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The impact of the COVID-19 pandemic on subjective mental well-being: The interplay of perceived threat, future anxiety and resilience

Mario R. Paredes^{a,*}, Vanessa Apaolaza^b, Cristóbal Fernandez-Robin^c, Patrick Hartmann^b, Diego Yañez-Martinez^c

^a Universidad del Rosario, School of Management and Business, Bogotá, Colombia

^b Faculty of Economics and Business Administration, University of the Basque Country UPV/EHU, Bilbao, Spain

^c Universidad Técnica Federico Santa María, Valparaíso, Chile

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ABSTRACT

The COVID-19 pandemic has potentially a serious impact on many people's mental well-being. This study analyses the influence of the perceived threat of COVID-19 on subjective mental well-being with an online survey (n = 711). Findings confirmed the hypothesized model that provides a process explanation for this effect through the mediating influence of the activation of future anxiety. In addition, results confirmed that this influence via future anxiety is moderated by resilience, a personality trait that enables individuals to cope better with stressful or traumatic events. Individuals with higher levels of resilience compared to those with lower levels registered a lower impact of perceived Covid threat on future anxiety and, in turn, on subjective well-being. This study contributes theoretically to a better understanding of the factors that determine the impact of traumatic events such as a pandemic on people's mental health. The implications of this study indicate interventions that may be carried out to minimize the pandemic's negative psychological consequences.

1. Introduction

The coronavirus disease 2019 (COVID-19) pandemic, caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has significantly transformed relationships among individuals. To prevent the spread of the virus, governments worldwide have implemented health measures (e.g., quarantining, wearing a protective mask, initiating social lockdowns) that have had psychosocial and economic effects (Montemurro, 2020). There has been emerging evidence that the Covid pandemic and the measures adopted can increase the severity of pre-existing mental diseases and cause new symptoms in individuals with no previous disorders (Cullen et al., 2020). Due to the magnitude of this pandemic, its psychological effects have become a matter of imminent research, particularly the potential factors that produce negative psychological consequences that may affect mental well-being, and potential mechanisms to cope with the consequences (Giallonardo et al., 2020; Liu et al., 2020; Satıcı et al., 2020).

Research has shown that individuals may respond differently to the emotional distress caused by traumatic events such as this pandemic (Killgore et al., 2020). For instance, the literature suggests resilience as a personality trait that may help individuals to cope with the negative

psychological effects of traumatic events, including the Covid pandemic (Liu et al., 2020). It is therefore important to advance theory development in this specific domain, not least to provide individuals and health-care practitioners with much-needed insight on how to mitigate the mental-health impact of the ongoing and possible future pandemics.

The present study aims to address this need by providing a process explanation for the effect of the perceived threat of Covid-19 on subjective mental well-being during the pandemic, based on the activation of future anxiety as a mediating variable. In light of the recent developments in the literature, we furthermore propose and test the moderating influence of resilience as a personality trait that describes the individual's ability to cope with stressful situations. Our findings have significant theoretical and practical implications.

1.1. The effect of the perceived threat of COVID-19 on subjective mental well-being

Mental well-being is necessary for society's effective functioning (Tennant et al., 2007). In a state of well-being, individuals can cope with the traditional stress of life, be productive, and contribute to their community (Surya et al., 2017). Previous research has stated that

* Corresponding author at: School of Management and Business, Universidad del Rosario, Calle 200 Autopista Norte y Carrera 7, Bogotá 110141, Colombia.

E-mail addresses: mario.paredes@urosario.edu.co (M.R. Paredes), vanessa.apaolaza@ehu.eus (V. Apaolaza), cristobal.fernandez@usm.cl (C. Fernandez-Robin), patrick.hartmann@ehu.eus (P. Hartmann), diego.yanez@usm.cl (D. Yañez-Martinez).

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unexpected events, such as pandemics or natural disasters, produce significant emotional effects on people, that are detrimental to their mental well-being (e.g., Folkman & Greer, 2000; Maunder et al., 2003). Recent research indicates that the circumstances surrounding the Covid pandemic (e.g., social distancing, isolation, uncertainty, fear, etc.) increase stress-related symptoms, affecting mental well-being (Duan & Zhu, 2020; Satici et al., 2020). For instance, individuals reported higher levels of depression, anxiety (Roy et al., 2020), post-traumatic stress (Liu et al., 2020), frustration, isolation (Giallonardo et al., 2020), anger-hostility, and sadness-depression (Pérez-Fuentes et al., 2020).

