



## Regular Article

# Can beliefs improve mental health? A dive into resilience during pandemic times in South America

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## ARTICLE INFO

## Keywords:

Paranormal beliefs

Depression

Stress

Anxiety

COVID-19

Rationality

## ABSTRACT

The association between paranormal beliefs and mental health has been extensively investigated. Nonetheless, there has been limited opportunity to examine this association in contexts characterized by high stress and social vulnerability. This study investigates the relationship between paranormal beliefs and mental health issues, particularly anxiety, depression, and stress, amidst the backdrop of the COVID-19 pandemic. Additionally, we evaluated the impact of dealing with the pandemic on rationality and assessed the subjective perception of beliefs as coping mechanisms. One hundred sixty-three participants took part in our online self-reported study. A correlational and hierarchical regression analysis shows that paranormal beliefs positively correlate with mental illness and could be predictive of them, that does not imply a causal relation. Rather, this means that in the context of the pandemic, higher levels of paranormal beliefs were associated with higher levels of anxiety, depression, and stress symptoms. Rationality was negatively correlated with paranormal beliefs, and on the contrary, those with stronger beliefs perceived their faith as a helpful tool to cope with mental health issues. Contrary to what people consciously reported, this study showed that paranormal beliefs harmed mental health during the pandemic. We acknowledge that other variables may contribute to paranormal beliefs and mental health outcomes. Although the pandemic is now, luckily enough, something from the past, and given the transient nature of the crisis, these results could be cautiously understood under the light of other stressful scenarios such as high social challenges, like extreme poverty or severe illness.

## 1. Introduction

In late 2019, a novel virus emerged in Wuhan, China, gaining momentum and eventually evolving into the global pandemic known as COVID-19. This epidemic, identified as SARS-CoV-2, resulted in a significant impact on both physical and mental health worldwide, leading to the tragic loss of hundreds of lives. Despite the introduction of vaccines, people's lifestyle standards remained under threat, causing fear and distress over extended periods (Daroische et al., 2021; Pavel et al., 2020; Varatharaj et al., 2020). However, existing studies have not yet yielded reliable insights into the operation of beliefs in contexts

characterized by fear, crisis, and uncertainty, thus leaving the literature ambiguous as to whether beliefs function as protective or risk factors.

This study aims to fill this gap by investigating the dynamic relationship between beliefs and mental health during the pandemic, offering a unique opportunity to understand human resilience and coping mechanisms in times of crisis. The widespread impact of the pandemic on mental health was particularly pronounced in developing countries with limited resources (Levin et al., 2022). Therefore, exploring diverse coping mechanisms, including paranormal beliefs (both religious and non-religious), becomes crucial to mitigate mental health issues (Luchetti et al., 2020; Pirutinsky et al., 2020; Thomas & Barbato, 2020).

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Religious and non-religious beliefs, potentially serving as coping mechanisms, warrant exploration to comprehend their role in combating the distress caused by the challenging pandemic (Dagnall et al., 2022b). Given the higher religiosity in developing countries (Awaworyi Churchill et al., 2019), understanding the dynamics of beliefs becomes even more imperative.

Beliefs influence the power to shape emotions, thoughts, and responses to the environment, influencing how individuals cope with stress, anxiety, and depressive symptoms (Rosmarin et al., 2019). Both religious and paranormal beliefs have been associated with mental health outcomes, yet the nature of this relationship is complex and context-dependent, leading to inconclusive findings (Ives & Kidwell, 2019; Kogan et al., 2019; Somefun, 2019). Studies suggest that certain beliefs may intensify during stressful situations, potentially serving as coping strategies (Keinan, 2002). For instance, religious individuals with generalized anxiety disorders demonstrated significant symptom improvement with religious-cultural therapy compared to non-religious counterparts (Razali et al., 2002). Conversely, some studies highlight a negative role of beliefs in mental health, associating depressive tendencies, dissociation, and impulsivity with paranormal beliefs (Sharps et al., 2006). Spirituality, involving belief in supernatural spirits, has shown inconsistent correlations with physical and mental health but has been linked to a sense of purpose in life (Lindeman et al., 2012). These findings underscore the complexity of the effects of paranormal beliefs, contingent on the specific context and type of beliefs involved.

In summary, the relationship between paranormal beliefs and mental health appears intricate, influenced by belief types (religious or non-religious), cognitive factors (e.g., rationality or educational level), and contextual factors. With this understanding, we designed an online study to assess (1) depressive, anxiety, and stress symptoms during and immediately after the COVID-19 confinement period, (2) the potential effects of various beliefs on these symptoms, and (3) participants' attributions to rationality. Our central hypothesis posits that religious beliefs play a protective role, while non-religious paranormal beliefs may represent a risk factor for mental health. This study aims to unravel the link between paranormal beliefs and mental health during a critical and challenging period for humanity.

