relationship between emotional experiences and well-being using existing data from a 30-day daily diary study.

Method

Participants

The study received ethical approval (Reference: 2020-SP-12027) from the Ethics Review Board of the Department of Social Psychology, University of Amsterdam. All participants consented to take part in the study. Participants were recruited via personal networks and social media, including targeted group adverts. A total of

140 participants residing in the United Kingdom took part in the study between April 10 and June 9, 2020. Data from 110 participants (55 women, 53 men, two other) were retained in the analyses. Participants' M_{age} was 37.98 years ($SD = 12.83$, range 18–71 years).

Study Procedure

The study was conducted in four phases. In the first part, participants gave informed digital consent and answered demographic questions. The second phase was a prediary questionnaire in which participants answered questions about stable traits, such as personality. The third phase was the 30-day diary study, during which participants answered a short (~10 min) daily online questionnaire each evening, shortly before going to bed. We used surveysignal.com to deliver the survey link; participants could choose whether to receive the questionnaire via text or email. We asked participants to indicate the intensity of their emotional experiences for 29 different positive and negative emotions for that day; each emotion was rated on a scale from 0 (*not intense at all*) to 100 (*very intense*). Of the 29 emotions measured, 17 overlapped with those tested in Studies 1 and 2 (frustration, regret, and confusion were not tested in the diary study). Participants also reported their end-of-day well-being, with well-being measures identical to those used in Studies 1 and 2. In the final phase, which was completed after the 30-day diary period, participants reported additional person-level traits, as well as completing the same battery of questionnaires as in the prediary phase.

Analyses and Results

Assessing the Well-Being Factor Structure

To confirm that the factor structure of well-being remained stable during the period of the daily diary study, we fitted a four-factor independent-cluster model in which the factor loading pattern was specified to the data of Days 1, 8, 15, and 22, in accordance with the Exploratory Factor Analysis (EFA) analysis reported in Studies 1 and 2. Results suggested that the four-factor well-being structure used in Studies 1 and 2 also fit the data well for this sample (see Tables S21–S22 in the online supplemental materials for details).

Emotional Experiences and Well-Being

To test for a temporal relationship of emotional experiences and well-being, we used a lagged analysis with a rolling[3] 7-day mean level of momentary emotional experience to predict well-being on the seventh day. The 17 emotions were added simultaneously into the multilevel regression models. We first fit models with only fixed effects and then added random effects (i.e., allowing the emotion-well-being relationship to differ between participants) for all Level 1 predictors. As the models failed to converge when random effects were allowed to correlate, we made the simplification of including independent random effects. We also added participants' SES, age, and gender in Level 2. As standardization is not advised in longitudinal studies (Moeller, 2015), we report unstandardized coefficients.

The results were consistent with the findings from Studies 1 and 2. As predicted, we found that the extent to which an individual had experienced momentary feelings of calm, hope, anxiety, loneliness, and sadness during the past week predicted their subsequent well-being. Specifically, calm positively predicted wellness, resilience, and health, and negatively predicted distress; hope positively predicted health; anxiety negatively predicted wellness, resilience, and health, and negatively predicted distress; loneliness negatively predicted health and positively predicted distress; sadness negatively predicted wellness and resilience, and positively predicted distress. In addition, anger was found to negatively predict wellness and health, and boredom was found to negatively predict wellness and resilience; neither anger nor boredom were key emotions in Studies 1 and 2. Detailed results are reported in Table S23 in the online supplemental materials.

Control Variables and Well-Being

In Study 3, we found that men reported better well-being (higher wellness and lower distress) than women. Participants with higher SES also reported higher well-being (wellness and health). We did not find a relationship between age and well-being outcomes, likely due to the relatively small sample size.

Study 3: Discussion

The results from Study 3 provide insights into the temporal relationship between emotional experiences and well-being. Experiences of calm, hope, anxiety, loneliness, sadness, and anger predicted well-being 1 week later, consistent with the cross-sectional findings in Studies 1 and 2. It is worth noting that although these data are longitudinal, they are not experimental, and so causal relationships cannot be established.

