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An International Study on Psychological Coping During COVID-19: Towards a Meaning-Centered Coping Style



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Abstract

Background/Objective: This study examined the role of different psychological coping mechanisms in mental and physical health during the initial phases of the COVID-19 crisis with an emphasis on meaning-centered coping. **Method:** A total of 11,227 people from 30 countries across all continents participated in the study and completed measures of psychological distress (depression, stress, and anxiety), loneliness, well-being, and physical health, together with measures of problem-focused and emotion-focused coping, and a measure called the Meaning-centered Coping Scale (MCCS) that was developed in the present study. Validation analyses of the MCCS were performed in all countries, and data were assessed by multilevel modeling (MLM). **Results:** The MCCS showed a robust one-factor structure in 30 countries with good test-retest, concurrent and divergent validity results. MLM analyses showed mixed results regarding emotion and problem-focused coping strategies. However, the MCCS was the strongest positive predictor of physical and mental health among all coping strategies, independently of demographic characteristics and country-level variables. **Conclusions:** The findings suggest that the MCCS is a valid measure to assess meaning-centered coping. The results also call for policies promoting effective coping to mitigate collective suffering during the pandemic.

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PALABRAS CLAVE

Escala de afronta-
miento centrada en el
sentido;
Malestar psicológico;
Bienestar;
COVID-19;
Estudio ex post facto

Estudio internacional sobre afrontamiento psicológico durante el COVID-19: Hacia un afrontamiento centrado en el sentido

Resumen

Antecedentes/Objetivo: Este estudio examinó el papel de diferentes estrategias de afrontamiento psicológico en la salud mental y física durante las fases iniciales de la crisis de COVID-19. **Método:** 11,227 personas de 30 países representando todos los continentes participaron en el estudio y completaron medidas de malestar psicológico (depresión, estrés y ansiedad), soledad, bienestar, salud física, medidas de afrontamiento centrado en el problema y en la emoción, y una medida denominada Escala del Afrontamiento Centrado en el Sentido (MCCS) que fue desarrollada en este estudio. El análisis de validación de la MCCS se realizó en todos los países, y los datos se evaluaron mediante un modelo multinivel. **Resultados:** La MCCS mostró una estructura unifactorial en 30 países con buenos resultados de validez test-retest, concurrente y divergente. Los análisis mostraron resultados mixtos en cuanto a las estrategias de afrontamiento centradas en la emoción y en el problema. La MCCS fue el predictor positivo más fuerte de salud física y mental, independientemente de las características demográficas y las variables a nivel de país. **Conclusiones:** Los resultados sugieren que la MCCS es un instrumento fiable para medir afrontamiento centrado en el sentido. Estos resultados pueden servir para dirigir políticas que promuevan un afrontamiento eficaz con el fin de mitigar el sufrimiento colectivo durante la pandemia.

The current COVID-19 pandemic represents the largest collective trauma in a generation. Beyond the direct impact of the coronavirus itself, the health and well-being of many people has been adversely affected by the global crisis. For example, the pandemic has negatively impacted mental health (e.g., Bueno-Notivol, 2021; Holingue et al., 2020; Kirzinger et al., 2020; Qiu et al., 2020; Wang et al., 2020; Witters & Harter, 2020), increased levels of anxiety (Qian et al., 2020) and posttraumatic stress symptoms (Liu et al., 2020) and much more besides, similarly to previous epidemics (for a review, see Brooks et al., 2020). Although several recent studies have explored the impact of the pandemic on mental health, there is still a paucity of data about the effectiveness of psychological coping mechanisms that may act as a buffer against the adverse effects of this collective trauma (Baloran, 2020; Cai et al., 2020; Dawson & Golijani-Moghaddam, 2020; Gerhold, 2020; Polizzi et al., 2020; Rosa-Alcázar et al., 2021).

In the literature on coping, problem-focused strategies (attempts to resolve some aspect of the stressor; see Folkman & Lazarus, 1984) are generally deemed adaptive (e.g., Main et al., 2011). Such strategies may include, in the context of COVID-19, following guidelines to stop the spread of the virus and adhering to protective measures (e.g., Cai et al., 2020; Gerhold, 2020). However, the use of problem-focused strategies has been also associated with negative emotions such as anxiety, fear, and anger (Huang et al., 2020). Another broad category, emotion-focused coping strategies, where one attempts to regulate one's emotions during a stressful period (Folkman & Lazarus, 1984), can lead to mixed results as well. When these strategies are employed only to keep unwanted emotions and thoughts out of conscious awareness (i.e., avoidant strategies), they can, after bringing a short-term relief, exacerbate the stressful situation (e.g., Dawson & Golijani-Moghaddam, 2020). These effects can be especially problematic when an avoidant coping strategy manifests in substance use (e.g., Clay & Parker, 2020; Satre et al., 2020). While emotion-focused coping strategies as a whole seem to be related to negative emotional responses during the present crisis (e.g., Huang et al., 2020), some emotion-based responses such as humor and acceptance can be adaptive after a trauma (e.g., Man et al., 2020; Rosa-Alcázar et al., 2021; Savitsky et al., 2020).

It is important to note that whether a certain coping strategy is classified as avoidance-focused or not, adaptive or maladaptive, is greatly context-dependent. Indeed, the efficacy of all coping mechanisms depends on the nature of the experienced situation or trauma and personal and cultural characteristics (e.g., Lazarus, 2000). For this reason, it is important to evaluate the effectiveness of all independent coping strategies in each scenario.

Although the aforementioned coping strategies have garnered the most attention in the literature, many of these strategies have been examined in times of societal peace and prosperity. Consequently, their usefulness in an unprecedented global crisis is unknown and may perhaps be limited. As a result of the COVID-19 pandemic, in a matter of weeks,

some of the most common pathways to the experience of meaning in life (King & Hicks, 2021) had become obfuscated or blocked entirely for most individuals. For instance, shelter-in-place mandates and job losses undermined many people's ability to derive purpose through their work (McKnight & Kashdan, 2009), experience the intrinsic pleasure associated with positive in-person social interactions (Lambert et al., 2013), and impeded participation in many of the routine behaviors that help life make sense (Heintzelman & King, 2019). Moreover, the incessant boredom associated with extended quarantine, chronic salience of our mortality, and anxiety about an impending global economic crisis have the potential to further disrupt the systems of meaning that people typically rely on to help navigate through life. In essence, much of humanity has been in the midst of a grand existential crisis with no discernible end in sight, even with the mass vaccination process starting in many countries.

