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Order out of chaos: Sense of coherence and the mediating role of coping resources in explaining mental health during COVID-19 in 7 countries

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ABSTRACT

In the midst of the COVID-19 pandemic and the universal chaos created by it, this study explores the role of sense of coherence (Soc, Antonovsky, 1979) and how it enables coping with a stressful situation and staying well. SOC is a generalized orientation which allows one to perceive the world as comprehensible, manageable, and meaningful. In an attempt to understand 'how does the SOC work' we employed the salutogenic assumption that a strong SOC allows one to reach out in any given situation and find those resources appropriate to the specific stressor. Thus, we hypothesized that the positive impact of SOC on mental health outcomes would be mediated through coping resources that are particularly salient in times of crisis. One resource is related to the micro level (perceived family support) and the other concerns the macro level (trust in leaders and social-political institutions). Data collection was conducted in different countries during May–June 2020 via online platforms. The data included 7 samples of adult participants (age 18–90) from Israel (n = 669), Italy (n = 899), Spain (n = 476), Germany (n = 708), Austria (n = 1026), Switzerland (n = 147), and the U.S. (n = 506). The questionnaires included standard tools (MHC-SF, SOC-13) as well as questionnaires of perceived family support and trust that were adapted to the pandemic context. As expected, SOC was associated with mental health in all the samples. Perceived family support and trust in leaders and social-political institutions mediated the relationships between SOC and mental health, controlling for age, gender, and level of financial risk. It appears that SOC has a universal meaning, not limited by cultural and situational characteristics. The discussion focuses on the theoretical, social, and political applications of the salutogenic model – and its core concept of SOC – in the context of coping with a global pandemic across different cultural contexts and countries.

1. Introduction

The COVID-19 pandemic has created chaos and changed the predictable reality and regular way of life of societies worldwide. It appears that this acute stressor has become chronic, as we still do not know when and where the virus will cause an epidemic outbreak, and what damages it will cause in the short and long term. Such a stressor, that introduces entropy into the global system, might shake one's perception of the world as a predictable and comprehensible place, and, as a result, could evoke high levels of anxiety and impede mental health (for a review see Xiong et al., 2020; Rajkumar, 2020; Jetten, Reicher, Haslam, & Cruwys, 2020).

Facing such a severe stressor in our global system has led researchers to ask pathogenic questions about the virus' potential damage and the pathological consequences (Ren, Gao, & Chen, 2020). However, the salutogenic model developed by Antonovsky (1979, 1987), encourages us to understand how people struggle with this global crisis, succeed in

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increasing their sense of order within the chaotic system, and remain healthy. Antonovsky's main answer to this salutogenic question lies in his core construct the 'Sense of coherence' (SOC).

SOC is defined as a generalized orientation of a person towards the world, perceiving it, on a continuum, as comprehensible, manageable, and meaningful (Antonovsky, 1979). According to Antonovsky (1987), SOC is a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that (1) The stimuli from one's internal and external environments in the course of living are structured, predictable, and explicable; (2) the resources are available to one to meet the demands posed by these stimuli; and (3) these demands are challenge, worthy of investment and engagement (p.19).

The SOC construct has been studied for the last few decades across many countries and cultural groups (Sagy, 2014). Strong SOC has been found as a significant factor in facilitating the movement of a person along the disease – ease continuum towards health (Eriksson & Lindström, 2005). Moreover, in research findings, SOC appears to be a resource that enables the individual to cope successfully not only with navigating the regular stressors which occur during their lifetime but also with various kinds of acute and chronic stressful life events. In addition, high SOC scores have been found to help in coping successfully with different types of personal and collective crises, and, as a result, to help people enjoy high levels of physical and mental health (for a review, see Eriksson & Lindström, 2005; Eriksson & Mittelmark, 2017).

A few recent studies have already reported the main contribution of SOC to coping with the COVID-19 pandemic. SOC was correlated with emotional distress among different cultural groups (Barni et al., 2020; Braun-Lewensohn, Abu-Kaf, & Kalagy, 2021) SOC was reported as a better predictor of mental health than demographic variables (e.g., gender, age, and education); risk factors (e.g., health and economic level of risk); or other coping resources (e.g., trust, family support) in different social contexts during the acute stage of the pandemic (Généreux & Roy, 2020; Hardy et al., 2021; Mana & Sagy, 2020; Mana et al., in press).

1.1. Research questions and context

Based on the previous research findings during the pandemic, in which SOC appeared to be a significant factor in predicting mental health, our main question in this study relates to the following: How does the SOC work? How does a strong SOC function positively in coping with the pandemic crisis and contribute to mental health?

The salutogenic model suggests that there are many ways in which a strong SOC could lead to successful coping and subsequently to improved health outcomes (Antonovsky, 1987). One of these ways is related to the term *generalized resistance resources* (GRRs), defined by Antonovsky (1987) as the characteristics of a person, a group, or a community that facilitate the individual's ability to cope effectively with stressors. Such resources could include, for example, knowledge and intelligence, material resources, family roots, and cultural stability. However, according to the salutogenic model, the crucial point is that GRRs are potential resources. They must be adopted before they can function to combat and overcome pathogen. Antibiotic, for example, is of no use unless it is taken appropriately. Surely, people differ in the potential resources available to them. But, beyond this, they also differ significantly in the readiness and willingness to exploit the potential resources that they do have at their disposal. This is what distinguishes between people with a stronger and weaker SOC. The former will search hard for those coping resources which are potentially available to him or her; the latter are more likely to give up (Einav & Margalit, 2020; Sagy, 1994).