General Discussion

A substantive body of work has documented that positive emotions positively relate to well-being, and negative emotions negatively relate to well-being (e.g., Fredrickson, 2000; Nguyen & Fredrickson, 2017). These relationships are consistent across cultures and languages (Kuppens et al., 2008; Suh et al., 1998). The present work provides a strong replication of this work, both in analyses of distinct positive and negative emotions (Studies 1–3) and with average positive and negative emotions (Study 2; Table S17 in the online supplemental materials). These findings are consistent with the broaden-and-build theory, which suggests that positive emotions build behavioral and biological resources that benefit psychological well-being (Fredrickson, 2001). It is also in line with the mental health literature suggesting that the experiences of negative emotions are key factors and diagnostic criteria for various mental illnesses (American Psychiatric Association, 2013).

Standing on the shoulders of this literature, in three studies (total $N = 26{,}263$), we heed calls to go beyond the one-size-fits-all approach of positive and negative affect and examined the role of specific types of emotional experiences for well-being during the COVID-19 pandemic, demonstrating a uniquely important role for recent momentary experiences of *calm*, *hope*, *anxiety*, *loneliness*, and *sadness*. The results held across analytical approaches, were consistent across countries, and were replicated in two demographic (age, sex, ethnicity) representative samples using preregistered

[3] Here, the rolling mean refers to the mean level of the emotions during days 1–7, 2–8, 3–9, and so on.

analyses, as well as in a 30-day diary study. These emotions are thus the strongest candidates for constituting key emotional experiences for psychological well-being and may thus be promising targets for well-being interventions. Why might these particular types of emotional experiences play a key role for well-being during stress?

Experiences of calm reflect activation of the parasympathetic nervous system (Porges, 2007), allowing for psychological and physiological recovery from stress (Fredrickson et al., 2008). The benefits of feeling calm appear to be intuitively recognized, as evidenced by a global surge in the use of meditation apps during the COVID-19 pandemic (Lerman, 2020). Research suggests potential promise for interventions targeting calm to increase well-being (Sin & Lyubomirsky, 2009), including spending time in nature (Bratman et al., 2012, 2019).

In contrast, feelings of anxiety and sadness were linked to worse psychological well-being. Prolonged or frequent anxiety or sadness can indicate risk for developing mental health problems (Vinkers et al., 2020). Because of the nature of the COVID-19 pandemic, people have periodically been instructed to physically distance from others, precluding many social strategies for handling stress (Torales et al., 2020). Interventions promoting calm may ameliorate anxiety, given that calm and anxiety have been proposed to reflect two ends of a bipolar continuum (Siddaway et al., 2018).

We also found that individuals who experienced more loneliness reported poorer psychological well-being, a result that is consistent with previous research (Groarke et al., 2020). Social relationships play an important role in mental health (Hawkley & Cacioppo, 2010), with feelings of loneliness indicating an absence of social support (Taylor, 2006). The present finding that loneliness plays a pivotal role in psychological well-being during the COVID-19 pandemic emphasizes the importance of maintaining social connections while practicing physical distancing (Wu et al., 2021). Technology-mediated interactions may offer a partial remedy for the loss of face-to-face interactions (Sun et al., 2022).

Finally, we found that momentary feelings of hope were associated with better well-being during the COVID-19 outbreak stage. This is in line with longitudinal research that has found that higher levels of hope are associated with greater well-being and perceived emotional control, as well as lower levels of anxiety and COVID-19 perceived stress (Gallagher et al., 2021; Leslie-Miller et al., 2021). Hope helps individuals orient to opportunities in the environment (Hood et al., 2012) and can aid resilience during challenges (Rutter, 1993), pointing to a broader role of hope as a protective mechanism against stress. These findings align with research on well-being interventions focused on hope, which show some promise (Duggleby et al., 2007).

The patterns of results were remarkably uniform across countries, and cultural norms did not significantly predict psychological well-being above and beyond emotional experiences. These findings indicate strong cross-cultural consistencies in the role of emotional experience for well-being, at least during elevated stress. Moreover, stable demographic factors mapped onto well-being, with women, younger individuals, and people with fewer years of education reporting poorer well-being during the pandemic, consistent with previous findings (Kowal et al., 2020). These findings highlight the stressors relating to both financial and health strains in lower SES communities, women, and younger individuals, especially in times of crisis.