In this context, we argue that a coping style directly related to the maintenance or restoration of one's sense of meaning and purpose in life could be particularly valuable during the COVID-19 pandemic. Meaning in life has been defined as the "cognizance of order, coherence and purpose in one's existence, the pursuit and attainment of worthwhile goals, and an accompanying sense of fulfillment" (Reker & Wong, 1988, p. 221). This definition is based on the knowledge gained by Viktor E. Frankl during the last great collective trauma, World War II. Frankl (1969) argued that the creation of meaning was crucial for people to transcend tragic circumstances. These influential ideas have garnered extensive empirical support showing that the loss of personal meaning following a trauma has a detrimental influence on psychological functioning, while finding meaning in the event plays an important role in the recovery (e.g., Updegraff et al., 2008). Meaning is closely connected to positive emotions (King et al., 2006) which in turn can serve as a buffer against psychological distress (e.g., Gloria & Steinhart, 2016). Several studies support the central role of meaning and positive emotions in resilience (Batthyany & Russo-Netzer, 2014; Fredrickson et al., 2003; Hicks & Routledge, 2013; Wong, 2012). Regarding the present crisis, it has been suggested that simply having the sensation of meaning in life can be a protective factor (e.g., Arslan & Yildirim, 2020; Chao Chen, Liu, Yang, & Hall, 2020; Milman et al., 2020; Trzebiński et al., 2020).

Many theoretical perspectives have explained how meaning is created and maintained, even under adverse circumstances (e.g., Batthyany & Russo-Netzer, 2014; Hicks & Routledge, 2013; King & Hicks, 2021; Wong, 2012). Most of these theories are encapsulated by existential positive psychology (PP2.0; Wong, 2011), also termed the second wave of positive psychology (Ivtzan, Lomas, Hefferon, & Worth, 2015), a paradigm that integrates the positive and negative aspects of living as the foundation of well-being and personal flourishing (Wong, 2011), and provides a framework to explain how meaning can transform suffering and adversity into personal growth (Wong, 2019, 2020). This approach uses the

resource-congruence model (Wong, 1993; Wong et al., 2006) to understand the best ways to cope with a stressor. It asserts that the most effective psychological coping strategies during traumatic events are creative/proactive and existential coping strategies. Creative/proactive strategies aim to transform adversity into personal growth by adopting an attitude of challenge (Wong et al., 2006), thus they focus on embracing stress as a challenge rather than a threat (for similar considerations, see Crum et al., 2020). Existential coping strategies are based on the construction of positive personal meaning from unchangeable situations by accepting the harshness of reality and affirming the meaning in life (Wong et al., 2006). Additionally, this model proposes collective coping when faced with large-scale disasters like the present pandemic (e.g., Wong et al., 2006). This type of coping represents implies the inclusion of others in the motives and ways to deal with the problematic situation and include strategies like prosociality and individual responsibility.

The present study adopts this complex perspective to gain understanding of the effective coping mechanisms in the midst of the COVID-19 pandemic and thus approaches meaning-centered coping as a set of emotional, cognitive and behavioral strategies that promote a sense of global meaning in life. Based on theoretical considerations and previous empirical data, these coping mechanisms include positive reframing (Park, 2010), hope (Feldman & Snyder, 2005), existential courage (Maddi, 2013), life appreciation (also termed existential gratitude: Jans-Beken & Wong, 2019; Kleiman et al., 2013), engagement in meaningful activities (Nakamura & Csikszentmihalyi, 2003; Schueller & Seligman, 2010), and prosociality (Klein, 2017; Van Tongeren et al., 2016). The only available questionnaire in the literature that explicitly measures meaning-focused coping (Gan et al., 2013) includes only predominantly cognitive facets of meaning-creation (e.g., changes in situational beliefs, changes in global beliefs, and changes in goals), thus it does not fully capture the phenomena described above based on the original works of Frankl and the current empirical and theoretical studies on how humans create sense of meaning. Based on the aforementioned considerations, we developed a scale to measure meaning-centered coping and investigated its role in mental and physical health.

The primary aim of the current study was to validate this measure and to test how different types of coping, including problem-focused, emotion-focused and especially meaning-centered coping strategies relate to people's subjective psychological and physical well-being during the beginning of the COVID-19 pandemic. We also examined whether several demographic characteristics and the experience of loneliness were associated with our variables of interest. Furthermore, as there may be cultural and country-level differences in how people deal with stress (e.g., De Vaus et al., 2018), we assessed the role of cultural values, GDP, and objective country-level severity of the COVID-19 outbreak for each country in our sample.

Method

Participants

A total of 11,227 people from 30 countries participated in the study as part of a broader research project. Mean age

was 35.36 years ($SD = 13.26$; range 18-85). Most participants were female (69.9%). It should be noted that only 17.6% of the total sample were students. Detailed socio-demographic characteristics of the sample are provided in Table 1.

Measures

Psychological distress. Local versions of the Depression Anxiety and Stress Scale (DASS-21; Brown et al., 1997) were employed in the study. Items on this scale describe negative emotional states experienced during the last week and are rated on a 4-point Likert-type scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much, or most of the time*). The DASS-21 contains 21 items with 3 subscales measuring depression, stress and anxiety. Total scores represent general psychological distress with a maximum score of 126. The questionnaire has good psychometric properties (see Brown et al., 1997). Alphas for the total scale in each sample ranged from .90 to .95.

Problem-focused and emotion-focused coping. The short version of the COPE inventory was implemented (Brief-COPE; Carver, 1997) to measure different coping strategies. The measure consists of 28 items arranged in 14 subscales (Active coping, Planning, Instrumental support, Use of emotional support, Self-distraction, Relief, Behavioral disconnection, Positive reinterpretation, Denial, Acceptance, Religion, Substance use, Humor and Self-blame). Participants answer on a Likert-type scale of 4 response alternatives from 0 (*I never do this*) to 3 (*I always do this*). Similarly to previously obtained data (Carver, 1997), Cronbach's alphas for the different coping strategies ranged between .36 and .75. Two composite scores were also created focusing on problem-focused (active coping, instrumental support and planning) and emotion-focused coping (the rest of the strategies), similarly to previous studies on psychological effects of pandemics (e.g., Huang et al., 2020; Yeung & Fung, 2007).