Thus, there is some reciprocal relationship between SOC and GRRs (Antonovsky, 1979). During childhood and adolescence, until early adulthood, the GRRs mainly contribute to the development and maintenance of the individual's SOC, and successful applications of GRRs lead to the development of a stronger SOC (Sagy & Antonovsky, 2000). However, once the SOC is formed and stabilized, the level of SOC is the meaningful factor that contributes to mobilize GRRs for enhancing the ability to manage stress. Individuals with stronger SOC can better use their GRRs in time of crisis compared to people with lower levels of SOC (Antonovsky, 1987).

While Antonovsky's assumptions about SOC–health connections have been widely studied, the mediating role of GRRs on the relationships between SOC and health has been less extensively studied (Mittelmark, Bull, Daniel, & Urke, 2017). Our research has attempted to address this omission. Our hypotheses are in accordance with this aspect of the salutogenic model: The positive association of SOC with mental health outcomes would be mediated through GRRs that are particularly salient in times of crisis. We examined the mediating effect of two GRRs-perceived family support (a micro-level factor) and trust in governmental institutions (a macro-level factor) by comparing the mediating model in different cultural and social contexts against the backdrop of the pandemic crisis.

In addition to exploring this suggested mediating model, our research relates to the assumption that SOC is a universal construct, not only a culturally bound concept. According to the salutogenic model "culture sets limits, but within these limits, it is the level of SOC that matters" (Antonovsky, 1987, p. 148). Antonovsky (1996) claimed that only the concrete translation of SOC into context-related coping strategies can vary widely according to cultural codes. Some recent studies among Jews and Arabs living in Israel support this distinction (Sagy, 2014). In these studies, it was the individual with a strong SOC, whether Arab or Jew, who presented better mental health. The specific coping strategies, however, were found to be different within each culture.

Thus, these considerations of culture and SOC comprise our second question in this study: Does SOC matter in all cultural groups? And if so, does the above postulated mediating mechanism between SOC and mental health through GRRs, particularly salient in times of crisis, work similarly in different cultural and social settings that are all being confronted with the same stressful factor of the pandemic?

This study was carried out in the midst of the COVID-19 pandemic (May–June 2020). It included 7samples from Israel, Italy, Spain, Germany, Austria, Switzerland, and the United States of America (U.S.). In each context the pandemic exposure was different in terms of number of deaths, testing, COVID-19 cases, as well as governmental responses and restrictions (for a comparison, see Roser, Ritchie, Ortiz-Ospina, & Hasell, 2020). Moreover, at the macro level, the reactions of the political, social, and economic systems to the crisis in each country were different and perhaps related to level of public trust in the relevant institutions responsible for managing the pandemic. There are also differences at the micro level between and within groups in level of familial closeness and strength of intergenerational ties that may influence the accessibility to coping resource of family support. Analysing those differences, however, is beyond the scope of the current study.

Beyond all these varieties and different contexts, COVID-19 has created chaos and changed the well-known reality in the whole world for an intensive period. Employing the salutogenic model, we expected that in this chaotic global context, SOC could be a universal concept in explaining mental health in all 7 samples. We assumed that people with stronger SOC would be able to create 'order out of chaos' and would also tend to better use GRRs and, as a result, strengthen their mental health, controlling for variables of gender, age, and the level of economic risk. Previous studies revealed that demographic factors of age, gender and income were strongly related with COVID-19 stress responses. Women and elders were reported as having higher levels of stress and anxiety as compared to men and younger people; decreased income during the pandemic was found to be strongly associated with levels of anxiety (Volk, Brazil, Franklin-Luther, Dane, & Vaillancourt, 2021). By controlling these variables, we try to explore a universal pattern related to the relationships between SOC and mental health, mediated by relevant GRRs, during the time of the pandemic.

1.2. Research concepts and hypotheses

The World Health Organization (WHO) definition of mental health is "a state of well-being in which the individual realizes his or her abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (World Health Organization, 1998). This definition is in accordance with the salutogenic perspective and, therefore, we examined the dependent variable of mental health as including emotional, psychological, and social well-being (Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011).

1.3. GRRs: perceived family support and trust

In his writing, Antonovsky (1987) considered supportive social environments, and especially social support one gets from his/her surroundings, as main GRRs that a person with strong SOC will use in stressful situations. The current study explored the mediating role of two GRRs on the relationships between SOC and mental health: at the micro level – one's perceived support from one's family, and at the macro level – trust in leaders, social, and political institutions that are responsible for managing the pandemic. Those GRRs have been found in previous studies as relevant to coping with the COVID-19 pandemic in various countries (Mana & Sagy, 2020; Mana et al., 2021).

Social support has been considered a significant coping resource for several decades (Ge, Yap, Ong, & Heng, 2017; Howick, Kelly, & Kelly, 2019). It was found to have both direct as well as buffering effects in warding off illness and advancing health (Srensen, Klungsyr, Kleiner, &). The subjective perception of one's surroundings as supportive is very important during stressful and traumatic events (Schäfer et al., 2019). Recent studies during COVID-19 have found social support to have a significant direct effect on mental health (Saltzman, Hansel, & Bordnick, 2020). At the micro level, perceived family support is related to one's belief that there are people in one's family who can potentially help in this time of distress. The literature on the relationships between perceived family support and SOC has mainly focused on the role of family support in strengthening levels of SOC during childhood (Sagy & Antonovsky, 2000). However, perceived family support was also found as reducing psychological distress during catastrophic situations (Banks & Weems, 2014; Sagy & Dotan, 2001) and during the COVID-19 pandemic (Saltzman et al., 2020).