The present work has several limitations. First, this study was conducted during the COVID-19 pandemic and thus provides an account of the role of specific types of emotional experiences for well-being during chronic stress. Even though we selected our emotions based on prepandemic work and their theoretical relationship with well-being, like nearly all studies conducted during the COVID-19 pandemic, the present study lacks nonpandemic baseline data. Our conclusions are therefore limited to situations of collective stress, like a pandemic. Further work will be needed to determine the extent to which these relationships are found also in the contexts of other types of stressors and during periods of low stress. Second, as we sought to limit survey length, we were only able to include a limited number of well-being items from each well-being facet. It would be worthwhile for future studies to seek to replicate our findings using more comprehensive measures of well-being.

In summary, we found that individuals' recent momentary experiences of calm, hope, anxiety, loneliness, and sadness are particularly crucial for predicting psychological well-being. However, this does not imply that emotions and well-being are a personal responsibility (Davies, 2015; Vinkers et al., 2020). Responding to collective crises will require not only individuals, but also organizations and public institutions to create opportunities for momentary experiences of calm and hope, and interventions to tackle anxiety, sadness, and loneliness.

References

Aknin, L. B., De Neve, J.-E., Dunn, E. W., Fancourt, D. E., Goldberg, E., Helliwell, J. F., Jones, S. P., Karam, E., Layard, R., Lyubomirsky, S., Rzepa, A., Saxena, S., Thornton, E. M., VanderWeele, T. J., Whillans, A. V., Zaki, J., Karadag, O., & Ben Amor, Y. (2022). Mental health during the first year of the COVID-19 pandemic: A review and recommendations for moving forward. *Perspectives on Psychological Science*, *17*(4), 915–936. https://doi.org/10.1177/17456916211029964

Alkozei, A., Smith, R., & Killgore, W. D. S. (2018). Gratitude and subjective wellbeing: A proposal of two causal frameworks. *Journal of Happiness Studies*, *19*(5), 1519–1542. https://doi.org/10.1007/s10902-017-9870-1

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

Barnard, L. K., & Curry, J. F. (2011). Self-compassion: Conceptualizations, correlates, & interventions. *Review of General Psychology*, *15*(4), 289–303. https://doi.org/10.1037/a0025754

Barrett, L. F. (2012). Emotions are real. *Emotion*, *12*(3), 413–429. https://doi.org/10.1037/a0027555

Barrett-Cheetham, E., Williams, L. A., & Bednall, T. C. (2016). A differentiated approach to the link between positive emotion, motivation, and eudaimonic well-being. *The Journal of Positive Psychology*, *11*(6), 595–608. https://doi.org/10.1080/17439760.2016.1152502

Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*, *25*(24), 3186–3191. https://doi.org/10.1097/00007632-200012150-00014

Block, J. H., & Block, J. (1980). The role of ego-control and ego-resiliency in the organization of behavior. In W. A. Collins (Ed.), *Development of cognition, affect and social relations. The Minnesota symposia on child psychology* (Vol. 13, pp. 39–101). Erlbaum. https://doi.org/10.4324/9781315803029-7

Bratman, G. N., Anderson, C. B., Berman, M. G., Cochran, B., De Vries, S., Flanders, J., Folke, C., Frumkin, H., Gross, J. J., & Hartig, T. (2019). Nature and mental health: An ecosystem service perspective. *Science Advances*, *5*(7), Article eaax0903. https://doi.org/10.1126/sciadv.aax0903

Bratman, G. N., Hamilton, J. P., & Daily, G. C. (2012). The impacts of nature experience on human cognitive function and mental health. *Annals of the*

New York Academy of Sciences, *1249*(1), 118–136. https://doi.org/10.1111/j.1749-6632.2011.06400.x

Bruine de Bruin, W., Dombrovski, A. Y., Parker, A. M., & & Szanto, K. (2016). Late-life depression, suicidal ideation, and attempted suicide: The role of individual differences in maximizing, regret, and negative decision outcomes. *Journal of Behavioral Decision Making*, *29*(4), 363–371. https://doi.org/10.1002/bdm.1882

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., Duriez, B., Lens, W., Matos, L., Mouratidis, A., Ryan, R. M., Sheldon, K. M., Soenens, B., Van Petegem, S., & Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion*, *39*(2), 216–236. https://doi.org/10.1007/s11031-014-9450-1

Chipperfield, J. G., Perry, R. P., & Weiner, B. (2003). Discrete emotions in later life. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *58*(1), P23–P34. https://doi.org/10.1093/geronb/58.1.P23