## 2. Methods

### 2.1. Participants

A total of 209 people took part in this study. For the analysis, only the participants who completed the protocol were considered. The final sample is 163 participants (age  $M = 35.63$ ,  $SD = 11.23$ ; educational level (in years of education)  $M = 17.31$ ,  $SD = 3.22$ ). Furthermore, the target population was adults between 18 and 55 years of age, and the sample size was calculated with G-power software (see supplementary material). Participation was voluntary; a link to the online survey was posted on social media (such as Facebook and Instagram) and available for eight months in 2021. The data collected were anonymized. At the beginning of the protocol, we asked participants if they had received diagnoses of psychiatric or neurological, as well as substance abuse conditions; none of the participants in the final sample reported any of these conditions. The study received prior approval from the ethics committee of Adolfo Ibáñez University and followed the protocol of the Declaration of Helsinki. Finally, all participants provided online consent after reading the information sheet with detailed procedure information.

### 2.2. Procedure

The protocol ensured that each participant had read and understood the information of the study before it began. Participants were told that they could stop the protocol at any point and ask any question regarding the evaluation to the research team. Members from the *Centre for Social and Cognitive Neuroscience* (CSCN) of the Universidad Adolfo Ibáñez

developed jsPsychR (Navarrete, G., & Valencia, H. 2023), an original online platform based on jsPsych (DeLeeuw, 2015) to ensure the safety of the data. The scales included in the form were randomly displayed to each participant to avoid possible bias. Participants received the questionnaire by email. Selecting being under 18 years old on the demographic scale stops the questionnaire (an error message was raised), and those people could not go further in the study. Those who participated in the experiment were presented with an encouraging message every 2 or 3 questionnaires to maintain their engagement. For example, the following statement was displayed after responding to the demographic's questions: "First part finished! Now, we will ask some questions about your mood (2 to 3 min). Please continue to the end and follow the instructions to answer each question." The protocol was run entirely online and took approximately 10 min to complete. All the collected data were stored on the university servers and anonymized before the analysis.

### 2.3. Instruments

This protocol includes measures for Anxiety to COVID (CAS), Depression, Anxiety and Stress Scale (DASS-21), Paranormal beliefs (rPBS), Importance of rationality (IRS), and Self-regulation related to beliefs (SRBQ). This last one was a set of questions we designed for this study to assess the subjective perception of beliefs as coping mechanisms specifically. Besides potential biases in self-reported measures, the instruments provide information about the subjective perception regarding the variables in this study. The reliability of the standardized measures was calculated with the alpha of Cronbach and is organized in Table 2.

**Descriptive information for COVID-19 conditions:** we applied a set of questions oriented to describe the conditions during the pandemic period. It is a 6-question frequency instrument; for details, see Table S1.

**CAS (COVID Anxiety Scale) (Lee, 2020):** COVID Anxiety Scale is a 7-questions-scale rated from 0 to 3 (0 = not applicable to me, 1 = hardly ever applicable to me, 2 = sometimes applicable to me, and 3 = very applicable to me) that aim to assess psychological COVID-19 related stress.

**DASS-21 (Depression Anxiety Stress Scale 21 items):** The Depression, Anxiety, and Stress Scales (Lovibond & Lovibond, 1995) measure Depression, Anxiety, and Stress in separate subscales of seven items for each scale.

**rPBS (Revised Paranormal Beliefs Scale):** The Revised Paranormal Beliefs Scale (Tobacyk, 2004) consists of 26 items that yield seven dimensions of belief plus an overall paranormal belief score. A 7-point Likert scale (from strongly disagree to strongly agree) is used for the response.

**IRS (Importance of Rationality Scale):** this scale evaluates the subjective relevance of rationality in forming or evaluating beliefs. It comprehends six items, and each item scores between 1 (totally agree) and 7 (totally disagree) (Ståhl et al., 2016).

**SRBQ (Self-regulation and Beliefs Questionnaire).** According to the specific objectives of the present study, we designed a short survey of 6 questions, with a 7-point Likert scale (from "strongly disagree" to "strongly agree"). This scale assesses the perception of beliefs as self-regulatory strategies for Stress, Anxiety, and Depression, the variation in the level of beliefs during the pandemic, and the level of atheism. This instrument included: "My beliefs have helped to cope with the stress caused by the pandemic"; "My beliefs have helped to cope with moments of anxiety during the pandemic"; "My beliefs have helped to cope with moments of sadness and depression during the pandemic"; "My beliefs became stronger during the pandemic"; "In general, I consider myself a person with no beliefs."

### 2.4. Statistical analysis

All data was stored locally on the university servers, accessible only to the principal investigator and his team, who signed confidentiality

commitments in handling the data. Before manipulating and analyzing the information, all data was anonymized. Statistical analyses were conducted using Python libraries v3.10 (Pandas, Numpy, Pingouin) and R v4.3.0 (Pacman, tidyverse, psych, readr). Descriptive and inferential statistical analyses were employed, such as bivariate correlations and multiple linear regressions.

### 3. Results

#### 3.1. Descriptives for instruments

The Table 1 below presents information concerning the descriptive signatures for all instruments completed by participants, comprising PBS, DASS-21, CAS, SRBQP, and IRS. This information is represented by the mean, standard deviation, and reliability measures.