At the macro level, perception of political leaders and other social institutions responsible for managing the COVID-19 crisis as trustworthy was found to have a strong and direct effect on mental health (Fancourt, Steptoe, & Wright, 2020; Mana & Sagy, 2020; Sibley et al., 2020). On the other hand, lower levels of trust were correlated with developing conspiracy theories about the nature and the cause of the threatening event and to increasing feeling of stress (Marinthe, Brown, Delouvée, &). According to the data of the OECD (2021) and the Edelman trust barometer (2021), in many parts of the world during the outbreak of the COVID-19 pandemic, the level of trust in governments increased. This tendency was explained as the citizens needs for guidance and support in the chaotic situation. However, by January 2021, the trust in government had fallen by 8 points globally, showcasing the challenges in sustaining high trust while struggling with uncertainty, restrictive regulations, and social and economic crisis.

In the present research, we specifically examined the mediating role of trust in media, legal courts, prime minister, police, the government, ministry of finance, ministry of health, health-care workers, and hospitals, on the relationships between SOC and mental health.

To conclude, the research aim is to develop an understanding of the association of SOC with mental health during this time of the pandemic, and especially how it works beyond specific contexts or cultures. More specifically, we asked about the potential universality of the positive effect of SOC in times of a global crisis and examined a mediating model in which main GRRs at the micro level (perceived family support) and at the macro level (trust in the leaders and governmental institutions who are in charge of managing the COVID-19 crisis) mediate the relationships between SOC and mental health. We examined the following hypotheses:

1. SOC, perceived family support and trust in the governmental institutions will be related to higher levels of mental health in all 7 samples.
2. Perceived family support and trust in the governmental institutions will mediate the relationships between SOC and mental health (after controlling for levels of age, gender, and exposure to financial risk).

2. Methods

2.1. Participants and data collection

The current data analysis includes 7 samples of adult participants (age 18–90) from Israel (n = 669), Italy (n = 899), Spain (n = 476), Germany (n = 708), Austria (n = 1026), Switzerland (n = 147), and the U.S. (n = 506). Significant differences were found between the samples regarding the sociodemographic variables of age, gender, and marital status. The number of males in most countries was between 15% and 30% of the sample, while the number of males in the Israeli and the Italy samples was higher. The participants from the USA were older than participants in other countries while the participants from Israel were younger participants. In Switzerland most of the participants were single (52.4%), in Italy and Germany about 50% were married, while in Austria, Israel and Spain more than 59% were married. The number of people who reported that they or their family member had tested positive for coronavirus was very low in all the samples except in Spain (where 18% reported that they have had a close family member who has been diagnosed with COVID-19). As for the financial risk, the Italian participants estimated more than others that they would suffer financially from the Corona virus crisis and 8.19% preferred not to answer this question. On the other hand, the participants from Germany, Switzerland, and Austria estimated less than the others that they would suffer financially.

Data collection took place during May–June 2020. Prior to data collection, we obtained approval from the ethics committees of the participating academic institutions in each country as required. Recruitment of participants was conducted via online survey. In Israel, we used a pre-recruited panel sampling, and the data were collected via a nonprobability, general population panel, which includes about 100,000 panelists. In the other countries we used a list-based sampling strategy, conducted by the web via social media networks (like Facebook, Instagram), and by e-mail, using Qualtrics or Goggle Forms. The invitation letter was distributed among a large variety of social networks and e-mail lists (colleagues in different workplaces, students in various academic institutions, social aid groups in different geographic locations, etc..). To reduce the sample selection problem, we also used snowball sampling and the participants were asked to help in further distributing the link to the questionnaire. In this letter we explained that the research objective was to understand the participant's experience during the period of COVID-19. The anonymity of the participants was guaranteed, and no identifying data was collected in the questionnaire. This method is a nonprobability cost-efficient method to quickly obtain large amount of data (Alvarez & VanBeselaere, 2005, pp. 955–962).

Data was analyzed using SPSS Statistics and R. Descriptive data was compared using ANOVA and separated mediating models (Hayes, 2013) were conducted for each country. Since the percent of missing data was less than 1% of observations (see Tables 1 and 2), we used Full Information Maximum Likelihood (FIML) method (Olinsky, Chen, & Harlow, 2003). The FIML approach computes a case-wise likelihood function with observed variables for each case and estimates parameters on the basis of the available complete data as well as the implied values of the missing data given the observed data. The FIML was calculated by R program (Lavaan package).

Table 1
Demographic variables.