Relevant for its impact on mental well-being is less the objective than the perceived threat level. In the case of diseases, threat perception is influenced by a number of factors, including the likelihood of vulnerability or contagion and the harshness of the changes produced by the disease in case of infection (Pérez-Fuentes et al., 2020). Perceived threat has been related to higher levels of worry (Berenbaum et al., 2007). Individuals who experience a higher threat perception therefore experience a greater risk to face detrimental consequences on subjective mental well-being. In the Covid case, threat perception is related to the individuals' perceptions of how COVID-19 may produce an undesirable outcome which may cause negative consequences in their life. Also, individuals have been shown to experience fear due to the perceived Covid threat that may harm their mental health (Usher et al., 2020; Garfin et al., 2020; Killgore et al., 2020; Lima et al., 2020). Thus, we expect that the more severe the threat from Covid is perceived, the more negatively affected will be an individual's mental well-being.

Hypothesis 1. The degree of perceived threat of Covid has a negative effect on subjective mental well-being.

1.2. The mediating role of future anxiety

The changes and uncertainty provoked by the pandemic and the measures implemented (e.g., quarantining, wearing a protective mask, social lockdowns; Montemurro, 2020) have a profound psychological impact on the population's mental well-being, causing an increase in stress, depression, anxiety, and suicidal ideation (Garfin et al., 2020; Killgore et al., 2020; Lima et al., 2020). In addition, mass media communication may provide information that leads to confusion and uncertainty, magnifying the emotional distress (Han et al., 2018; Usher et al., 2020).

Previous research on significant outbreaks (e.g., pandemics, natural disasters, terrorist attacks) has demonstrated that the psychological effects remain years after the incident (Blackmon et al., 2017; Bonanno et al., 2008). Individuals may be affected by future negative thinking undermining their mental well-being (Holman & Silver, 2005). COVID-19 has increased individuals' worries about their present and future situations (Giallonardo et al., 2020; Usher et al., 2020) since there is not a known end to the crisis, and its effects cannot be controlled (Liu et al., 2020). Traumatic events such as COVID-19 remind individuals of the possibility of death, generating anxiety as a common response to a stressful situation (Roy et al., 2020). Potential economic and social problems (e.g., unemployment, risk of infection, economic collapse) from the pandemic may encourage anticipatory fear. Individuals are concerned about unfavorable changes to their future state. Therefore, we expect that the perceived threat of COVID-19 will increase future anxiety, which, in turn, will have a negative impact on subjective mental well-being:

Hypothesis 2. The degree of perceived threat of Covid has an indirect negative effect on subjective mental well-being mediated by its positive effect on future anxiety.

1.3. The moderating role of resilience

Resilience has been acknowledged as a complex construct since it

can be viewed as a trait, a process, or an outcome (Agaibi & Wilson, 2005), which may be determined by different biological, cultural, social, and psychological factors that regulate how individuals cope with stressful events at different situations across multiple domains of life (Southwick et al., 2014). It may vary according to an individual's development and interaction with the environment (Kim-Cohen & Turkewitz, 2012).

Resilience plays an important role in overcoming the adverse effect of stressful situations. For instance, in the sports domain, where athletes have to overcome difficult challenges to become successful, resilience allows individuals to adapt to adverse conditions (e.g., Hill et al., 2018). Previous research has shown that when facing stressful or adverse situations, resilient individuals tend to experience lower levels of depression or anxiety, have the ability to recover more quickly to pre-crisis stages, and arrive at a pre-stress baseline more quickly (Luthar et al., 2000). Resilience reduces the negative mental consequences caused by disasters or stressful events (e.g., Blackmon et al., 2017; Osofsky et al., 2011). Following Connor and Davidson (2003), this study understands resilience as a self-perceived trait that enables individuals to cope with adversity or stressful life events.