Cowen, A. S., & Keltner, D. (2017). Self-report captures 27 distinct categories of emotion bridged by continuous gradients. *Proceedings of the National Academy of Sciences*, *114*(38), E7900–E7909. https://doi.org/10.1073/pnas.1702247114

Curran, P. G. (2016). Methods for the detection of carelessly invalid responses in survey data. *Journal of Experimental Social Psychology*, *66*, 4–19. https://doi.org/10.1016/j.jesp.2015.07.006

Curtis, V. (2011). Why disgust matters. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *366*(1583), 3478–3490. https://doi.org/10.1098/rstb.2011.0165

Davies, W. (2015). *The happiness industry: How the government and big business sold us well-being*. Verso Books.

de Neve, J.-E. E., Ward, G., De Keulenaer, F., van Landeghem, B., Kavetsos, G., & Norton, M. I. (2018). The asymmetric experience of positive and negative economic growth: Global evidence using subjective well-being data. *The Review of Economics and Statistics*, *100*(2), 362–375. https://doi.org/10.1162/REST_a_00697

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, *49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Diener, E., Oishi, S., & Lucas, R. E. (2003). Personality, culture, and subjective well-being: Emotional and cognitive evaluations of life. *Annual Review of Psychology*, *54*(1), 403–425. https://doi.org/10.1146/annurev.psych.54.101601.145056

Duggleby, W. D., Degner, L., Williams, A., Wright, K., Cooper, D., Popkin, D., & Holtslander, L. (2007). Living with hope: Initial evaluation of a psychosocial hope intervention for older palliative home care patients. *Journal of Pain and Symptom Management*, *33*(3), 247–257. https://doi.org/10.1016/j.jpainsymman.2006.09.013

Eid, M., & Diener, E. (2004). Global judgments of subjective well-being: Situational variability and long-term stability. *Social Indicators Research*, *65*(3), 245–277. https://doi.org/10.1023/B:SOCI.0000003801.89195.bc

Epstein, J., Osborne, R. H., Elsworth, G. R., Beaton, D. E., & Guillemin, F. (2015). Cross-cultural adaptation of the Health Education Impact Questionnaire: Experimental study showed expert committee, not back-translation, added value. *Journal of Clinical Epidemiology*, *68*(4), 360–369. https://doi.org/10.1016/j.jclinepi.2013.07.013

Fehr, B., & Russell, J. A. (1984). Concept of emotion viewed from a prototype perspective. *Journal of Experimental Psychology: General*, *113*(3), 464–486. https://doi.org/10.1037/0096-3445.113.3.464

Fiske, A. P. (2019). *Kama Muta: Discovering the connecting emotion*. Routledge.

Fredrickson, B. L. (2000). Cultivating positive emotions to optimize health and well-being. *Prevention & Treatment*, *3*(1), Article 1. https://doi.org/10.1037/1522-3736.3.1.31a

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist*, *56*(3), 218–226. https://doi.org/10.1037/0003-066X.56.3.218

Fredrickson, B. L., Cohn, M. A., Coffey, K. A., Pek, J., & Finkel, S. M. (2008). Open hearts build lives: Positive emotions, induced through loving-kindness meditation, build consequential personal resources. *Journal of Personality and Social Psychology*, *95*(5), 1045–1062. https://doi.org/10.1037/a0013262

Funder, D. C., & Ozer, D. J. (2019). Evaluating effect size in psychological research: Sense and nonsense. *Advances in Methods and Practices in Psychological Science*, *2*(2), 156–168. https://doi.org/10.1177/2515245919847202

Gallagher, M. W., Smith, L. J., Richardson, A. L., D'Souza, J. M., & Long, L. J. (2021). Examining the longitudinal effects and potential mechanisms of hope on COVID-19 stress, anxiety, and well-being. *Cognitive Behaviour Therapy*, *50*(3), 234–245. https://doi.org/10.1080/16506073.2021.1877341

Gelfand, M. J., Jackson, J. C., Pan, X., Nau, D., Pieper, D., Denison, E., Dagher, M., Van Lange, P. A. M., Chiu, C.-Y., & Wang, M. (2021). The relationship between cultural tightness–looseness and COVID-19 cases and deaths: A global analysis. *The Lancet Planetary Health*, *5*(3), E135–E144. https://doi.org/10.1016/s2542-5196(20)30301-6