Variable	Categories	*Israel n = 669*	Italy n = 899	Spain n = 476	Germany n = 708	Austria n = 1026	Switzerland n = 147	U.S.A. n = 506
Gender	**Male**	338 (50.7)	334 (37.2)	113 (23.7)	189 (26.8)	308 (30.1)	43 (29.3)	115 (24.3)
	Female	329 (49.3)	565 (62.8)	363 (76.3)	517 (73.2)	716 (69.9)	104 (70.7)	358 (75.7)
	missing	2	0	0	2	2	0	33
Marital Status	**Single**	229 (34.2)	413 (45.9)	119 (25.1)	272 (38.4)	332 (32.4)	77 (52.4)	
	Married	397 (59.3)	414 (46.1)	301 (63.4)	358 (50.6)	605 (59.0)	56 (38.1)	
	Divorced	41 (6.1)	51 (5.7)	46 (9.7)	63 (8.9)	76 (7.4)	12 (8.2)	
	Widower	2 (0.4)	21 (2.3)	9 (1.8)	15 (2.1)	13 (1.2)	2 (1.3)	
	missing	0	0	1	0	0	0	
Positive for COV19	**Yes**	7 (1.0)	4 (0.4)	24 (5.1)	3 (0.4)	12 (1.2)	1 (0.7)	9 (1.8)
	No	662 (99.0)	895 (99.6)	450 (94.9)	705 (99.6)	1014 (98.8)	146 (99.3)	494 (98.2)
	missing	0	0	2	0	0	0	3
Family member positive COV19	**Yes**	15 (2.2)	17 (1.9)	89 (18.8)	21 (3.0)	40 (3.9)	5 (3.4)	122 (24.3)
	No	654 (97.8)	882 (98.1)	385 (81.2)	687 (97.0)	986 (96.1)	142 (96.6)	380 (75.7)
	missing	0	0	2	0	0	0	4
Age	**Mean (S.D)**	39.12	41.60	48.06	46.66 (15.56)	47.74 (13.29)	42.45 (14.40) 6	51.68 (14.43)
	missing	(13.28) 0	(16.80) 0	(13.84) 2	11	24		16
Finance risk due to COV19	**Mean (S.D)**	3.00 (1.32)	3.53 (1.22)	2.59 (1.03)	2.01 (0.98) 24	1.95 (0.97) 22	1.96 (1.00) 5	2.48 (1.02) 3
	missing	22	76	29				

Table 2
Descriptive statistics and correlations for mental health, SOC, perceived family support, and trust.

County	Variable	n	M	SD	SOC	F. Support	Trust
Israel	M. health	669	3.77	1.02	.54***	.47***	.31***
	SOC	669	4.56	0.89		.32***	.20***
	F. Support	666	4.28	0.95			.23***
	Trust	669	3.01	0.78			
Italy	M. health	899	4.02	0.98	.59***	.35***	.25***
	SOC	899	4.43	0.96		.33***	.11**
	F. Support	867	4.09	0.99			.04
	Trust	899	3.15	0.76			
Spain	M. health	476	4.18	1.09	.47***	.39***	.27***
	SOC	476	4.82	0.90		.33***	.17***
	F. Support	472	4.65	0.66			.11*
	Trust	476	2.54	0.77			
Germany	M. health	708	4.27	0.88	.57***	.19***	.29***
	SOC	708	5.17	0.73		.16***	.15***
	F. Support	699	4.25	0.87			.12**
	Trust	708	3.49	0.80			
Austria	M. health	1026	4.50	0.90	.57***	.29***	.37***
	SOC	1026	5.37	0.78		.25***	.23***
	F. Support	1019	4.44	0.80			.12***
	Trust	1026	3.62	0.75			
Switzerland	M. health	147	4.40	0.79	.63***	.26***	.18*
	SOC	147	5.26	0.66		.28***	.12
	F. Support	146	4.35	0.80			.11
	Trust	147	3.85	0.59			
U.S.A.	M. health	506	4.19	0.95	.67***	.38***	.34***
	SOC	506	4.78	1.00		.38***	.38***
	F. Support	501	4.33	0.89			.20***
	Trust	506	2.79	0.49			

*p < .05 **p < .01 ***p < .001.
The variables: M.health = mental health; F. Support = perceived family support; SOC = sense of coherence.

2.2. Instruments

The study instrument comprised structured self-report questionnaires that were back translated from English to Hebrew, Italian, Spanish, and German. The reliability for the following measures will be presented according to this order: Israel, Italy, Spain, Germany, Austria, Switzerland, and the U.S.

Mental Health Continuum (MHC-SF) (Lamers et al., 2011).

This scale includes 14-items measuring the three components of well-being: emotional, social, and psychological. The emotional well-being is assessed via three items related to positive emotions and life satisfaction. e.g., you felt *"satisfied with life."* The psychological well-being is assessed via six items dealing with goals related to self-acceptance, positive relations with others, autonomy, environmental mastery, purpose in life as well as personal growth, e.g., you felt that *" you liked most parts of your personality"* the social well-being is assessed via five items relating to social coherence, social acceptance, social actualization, social contribution, and social integration, e.g., you felt that … *"our society is a good place, or is becoming a better place, for all people"* Since the MHC-SF is better represented by a bifactor model than a three-factor model (e.g., Jovanović, 2015), and we calculated the mean of all the items.

The questionnaire was adapted to the current context and based on the experiences the participants had over the last month (*never*, *once in two weeks, about once a week*, *2 or 3 times a week*, *almost every day*, or *every day*). Internal consistency of the questionnaire was estimated at 0.89 (Lamers et al., 2011) and in the current study the α ranged between 0.89 and 0.94.

Sense of Coherence (SOC-13, Antonovsky, 1987).

The SOC measure includes 13 items, on a 7-point Likert scale, which explore the participants' perceptions of the world as comprehensible, meaningful, and manageable. *For example, "Has it happened that people whom you counted on disappointed you?" "How often do you have the feeling that there is little meaning in the things you do in your daily life?"* Since the SOC-13 is better represented by a bifactor model than a three-factor model (e.g., Eriksson & Lindström, 2005), we calculated mean of all the items.