Resilience may help people cope with adversity and reduce the negative impact of traumatic events on mental health (Osofsky et al., 2011). It has been positively related to mental well-being (e.g., Arslan, 2019). Research has recently identified resilience as a strategy to cope with the mental health challenges derived from COVID-19 (Prime et al., 2020). For instance, in a study performed on U.S. adults, Killgore et al. (2020) found that higher scores in resilience were related to lower levels of worry about COVID-19 effects. Likewise, individuals with less resilience expressed greater difficulty in coping with the situation's emotional challenges. Therefore, we expect that the indirect effect of the perceived threat of COVID-19 on mental well-being, mediated by future anxiety, will be weaker for individuals with higher levels of resilience and greater for individuals with lower levels of resilience:

Hypothesis 3. The indirect effect of the degree of perceived threat of Covid on subjective mental well-being through activating future anxiety is moderated negatively by the individual's degree of resilience.

The theoretical model is represented in Fig. 1.

2. Method

2.1. Participants and procedure

The study was conducted between the 15 and 20 of June 2020 during a severe lockdown measure which was initiated one week before the invitation mail was sent. Residents of the interviewed area were allowed to leave their home only for essential activities such as purchasing food, visiting a doctor, or work in essential economic sectors that could not be conducted online. According to the National Health Institute, in the corresponding region, at the moment of the study, there were 46.028 active cases with 1289,5 cases per 100.000 individuals. For the data collection, an invitation email with a link to an online

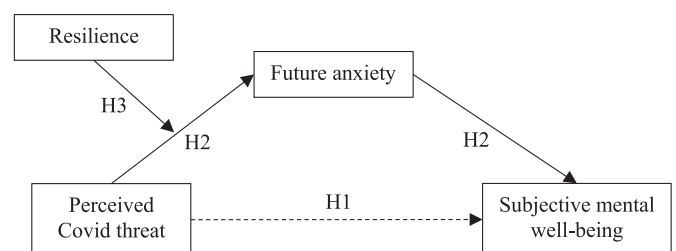


Fig. 1. Theoretical model of the indirect effect of the perceived threat of the COVID-19 pandemic on subjective mental well-being through activating future anxiety.

questionnaire was sent to a database of 19,000 undergraduate and postgraduate students of a major public university. The invitation email was sent from the university communication management through the official communication channel of the institution. The invitation explained the overall aims of the study and data treatment. Participants had to give informed consent before accessing the main questionnaire. The study received ethical approval. Through the online platform SurveyMonkey, 711 valid questionnaires were received (43.9% female, 56.1% male, $M_{age} = 21.60$; $SD = 4.72$). The age of participants ranged from 18 to 49 years (18–20, 39.5%, 21–25: 43.6%, 26–30: 11.4%, 31–49: 5.5%); 71.7% were undergraduate and 28.3% postgraduate students. The low response rate of 4% can be explained by the fact that participation in the survey was voluntary without incentive, and only one invitation without a follow-up message was sent. Participants responded to the online questionnaire, assessing their perception about the threat of COVID-19, their future anxiety, subjective mental well-being, and their level of resilience as a personality trait.

2.2. Measures

The analyzed variables were assessed with validated measurement scales stemming from the literature. The measure for the *perceived threat of COVID-19*, assessed on four items with 7-point scales ranging from *not at all* = 1 to *very much* = 7, was adapted from Tyler and Cook (1984) by specifying the Covid pandemic as the threat concept mentioned in the four items of the scale. Respondents were asked to indicate how information on the COVID-19 pandemic they had received from television news, the internet, and newspapers had made them concerned about the *threat*, the *spread*, the *severity*, and the *impact of the pandemic on their lives*. To assess the individuals' *future anxiety*, we used Zaleski's (1996) scale. Participants rated six items on a 7-point Likert-type scale (1 = *strongly disagree*; 7 = *strongly agree*). *Subjective mental wellbeing* was assessed on ten items of the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) as used in prior research (Adler & Fagley, 2005; Mackinnon et al., 1999). Participants were instructed to indicate what they felt was their dominant overall mood or feelings state recently, rating the following five positive and five negative affective items on scales ranging from 1 (*not at all*) to 7 (*extremely so*): *relaxed*, *alive and full of energy*, *stress-free*, *confident*, *happy*, *sad*, *anxious*, *lonely*, *vulnerable*, and *fragile*. To measure *resilience* as a personality trait, we used nine items from Connor and Davidson's (2003) scale. We asked participants to indicate the traits they believed fit their way of being or their personality. Participants rated each item on a 7-point Likert-type scale (1 = *not at all*; 7 = *extremely so*). All measurement items and their properties are displayed in Table 1. Cronbach's alpha confirmed the reliability of all the scales.