Gelfand, M. J., Raver, J. L., Nishii, L., Leslie, L. M., Lun, J., Lim, B. C., Duan, L., Almaliach, A., Ang, S., Arnadottir, J., Aycan, Z., Boehnke, K., Boski, P., Cabecinhas, R., Chan, D., Chhokar, J., D'Amato, A., Ferrer, M., Fischlmayr, I. C., … Yamaguchi, S. (2011). Differences between tight and loose cultures: A 33-nation study. *Science*, *332*(6033), 1100–1104. https://doi.org/10.1126/science.1197754

Golden, J., Conroy, R. M., Bruce, I., Denihan, A., Greene, E., Kirby, M., & Lawlor, B. A. (2009). Loneliness, social support networks, mood and wellbeing in community-dwelling elderly. *International Journal of Geriatric Psychiatry*, *24*(7), 694–700. https://doi.org/10.1002/gps.2181

Groarke, J. M., Berry, E., Graham-Wisener, L., McKenna-Plumley, P. E., McGlinchey, E., & Armour, C. (2020). Loneliness in the UK during the COVID-19 pandemic: Cross-sectional results from the COVID-19 psychological wellbeing study. *PLoS ONE*, *15*(9), Article e0239698. https://doi.org/10.1371/journal.pone.0239698

Harrington, J. R., Boski, P., & Gelfand, M. J. (2015). Culture and national well-being: Should societies emphasize freedom or constraint? *PLoS ONE*, *10*(6), Article e0127173. https://doi.org/10.1371/journal.pone.0127173

Hawkley, L. C., & Cacioppo, J. T. (2010). Loneliness matters: A theoretical and empirical review of consequences and mechanisms. *Annals of Behavioral Medicine*, *40*(2), 218–227. https://doi.org/10.1007/s12160-010-9210-8

Hensel, L., Witte, M., Caria, S., Fetzer, T., Fiorin, S., Goetz, F. M., Gomez, M., Haushofer, J., Ivchenko, A., Kraft-Todd, G., Reutskaja, E., Roth, C., Yoeli, E., & Jachimowicz, J. M. (2022). Global behaviors, perceptions, and the emergence of social norms at the onset of the COVID-19 pandemic. *Journal of Economic Behavior & Organization*, *193*, 473–496. https://doi.org/10.1016/j.jebo.2021.11.015

Holmes, E. A., O'Connor, R. C., Perry, V. H., Tracey, I., Wessely, S., Arseneault, L., Ballard, C., Christensen, H., Silver, R. C., Everall, I., Cohen Silver, R., Everall, I., Ford, T., John, A., Kabir, T., King, K., Madan, I., Michie, S., Przybylski, A. K., … Everall, I. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: A call for action for mental health science. *The Lancet Psychiatry*, *7*(6), 547–560. https://doi.org/10.1016/S2215-0366(20)30168-1

Hood, A., Pulvers, K., Carrillo, J., Merchant, G., & Thomas, M. D. (2012). Positive traits linked to less pain through lower pain catastrophizing. *Personality and Individual Differences*, *52*(3), 401–405. https://doi.org/10.1016/j.paid.2011.10.040

Houben, M., Van Den Noortgate, W., & Kuppens, P. (2015). The relation between short-term emotion dynamics and psychological well-being: A

meta-analysis. *Psychological Bulletin*, *141*(4), 901–930. https://doi.org/10.1037/a0038822

Huang, J. L., Curran, P. G., Keeney, J., Poposki, E. M., & DeShon, R. P. (2012). Detecting and deterring insufficient effort responding to surveys. *Journal of Business and Psychology*, *27*(1), 99–114. https://doi.org/10.1007/s10869-011-9231-8

Huppert, F. A. (2009). Psychological well-being: Evidence regarding its Causes and Consequences. *Applied Psychology: Health and Well-Being*, *1*(2), 137–164. https://doi.org/10.1111/j.1758-0854.2009.01008.x

Jacobson, N. C., Lekkas, D., Price, G., Heinz, M. V., Song, M., O'Malley, A. J., & Barr, P. J. (2020). Flattening the mental health curve: COVID-19 stay-at-home orders result in alterations in mental health search behavior in the United States. *JMIR Mental Health*, *7*(6), Article e19347. https://doi.org/10.2196/19347