We used the existing SOC versions in English (Antonovsky, 1987), Italian (Sardu et al., 2012), Spanish (Virués-Ortega, Martí), German (Abel, Kohlmann, & Noack, 1995), and Hebrew (Antonovsky, 1987) in the relevant samples. The α values of the SOC-13 versions range from 0.70 to 0.92 (see Eriksson & Mittelmark, 2017) and in this study the α ranged between 0.78 and 0.86.

2.3. Trust in leaders and governmental institutions

This is an 8-item questionnaire regarding level of trust in relevant institutions (media, legal courts, prime minister, police, the government, ministry of finance, ministry of health, health-care workers, and hospitals) on a 5-point Likert scale (1 = very much, 5 = not at all). The instruction was "*In coping with the Corona virus crisis, to what extent do you trust the following people or institutions*?" Internal consistency ranged between α = 0.80 and α = 0.91 (the only exception was for USA: α = 0.65). We calculated the mean of all the items.

2.4. Perceived family support

One item asking *"over the last month, to what extent have you felt* support *by your family members"* on a 5-point Likert scale (1 = very much, 5 = not at all).

2.5. Level of exposure to COVID-19

We explored both health and financial exposure to the COVID-19 crisis by asking if the participant: 1. had been diagnosed with COVID-19 (Yes/No); 2. had a close family member who had been diagnosed with COVID-19 (Yes/No); and 3. to what extent do you think you will suffer financially from the Corona virus crisis? (1 = not at all, 5 = extremely). Due to the small numbers of participants who were exposed to the virus, we controlled only the exposure to financial risk.

2.6. Socio-demographic variables

Demographic information (gender, age, marital status) was collected. Gender was calculated as a DUMMY variable and was used as a covariate. Age, as representing a health risk factor, was also used as a covariate. Marital status was examined by asking the participant if he/she was single; married/common law marriage; divorced; widow/widower; other. However, it was not entered as a covariate since it was not included in the U.S. sample.

3. Results

3.1. Descriptive analysis – hypothesis 1

We conducted an ANOVA test for the differences in the levels of the research variables (mental health, SOC, trust, and perceived family support) between the seven research groups (see Table 2). The comparisons were conducted separately for the various countries.

Since the assumption of homogeneity of variance was not met, we used the Welch's adjusted F ratio, which was significant at the 0.001 alpha levels for all the variables. Based on the significant differences between the countries in mental health, $F(6,4424) = 46.59$, $p < .001$; SOC, $F(6,4424) = 129.70$, $p < .001$; perceived family support, $F(6,4363) = 25.38$, $p < .001$ and trust, $F(6, 4424) = 188.37$, $p < .001$, Games-Howell post hoc tests were conducted, and revealed that the levels of mental health were significantly lower ($p < .001$) among the Israeli participants, as compared to the other participants. The levels of SOC among the Israeli and Italian participants were significantly lower ($p < .001$) as compared to the participants from the other countries. The SOC levels among the participants from Switzerland, Germany, and Austria were significantly higher as compared to the other countries ($p < .001$). As for levels of perceived family support, the participants from Italy reported significantly lower family support ($p < .001$) as compared to the participants from the other countries. The perceived family support among the participants from Spain and Austria was significantly higher as compared to the other countries ($p < .001$). The trust in the governmental institutions was the lowest in Spain, followed by American participants ($p < .001$), and Israelis and Italian participants ($p < .001$). The highest level of trust was found among the Swiss participants ($p < .001$).

The results revealed significant differences between the countries and a pattern in which the Swiss, German, and Austrian participants reported higher levels of GRRs and mental health as compared to the other participants (see Table 2).

Correlation analyses, however, revealed positive strong and significant associations between mental health and SOC, perceived family support, and trust in governmental institutions in all countries. The only exceptions were Switzerland and Italy; among Swiss participants the correlations between SOC and trust and between perceived family support and trust were positive but were not significant. And among Italian participants the correlation between perceived family support and trust was positive but was not significant. The results support our first hypothesis.

3.2. Overall mediation model - hypothesis 2

To test whether the effect of SOC (independent variable) on the levels of mental health (dependent variable) could be explained through perceived family support (mediator one) and trust in governmental institutions (mediator two), using age, gender, and financial risk as covariates, a mediation analysis using R software was conducted, using a percentile bootstrap estimation approach with 10,000 samples (Hayes, 2013). The direct effect of SOC on mental health is strong and significant. Perceived family support and trust have also significant direct effects on levels of mental health, but their effects are lower than SOC (see Table 3).

The indirect effect of perceived family support on the relationships between SOC and mental health was 0.050, SE = 0.004, 95% CI [0.041, 0.059]. The indirect effect of trust was very similar, 0.049, SE = 0.004, 95% CI [0.041, 0.058]. Thus, both variables mediate the relationships between SOC and mental health, but the overall indirect effect is small = 0.099, SE = 0.006, 95% CI [0.087, 0.1112]. Belonging to a financial risk group and gender was not significantly associated with levels of mental health, but age was. It appears that hypothesis 2 related to perceived family support and trust as mediators in the relationship between SOC and mental health was supported.

3.3. Comparing mediation models across countries

We conducted separate mediation analysis using R software. We used a percentile bootstrap estimation approach with 10,000 samples (Hayes, 2013) in each country sample (see Table 3). In order to compare the effects of the different factors among each group a multi-group analysis was conducted. The analysis emphasizes the differences between the models across the countries. Specifically, the only relations that were similar across the countries were the relations between SOC and mental health, Trust and mental health, and gender and mental health. Thus, we preferred to analyze the same model for each country separately, without restrictions.

