

RESEARCH ARTICLE

Open Access

## Effect of Conspiracy Beliefs on Covid-19 Vaccine Hesitancy: Moderating Role of Existential Anxiety and Spiritual Wellbeing in Adults

Atqa Noor, Soulat Khan, Ushba Rafaqat, & Dua Butt

### Abstract

**Background:** This study examined the influence of beliefs in Coronavirus conspiracy theories on the reluctance to receive COVID-19 vaccines among adults. Additionally, it investigated how existential anxiety and spiritual well-being might moderate this relationship.

**Methods:** A total of 850 employees, comprising 368 males and 482 females, were recruited from various universities in Islamabad and Rawalpindi, Pakistan, using convenient sampling techniques within a cross-sectional research framework. The participants ranged in age from 18 to 55 years, with a mean age of 33.56 years and a standard deviation of 10.71. To assess various constructs, four established psychological instruments were employed in this study: the Coronavirus Conspiracy Beliefs Scale, the Oxford COVID-19 Vaccine Hesitancy Scale, the Existential Anxiety Questionnaire, and the Spiritual Well-Being Scale.

**Results:** In this study, COVID-19 vaccine hesitancy displayed significant positive associations with beliefs in Coronavirus conspiracy theories and existential anxiety, while exhibiting a significant negative relationship with spiritual well-being. Specifically, higher endorsement of Coronavirus conspiracy beliefs positively predicted greater vaccine hesitancy, whereas increased spiritual well-being negatively predicted vaccine hesitancy. Notably, existential anxiety did not emerge as a significant predictor of vaccine hesitancy. Moreover, neither existential anxiety nor spiritual well-being functioned as significant moderators in the relationship between beliefs in Coronavirus conspiracy theories and COVID-19 vaccine hesitancy. Gender differences indicated that males exhibited higher levels of both COVID-19 vaccine hesitancy and beliefs in Coronavirus conspiracy theories, whereas females scored higher on religious well-being and existential anxiety compared to their male counterparts.

**Conclusions:** This study illuminates the role of Coronavirus conspiracy beliefs and existential anxiety in heightening COVID-19 vaccine hesitancy among adults. Additionally, it underscores the moderating influence of spiritual well-being in mitigating these associations.

**Keywords:** Coronavirus conspiracy beliefs, COVID-19 vaccine hesitancy, existential anxiety, spiritual wellbeing

1. BS scholar, Department of Psychology, Foundation University School of Science and Technology, Pakistan.
2. Lecturer, Department of Psychology, Foundation University School of Science and Technology, Pakistan.
3. BS scholar, Department of Psychology, Foundation University School of Science and Technology, Pakistan.
4. BS scholar, Department of Psychology, Foundation University School of Science and Technology, Pakistan.

Correspondence concerning this article should be addressed to Atqa Noor, Department of Psychology, Foundation University School of Science and Technology, Pakistan. Email: nooratqa@gmail.com.

## Background

The COVID-19 pandemic has resulted in over 5 million deaths worldwide (Zhao et al., 2021) and a significant number of confirmed cases. Mass vaccination is deemed crucial for effectively combating this disease. New variants of the virus, like Omicron, have raised concerns due to their multiple mutations, potentially increasing contagiousness and evading immune responses (Zhao et al., 2021). Pharmaceutical companies are working on variant-specific vaccines, with potential modifications expected to enhance protection against these variants (Pfizer, 2021). However, the success of vaccination programmes depends on vaccine uptake, and vaccine hesitancy remains a challenge (Freeman et al., 2020).

In Pakistan, conspiracy theories and misinformation about COVID-19 vaccines have been widely circulated. Prominent figures, including politicians and journalists, have propagated baseless theories, complicating vaccine acceptance (Staff, 2020; Troiano, 2021). Pakistan faces challenges due to its healthcare system, overpopulation, and hygiene practices, making infectious diseases a significant concern (Akhtar, 2021).

Studies have shown a link between education levels and vaccine acceptance, with lower-educated individuals exhibiting greater vaccine hesitancy (Oxford Coronavirus Explanations, Attitudes, and Narratives Survey, OCEANS). Conspiracy theories tend to thrive in digital media environments, with COVID-19 fueling such beliefs, especially in individuals with predisposing dysphoric schemas, as they seek control and certainty in stressful times. Relying solely on social media for information can contribute to vaccine conspiracy beliefs and hinder vaccine acceptance.