3. Data analysis and results

A correlation analysis (Table 2) confirmed a significant positive relationship between the perceived threat of the COVID-19 pandemic and future anxiety ($r = 0.212$, $p < .01$) and a significant negative relationship between future anxiety and subjective mental well-being ($r = -0.553$, $p < .01$). Results also confirmed a significant negative relationship between the perceived threat of COVID-19 and subjective mental well-being ($r = -0.137$, $p < .01$), providing support for H1.

Mediation analysis of indirect effects using Hayes' (2013) PROCESS with 10,000 bootstrap samples and bias-corrected bootstrap confidence intervals (Hayes, 2013), confirmed that the effect of the perceived Covid threat on subjective mental well-being was mediated by future anxiety ($b_{ind} = -0.13$, $Boot SE = 0.02$, 95% $Boot CI [-0.18, -0.08]$), providing support for H2. The mediation was complete with the remaining direct effect being nonsignificant ($b = -0.023$, $SE = 0.03$, $t = -0.66$, $p = .51$).

Moderated mediation analysis with PROCESS of the moderating effect of resilience on the former relationship revealed a significant

Table 1
Variables and measurement items.

	Mean	SD	α
<i>Perceived threat of the COVID-19</i>	5.97	1.01	0.82
<i>Level of consciousness about...</i>			
The threat of the pandemic.	5.91	1.21	
The spread of the pandemic.	6.08	1.23	
The severity of the pandemic.	5.90	1.26	
The impact of the pandemic on people's lives.	5.98	1.35	
<i>Future anxiety</i>	5.13	1.34	0.86
I am afraid that the problems which trouble me now will continue for a long time.	5.32	1.71	
I am uneasy about possible mishaps.	5.34	1.68	
I am afraid that changes in the economic-political situation will threaten my future.	5.40	1.65	
I am afraid that the health-care system situation will threaten my future.	5.06	1.76	
I am disturbed by the possibility of a serious illness.	5.08	1.87	
I fear I will fail to overcome mounting difficulties.	4.59	1.83	
<i>Subjective mental well-being</i>	2.98	1.10	0.85
Relaxed	2.45	1.48	
Alive and full of energy	2.74	1.41	
Stress-free	2.38	1.82	
Confident	3.11	1.56	
Happy	3.44	1.45	
Sad (reverse coded)	3.29	1.73	
Anxious (reverse coded)	2.22	1.45	
Lonely (reverse coded)	3.48	1.98	
Vulnerable (reverse coded)	3.48	1.88	
Fragile (reverse coded)	3.17	1.85	
<i>Resilience</i>	4.90	1.06	0.86
Able to adapt to change.	4.82	1.47	
Past success gives confidence for new challenges.	4.91	1.62	
See the humorous side of things.	4.71	1.73	
When things look hopeless, I don't give up.	4.94	1.43	
Not easily discouraged by failure.	4.69	1.54	
Think of yourself as a strong person.	5.05	1.51	
In control of your life.	4.40	1.61	
I like challenges.	5.02	1.47	
You work to attain your goals.	5.52	1.36	

The variables are in italics. The measurement items in regular text. The variables are computed by averaging the corresponding measurement items.

Table 2
Variable correlations.

	PT	FA	MW
Perceived Threat (PT)			
Future Anxiety (FA)	0.212**		
Mental Well-being (MW)	-0.137**	-0.553**	
Resilience (RE)	0.011	-0.206**	0.347**

** $p < .01$.

moderated mediation index (10,000 bootstrap samples; $b_{modmed} = 0.052$, $SE = 0.02$, 95% $Boot CI [0.02, 0.09]$). Therefore, the results confirmed that the indirect effect of the perceived threat of the pandemic on mental well-being through future anxiety was moderated by the level of resilience, providing support for H3. Table 3 and Fig. 2 present the pattern of moderation at different values of the moderator resilience.

4. Discussion

4.1. Theoretical contribution and practical implications

The findings of our study contribute to the understanding of the antecedents of mental well-being during a pandemic and, specifically, during the COVID-19 outbreak. To provide adequate mental health interventions, it is necessary to understand the impact of the pandemic

Table 3
Moderated mediation analysis of indirect effect of the perceived threat of COVID-19 on subjective mental well-being through activating future anxiety.