Kaspereen, D. (2012). Relaxation intervention for stress reduction among teachers and staff. *International Journal of Stress Management*, *19*(3), 238–250. https://doi.org/10.1037/a0029195

Keltner, D., & Gross, J. J. (1999). Functional accounts of emotions. *Cognition & Emotion*, *13*(5), 467–480. https://doi.org/10.1080/026999399379140

Kerr, S., Johnson, V. K., Gans, S. E., & Krumrine, J. (2004). Predicting adjustment during the transition to college: Alexithymia, perceived stress, and psychological symptoms. *Journal of College Student Development*, *45*(6), 593–611. https://doi.org/10.1353/csd.2004.0068

King, L. A. (2008). Interventions for enhancing subjective well-being: Can we make people happier and should we? In M. Eid & R. J. Larsen (Eds.), *The science of subjective well-being* (pp. 431–448). Guilford Press.

Kirby, L. D., Tugade, M. N., & Shiota, M. N. (2020). Conclusions and future directions. In M. N. Tugade, M. N. Shiota, & L. D. Kirby (Eds.), *Handbook of positive emotians*. (pp. 479–485). The Guilford Press.

Kopper, B. A., & Epperson, D. L. (1996). The experience and expression of anger: Relationships with gender, gender role socialization, depression, and mental health functioning. *Journal of Counseling Psychology*, *43*(2), 158–165. https://doi.org/10.1037/0022-0167.43.2.158

Kowal, M., Coll-Martín, T., Ikizer, G., Rasmussen, J., Eichel, K., Studzińska, A., Koszałkowska, K., Karwowski, M., Najmussaqib, A., Pankowski, D., Lieberoth, A., & Ahmed, O. (2020). Who is the most stressed during the COVID-19 pandemic? Data from 26 countries and areas. *Applied Psychology: Health and Well-Being*, *12*(4), 946–966. https://doi.org/10.1111/aphw.12234

Kuppens, P., Realo, A., & Diener, E. (2008). The role of positive and negative emotions in life satisfaction judgment across nations. *Journal of Personality and Social Psychology*, *95*(1), 66–75. https://doi.org/10.1037/0022-3514.95.1.66

Lecci, L., Okun, M. A., & Karoly, P. (1994). Life regrets and current goals as predictors of psychological adjustment. *Journal of Personality and Social Psychology*, *66*(4), 731–741. https://doi.org/10.1037/0022-3514.66.4.731

Lerman, R. (2020). *Headspace, Calm, Ten Percent Happier and other meditation apps see surge in coronavirus-related relaxation*. *The Washington Post*. https://www.washingtonpost.com/technology/2020/04/21/meditation-up-during-coronavirus/

Leslie-Miller, C. J., Waugh, C. E., & Cole, V. T. (2021). Coping with COVID-19: The benefits of anticipating future positive events and maintaining Optimism. *Frontiers in Psychology*, *12*, Article 646047. https://doi.org/10.3389/fpsyg.2021.646047

Li, P. J., Wong, Y. J., & Chao, R. C. L. (2019). Happiness and meaning in life: Unique, differential, and indirect associations with mental health. *Counselling Psychology Quarterly*, *32*(3-4), 396–414. https://doi.org/10.1080/09515070.2019.1604493

MacLeod, C., & Clarke, P. J. F. (2015). The attentional bias modification approach to anxiety intervention. *Clinical Psychological Science*, *3*(1), 58–78. https://doi.org/10.1177/2167702614560749

Masi, C. M., Chen, H.-Y., Hawkley, L. C., & Cacioppo, J. T. (2011). A meta-analysis of interventions to reduce loneliness. *Personality and Social Psychology Review*, *15*(3), 219–266. https://doi.org/10.1177/1088868310377394

Moeller, J. (2015). A word on standardization in longitudinal studies: Don't. *Frontiers in Psychology*, *6*, Article 1389. https://doi.org/10.3389/fpsyg.2015.01389

Möhring, K. (2021, February 22). *The fixed effects approach as an alternative to multilevel analysis for cross-national analyses*. https://doi.org/10.31235/osf.io/3xw7v

Moskowitz, J. T., Cheung, E. O., Freedman, M., Fernando, C., Zhang, M. W., Huffman, J. C., & Addington, E. L. (2021). Measuring positive emotion outcomes in positive psychology interventions: A literature review. *Emotion Review*, *13*(1), 60–73. https://doi.org/10.1177/1754073920950811

Motenko, A. K. (1989). The frustrations, gratifications, and well-being of dementia caregivers. *The Gerontologist*, *29*(2), 166–172. https://doi.org/10.1093/geront/29.2.166

Muthén, B., & Muthén, L. (2017). *Mplus*. Chapman and Hall/CRC.