Meaning-centered coping. The Meaning-centered Coping Scale (MCCS) was developed for the current study. Items describe coping strategies based on the theoretical considerations presented and include positive reframing, maintaining life appreciation and hope, adopting a courageous attitude against adversity, and being involved in prosocial and meaningful activities. Participants rated items on a Likert scale from 1 (*I do not agree at all*) to 7 (*I completely agree*). A panel of experts examined the content validity of the items and the final pool consisted of twenty items. After the analyses reported in this paper, the final scale contained nine items. Translations were created based on the recommended best practices (Beaton et al., 2000).

Well-being, perceived physical health, and loneliness. The PERMA profiler (Butler & Kern, 2016) was implemented. This instrument measures five domains of flourishing (positive emotion, engagement, relationships, meaning, and accomplishment) with three items each, with the total score from these domains constituting a measure of well-being. The PERMA profiler also assesses physical health (three items), negative emotion (three items, excluded from the study) and loneliness (one item). Participants responded on a Likert scale from 0 to 6 instead of 0-10 to be consistent with the rest of the questionnaires in the package (see Dawes, 2008). In all countries, Cronbach's alphas of the

Table 1 Socio-demographic characteristics of the sample ($N = 11,227$).

Country	n	Sev.	Gender		Age		Town size (%)				Education (%)			Economic status (%)			Household size (%)	Marital status (%)			Days at home
			F	M	M (SD)	Range	1	2	3	4	Sec	Uni	Stu	High	Med	Low		Sin	Rel	Mar	
Algeria	253	1	67.6	37.6	32.28 (10.18)	18-69	N/A	N/A	5.9	94.1	4.7	76.7	18.6	24.9	69.2	5.9	4.96 (2.68)	59.3	N/A	40.7	11.17 (9.55)
Argentina	145	2	72.4	27.6	36.32 (11.07)	18-63	N/A	9.7	29.0	56.6	48.3	15.2	36.6	9.0	72.4	18.6	3.59 (2.16)	48.3	15.2	36.6	29.66 (13.28) (13.38)
Australia	53	2	84.9	15.1	44.77 (11.11)	18-73	3.8	11.3	9.4	54.7	7.5	88.7	3.8	54.7	41.5	3.8	2.74 (1.29)	17.0	7.5	75.5	19.89 (11.90)
Bangladesh	344	1	39.8	60.2	25.35 (7.41)	18-78	N/A	5.8	43.3	50.9	9.9	43.3	46.8	7.6	86.0	6.4	5.23 (3.64)	74.4	5.2	20.3	13.72 (2.59)
Brazil	298	2	73.5	26.5	38.33 (13.17)	18-77	N/A	6.4	56.0	36.2	8.1	81.5	10.4	28.5	62.1	9.4	3.08 (1.49)	38.6	13.4	48.0	34.00 (14.20)
Canada	332	2	48.5	51.5	36.87 (13.74)	18-84	2.4	11.4	25.9	55.4	15.1	73.8	11.1	25.4	62.7	11.4	2.99 (1.54)	32.5	12.7	54.8	32.82 (19.0)
Colombia	115	2	87.8	12.2	40.31 (12.17)	20-70	.9	10.4	47.8	35.7	15.7	69.6	14.8	7.8	73.0	19.1	3.01 (3.79)	34.8	15.7	49.6	8.85 (7.50)
Egypt	285	1	70.5	29.5	37.19 (11.02)	18-70	N/A	N/A	N/A	100	13.0	82.1	4.9	33.7	58.2	8.1	4.11 (1.32)	34.0	N/A	66.0	19.23 (12.61)
France	465	3	76.8	23.2	43.64 (11.54)	18-81	10.5	39.6	32.0	17.4	10.5	85.2	4.3	20.6	69.0	10.3	2.79 (1.41)	30.13	24.7	44.9	32.04 (12.65)
Germany	281	3	69.4	30.6	40.84 (15.27)	18-79	1.8	38.8	33.1	22.1	31.3	59.1	9.6	40.6	50.2	9.3	3.80 (1.37)	21.7	21.4	56.9	25.53 (16.54)
Hungary	262	2	88.9	10.7	37.42 (12.43)	18-71	8.4	23.7	13.0	55.0	22.0	72.5	6.5	27.1	64.5	8.4	2.78 (1.31)	34.0	15.6	50.4	17.65 (99.87)
India	596	1	56.5	43.3	26.71 (7.95)	18-85	.2	6.9	6.5	80.7	7.7	56.0	36.2	11.4	81.9	6.7	5.26 (3.65)	68.6	6.4	25.0	19.50 (8.95)
Indonesia	277	1	73.3	26.7	24.83 (9.85)	18-59	N/A	13.4	57.8	28.9	9.4	32.9	57.8	9.4	84.1	6.5	5.05 (3.89)	80.5	N/A	19.5	22.75 (14.25)
Italy	511	3	75.3	24.3	34.53 (14.67)	18-80	2.2	49.5	41.7	6.3	37.6	46.8	15.7	8	78.1	13.9	2.99 (1.28)	34.8	31.3	33.9	26.22(121.15)
Lebanon	294	2	64.6	35.4	28.74 (11.96)	18-69	3.1	27.2	39.8	4.4	58.5	59.2	34.0	20.7	73.1	6.1	4.30 (1.76)	58.5	22.1	19.4	54.09 (13.43)
Mexico	648	2	79.2	20.8	41.45 (13.39)	18-80	.3	4.0	43.8	50.2	4.2	92.0	3.9	43.7	16.0	40.3	3.65 (1.60)	35.5	8.5	56.0	33.88 (16.39)
New Zealand	43	2	74.4	25.6	45.34 (13.00)	20-74	2.3	16.3	58.1	20.9	11.6	88.4	N/A	46.5	51.2	2.3	2.98 (1.32)	16.3	7.0	76.7	34.17 (15.09)
Nigeria	435	1	31.5	68.5	33.34 (8.67)	19-64	N/A	.5	36.5	63.0	.7	87.8	11.5	7.1	79.3	13.6	4.27 (3.06)	46.0	14.5	39.5	10.73 (9.07)
Pakistan	420	1	61.4	38.6	20.59 (10.31)	18-80	N/A	10.0	21.0	69.0	9.0	59.8	31.2	30.7	64.3	5.0	6.35 (2.95)	61.0	6.0	33.1	27.68 (9.22)
Poland	275	2	79.6	20.4	33.73 (12.70)	19-82	2.2	14.9	24.7	57.8	8.7	70.9	20.4	25.8	69.1	5.1	2.79 (1.35)	33.1	21.1	45.8	23.38 (8.40)
Portugal	483	3	72.0	28.0	39.01 (12.27)	18-75	N/A	3.7	87.0	9.3	21.5	73.7	4.8	9.9	82.4	7.7	3.15 (2.34)	29.8	18.8	51.3	34.30 (12.97)
Romania	546	2	70.7	29.3	32.87 (11.65)	18-69	N/A	N/A	33.2	66.8	12.8	69.6	17.6	16.5	78.0	5.5	2.84 (1.23)	29.1	31.7	39.2	9.19 (6.61)
Russia	307	2	89.3	10.4	44.62 (11.06)	19-79	N/A	3.6	10.7	69.1	2.6	94.1	3.3	13.4	75.9	10.7	2.76 (2.58)	34.9	4.6	60.6	32.30 (12.41)
Slovenia	1271	2	82.6	16.7	34.58 (13.70)	18-81	N/A	N/A	N/A	N/A	26.9	55.8	17.3	12.0	78.6	9.4	3.25 (1.5)	32.7	22.0	45.3	18.06 (9.40)
Spain	640	3	71.6	23.9	36.26 (11.78)	18-73	3.0	30.9	54.5	10.3	14.2	63.9	12.4	8.7	77.0	14.5	2.83 (1.19)	34.4	20.0	45.6	9.17 (3-64)
Sweden	278	3	84.5	15.1	41.84 (12.34)	18-75	N/A	21.2	59.0	16.5	11.5	78.41	10.4	43.5	51.4	5.0	2.69 (1.30)	21.6	9.7	68.7	38.53 (22.03)
Thailand	405	1	33.1	64.7	34.39 (10.85)	18-70	N/A	N/A	1.5	98.5	3.0	87.2	9.9	14.2	75.1	10.6	2.76 (1.70)	48.1	24.4	27.4	21.17 (13.45)
Turkey	302	2	60.9	39.1	27.35 (8.67)	18-61	N/A	1.0	6.6	92.4	4.6	63.2	32.1	12.3	70.5	17.2	4.07 (1.72)	16.5	78.0	29.8	24.96 (91.33)
United Kingdom	382	3	86.6	12.8	42.02 (15.18)	18-76	.8	23.3	21.5	20.4	26.7	51.3	22.0	20.9	62.8	16.2	2.80 (1.38)	33.5	13.6	51.0	25.06 (17.60)
United States	281	3	76.9	23.1	44.81 (15.83)	18-77	3.2	18.5	17.4	11.4	16.0	53.4	30.6	28.5	54.1	17.4	3.16 (1.65)	43.8	12.8	43.8	28.49 (17.22)
Total			69.9	29.9	35.36 (13.26)	18-85	1.3	15.1	34.5	48.9	14.2	68.3	17.6	19.4	68.9	11.7	3.56 (2.31)	41.1	15.8	43.0	23.54 (36.47)