Existential anxiety, often perceived as abstract and intellectually intricate, poses challenges for empirical research, making it difficult to objectively analyse its underlying psychological processes. It is characterized by a profound sense of disillusionment about life's meaning and an intense preoccupation with unanswered questions about the future. Factors like global climate change and shifts in democracy can contribute to existential distress.

Existential anxiety involves a fear of life's purpose and what lies beyond death. Those grappling with it may harbor concerns about finding happiness by avoiding suffering. When life lacks genuine joy, it can feel empty. Interestingly, there appears to be a growing sensitivity to the COVID-19 vaccination among adults, potentially linked to existential anxiety. Life-altering experiences like the COVID-19 pandemic can trigger or exacerbate existential anxiety, impacting one's overall well-being and mental stability. Scrima et al. (2021) suggested that when existential anxiety activates distal defence mechanisms, it might lead to the

formation of unrealistic and irrational beliefs, such as conspiracy theories, as individuals attempt to make sense of their anxiety.

Spiritual well-being is often defined as having a sense of purpose and meaning in life, coupled with a belief in and connection to a higher power. Conceptualizing spiritual well-being can be challenging due to evolving definitions of "spiritual" and "well-being." Research indicates that religious affiliation alone may not significantly predict health benefits. However, spirituality and faith can serve as sources of resilience across psychological, physical, and mental dimensions. During times of adversity, such as the COVID-19 pandemic, spiritual distress should not be overlooked. Individuals with strong spiritual well-being tend to navigate threats and uncertainties more effectively. Research in Italy has shown that spiritual well-being can act as a protective factor against stress and fears related to the pandemic. Pathological religion has played a role in historical conflicts and modern terrorism, emphasizing the impact of spiritual health and sound religious affiliation on public and global mental well-being.

Faith and spirituality have long served as fundamental coping strategies in the face of mortality, with higher levels of spiritual distress linked to lower population mental health. Public health authorities should consider the importance of maintaining spiritual and religious activities during the pandemic to support emotional well-being.

The ongoing global pandemic has affected populations in more than 200 countries, including Pakistan, where, as of a WHO report on January 15, there were over 1.3 million confirmed cases and more than 28,000 deaths (WHO, 2022). The pandemic has seen a rapid proliferation of conspiracy theories and irrational beliefs. Research has shown that such beliefs can undermine professional involvement in health behaviour and erode support for public health policies (Earnshaw et al., 2020). Vaccination against the virus is a key strategy for mitigating the pandemic's impact, but vaccination hesitancy fueled by false beliefs and the dissemination of misinformation poses a serious obstacle to pandemic control and prevention, as outlined by Sallam et al. in 2020. It is crucial to counter false knowledge and conspiracy theories and encourage compliance with public health policies, especially regarding COVID-19 vaccination, to prevent further harm from this deadly disease, especially as new, potentially more dangerous variants emerge. This study explores how spiritual well-being and existential anxiety can moderate the influence of coronavirus conspiracy beliefs on COVID-19 vaccine hesitancy.

## Method

### Research design

This study employed a cross-sectional research design and a convenient sampling technique.

### Research Hypotheses

For this study, the following hypotheses were formulated:

1. Coronavirus conspiracy beliefs and existential anxiety will positively correlate with COVID-19 vaccine hesitancy among adults.
2. Coronavirus conspiracy beliefs and existential anxiety will positively predict COVID-19 vaccine hesitancy in adults.
3. There will be a negative association between spiritual well-being and COVID-19 vaccine hesitancy in adults.
4. Spiritual well-being will negatively predict COVID-19 vaccine hesitancy in adults.
5. Existential anxiety will strengthen the link between coronavirus conspiracy beliefs and COVID-19 vaccine hesitancy in adults.
6. Spiritual well-being will weaken the relationship between coronavirus conspiracy beliefs and COVID-19 vaccine hesitancy in adults.
7. Gender differences are expected in coronavirus conspiracy beliefs, spiritual wellbeing, existential anxiety, and COVID-19 vaccine hesitancy among adults.
8. Differences based on education status, marital status, and vaccination status are likely to exist in coronavirus conspiracy beliefs, spiritual wellbeing, existential anxiety, and COVID-19 vaccine hesitancy among adults.