#### 3.2. Bivariate correlations

Fig. 1 shows the correlation between beliefs, mental health, and rationality. It highlights the positive correlation between the total score for PBS (beliefs) and DASS-21: Stress,  $r = 0.24, p = 0.002$ ; Anxiety,  $r = 0.26, p = 0.001$  and Depression,  $r = 0.25, p = 0.001$ ; as well between PBS and Anxiety to Covid,  $r = 0.24, p = 0.002$ . On the other hand, PBS shows a negative correlation with rationality,  $r = 0.35, p = 0.000$ .

A positive correlation was found between PBS and the perception of belief as helpful with stress,  $r = 0.25, p = 0.001$ ; anxiety,  $r = 0.30, p = 0.000$ ; and depression,  $r = 0.25, p = 0.001$ . Additionally, we found another positive correlation between PBS and the idea that beliefs became stronger during the pandemic,  $r = 0.26, p = 0.001$  and, as we expected, a negative correlation between PBS and the self-perception as a non-believer,  $r = 0.21, p = 0.007$ .

#### 3.3. Hierarchical regressions

We performed five different hierarchical regressions. The first one included in this document considers the total score for DASS-21 (a global mental health index) as the dependent variable. The other four regressions are included in supplementary material and consider specific aspects of mental health as dependent variables: 1) Anxiety, 2)

**Table 1**  
Scales descriptive information for beliefs and mental health.

	M	SD	min	max	Reliability $\alpha$
<b>PBS</b>	3.37	1.14	1.12	6.7	0.92
Traditional beliefs	4.27	1.71	1	7	0.77
Psi	3.25	1.5	1	7	0.60
Witchery	3.64	1.94	1	7	0.91
Superstition	1.63	1.12	1	7	0.81
Spiritism	4.01	1.72	1	7	0.86
Extraordinary life forms	3.41	1.27	1	7	0.64
Precognition	2.98	1.41	1	7	0.78
<b>DASS-21</b>					
Depression	10.67	11.2	0	42	0.91
Anxiety	8.23	9.31	0	42	0.87
Stress	14.71	11.0	0	42	0.91
<b>CAS</b>	9.44	4.74	0	21	0.86
<b>SRBQP*</b>					0.68
Beliefs & Stress	4.84	1.92	1	7	—
Beliefs & Anxiety	4.78	1.91	1	7	—
Beliefs & Depression	4.94	1.9	1	7	—
Beliefs in pandemic	4.34	1.99	1	7	—
Non-beliefs	2.76	1.92	1	7	—
<b>IRS</b>	31.15	7.13	12	42	0.84

Table 1. Descriptive statistics for variables investigated. All the variables were calculated as the mean across items. \* SRBQP reliability is calculated for the global instrument. PBS = Paranormal Beliefs Scale; DASS-21 = Depression, Anxiety and Stress Scale; CAS = Covid Anxiety Scale; SRBQP = Self-regulation and Beliefs Questionnaire; IRS = Importance to Rationality Scale.

Depression, 3) Stress, and 4) Anxiety about COVID-19 (CAS). Please see supplementary material in hierarchical regression section.

For each hierarchical regression, we created four models or steps: Model 1 (*demographics*), which used age and years of education as control variables. Model 2 (*rationality*): includes the importance of the rationality scale. Model 3 (*beliefs*): includes a scale for paranormal beliefs. Finally, a complete model including all the predictors is included in the fourth model, named the *complete model*.

For regression 1 (Table 2, Fig. 2), using DASS-21 (mental health issues) as the dependent variable, our analysis revealed in step 1 that both age and educational level contribute to explaining the variance of DASS-21 significantly and with negative estimates; this means that in this sample, older and higher educational level is associated with fewer mental health issues,  $R^2 = 0.150, F(2,160) = 14.15, p < .001$ . In the second step, the importance of rationality shows a non-significant tendency to explain mental health issues.  $R^2 = 0.017, F(1,161) = 2.75, p < .098$  with negative estimates, which means that higher importance to rationality tends to explain less mental health issues. In the third step, paranormal beliefs are included and explain mental health issues significantly,  $R^2 = 0.072, F(1,161) = 12.45, p < .001$  with positive estimates; this means that higher levels of paranormal beliefs significantly predict high levels of mental health issues. Finally, in the last step, the complete model reveals that paranormal beliefs still significantly contribute when added to the rest of the steps  $\Delta R^2 = 0.114, F(4,158) = 9.04, p < .001$ , this means that controlling for other relevant variables, higher levels of paranormal beliefs significantly predict a worst mental health.

Table 2 depicts the set of predictive variables (Age, Education, IRS = importance to rationality and PBS = paranormal beliefs scale) evaluated in consecutive models: Demographic, Rationality, Beliefs, and the Complete model, explaining the variance of the dependent variable, DASS-21 (mental health issues).  $\Delta R^2$  represents the difference between the Complete and Beliefs models.