Notes. Gender: F = female, M = male; Sev. = Severity index; Town size: 1 = less than 2000 habitants; 2 = between 2000 and 50,000 habitants, 3 = between 50,000 and 500,000 habitants, 4 = more than 500,000 habitants; Education: Sec = secondary education, Uni = university degree, Stu = still a student; Marital status: Sin = single, divorced or widow, Rel = In a relationship (without cohabitation), Marr = married or in a cohabitating partnership; Days at home = days since the participant does not leave their household besides necessary activities (e.g., work, food shopping); N/A = not applicable. In United States, age is missing in 111 cases.

well-being and physical health scales ranged between .89 and .96 and between .82 and .92, respectively.

Individual demographic characteristics. We assessed gender, age, marital status, socio-economical status, education level, and population size of the town/city of the participants (see Table 1 for the classification of said variables). Additionally, we asked the participants about the number of days they were obliged to stay at home and the number of people they are living in the same household with.

Country-level variables. Countries were classified based on the severity of the national COVID-19 health crisis during our data collection period. Severity level 1 represents the lowest level (less than 100 infected per million inhabitants), 2 a medium level (between 100 and 2000) and 3 the highest severity level (more than 2000 infected) of the pandemic (see Table 1). We also assessed country-level variables according to Hofstede's (2001) cultural values framework: individualism/collectivism, uncertainty avoidance, power distance, masculinity/femininity, long-term orientation and indulgence/self-restraint. Countries were grouped into six major world regions according to the United Nations geo-scheme (Africa, Asia, Europe, Northern America, Oceania, and Latin America and the Caribbean grouped together). All world regions are represented in the study.

Procedure

This study was part of an international project aimed to understand the psychological impact of the COVID-19 pandemic. A total of 43 international collaborators were recruited through personal contacts and ResearchGate announcements. The collaborators were experienced researchers in the field of psychology and carried out the implementation of the questionnaire package in their respective languages and were responsible for the sample collection. In each country, participants were recruited from the community by a snowball sampling method during the first months (March, April, May and June of 2020) of the COVID-19 health crisis. Specifically, the collaborators shared a link of the online survey on various social media platforms (Facebook, Instagram, and Twitter) and through direct e-mail invitations and invited their contacts to do the same. They were encouraged not to limit the email invitations to students in order to aim for a more representative sample of the general population. Data collection in each country lasted for two to three weeks. No data are available about the percentage of people who were invited but declined the participation. Participants needed to be at least 18 years of age, neither currently diagnosed with COVID-19 nor with a preexisting mental illness, live in one of the participating countries. The language of the survey was in each case the most widely spoken official language of each country, with the exception of Lebanon where we collected data in English. Respondents were informed that their participation was anonymous, voluntary and they were allowed to withdraw at any moment. They were not offered any monetary or another type of compensation for partaking in the study with the exception of part of the Canadian sample where we used MTurk. After giving their informed consent, participants responded to the demographic questions and then filled in the psychometric questionnaires of the survey. Participation was individual and typically took 20 minutes. After

completing the survey, participants were fully debriefed and were given the option to leave their contact details if they wanted to participate in future research. The target sample size was 250 respondents from each country (Schönbrodt & Perugini, 2013). Additionally, in nearly all samples, a small subset of randomly chosen participants completed the MCCS again three to four weeks after the first assessment to evaluate test-retest reliability of this measure.