Similar patterns were found among participants from different countries: SOC was mainly associated with mental health as compared to family support and trust (but not in Spain), while trust was stronger

Table 3
The regression analysis of mediating effects, controlling age, gender (male = 1), and economic risk; X = SOC, independent variable; Y = mental health, dependent variable, M1 = family support, mediator1; M2 = trust, mediator2.

Country	Effect	b	SE	Percentile 95% CI	
				Lower	Upper
All	Effect of SOC on F. Support (a1)	0.267***	0.014	0.240	0.295
	Effect of SOC on Trust (a2)	0.236***	0.013	0.211	0.261
	Effect of F. Support on M. health (b1)	0.187***	0.013	0.161	0.213
	Effect of Trust on M. health (b2)	0.210***	0.015	0.181	0.238
	Effect of SOC on M. health (c')	0.504***	0.014	0.477	0.531
	Effect of age on M. health	0.004***	0.001	0.002	0.005
	Effect of male on M. health	−0.036	0.025	−0.084	0.013
	Effect of economic risk on M. health	0.000	0.001	−0.002	0.002
	Indirect effect of SOC on M. health through F. Support (a1b1)	0.050***	0.004	0.041	0.059
	Indirect effect of SOC on M. health through Trust (a2b2)	0.049***	0.004	0.041	0.058
	Total indirect effect	0.099***	0.006	0.087	0.112
	Total effect of SOC on M. health (c)	0.603***	0.013	0.577	0.630
	CFI = 0.987, TLI = 0.971, RMSEA = 0.036, SRMR = 0.017, $\chi^2(7) = 46.60$***				
Israel	Effect of SOC on F. Support (a1)	0.325***	0.040	0.247	0.402
	Effect of SOC on Trust (a2)	0.172***	0.033	0.107	0.238
	Effect of F. Support on M. health (b1)	0.304***	0.034	0.237	0.371
	Effect of Trust on M. health (b2)	0.202***	0.041	0.122	0.282
	Effect of SOC on M. health (c')	0.485***	0.038	0.410	0.559
	Effect of age on M. health	−0.004	0.002	−0.009	0.000
	Effect of male on M. health	−0.073	0.061	−0.192	0.047
	Effect of economic risk on M. health	−0.051*	0.022	−0.094	−0.007
	Indirect effect of SOC on M. health through F. Support (a1b1)	0.099***	0.016	0.067	0.131
	Indirect effect of SOC on M. health through Trust (a2b2)	0.035***	0.010	0.016	0.054
	Total indirect effect	0.133***	0.018	0.098	0.169
	Total effect of SOC on M. health (c)	0.618***	0.038	0.543	0.683
	CFI = 0.924, TLI = 0.837, RMSEA = 0.088, SRMR = 0.042, $\chi^2(7) = 43.07$***				
Italy	Effect of SOC on F. Support (a1)	0.300***	0.034	0.233	0.368
	Effect of SOC on Trust (a2)	0.085***	0.026	0.033	0.136
	Effect of F. Support on M. health (b1)	0.158***	0.025	0.109	0.207
	Effect of Trust on M. health (b2)	0.247***	0.033	0.182	0.312
	Effect of SOC on M. health (c')	0.487***	0.029	0.430	0.544
	Effect of age on M. health	0.007***	0.002	0.004	0.010
		0.024	0.052	−0.078	0.127
	Effect of male on M. health				
	Effect of economic risk on M. health	0.001	0.019	−0.035	0.038
	Indirect effect of SOC on M. health through F. Support (a1b1)	0.047***	0.009	0.029	0.066
	Indirect effect of SOC on M. health through Trust (a2b2)	0.021**	0.007	0.007	0.035
	Total indirect effect	0.068***	0.012	0.045	0.091
	Total effect of SOC on M. health (c)	0.556***	0.029	0.499	0.613
	CFI = .960, TLI = 0.913, RMSEA = 0.062, SRMR = 0.031, $\chi^2(7) = 30.87$***				
Spain	Effect of SOC on F. Support (a1)	0.223***	0.032	0.160	0.286
	Effect of SOC on Trust (a2)	0.155***	0.039	0.079	0.232
	Effect of F. Support on M. health (b1)	0.422***	0.067	0.291	0.554
	Effect of Trust on M. health (b2)	0.239***	0.055	0.130	0.347
	Effect of SOC on M. health (c')	0.444***	0.051	0.344	0.544
	Effect of age on M. health	−0.009**	0.003	−0.015	−0.003
	Effect of male on M. health	0.019	0.098	−0.174	0.211
	Effect of economic risk on M. health	−0.034	0.033	−0.099	0.031
	Indirect effect of SOC on M. health through F. Support (a1b1)	0.094***	0.020	0.055	0.134
	Indirect effect of SOC on M. health through Trust (a2b2)	0.037**	0.013	0.012	0.062
	Total indirect effect	0.131***	0.023	0.085	0.177
	Total effect of SOC on M. health (c)	0.575***	0.050	0.477	0.674
	CFI = 0.942, TLI = 0.876, RMSEA = 0.067, SRMR = 0.037, $\chi^2(7) = 21.65$**				
Germany	Effect of SOC on F. Support (a1)	0.199***	0.044	0.112	0.285
	Effect of SOC on Trust (a2)	0.155***	0.041	0.075	0.234
	Effect of F. Support on M. health (b1)	0.073*	0.030	0.014	0.133
	Effect of Trust on M. health (b2)	0.245***	0.033	0.179	0.310
	Effect of SOC on M. health (c')	0.570***	0.038	0.497	0.644
	Effect of age on M. health	0.010***	0.002	0.006	0.013
	Effect of male on M. health	0.083	0.059	−0.033	0.199
	Effect of economic risk on M. health	0.001	0.002	−0.002	0.004
	Indirect effect of SOC on M. health through F. Support (a1b1)	0.015*	0.007	0.001	0.028
	Indirect effect of SOC on M. health through Trust (a2b2)	0.038***	0.011	0.016	0.060
	Total indirect effect	0.052***	0.013	0.027	0.078
	Total effect of SOC on M. health (c)	0.623***	0.038	0.548	0.697
	CFI = 0.962, TLI = 0.918, RMSEA =				