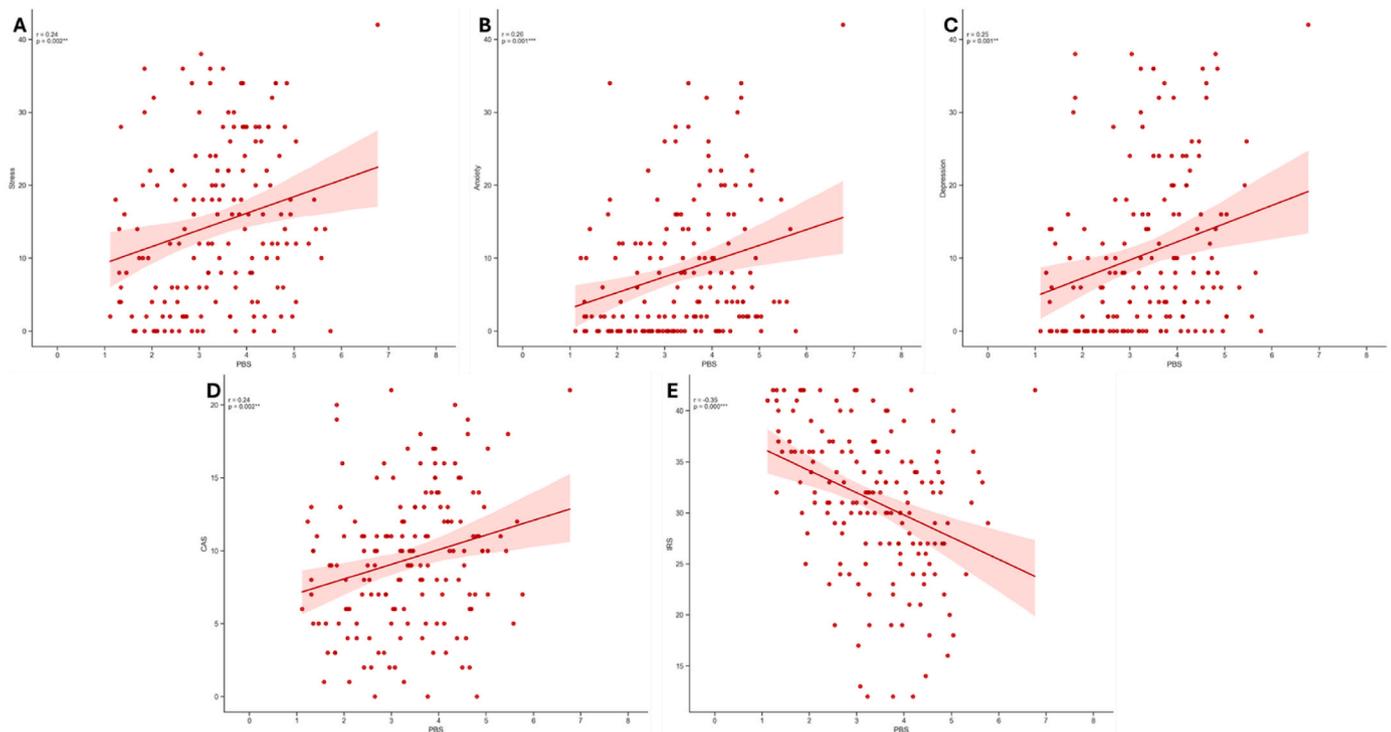
### 4. Discussion

The present study delved into the relationship between paranormal beliefs and mental health, focusing on anxiety, anxiety related to COVID-19, depression, and stress during COVID-19 confinement. We acknowledge that correlational analysis does not imply causation; other factors, such as culture or socioeconomic status, may also play a role. However, focusing on the topics investigated in this work allows us to have a more specific perspective regarding the relationship between paranormal beliefs and mental health in the context of a pandemic.

We investigated the perceived importance of rationality in coping with mental health issues, utilizing a custom set of questions. Our results demonstrated a positive correlation between paranormal beliefs and anxiety, depression, stress, and anxiety related to COVID-19. Notably, there was a negative relationship between paranormal beliefs and the importance attributed to rationality (see Fig. 1; for a more comprehensive correlational analysis, please see Fig. S1).

Furthermore, we found a positive correlation between **paranormal beliefs and the belief that they help cope with mental health issues** (see Fig. S2). Interestingly, despite this belief, our data revealed the opposite; stronger paranormal beliefs were associated with poorer mental health outcomes. Our predictive models indicated that paranormal beliefs and age significantly predict anxiety and depression. The study's findings suggest that during the pandemic and for a general population sample, paranormal beliefs acted as a risk factor rather than a protective factor for mental health. These results are consistent with previous research showing a link between paranormal beliefs and diminished well-being (Dagnall et al., 2022, 2022a, 2022b).

A plausible explanation for this relationship is the context of the pandemic, where COVID-19 might have intensified both paranormal beliefs and mental health issues, potentially contributing to increased depression, anxiety, and stress. Additionally, our data highlighted that



**Fig. 1.** Bivariate correlation analysis between the Paranormal Beliefs with A) Stress, B) Anxiety, C) Depression, D) Anxiety to Covid, and E) Importance of Rationality. PBS = Paranormal belief scale; DASS-21 = Stress, Anxiety, Depression; CAS = Anxiety to COVID Scale; IRS = Importance to Rationality Scale.

most of the sample experienced quarantine, a condition predisposing individual to loneliness and social isolation strongly linked to mood disorders (Beutel et al., 2017; Wang et al., 2018). A thorough investigation into the temporal dimensions, including the initiation and duration of supernatural convictions in connection with stressors associated with the pandemic, might offer a nuanced comprehension of the identified correlations.