Data analytic strategy

We used Mplus (Muthén & Muthén, 2016) for the factor analyses and SPSS (Version 24). Prior to the analyses, data were tested for normality and missing values. Data was removed for those participants who failed to complete one or more full questionnaires or showed straight lining behavior. Missing data in the formal questionnaires was less than 0.1%, (missing completely at random) and was replaced with the expectation maximization algorithm. Missing data on demographic variables was less than 0.2% and was not replaced.

To validate MCCS, exploratory factor analysis (EFA) using principal component analysis with oblimin rotation was conducted on the first randomly selected half of the Spanish sample ($n = 316$). Then, confirmatory factor analyses (CFAs) were performed on the second half of the Spanish sample ($n = 328$) and on all samples from each country. The Satorra–Bentler robust chi-square goodness-of-fit tests were used employing the Mean-Adjusted Maximum Likelihood estimator. As chi-square is sensitive to sample size, criteria for assessing overall model fit were the Comparative Fit Index (CFI), Root-Mean-Square Error of Approximation (RMSEA), and Standardized Root-Mean-Square Residual (SRMR). RMSEA values below .08 indicate a reasonable fit, between .08 and .10 a mediocre fit, and above .10 a poor fit (Browne & Cudeck, 1993). SRMR values below .08 show a good fit (Schreiber et al., 2006), while CFI and TLI values above .90 are considered an acceptable and above .95 an excellent fit (Hu & Bentler, 1998). Because of the small sample sizes, the Oceanian sample (New Zealand and Australia) was pooled for all factor analyses.

Item total correlations and Cronbach's alphas were conducted to assess reliability, intraclass correlation coefficient (ICC) with two-way mixed model and absolute agreement to evaluate test-retest reliability, and Spearman correlation coefficients together with Pearson biserial correlations for categorical variables to assess relationships between variables.

Multilevel modeling (MLM) was used to evaluate the effect of individual and country-level variables of the study on (a) psychological distress, (b) well-being and (c) perceived physical health. We assessed all 14 coping strategies measured by COPE instead of composite scores. In all three analyses, standardized variables and restricted likelihood method were used. Each time, two nested models were compared by -2 log likelihood (-2LL) and chi square difference tests (the latter were performed using maximum likelihood). The null models served as a baseline models with random intercepts to decide whether MLM was warranted. Full models incorporated all individual and country-level variables (see Measures).

Results

Meaning-centered coping

EFA was conducted on the first random half of the Spanish sample. One of the original twenty items was not included because it had a highly unbalanced distribution (85% of the respondents fully agreed with the item). Kaiser-Meyer-Olkin measure showed that data was adequate for factor analysis (.93). Bartlett's test of sphericity was significant, $\chi^2 = 3228.63$, $df = 190$, $p < .001$. Number of components was determined by parallel analysis (Hayton et al., 2004) and by assessing the scree plot (Cattell, 1966). A one-factor solution was derived that explained 41.84% of the variance with twelve items.

A CFA was conducted on the second half of the Spanish sample. The fit was not acceptable ($SB\chi^2 = 737.42$, $df = 170$, $p < .001$, CFI = .778, RMSEA = .101 [90% CI .093, .108], SRMR = .082), thus modification indices, residual variances and regression weights were assessed and three items were removed to make the model more parsimonious. Fit was then deemed to be excellent ($SB\chi^2 = 43.58$, $df = 27$, $p < .001$, CFI = .983, RMSEA = .043 [90% CI .016, .066], SRMR = .030). The same 9-item structure (see Appendix A) was assessed in all other language variations and the fit was good in each case (see Table 2). Nevertheless, in case of the Oceanian, Pakistani, Turkish and Argentinean sample some error terms reflecting hope and life appreciation-related items were allowed to correlate. In case of the US, Russian, Portugal and German sample, we allowed correlating error terms of items reflecting on active, meaningful behaviors. Regression weights in all countries ranged between .36 and .88. Item-total correlations in each country were also acceptable, ranging between .39 and .95. Test-retest data of MCCS was between good and excellent in all samples where we collected data (from .60 to .88, see Table 2).

The final 9-item MCCS correlated in the expected directions with psychological distress, mental and physical well-being and loneliness (see Table 3). Females and older participants showed higher levels of meaning-centered coping. Moreover, it was strongly related to the meaning subscale of PERMA ($M = 4.43$, $SD = 1.27$), $r = .57$, $p = .001$. After controlling for the effect of country, MCCS explained 35.2% of its variance ($B = .60$, $SD = .01$, $p < .001$).

Predictors of psychological distress, well-being and perceived physical health

In all three MLM analyses, null models (psychological distress: $-2LL = 31340.32$; well-being: $-2LL = 31181.51$; physical health: $-2LL = 31380.45$) showed that country of origin had a small but significant effect on our outcome variables (psychological distress: Wald $Z = 3.62$, $p < .001$, ICC = .05; well-being: Wald $Z = 3.64$, $p < .001$, ICC = .06; physical health: Wald $Z = 3.58$, $p < .001$, ICC = .04), thus taking into account the country's effect was warranted. In all cases, the full models including individual and country-level variables were superior to the baseline models (see Table 4).

In regard to demographic characteristics, final models showed that in this sample, participants' age did not

significantly affect well-being but older participants reported lower levels of psychological distress and worse perceived physical health. Relative to men, women reported significantly poorer physical and mental well-being, together with higher levels of distress. Married/cohabiting participants reported lower DASS-21 scores and higher PERMA physical health scores compared to their noncohabiting counterparts. They also showed higher levels on PERMA well-being than single participants. Economic status did not affect DASS-21 scores but higher economic status predicted higher well-being and physical health scores on PERMA. Students reported higher levels of psychological distress than participants having a higher degree, and they showed lower mental and physical well-being than participants with a high school degree who were currently not studying. The size of the town/city where the participants live and the confinement length did not affect any of the outcome variables. Higher number of people living in the same household increased the probability of having lower well-being and higher psychological distress.