### Participants

Eight hundred fifty employees (male employees,  $n = 368$ ; female employees,  $n = 482$ ) with an age range of 18 to 55 years ( $M = 33.56$ ,  $SD = 10.71$ ) were recruited from different universities in Islamabad and Rawalpindi, Pakistan, through convenient sampling techniques and a cross-sectional research design. Participants were recruited based on the following characteristics: adults aged 18–55 years, both vaccinated and non-vaccinated adults, both male and female genders, and both married and unmarried individuals.  $N = 850$  adults with a mean age of 33.56 (range = 18 to 55) were included in the study. The sample was taken from Foundation University Rawalpindi Campus, Riphah International University Rawalpindi, Fatima Jinnah University, and different areas of the twin cities (Islamabad and Rawalpindi). The sample has a somewhat higher representation of female participants than male participants ( $n = 482$ ).

Most of the participants in the sample were highly educated ( $n = 511$ ). The sample of participants somehow reflects the characterization of nuclear and joint family systems. The majority of participants belong to a middle-class socio-economic status ( $n = 710$ ). 698 participants were vaccinated in present study.

### Instruments

#### Coronavirus Conspiracy Beliefs Scale (CCBS)

Conspiracy beliefs were measured with the Coronavirus Conspiracy Beliefs Scale (Freeman et al., 2020). It consists of a seven-item general coronavirus conspiracy scale and a 14-item specific coronavirus conspiracy scale. Each item is rated on a 5-point Likert scale, from "do not agree" to "agree completely." There is also a "don't know" response option, which is not included in the score. The scores on both the subscales are computed to get the overall score on conspiracy beliefs. Higher scores indicate a greater level of coronavirus conspiracy beliefs.

**Existential anxiety questionnaire (EAQ).** The Existential Anxiety Questionnaire (Weems et al., 2004) is based on Tillich's (1952) theory and consists of 13 items that reflect three areas of relative and absolute existential concern: fate and death, guilt and condemnation, emptiness, and meaninglessness. It is a true-false rating scale. There are two questions for each of the six concepts (three items for "fate"), half positively worded and half negatively worded (for "fate," one is positively scored, two are negatively scored). Six items are in a positive direction (i.e., a "yes" indicates some existential anxiety and is scored as 1), and seven items are in a negative direction (i.e., a "yes" indicates no existential anxiety and is scored as 0). All the item scores are then summed to get the total score on existential anxiety. EAQ has a Cronbach's alpha of .71 and a two-week test-retest reliability estimate of  $r = .72$ .

#### The Spiritual Well-Being Scale (SWBS)

It is a 20-item scale that assesses an individual's overall life satisfaction and well-being on two dimensions or subscales: existential wellbeing (EWB) and religious wellbeing (RWB). The degree to which one feels and reports the well-being of his or her spiritual life in relation to God is measured by items linked to religious well-being that contain the term "God." General statements regarding life direction and satisfaction are included in existential well-being items, which evaluate one's well-being related to self, community, and environment. There are a total of 20 items on the SWBS, with the 10 odd-numbered items comprising the RWB subscale and the 10 even-numbered items comprising the EWB subscale. Nine of the items—item numbers 1, 2, 5, 6, 9, 12, 13, 16, and 18—are reverse worded (and therefore reverse scored) as a

guard against response set bias. Each item is answered on a 6-point Likert scale, scored from 1 to 6 (from strongly disagreeing to strongly agreeing). The overall score from the SWBS is computed by summing the responses to all twenty items after reversing the negatively worded items. It ranges from 20 to 120, with a higher number reflecting greater well-being. The scale yields three scores: (a) a total score for inclusive SWB, (b) a RWB subscale score, and (c) an EWB subscale score. Alpha reliability coefficients for SWB are .93, RWB is .96, and EWB is .86.

**Covid-19 Vaccine Hesitancy Scale (CVHS).** Covid-19 vaccine hesitancy was measured through the Oxford Covid-19 Vaccine Hesitancy Scale (Freeman et al., 2020). This is a seven-item scale with item-specific response options and a 5-point Likert scale coded from 1 to 5. A "don't know" option is also provided, which is excluded from scoring (scored as 0). There are no reverse-coded items on the scale. All items are summed to get the score on CVHS. Higher scores indicate a higher level of vaccine hesitancy. The Cronbach's alpha for this scale is 0.97.