A potential psychological mechanism can also be related to positive biases, such as optimism or confirmatory ones. For example, if beliefs are considered valuable and positive in general aspects of daily life, this will create a positive perception. Beliefs are good, and they obviously help me to cope with hard situations.

Another likely psychological explanation could be the presence of expectations versus reality. Here, the assumption is that given that I believe a transcendent entity is taking care of me, then I can expect that I'll be fine at some point. But in this scenario, the perception is not based on reality but on a fictional idea, which conduces to a fallacy in conclusions (perception).

Examining the relationship between **paranormal beliefs, anxiety, and anxiety related to COVID-19**, we found a positive association between the total score on the paranormal beliefs scale (PBS) and anxiety levels. Notably, anxiety significantly correlated with specific dimensions of paranormal beliefs, including witchery, supernatural beliefs, spiritism, and precognition. The hierarchical model indicated that the total score on the PBS and age strongly predicted anxiety. Moreover, anxiety related to COVID-19 positively correlated with the overall PBS score and its dimensions, particularly Psi, witchery, supernatural beliefs, precognition, and traditional beliefs. These findings were consistent with prior research, where superstition significantly predicted anxiety traits (Wolfradt, 1997). The constant exposure to distressing information during the pandemic might have heightened anxiety levels, leading individuals to rely on beliefs as an illusory coping mechanism.

Regarding **paranormal beliefs and depression**, our study observed a positive correlation, with significant associations found in dimensions

such as witchery, supernatural beliefs, spiritism, and precognition. The hierarchical model emphasized that PBS and age were better predictors of depression than education and rationality. These findings corroborated previous evidence indicating that paranormal beliefs align with depressive symptoms and experiences (Dagnall et al., 2022a). This evidence supports the notion that paranormal beliefs are inappropriate coping mechanisms for depression. A potential explanation for this relationship lies in the critical role of control in depression. Mood disorders often involve an external locus of control, and beliefs may promote a diminished sense of control over general life events (Roe & Bell, 2016).

In terms of **paranormal beliefs and stress**, a positive correlation was observed, particularly in dimensions like witchery, supernatural beliefs, spiritism, and precognition. These correlations aligned with previous research, suggesting that high perceived stress is associated with stronger paranormal beliefs (Dagnall, et al., 2022; Lasikiewicz, 2016). Our hierarchical model demonstrated that age significantly explained stress in the presence of demographic and rationality variables. In this context, stress stemmed from specific triggering events eliciting a physiological defensive response. The pandemic presented numerous fear stimuli, including confinement, contagion rates, death reports, and social isolation, fostering a scenario conducive to high stress levels. Beliefs might have initially acted as an escape route from these stressors, but over time, they might have contributed to a disconnection from relevant personal and intimate life events.

A variety of factors influence cultural differences in paranormal beliefs. Clobert and Saroglou (2015) found that religiosity is positively associated with paranormal beliefs in the West but not in East Asian cultures. Aarnio and Lindeman (2007) further explored this relationship, noting that high intuitive thinking and mystical experiences are common among both religious and paranormal believers. Wilson (2014) identified distinct belief patterns, challenging the traditional religious-secular dichotomy. Betsch (2020) highlighted the role of individual differences, such as cognitive ability, personality traits, and ontological confusion, in shaping paranormal beliefs. These studies

**Table 2**  
Hierarchical regression for DASS-21.

Predictors	Demographic				Rationality				Beliefs				Complete									
	Estimates	std.	Beta	CI	Estimates	std.	Beta	CI	Estimates	std.	Beta	CI	Estimates	std.	Beta	CI	P					
Intercept	89.43	0.00	65.22	-113.64	-0.14	-0.14	<0.001	29.93	-70.82	-0.15	-0.15	<0.001	10.24	0.00	-3.57	-24.05	0.145	29.32	-106.94	-0.14	-0.14	0.001
Age	-0.78	-0.29	-1.17	-0.38	-0.45	-0.14	<0.001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.28	-1.14	-0.36	-0.43	-0.36	-0.43	-0.14	<0.001
Education	-1.63	-0.18	-3.01	-0.24	-0.33	-0.03	0.021	-0.54	-0.13	-1.18	-0.10	0.099	-0.75	-1.15	-0.13	-2.56	-0.26	-0.28	-0.03	-0.28	-0.03	0.110
IRS																						
PBS																						
Observations	163				163			163				163						163				
R <sup>2</sup> /R <sup>2</sup> adjusted	0.150	0.140			0.017	0.011		0.072	0.066			0.186	0.166					0.186	0.166			
F Statistic	14.15	(p=<.001, df = 2; 160)			2.75	(p=<.098, df = 1; 161)		12.45	(p=<.001, df = 1; 161)			9.04	(p=<.001, df = 4; 158)					9.04	(p=<.001, df = 4; 158)			
ΔR <sup>2</sup>																						

collectively suggest that cultural, religious, and individual factors all shape paranormal beliefs. To have a more holistic and comprehensive vision regarding the influence of paranormal beliefs on mental health, it will be important to consider another potential factor that can help explain this effect in future research, such as culture, cognitive, and individual differences regarding the susceptibility to paranormal beliefs.