With reference to the different coping mechanisms, meaning-centered coping was by far the strongest positive predictor of PERMA well-being and physical health and the strongest negative predictor of psychological distress. Conversely, self-blame was the most prominent positive predictor for DASS-21 and negative predictor for PERMA well-being and physical health.

DASS-21 scores were negatively linked with active coping, humor and acceptance and positively associated with self-distraction, denial, substance abuse, emotional support, behavioral disengagement, venting, planning, and religion. Well-being scores measured by PERMA were positively related to active coping, emotional support, instrumental support and humor, and negatively to denial, substance use, behavioral disengagement and venting. Perceived physical health was positively linked to active coping and negatively to venting (see Table 4).

Among problem-focused coping mechanisms, instrumental support and active coping seemed to be adaptive while planning maladaptive. Emotion-focused coping mechanisms had adverse to nonsignificant effects, with the exception of humor and acceptance. Coping mechanisms based on emotional support showed mixed effects by being positively associated with both psychological distress and well-being. Level of loneliness was a strong predictor of mental and physical well-being and distress in the expected directions.

With respect to the country-level variables, only the country's indulgence levels had a small impact on all three outcome measures and long-term orientation on DASS-21 (the impact being positive in each case). The vast majority of the country-level variables had no direct impact on mental and physical health of our participants (see Table 4).

Discussion

In this study, we assessed different psychological coping strategies related to mental and physical health during the initial phases of the COVID-19 pandemic in a sample of more than ten thousand participants, representing thirty

Table 2 CFA, reliability, and test-retest results of MCCS per country.

Country	SB χ^2	df	CFI	RMSEA	SRMR	Cronbach's alpha	ICC (n)
Algeria ^a	67.28*	26	.939	.079 [.056, .103]	.045	.88	.71 (36)
Argentina	34.58*	27	.984	.044 [.000, .083]	.037	.91	N/A
Bangladesh	84.07*	27	.946	.078 [.060, .098]	.049	.90	N/A
Brazil	54.61*	27	.969	.059 [.036, .081]	.037	.89	.86 (32)
Canada	55.68*	27	.973	.057 [.035, .078]	.033	.90	N/A
Colombia ^a	44.17*	26	.947	.078 [.035, .117]	.052	.88	N/A
Egypt	65.47*	27	.962	.071 [.049, .093]	.038	.91	.88 (48)
France	85.27*	27	.940	.068 [.052, .085]	.040	.83	.60 (31)
Germany ^b	62.54*	26	.928	.071 [.048, .093]	.053	.81	.85 (41)
Hungary	71.467*	27	.917	.079 [.057, .102]	.050	.84	.66 (29)
India	82.29*	27	.968	.059 [.044, .073]	.032	.89	.71 (48)
Indonesia	54.61*	27	.954	.061 [.037, .084]	.044	.88	.84 (57)
Italy	88.15*	27	.938	.067 [.051, .082]	.041	.83	.85
Lebanon	66.16*	27	.951	.070 [.049, .092]	.041	.88	.75 (51)
Mexico	90.74*	27	.962	.060 [.047, .074]	.033	.90	.60 (46)
New Zealand and Australia ^c	36.45*	26	.974	.065 [.000, .111]	.038	.92	N/A
Nigeria	39.81*	27	.992	.033 [.000, .054]	.022	.93	.65 (37)
Pakistan ^d	87.35*	26	.970	.075 [.058, .093]	.032	.94	N/A
Poland	54.67*	27	.956	.061 [.037, .084]	.040	.85	.76 (34)
Portugal ^{b, f}	96.75*	25	.927	.077 [.061, .094]	.046	.83	.88 (27)
Romania	93.65*	27	.952	.067 [.053, .082]	.038	.87	.69 (49)
Russia ^e	76.62*	28	.931	.080 [.059, .101]	.050	.86	.78 (46)
Slovenia	126.89*	27	.957	.054 [.045, .064]	.032	.83	.75 (42)
Spain	43.58*	27	.983	.043 [.016, .066]	.030	.89	.86 (37)
Sweden	64.36*	27	.929	.071 [.048, .093]	.047	.82	N/A
Thailand	74.30*	27	.959	.066 [.048, .084]	.038	.90	.98 (44)
Turkey ^{c, g}	62.91*	24	.944	.073 [.051, .096]	.057	.86	.64 (39)
United Kingdom	65.00*	27	.960	.061 [.042, .080]	.037	.87	.72 (18)
United States ^f	72.39*	26	.936	.080 [.058, .102]	.051	.88	.68 (20)

Notes. S-B χ^2 =Satorra–Bentler scaled chi-square; df = degrees of freedom; CFI= Comparative Fit Index; SRMR = Standardised Root Mean Residual; RMSEA = Root Mean Square Error of Approximation; ICC = Intraclass Correlation Coefficient.

* significant at $p < .05$.

^a Error terms for Items 1 and 6 were allowed to correlate.

^b Error terms for Items 4 and 3 were allowed to correlate.

^c Error terms for Items 1 and 2 were allowed to correlate.

^d Error terms for Items 8 and 9 were allowed to correlate.

^e Error terms for Items 4 and 5 were allowed to correlate.

^f Error terms for Items 3 and 5 were allowed to correlate.

^g Error terms for Items 1 and 8 and for 6 and 9 were allowed to correlate.

Table 3 Intercorrelations and descriptive statistics of the main variables together with age and gender ($N = 11,227$).

	Severity	DASS-21	W-PERMA	H-PERMA	MCCS	EFC	PFC	Loneliness	Age
DASS-21	.03**								
W-PERMA	.04**	-.40***							
H-PERMA	-.01	-.30***	.53***						
MCCS	-.05**	-.25***	.62***	.37***					
EFC	.03**	.31***	.11***	.01	.23***				
PFC	-.01	.11***	.27***	.10***	.34***	.60***			
Loneliness	-.05**	.32***	-.30***	-.12***	-.11***	.09***	-.01		
Age	.27**	-.19**	.14***	.01	.13***	-.03***	.00	-.13***	
Gender	-.19**	-.12***	-.05***	.01	-.09***	-.10***	-.08***	-.03***	-.04***
M	N/A	27.64	4.25	4.25	47	46.49	15.23	2.45	35.36
SD	N/A	23.83	1.01	1.22	11.33	9.25	4.01	1.92	13.26
Cronbach's alpha [95% CI]	N/A	.93 [.93, .94]	.93 [.93, .94]	.88 [.87, .88]	.88 [.88, .88]	.77 [.76, .77]	.73 [.72, .74]	N/A	N/A

Notes.