Neff, K. D., & Seppälä, E. (2017). Compassion, well-being, and the hypo-egoic self. In K. W. Brown & M. R. Leary (Eds.), *The Oxford handbook of hypo-egoic phenomena* (pp. 189–203). Oxford University Press.

Nguyen, K. D., & Fredrickson, B. L. (2017). Positive emotions and well-being. In D. S. Dunn (Ed.), *Positive psychology* (pp. 29–45). Routledge.

Oishi, S., Schimmack, U., & Diener, E. (2001). Pleasures and subjective well-being. *European Journal of Personality*, *15*(2), 153–167. https://doi.org/10.1002/per.406

Okulicz-Kozaryn, A., & Mazelis, J. M. (2017). More unequal in income, more unequal in wellbeing. *Social Indicators Research*, *132*(3), 953–975. https://doi.org/10.1007/s11205-016-1327-0

Oravecz, Z., Dirsmith, J., Heshmati, S., Vandekerckhove, J., & Brick, T. R. (2020). Psychological well-being and personality traits are associated with experiencing love in everyday life. *Personality and Individual Differences*, *153*, Article 109620. https://doi.org/10.1016/j.paid.2019.109620

Patel, J. A., Nielsen, F. B. H., Badiani, A. A., Assi, S., Unadkat, V. A., Patel, B., Ravindrane, R., & Wardle, H. (2020). Poverty, inequality and COVID-19: The forgotten vulnerable. *Public Health*, *183*, 110–111. https://doi.org/10.1016/j.puhe.2020.05.006

Perrin, P., McCabe, O., Everly, G., & Links, J. (2009). Preparing for an influenza pandemic: Mental health considerations. *Prehospital and Disaster Medicine*, *24*(3), 223–230. https://doi.org/10.1017/S1049023X00006853

Plaut, V. C., Markus, H. R., Treadway, J. R., & Fu, A. S. (2012). The cultural construction of self and well-being: A tale of two cities. *Personality and Social Psychology Bulletin*, *38*(12), 1644–1658. https://doi.org/10.1177/0146167212458125

Pleeging, E., Burger, M., & van Exel, J. (2021). The relations between hope and subjective well-being: A literature overview and empirical analysis. *Applied Research in Quality of Life*, *16*(3), 1019–1041. https://doi.org/10.1007/s11482-019-09802-4

Poerio, G. L., Totterdell, P., Emerson, L.-M., & Miles, E. (2015). Love is the triumph of the imagination: Daydreams about significant others are associated with increased happiness, love and connection. *Consciousness and Cognition*, *33*, 135–144. https://doi.org/10.1016/j.concog.2014.12.011

Porges, S. W. (2007). The polyvagal perspective. *Biological Psychology*, *74*(2), 116–143. https://doi.org/10.1016/j.biopsycho.2006.06.009

Pressman, S. D., & Cross, M. P. (2018). Moving beyond a one-size-fits-all view of positive affect in health research. *Current Directions in Psychological Science*, *27*(5), 339–344. https://doi.org/10.1177/0963721418760214

Roy-Byrne, P. P., Craske, M. G., & Stein, M. B. (2006). Panic disorder. *The Lancet*, *368*(9540), 1023–1032. https://doi.org/10.1016/S0140-6736(06)69418-X

Rutter, M. (1993). Resilience: Some conceptual considerations. *Journal of Adolescent Health*, *14*(8), 626–631. https://doi.org/10.1016/1054-139X(93)90196-V

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being.