Interestingly, our data revealed that stronger paranormal beliefs predisposed individuals to believe that these beliefs were helpful for their mental health. However, the opposite was true, as paranormal beliefs were associated with poorer mental health. This information is essential in clinical contexts where therapies might incorporate spirituality and beliefs.

In clinical contexts, is important to consider the individual and particular case and to establish a welcoming environment, a safe and non-judgmental space, respect diversity and integrate beliefs into clinical practice for a more holistic approach. The understanding of beliefs in clinical practice can help to foster a therapeutic alliance.

Beliefs generally serve as frameworks for interpreting reality and making decisions. Nevertheless, mental health is paramount for a healthy social adjustment. Understanding the potential impact of beliefs on mental health is essential, especially during high social challenges like the pandemic or the emergence of artificial intelligence.

### 5. Limitations

Our study presents an online survey with a non-probabilistic sampling. Despite the inherent and well-known limitations of non-representative (limitation of generalizing findings) online surveys, they can play an important role in exploratory research (Lehdonvittra et al., 2021). Also, we collected the data during the COVID-19 pandemic, which constituted a worldwide natural experiment, creating interesting conditions for research in different fields. But this in itself can also be a source of bias. The link we establish between our results and other challenging contexts is hypothetical, and it should be investigated further. Additionally, using self-reported measures may introduce potential response biases, such as social desirability; future research could consider a more experimental approach and include objective measures.

### 6. Conclusion

In conclusion, our study indicates that higher levels of paranormal beliefs are associated with increased anxiety, stress, and depression. Although individuals may perceive these beliefs as helpful for coping with mental health issues, our findings show that they correlate negatively. Consequently, paranormal beliefs can negatively impact psychological functioning and well-being.

To promote mental health in challenging contexts like the pandemic, interventions should emphasize evidence-based approaches and rationality rather than relying on paranormal beliefs. Understanding the intricate relationship between beliefs and mental health is vital for effective clinical interventions and societal adaptation in times of crisis. For example, the cognitive therapy approach helps to identify wrong beliefs and thought structures based on unsuitable beliefs. By recognizing these factors posed by paranormal beliefs, we can better address the needs of individuals and foster healthier coping strategies.

### Funding

This work was supported by grants from Comisión Nacional de Investigación Científica y Tecnológica: ANID/FONDECYT Regular N° 1231117 to David Huepe, and ANID/FONDECYT Regular N° 1211373 to Gorka Navarrete.

### CRedit authorship contribution statement

**Juan-Pablo Morales:** Writing – review & editing, Writing – original

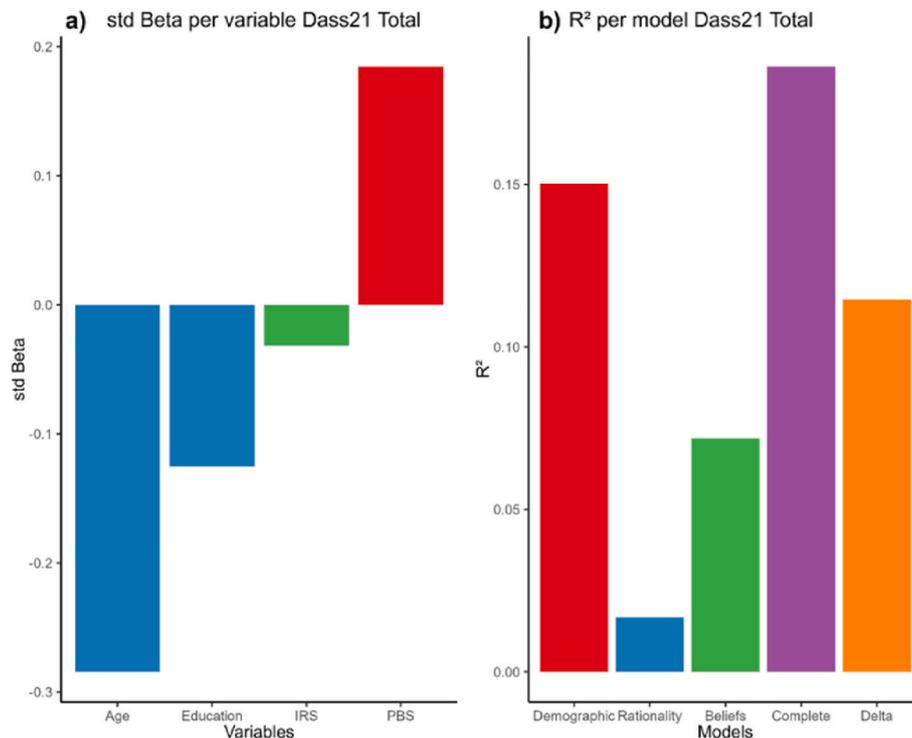


Fig. 2. Represents the influence of each model on the DASS-21 scale, a measure for mental health issues. A) Standardized beta values for variables: age, education, Importance to Rationality scale (IRS), and Paranormal Beliefs Scale (PBS) and B) R2 for each model: Demographic, Rationality, Beliefs, and Complete models.

draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Brenda E. Ryan:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Vince Polito:** Writing – review & editing, Formal analysis. **Gorka Navarrete:** Writing – review & editing, Software. **Mayte Vergara:** Writing – review & editing. **David Huepe:** Writing – review & editing, Supervision, Resources, Funding acquisition, Conceptualization.

**Declaration of generative AI and AI-assisted technologies in the writing process**

While preparing this work, the authors did not use AI Generative or assisted AI in writing.

**Declaration of competing interest**

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.

**Acknowledgments**

The authors would like to thank the reviewers who gave helpful and valuable feedback on the draft of this manuscript.

**Appendix A. Supplementary data**

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssaho.2024.100883>.

**References**

Aarnio, K., & Lindeman, M. (2007). Religious people and paranormal believers. *Journal of Individual Differences*, 28(1), 1–9. <https://doi.org/10.1027/1614-0001.28.1.1>

Awaworyi Churchill, S., Appau, S., & Farrell, L. (2019). Religiosity, income and wellbeing in developing countries. *Empirical Economics*, 56(3). <https://doi.org/10.1007/s00181-017-1380-9>

Betsch, T., Aßmann, L., & Glöckner, A. (2020). *Paranormal beliefs and individual differences: Story seeking without reasoned review*. *Heliyon*, 6(6). <https://doi.org/10.1016/j.heliyon.2020.e04259>

Beutel, M., Klein, E., Brähler, E., Reiner, I., Jünger, C., Michal, M., Wiltink, J., Wild, P., Münzel, T., Lackner, K., & Tibubos, A. (2017). Loneliness in the general population: Prevalence, determinants and relations to mental health. *BMC Psychiatry*, 17(1). <https://doi.org/10.1186/s12888-017-1262-x>

Clobert, M., & Saroglou, V. (2015). Religion, paranormal beliefs, and distrust in science: Comparing east versus west. *Archive for the Psychology of Religion*, 37(2), 185–199. <https://doi.org/10.1163/15736121-12341302>

Dagnall, N., Denovan, A., & Drinkwater, K. G. (2022a). Paranormal belief, cognitive-perceptual factors, and well-being: A network analysis. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.967823>

Dagnall, N., Denovan, A., & Drinkwater, K. G. (2022b). Variations in well-being as a function of paranormal belief and psychopathological symptoms: A latent profile analysis. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.886369>

Dagnall, N., Denovan, A., Drinkwater, K. G., & Escolà-Gascón, Á. (2022). Paranormal belief and well-being: The moderating roles of transliminality and psychopathology-related facets. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.915860>

Daroische, R., Hemminghyth, M. S., Eilertsen, T. H., Breivte, M. H., & Chwiszczuk, L. J. (2021). Cognitive impairment after COVID-19—a review on objective test data. In *Frontiers in neurology* (Vol. 12). <https://doi.org/10.3389/fneur.2021.699582>

Ives, C. D., & Kidwell, J. (2019). Religion and social values for sustainability. *Sustainability Science*, 14(5). <https://doi.org/10.1007/s11625-019-00657-0>

Keinan, G. (2002). The effects of stress and desire for control on superstitious behavior. *Personality and Social Psychology Bulletin*, 28(1). <https://doi.org/10.1177/0146167202281009>

Kogan, I., Fong, E., & Reitz, J. G. (2019). Religion and integration among immigrant and minority youth. *Journal of Ethnic and Migration Studies*, 46(17). <https://doi.org/10.1080/1369183X.2019.1620408>

Lasikiewicz, N. (2016). Perceived stress, thinking style, and paranormal belief. *Imagination, Cognition and Personality*, 35(3). <https://doi.org/10.1177/0276236615595235>

Lee, S. A. (2020). Coronavirus anxiety scale: A brief mental health screener for COVID-19 related anxiety. *Death Studies*, 44(7). <https://doi.org/10.1080/07481187.2020.1748481>

Levin, A. T., Owusu-Boaitey, N., Pugh, S., Fosdick, B. K., Zwi, A. B., Malani, A., Soman, S., Besançon, L., Kashnitsky, I., Ganesh, S., McLaughlin, A., Song, G., Uhm, R., Herrera-Esposito, D., De Los Campos, G., Peçanha Antonio, A. C. P., Tadese, E. B., & Meyerowitz-Katz, G. (2022). Assessing the burden of COVID-19 in developing countries: Systematic review, meta-Analysis and public policy implications. *BMJ Global Health*, 7(5). <https://doi.org/10.1136/bmjgh-2022-008477>