* $p < .05$;** $p < .01$;*** $p < .001$. All p values are two-tailed.

W-PERMA = Wellbeing PERMA; H-PERMA = Health PERMA; MCCS = Meaning-centered coping scale; EFC = Emotion-focused coping; PFC = Problem-focused coping. Gender: 1 = female; 2 = male.

countries from all major geographic areas of the world. In addition, we aimed to evaluate whether meaning-centered coping would be a unique and robust predictor of psychological and physical health during the present pandemic. For this purpose, we developed a measure of meaning-centered coping that integrated different components that promote meaning in life including positive reframing, hope, existential courage, life appreciation, engagement in meaningful activities, and prosociality, called the Meaning-Centered Coping Scale (MCCS). Factor analyses showed that these elements are strongly related and form one general factor, creating an integrative, stable, 9-item measure of meaning-centered coping in all eighteen languages, in a total of thirty countries. As anticipated, this measure was strongly negatively related to psychological distress and loneliness, and positively associated with measures of mental and physical well-being, as well as with the presence of meaning in life. Worldwide, women and older participants tended to have higher scores on the measure. The latter findings are congruent with previous studies showing that meaning in life increases across the lifespan, and partially consistent with previous studies on gender and meaning in life (see Carreno et al., 2020; Steger et al., 2009).

With regard to emotion-focused coping strategies, our findings indicate that these strategies were mostly not associated or were adversely associated with health and well-being, with the exception of coping mechanisms based on humor and acceptance. The latter effects are consistent with previous research demonstrating the importance of humor and acceptance during this trauma (e.g., Man et al., 2020; Savitsky et al., 2020). Self-distraction, denial, substance use, behavioral disengagement, religion, venting and self-blame were all adversely linked to at least one of the health markers used in this study. Self-blame, in particular, was the strongest negative predictor of these markers (for similar results, see for example Davis et al., 1996; Rosa-Alcazar et al., 2021). Previous findings showed that emotion-focused coping, especially if avoidance-based, is often negatively associated with psychological health (e.g., Dawson et al., 2020; Huang et al., 2020; Lau et al., 2010; Puterman et al., 2009). The above-mentioned findings may also indicate that people use these types of emotion-focused coping strategies particularly when they feel more distressed.

When we assessed problem-focused strategies independently, active coping predicted better health on all three outcomes. However, planning, somewhat surprisingly perhaps, predicted higher psychological distress (see also Huang et al., 2020; Umucu & Lee, 2020), while instrumental support predicted only higher levels of well-being (for similar results, see Umucu & Lee, 2020). These results are only partially in line with previous findings: some previous studies reported that problem-focused coping strategies (e.g., problem solving, cognitive restructuring, active coping and planning) were associated with a better psychological adjustment during epidemics (e.g., Cai et al., 2020; Main et al., 2011; Puterman et al., 2009), while others reported inverse relationships with mental health (e.g., Huang et al., 2020; Oni, Harville, Xiong, & Buekens, 2012). One possible explanation can be the aspects of uncertainty and

Table 4 Final models of three separate multilevel modeling predicting psychological distress, wellbeing, and perceived physical health during the COVID-19 crisis.

	Psychological distress B (SE)	PERMA wellbeing B (SE)	Perceived physical health B (SE)
<i>Individual- level variables</i>			
Age	-.05 (.01)***	-.01 (.01)	-.04 (.01)**
Gender (female)	.17 (.02)***	-.06 (.02)**	-.12 (.02)***
Marital status (reference: married)			
Single	-.02 (.02)	-.11 (.02)***	.05 (.02)*
In a relationship (noncohabiting)	.08 (.03)**	.02 (.03)	.08 (.03)*
Education level (reference: student)			
Secondary	-.03 (.03)	-.09 (.03)**	-.12 (.04)**
University	-.12 (.03)***	-.01 (.02)	.04 (.03)
Economic status	.01 (.01)	-.03 (.01)***	-.03 (.01)***
Town size	.00 (.01)	-.01 (.01)	.00 (.01)
Household size	.02 (.01)**	-.02 (.01)**	-.01 (.01)
Days at home	.00 (.01)	.01 (.01)	.00 (.01)
Meaning-centered coping	-.20 (.01)***	.58 (.01)***	.38 (.01)***
Self-distraction	.07 (.01)***	-.01 (.01)	-.01 (.01)
Active coping	-.08 (.01)***	.09 (.01)***	.06 (.01)***
Denial	.09 (.01)***	-.04 (.01)***	-.02 (.01)
Substance use	.09 (.01)***	-.04 (.01)***	-.02 (.01)
Emotional support	.09 (.01)***	.04 (.01)***	.02 (.01)
Instrumental support	-.02 (.01)	.05 (.01)***	-.01 (.01)
Behavioral disengagement	.13 (.01)***	-.06 (.01)***	-.02 (.01)
Venting	.17 (.01)***	-.03 (.01)**	-.06 (.01)***
Positive reframing	.02 (.01)	-.02 (.01)	.00 (.01)
Planning	.09 (.01)***	.00 (.01)	-.02 (.01)
Humor	-.05 (.01)***	.03 (.01)**	.00 (.01)
Self-blame	.21 (.01)***	-.11 (.01)***	-.12 (.01)***
Acceptance	-.06 (.01)***	.00 (.01)	.01 (.01)
Religion	.02 (.01)*	-.01 (.01)	.02 (.01)
Loneliness	.19 (.01)***	-.11 (.01)***	-.03 (.01)**
<i>Country-level variables</i>			
World region	.00 (.08)	-.01 (.05)	-.06 (.05)
GDP	.04 (.15)	-.05 (.10)	.01 (.11)
Severity index	-.06 (.11)	.10 (.07)	.05 (.08)
Power distance	.00 (.08)	.02 (.05)	.03 (.06)
Individualism	.15 (.12)	-.02 (.08)	-.01 (.08)
Masculinity	-.01 (.08)	.01 (.05)	.06 (.05)
Uncertainty avoidance	-.03 (.08)	.09 (.05)	.10 (.05)
Long-term orientation	-.14 (.06)*	.05 (.03)	.04 (.04)
Indulgence	-.20 (.08)*	.13 (.05)***	.15 (.06)**
<i>Covariance parameters</i>			
Residual variance	.60***	.49***	.80***
Intercept variance	.08**	.03**	.03**
-2 log likelihood	19863.803	18182.373	222212.962
χ^2 (df) difference with null model (ML)	11692.120 (35)***	13230.139 (35)***	9383.603 (35)***

* $p < .05$;** $p < .01$;*** $p < .001$.

uncontrollability of the present situation that may make some of these strategies not viable. These findings suggest that the role of problem-focused coping in mental health is complex.