American Psychologist, *55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology*, *57*(6), 1069–1081. https://doi.org/10.1037/0022-3514.57.6.1069

Schindler, I. (2014). Relations of admiration and adoration with other emotions and well-being. *Psychology of Well-Being*, *4*(1), Article 14. https://doi.org/10.1186/s13612-014-0014-7

Siddaway, A. P., Taylor, P. J., & Wood, A. M. (2018). Reconceptualizing anxiety as a Continuum that ranges from high calmness to high anxiety: The joint importance of reducing distress and increasing well-being. *Journal of Personality and Social Psychology*, *114*(2), e1–e11. https://doi.org/10.1037/pspp0000128

Sin, N. L., & Lyubomirsky, S. (2009). Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: A practice-friendly meta-analysis. *Journal of Clinical Psychology*, *65*(5), 467–487. https://doi.org/10.1002/jclp.20593

Suh, E., Diener, E., Oishi, S., & Triandis, H. C. (1998). The shifting basis of life satisfaction judgments across cultures: Emotions versus norms. *Journal of Personality and Social Psychology*, *74*(2), 482–493. https://doi.org/10.1037/0022-3514.74.2.482

Sun, R., Rieble, C., Liu, Y., & Sauter, D. (2022). Connected despite COVID-19: The role of social interactions and social media for wellbeing. *Collabra: Psychology*, *8*(1), Article 37061. https://doi.org/10.1525/collabra.37061

Taylor, S. E. (2006). Tend and befriend: Biobehavioral bases of affiliation under stress. *Current Directions in Psychological Science*, *15*(6), 273–277. https://doi.org/10.1111/j.1467-8721.2006.00451.x

Telenti, A., Arvin, A., Corey, L., Corti, D., Diamond, M. S., García-Sastre, A., Garry, R. F., Holmes, E. C., Pang, P. S., & Virgin, H. W. (2021). After the pandemic: Perspectives on the future trajectory of COVID-19. *Nature*, *596*(7873), 495–504. https://doi.org/10.1038/s41586-021-03792-w

Torales, J., O'Higgins, M., Castaldelli-Maia, J. M., & Ventriglio, A. (2020). The outbreak of COVID-19 coronavirus and its impact on global mental health. *International Journal of Social Psychiatry*, *66*(4), 317–320. https://doi.org/10.1177/0020764020915212

Triandis, H. C. (1989). The self and social behavior in differing cultural contexts. *Psychological Review*, *96*(3), 506–520. https://doi.org/10.1037/0033-295X.96.3.506

Van Kleef, G. A. (2010). Don't worry, be angry? Effects of anger on feelings, thoughts, and actions in conflict and negotiation. In M. Potegal, G. Stemmler, & C. D. Spielberger (Eds.), *International handbook of anger* (pp. 545–559). Springer. https://doi.org/10.1007/978-0-387-89676-2

Vinkers, C. H., van Amelsvoort, T., Bisson, J. I., Branchi, I., Cryan, J. F., Domschke, K., Manchia, M., Pinto, L., de Quervain, D., Schmidt, M. V., & van der Wee, N. (2020). Stress resilience during the coronavirus pandemic. *European Neuropsychopharmacology*, *35*, 12–16. https://doi.org/10.1016/j.euroneuro.2020.05.003

Wilson, I. B., & Cleary, P. D. (1995). Linking clinical variables with health-related quality of life. A conceptual model of patient outcomes. *JAMA*, *273*(1), 59–65. https://doi.org/10.1001/jama.1995.03520250075037

Wirth, R. J., & Edwards, M. C. (2007). Item factor analysis: Current approaches and future directions. *Psychological Methods*, *12*(1), 58–79. https://doi.org/10.1037/1082-989X.12.1.58

Wood, A. M., Froh, J. J., & Geraghty, A. W. (2010). Gratitude and well-being: A review and theoretical integration. *Clinical Psychology Review*, *30*(7), 890–905. https://doi.org/10.1016/j.cpr.2010.03.005

World Health Organization. (2022). https://covid19.who.int/

Wu, Y.-J., Wu, Y.-J., Chen, C.-W., & Sun, R. (2021). *The relations of social support and social connectedness to well-being during the COVID-19 pandemic across 49 countries*. PsyArXiv. https://osf.io/7fqvs

Zhang, D. D., Lee, H. F., Wang, C., Li, B., Pei, Q., Zhang, J., & An, Y. (2011). The causality analysis of climate change and large-scale human crisis. *Proceedings of the National Academy of Sciences*, *108*(42), 17296–17301. https://doi.org/10.1073/pnas.1104268108

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