- Lindeman, M., Blomqvist, S., & Takada, M. (2012). Distinguishing spirituality from other constructs. *The Journal of Nervous and Mental Disease*, 200(2). <https://doi.org/10.1097/nmd.0b013e3182439719>
- Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the depression anxiety stress scales (DASS) with the beck depression and anxiety inventories. *Behaviour Research and Therapy*, 33(3). [https://doi.org/10.1016/0005-7967\(94\)00075-U](https://doi.org/10.1016/0005-7967(94)00075-U)
- Lucchetti, G., Góes, L. G., Amaral, S. G., Ganadjian, G. T., Andrade, I., Almeida, P. O., do Carmo, V. M., & Manso, M. E. (2020). Spirituality, religiosity and the mental health consequences of social isolation during COVID-19 pandemic. *International Journal of Social Psychiatry*, 67(6), 672–679. <https://doi.org/10.1177/0020764020970996>
- Navarrete, G., & Valencia, H. (2023). Create experimental paradigms with jsPsych. *Simulate Participants and Standardize the Data Preparation and Analysis*, 1, 73. <https://gorkang.github.io/jsPsychRmanual/>, 10.5281/zenodo.8296995.
- Pavel, A., Murray, D., & Stoessl, A. (2020). COVID-19 and selective vulnerability to Parkinson's disease. *The Lancet Neurology*, 19(9). [https://doi.org/10.1016/S1474-4422\(20\)30269-6](https://doi.org/10.1016/S1474-4422(20)30269-6)
- Pirutinsky, S., Cherniak, A. D., & Rosmarin, D. H. (2020). Covid-19, mental health, and religious coping among American Orthodox Jews. *Journal of Religion and Health*, 59(5), 2288–2301. <https://doi.org/10.1007/s10943-020-01070-z>
- Razali, S., Aminah, K., & Khan, U. (2002). Religious-cultural psychotherapy in the management of anxiety patients. *Transcultural Psychiatry*, 39(1). <https://doi.org/10.1177/136346150203900106>
- Roe, C., & Bell, C. (2016). Paranormal belief and perceived control over life events. *Journal of the Society for Psychological Research*, 80(2).
- Rosmarin, D. H., Salcone, S., Harper, D., & Forester, B. P. (2019). Spiritual psychotherapy for inpatient, residential, and intensive treatment. *American Journal of Psychotherapy*, 72(3). <https://doi.org/10.1176/appi.psychotherapy.20180046>
- Sharps, M. J., Matthews, J., & Asten, J. (2006). Cognition and belief in paranormal phenomena: Gestalt/feature-intensive processing theory and tendencies toward ADHD, depression, and dissociation. *The Journal of Psychology: Interdisciplinary and Applied*, 140(6). <https://doi.org/10.3200/JRPL.140.6.579-590>
- Somefun, O. (2019). Religiosity and sexual abstinence among Nigerian youths: Does parent religion matter? *BMC Public Health*, 19(1). <https://doi.org/10.1186/s12889-019-6732-2>
- Ståhl, T., Zaal, M. P., & Skitka, L. J. (2016). Moralized rationality: Relying on logic and evidence in the formation and evaluation of belief can be seen as a moral issue. *PLoS One*, 11(11). <https://doi.org/10.1371/journal.pone.0166332>
- Thomas, J., & Barbato, M. (2020). Positive religious coping and mental health among Christians and Muslims in response to the COVID-19 pandemic. *Religions*, 11(10), 498. <https://doi.org/10.3390/rel11100498>
- Tobacyk, J. (2004). A revised paranormal belief scale. *International Journal of Transpersonal Studies*, 23(1), 11.
- Varatharaj, A., Thomas, N., Ellul, M., Davies, N., Pollak, T., Tenorio, E., Sultan, M., Easton, A., Breen, G., Zandi, M., Coles, J., Manji, H., Al-Shahi, R., Menon, D., Nicholson, T., Benjamin, L., Carson, A., Smith, C., Turner, M., ... Michael, B. (2020). Neurological and neuropsychiatric complications of COVID-19 in 153 patients: A UK-wide surveillance study. *The Lancet Psychiatry*, 7(10). [https://doi.org/10.1016/S2215-0366\(20\)30287-X](https://doi.org/10.1016/S2215-0366(20)30287-X)
- Wang, J., Mann, F., Lloyd-Evans, B., Ma, R., & Johnson, S. (2018). Associations between loneliness and perceived social support and outcomes of mental health problems: A systematic review. *BMC Psychiatry*, 18(1). <https://doi.org/10.1186/s12888-018-1736-5>
- Wilson, E. K. (2014). Theorizing religion as politics in postsecular international relations. *Politics, Religion & Ideology*, 15(3), 347–365. <https://doi.org/10.1080/21567689.2014.948590>
- Wolfradt, U. (1997). Dissociative experiences, trait anxiety and paranormal beliefs. *Personality and Individual Differences*, 23(1). [https://doi.org/10.1016/S0191-8869\(97\)00043-3](https://doi.org/10.1016/S0191-8869(97)00043-3)