Index of moderated mediation						
Mod.	Med.	Mod. med. index	Boot SE	Boot LLCI	Boot ULCI	
RE	FA	0.052	0.02	0.02	0.09	

Conditional indirect effect at values of the moderator						
Mod.	Med.	Values mod.	Cond. ind. effect	Boot SE	Boot LLCI	Boot ULCI
RE	FA	3.84 (-1SD)	-0.18	0.04	-0.26	-0.12
		4.90 (M)	-0.13	0.02	-0.19	-0.09
		5.95 (+1SD)	-0.08	0.03	-0.14	-0.02

Note. 10,000 bootstrap samples for bias-corrected 95% bootstrap confidence intervals, Boot SE = Bootstrap standard error, Boot LLCI = Bootstrap lower limit confidence interval, Boot ULCI = Bootstrap upper limit confidence interval, values for quantitative moderators are the mean (M) and plus/minus one SD from mean (-1SD/+1SD), Mod.: moderator, Med.: mediator, RE: resilience, FA: future anxiety.

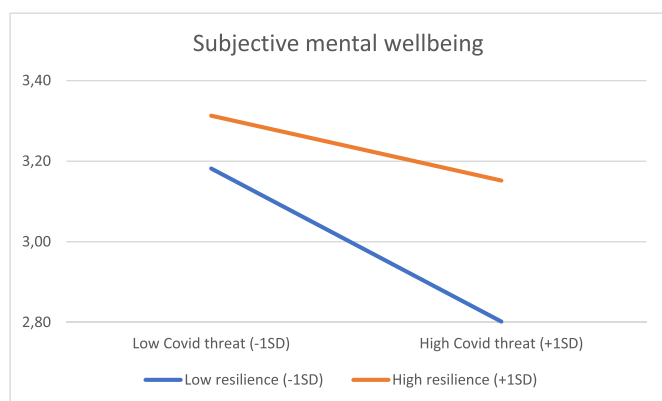


Fig. 2. Effect of low and high perceived threat of the COVID-19 pandemic on subjective mental well-being mediated by future anxiety, at high and low values of moderator resilience.

Note. Low Covid threat (-1SD) = 4.95; high Covid threat (+1SD) = 6.98; low resilience (-1SD) = 3.84; high resilience (+1SD) = 5.95.

on mental well-being (Giallonardo et al., 2020). Our results confirmed that the pandemic's perceived threat generates uncertainty and fear, increasing stress and vulnerability, which, in turn, has a detrimental impact on subjective mental well-being. Furthermore, the mediating effect of future anxiety provides evidence on how the perceived threat also activates individuals' worries for their future situation, leading to the experience of negative perceptions about future consequences. These findings support the results of previous research on significant viral outbreaks and their detrimental consequences for mental well-being (e.g., Folkman & Greer, 2000).

Prior research has assessed the role of social support, social isolation, loneliness, prior history of trauma, and prior mental health history, among other factors affecting wellbeing during a pandemic (Keshavan, 2020; Pappa et al., 2020). Our findings add to this literature by providing a process explanation based on the mediating effect of future anxiety. Furthermore, the results support the findings of recent studies that proposed adverse effects on mental health from the circumstances surrounding COVID-19 (e.g., Garfin et al., 2020; Usher et al., 2020).

Further findings of this study indicate that resilience moderates the indirect influence of the perceived threat on mental well-being through future anxiety. Individuals with higher levels of resilience were less susceptible to the harmful effects of the perceived threat of COVID-19

on subjective mental well-being through the activation of future anxiety. This finding implies that resilience, as a personality trait, prepares individuals to cope with the pandemic's adverse effects. Individuals with higher levels of resilience reported lower levels of future anxiety and, in turn, lower effects on subjective mental well-being, experiencing greater success in coping with the emotional distress provoked by the pandemic. This result is consistent with research that analyzes the importance of resilience in coping with adversities, such as the negative mental health impact of disasters (e.g., Blackmon et al., 2017; Osofsky et al., 2011). Taha et al.'s (2014) study on emotional reactions to the health threat of pandemic outbreaks showed that appraisals of the threat, control, and the use of emotion-focused coping mediate the psychological impact of the physical threat of a pandemic, and that uncertainty moderates the effect on anxiety regarding the pandemic. Our confirmation of the moderating influence of resilience on the impact of threat perception on future anxiety adds resilience as a further variable to this perspective.