(*continued on next page*)

Table 3 (*continued*)

Country	Effect	b	SE	Percentile 95% CI	
				Lower	Upper
	0.056, SRMR = 0.031, $\chi^2(7) = 22.26$**				
Austria	Effect of SOC on F. Support (a1)	0.236***	0.032	0.174	0.298
	Effect of SOC on Trust (a2)	0.218***	0.029	0.161	0.276
	Effect of F. Support on M. health (b1)	0.155***	0.028	0.100	0.210
	Effect of Trust on M. health (b2)	0.276***	0.030	0.216	0.335
	Effect of SOC on M. health (c')	0.561***	0.031	0.501	0.621
	Effect of age on M. health	0.001	0.002	−0.003	0.004
	Effect of male on M. health	−0.032	0.050	−0.130	0.066
	Effect of economic risk on M. health	0.002	0.002	−0.001	0.005
	Indirect effect of SOC on M. health through F. Support (a1b1)	0.037***	0.008	0.021	0.053
	Indirect effect of SOC on M. health through Trust (a2b2)	0.060***	0.010	0.040	0.081
	Total indirect effect	0.097***	0.013	0.071	0.122
	Total effect of SOC on M. health (c)	0.658***	0.031	0.598	0.718
	CFI = 0.980, TLI = 0.956, RMSEA = 0.043, SRMR = 0.022, $\chi^2(7) = 19.98$**				
Switzerland	Effect of SOC on F. Support (a1)	0.299**	0.100	0.103	0.495
	Effect of SOC on Trust (a2)	0.126	0.074	−0.018	0.270
	Effect of F. Support on M. health (b1)	0.049	0.064	−0.076	0.174
	Effect of Trust on M. health (b2)	0.155	0.088	−0.018	0.328
	Effect of SOC on M. health (c')	0.684***	0.083	0.522	0.847
	Effect of age on M. health	0.006	0.004	−0.001	0.013
	Effect of male on M. health	0.071	0.115	−0.155	0.296
	Effect of economic risk on M. health	0.002	0.003	−0.004	0.008
	Indirect effect of SOC on M. health through F. Support (a1b1)	0.015	0.020	−0.024	0.053
	Indirect effect of SOC on M. health through Trust (a2b2)	0.019	0.016	−0.012	0.051
	Total indirect effect	0.034	0.025	−0.014	0.082
	Total effect of SOC on M. health (c)	0.718***	0.081	0.559	0.878
	CFI = 0.993, TLI = 0.984, RMSEA = 0.025, SRMR = 0.039, $\chi^2(7) = 7.63$				
USA	Effect of SOC on F. Support (a1)	0.354***	0.037	0.282	0.427
	Effect of SOC on Trust (a2)	0.185***	0.021	0.143	0.226
	Effect of F. Support on M. health (b1)	0.105**	0.040	0.026	0.183
	Effect of Trust on M. health (b2)	0.183**	0.070	0.045	0.321
	Effect of SOC on M. health (c')	0.539***	0.039	0.463	0.614
	Effect of age on M. health	−0.001	0.002	−0.005	0.004
	Effect of male on M. health	−0.130	0.074	−0.274	0.014
	Effect of economic risk on M. health	−0.104**	0.032	−0.166	−0.042
	Indirect effect of SOC on M. health through F. Support (a1b1)	0.037*	0.015	0.008	0.066
	Indirect effect of SOC on M. health through Trust (a2b2)	0.034*	0.014	0.007	0.060
	Total indirect effect	0.071***	0.019	0.033	0.109
	Total effect of SOC on M. health (c)	0.609***	0.035	0.540	0.678
	CFI = 0.998, TLI = 0.996, RMSEA = 0.017, SRMR = 0.019, $\chi^2(7) = 7.91$				

*p < .05, **p < .01, ***p < .001.
The variables: M.health = mental health; F. Support = perceived family support; SOC = sense of coherence.

associated with mental health as compared to perceived family support (but not in Israel and Spain). The total effect of SOC, perceived family support, and trust were significantly higher as compared to the direct effects of SOC on mental health in all the samples.

The indirect effect of perceived family support and trust on the relationships between SOC and mental health was significant in most of the countries (except Switzerland)).

In conclusion, our first hypothesis was supported and SOC, perceived family support, and trust in governmental institutions were all strongly related to higher levels of mental health in all 7 samples. As predicted in the second hypothesis, perceived family support and trust mediated the relationships between SOC and mental health. It is also noteworthy that the indirect effect of SOC on mental health was significant in most of the samples (except Switzerland).

4. Discussion

The COVID-19 crisis that disrupted reality and caused chaos all over the world has raised many pathogenic questions among researchers. Our study, however, employed a salutogenic approach and asked: how do people create order out of the chaotic reality during the pandemic and stay mentally healthy?