In general, the results of this study extend the aforementioned previous work on coping styles demonstrating the prominent role of meaning-centered coping in psychological and physical health. Meaning-centered coping was the

strongest predictor among all coping mechanisms for all three outcome variables (psychological distress, well-being and perceived physical health). These findings support the central role of meaning in the maintenance of mental and physical health during crises (e.g., Arslan & Yildirim, 2020; Chao, Chen, Liu, Yang, & Hall, 2020; Milman et al., 2020). Our findings expand the existing literature showing that in addition to the sense of meaning, psychological strategies that promote this complex phenomenon can also be relevant when approaching psychological suffering and well-being, especially during times of crisis.

We should note that the strong predictive power of meaning-centered coping, especially in case of negative emotions, is not fully consistent with previous studies that assessed this type of coping strategy with a different measure (i.e., they did not report strong relationships, see Gan et al., 2013; Guo et al., 2013; Riley & Park, 2014). The likely reason behind this discrepancy is that those studies focused mostly on the cognitive aspects of meaning. Instead, we approached meaning-centered coping as a concept that inherently involves cognitive, emotional and behavioral elements, as well as personal and interpersonal aspects (e.g., Reker & Wong, 1988; Wong, 2012). Empirical evidence supports this integrative approach, demonstrating the involvement of the areas measured by the MCCS in the creation of meaning in life (e.g., Feldman & Snyder, 2005; Jans-Beken & Wong, 2019; Kleiman et al., 2013; Klein, 2017; Maddi, 2013; Nakamura & Csikzentmihalyi, 2003; Park, 2010; Schueller & Seligman, 2010; Van Tongeren et al., 2016). These results are consistent with the framework adopted by existential positive psychology (e.g., Wong, 2011). This paradigm highlights the importance of integrating both positive and negative aspects of living and it proposes not only the acceptance of suffering but also its transformation into personal growth through meaning that can be one of the pillars of resilience.

While not the primary focus of our investigation, our analyses revealed that the aforementioned relationships between variables occur independently from most country-level characteristics (GDP, individualism/collectivism, uncertainty avoidance, power distance, masculinity/femininity, long-term orientation and indulgence/self-restraint) and demographic characteristics (age, gender, town size, socio-economic status, education level, household size, marital status and confinement length). Nevertheless, our regression models indicated that older participants had lower levels of psychological distress and poorer physical well-being (but not lower levels of well-being). Women, students and people who were single/did not cohabit with their partners and participants cohabiting with larger number of other people were at highest risk to show markers of poor psychological and physical health (for similar results, see Odriozola-González et al., 2020). Country-level variables explained a very small percentage of our outcomes (less than 7% in each case), and only indulgence and long-term orientation affected slightly our outcomes. In addition, this study showed the importance of loneliness in mental and physical health (see Killgore et al., 2020) and the relevance of measuring aspects of well-being and flourishing during times of crisis, not only distress.

Nevertheless, the interpretation of the present findings is limited by our sampling method, which yielded a disproportionately high number of women, people living in larger cities, and with higher levels of education and socio-economic status. As many of our participants were medium to high in economic status, they may not have suffered as much from some of the secondary effects of the pandemic, such as job losses and severe economic hardship. Despite the large and international sample size and the low percentage of students, this sampling method remains a limitation of the study. Although we aimed to partially mitigate this concern by controlling for demographic and country-level variables in all analyses, future studies could pursue active measures to obtain more representative samples of the general population. Additionally, as the study was cross-sectional, we do not have information about the participants' emotional and physical well-being prior to the COVID-19 health crisis. Data, however, show that average stress levels have risen after the start of the pandemic (e.g., Witters & Harter, 2020). Due to the cross-sectional nature of the study, causal relationships among variables cannot be implied. We focused on general trends, while controlling for a number of country-level variables, nevertheless, futures studies may analyze these effects more in detail in each participating country and potential relationships between variables could be tested through longitudinal studies or network analysis.

To conclude, the current study demonstrates that how we attempt to cope with the COVID-19 pandemic is closely related to our mental and physical health. The findings indicate that people who generally maintained physical and psychological health during the beginning of the current global crisis were those who proactively coped with the situation, received instrumental support, accepted the reality of the situation as it is, even joked about it; and especially those who found a personal meaning by adopting an attitude of hope and courage, appreciating life in its current form, and acting responsibly with themselves and with others. These findings can be generalized to a wide variety of contexts as they are independent of various demographic and cultural characteristics. As the course of the current pandemic remains uncertain with new variants emerging, and the impact of protective measures yet to fully materialize, we may be the beginning of a longer, deeper and more complex crisis of humanity. We thus urge policy makers to use empirical data, like those in the present study, to guide decisions to help mitigate the collective suffering of humanity. Based on our findings, policies that help support meaning-centered coping strategies are paramount for alleviating stress related to COVID-19 and promoting public health during these historic times.

Appendix A The Meaning-Centered Coping Scale

Please rate your agreement with each statement about your coping mechanisms with *the coronavirus pandemic* according to the following scale.

1	2	3	4	5	6	7	
I do not agree at all						I completely agree	
1. I hope for the best.	1	2	3	4	5	6	7
2. I have found a personal meaning in the current situation.	1	2	3	4	5	6	7
3. I do something productive every day.	1	2	3	4	5	6	7
4. I help others during this time.	1	2	3	4	5	6	7
5. I still do what is most important in my life.	1	2	3	4	5	6	7
6. I have faith that something positive will come out of this.	1	2	3	4	5	6	7
7. I use this situation to get closer to my loved ones.	1	2	3	4	5	6	7
8. I am grateful for my life as it is.	1	2	3	4	5	6	7
9. I will get out of this situation stronger than I was before.	1	2	3	4	5	6	7

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