COVID-19 has been considered one of the recent outbreaks with the greatest psycho-social impact, requiring in the cases of many individuals the implementation of mental health interventions to improve psychological well-being. The literature has identified different strategies to strengthen individual resilience. For instance, there is evidence that mindfulness as a trait—the disposition to pay attention to the present moment—, positively links with resilience (Garland et al., 2011; Zarotti et al., 2020). This mindfulness trait can be increased through mindfulness-based interventions, leading to mental health benefits (Kiken et al., 2015). Specifically, in the context of pandemics, recent literature has documented the benefits of digital mindfulness-based interventions (Mrazek et al., 2019). Digital platforms may serve as alternatives to continue with social support and contact with family and friends, elements that promote resilience (Polizzi et al., 2020). In addition, there is also evidence that exercise, better sleep, and spiritual health also enhance resilience (Killgore et al., 2020).

Implementing public measures and plans to respond to mental health issues can help to reduce the perceived threat and future anxiety generated by the pandemic. Governments should promote clear communication strategies because social media consumption and news outlets may provide confusing information, increasing fear and anxiety. Communication campaigns should promote messages encouraging preventive actions to avoid the spread of the virus. Messages should be concise and focused on practical ways to reduce risk and create tranquility in the population (Wang et al., 2020). During and in the aftermath of the pandemic, as “telehealth” services have proven to be similar in effectiveness as in-person services (Golberstein et al., 2020), it is essential to open communication channels through digital media to provide mental health services, such as medication management or assessment.

4.2. Limitations and future research

The present study has a number of significant limitations. The study was based on a cross-sectional data collection, carried out at a point in time during the pandemic; therefore, conclusions about long-term effects cannot be inferred. Our study also did not evaluate the previous mental health conditions of the participants. Future research should implement longitudinal studies to evaluate changes in mental health due to the evolution of the pandemic. Further studies may also include experimental and observational designs to measure actual behavior during the pandemic (Bish & Michie, 2010).

As a complementary explanation to the proposed model, it is also feasible that individuals with a higher level of well-being may perceive the perceived Covid threat as less severe and also experience less future anxiety. Since this research is cross-sectional, the directionality of the causality of effects cannot be established empirically, but only based on theory. Based on the data alone, an inverse effect would potentially also be feasible, as well as a bi-directional interrelationship of these three

constructs. Future research should further address the directionality of effects with experimental studies manipulating the dependent variable perceived threat.

Furthermore, the data collected are based on a student sample, which may cause a bias in the findings. Our sample represents a part of the population who has access to higher education and the internet; therefore, caution must be taken about the generalizability of the results. Future research should include different populations who may not have access to this level of education or technology, and who may also be at greater risk of mental well-being issues. Since most participants (83,1%) were centered in the age group between 18 and 30 years we have not provided an age-related group assessment. Future research should extend the study to a wider age group with the aim to analyze the observed pattern of effects in different sub-groups. In addition, future research should assess the role of further mediators and moderators of the observed process. Factors like social isolation, intolerance to uncertainty, loneliness, or previous mental health history, may also influence individuals' mental well-being during an outbreak.

4.3. Conclusions

Our results provide empirical evidence on the antecedents of subjective mental well-being during COVID-19. The pandemic's perceived threat has a detrimental impact on mental health. This process can be explained by the activation of future anxiety, and it is moderated by resilience as a personality trait. Individuals with higher resilience are less susceptible to the pandemic's negative psychological consequences because they experience a lower increase in future anxiety, compared to individuals with lower levels of resilience. Our findings imply that mental health intervention strategies aimed at strengthening resilience and preventing future anxiety have a significant potential to mitigate the adverse impact on mental well-being of the Covid-19 pandemic itself and the social measures adopted to curb the pandemic.

CRedit authorship contribution statement

Mario R. Paredes: Conceptualization, Investigation, Writing - original draft. **Vanessa Apaolaza:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing - original draft. **Cristóbal Fernandez-Robin:** Data curation, Funding acquisition, Investigation, Project administration, Validation. **Patrick Hartmann:** Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing - review & editing. **Diego Yañez-Martínez:** Data curation, Investigation, Project administration, Validation.

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