We examined this question in 7 countries during the first months of the COVID-19 crisis. Investigating and comparing coping patterns with the pandemic across 7 countries, differing widely in respect to political, welfare-system, culture, and burden of the pandemic, can yield valuable insights related to salutogenic processes and to the question of how populations can deal with stressors while protecting their mental health.

We, however, were mainly interested in understanding the association of SOC with mental health during this time of the pandemic, and especially how it works beyond specific contexts or cultures. More specifically, we asked about the potential universality of the positive effect of SOC in times of a global crisis and examined a mediating model in which main GRRs at the micro level (perceived family support) and at the macro level (trust in the leaders and governmental institutions who are in charge of managing the COVID-19 crisis) mediate the relationships between SOC and mental health. Based on Antonovsky's assumption about the universal nature of SOC, we expected to find similar patterns among people from different countries.

The preliminary analysis indeed revealed some significant differences between the participants from the 7 samples in levels of SOC, perceived family support, trust, and mental health. A gap was found between Swiss, German, and Austrian samples and the other 4 samples, as these 3 samples reported stronger SOC levels as well as coping resources (GRRs) and mental health measures as compared to the other samples. These results

might reflect the different cultural contexts, as well as the various political, economic resources, and social stability (Sagy & Antonovsky, 1996) as well as the pandemic crisis at the time of data collection. Discussing these differences in-depth, however, is beyond the scope of this paper. Moreover, since the sampling is not representative, our ability to discuss those differences is quite limited.

However, and despite these differences, a similar pattern was revealed in the correlation analyses and in the mediation model. As we expected (our first hypothesis), we consistently found strong connections between SOC, perceived family support, trust, and mental health in all the 7 samples and they consistently contribute directly to mental health, when controlling for levels of age, gender, and perceived financial risk. Moreover, the relationships between SOC and mental health were stronger compared to the relationships of the two GRRs (perceived family support and trust) with mental health. These findings confirm the central role Antonovsky (1979) assigned to the SOC as a core and main coping resource. Moreover, SOC appears to have a universal meaning, not limited by cultural characteristics.

These similar patterns enabled us to examine the mediating role (hypothesis 2) of perceived family support and trust in the relationships between SOC and mental health for the entire sample of the 7 countries, as well as in each sample separately. Overall, we found SOC to be the main predictor of mental health in all 7 countries included in our study. We also found a strong support for the mediating model in which each GRR contributed to the relationship between SOC and mental health. However, there were some differences among the samples. In three of the countries – Israel, Italy, and Spain – perceived family support had a stronger effect on the relationships between SOC and mental health compared to trust. This direction is consistent with previous Israeli studies related to the strong association between SOC and family support (Sagy & Antonovsky, 1992). Among two other countries –Germany, and Austria – trust had a stronger effect on the relationship between SOC and mental health as compared to family support. While Switzerland's was different from the other countries since the indirect effect of perceived family support and trust on the relationships between SOC and mental health was not significant. It appears that there are differences and similarities between the various countries. While the SOC is a universal coping resource, the chosen GR is verifying due to individual and collective preferences and availability. The question related the collective preference of specific GR during national crisis is an interesting question and should be further investigated.

But, as we mentioned before, this discussion is beyond the scope of this manuscript.

Before concluding, some main limitations must be considered. We used an internet-based snowball sampling, and the samples were not representative, since there is a selection bias. Using internet questionnaires may neglect groups that have less accessibility to computers and social media, for example due to ideology, religious beliefs, and or financial reasons (Alvarez & VanBeselaere, 2005, pp. 955–962). However, the use of internet questionnaires has benefits for large sampling during the COVID-19, due to the social distancing regulations which made it difficult to collect data face to face, and the growing usage of internet among the global population. Moreover, the rapid changes in the social reality also required a rapid process of data collection. Another limitation is exploring perceived social support with only one item. Although the usage of one item for family support is common (Krahn, 1993), the current finding related to the importance of this variable in mediating the relationship between SOC and mental health reinforces the need to explore it more deeply while using standardized questionnaires.

To summarize, the COVID-19 provided us a unique opportunity to understand how people from different countries and cultural contexts struggle with the same stressor: a challenging pandemic. Overall, we can conclude that asking salutogenic questions lead us to develop a better understanding of coping with such hard times. Our results confirm Antonovsky's hypothesis that the personal construct of SOC is the decisive factor in advancing movement towards health, even in times of a widespread health crisis. Strong SOC allows one to be flexible and reach out to the appropriate resources in one's surroundings. These results seem to have a special significance in the current period of struggling with a pandemic that appears to have a strong impact on our social-economic and political life. In the aim of advancing coping with pandemic, our findings lead us to understand that it is not enough to provide material resources, rather, and perhaps even more important, is the need to also enhance the ability of members of society to comprehend, manage, and give some meaning to the chaotic reality.

How might these conclusions be implemented? We can suggest some examples: spokespeople during a health crisis should be professionals and trustworthy experts rather than political figures, the professional leading team should have the authority to make difficult decisions without interruptions by politics and interest groups, and they should give the population reliable, consistent, and reasonable information about the situation and the ways which are chosen to handle it. The application of these suggestions could be different, of course, according to the various social-political-cultural contexts but the central question should be the same: How can we promote the advancement of the three components of the universal construct of SOC: comprehensibility, manageability, and meaningfulness?

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Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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