### Demographics Information Sheet

Participants completed a demographic questionnaire developed by the researchers. It comprised information regarding the participant's age, gender, education status, family structure, socioeconomic status, occupation, time spent watching news, vaccination status, and three questions: "Will you use herbs or essential oils as a replacement for vaccines?" Is there a death in your family or among your friends as a result of COVID-19? Has someone in your family or circle of friends experienced side effects after a vaccination? Each is given a yes or no option.

### Procedure

This study was approved by the Department of Psychology at the Foundation University Rawalpindi Campus and followed the guidelines of the American Psychological Association. Eight hundred fifty employees (male employees,  $n = 368$ ; female employees,  $n = 482$ ) with an age range of 18 to 55 years ( $M = 33.56$ ,  $SD = 10.71$ ) were recruited from different universities in Islamabad and Rawalpindi, Pakistan. Both verbal and written informed consent were taken to carry out this study, and the participants were briefed about the nature, significance, and purpose of the study. Instructions regarding how to fill out the questionnaire were given to the participants. Each participant was assured of their privacy as well as the confidentiality of their information and identity. It was explained to them that their participation was purely voluntary, and they had the right to discontinue participating in the research at any

moment if they did not wish to continue. Researchers used different data analysis strategies to analyse the data.

Researchers utilised SPSS and Process Macro as data analysis tools. They calculated descriptive analyses (mean, standard deviation, and range) on research variables and demographic variables to find out the psychometric properties of the respective variables and reliability analyses to find out the alpha coefficient of scales. To determine the relationship between study variables, correlation was calculated. They used regression analysis to find predictors of the dependent variable and an independent sample t-test to compare differences in the independent variable and moderators. Moderation analyses were used to find the moderating role of spiritual wellbeing and existential anxiety in the relationship between Corona conspiracy beliefs and the COVID vaccine hesitancy scale.

### Results

Descriptive psychometric properties of the study variables are reported in Table 1. Table 2 depicts the relationship between study variables. Tables 3 and 4 show how existential anxiety and spiritual well-being play a moderating role in the relationship between Coronavirus conspiracy beliefs and COVID-19 vaccine hesitancy. Gender differences in study variables are reported in Table 5.

In the table 2, COVID-19 vaccine hesitancy was found to have a significant positive relationship with Coronavirus conspiracy beliefs and existential anxiety, but a significant negative relationship with spiritual wellbeing. Results also show that age and spiritual wellbeing have a significant negative correlation with existential anxiety. Coronavirus conspiracy beliefs, on the other hand, had no significant relationship with spiritual well-being. In Tables 2 and 3, existential anxiety emerged as a non-significant predictor of COVID-19 vaccine hesitancy, whereas spiritual wellbeing emerged as a significant predictor of COVID-19 vaccine hesitancy. Moreover, results revealed that existential anxiety and spiritual wellbeing didn't emerge as significant moderators in the relationship between coronavirus conspiracy beliefs and COVID-19 vaccine hesitancy.

In table 5, there were found to be significant gender differences in COVID-19 vaccine hesitancy, coronavirus conspiracy beliefs, spiritual wellbeing, and existential anxiety. Results clearly show that males have higher COVID-19 vaccine hesitancy and coronavirus conspiracy beliefs, whereas females scored higher on religious wellbeing and existential anxiety than males.

**Table 1***Psychometric Properties of the Study Variables (N=850)*

Variable	<i>k</i>	$\alpha$	<i>M</i>	<i>SD</i>	<i>Range</i>		<i>Skewness</i>	<i>Kurtosis</i>
					<i>Potential</i>	<i>Actual</i>		
CVH	7	.90	15.96	7.03	0-35	0-35	.88	.21
CCB	21	.96	36.48	22.52	0-105	0-100	.76	-.11
CCB-b	7	.90	13.96	8.64	0-35	0-35	.52	-.62
CCB-s	14	.94	22.51	15.23	0-70	0-68	.87	.10
SWB	20	.89	93.58	15.83	20-120	45-120	-.28	-.87
RWB	10	.86	49.35	9.13	10-60	22-60	-.59	-.85
EWB	10	.79	44.23	8.16	10-60	18-60	-.01	-.45
EA	13	.59	6.07	2.59	0-13	0-13	-.05	-.14

*Note.* CVH = Covid-19 Vaccine Hesitancy, CCB = Coronavirus Conspiracy Beliefs, CCB-b= Coronavirus Conspiracy beliefs-broad explanations, CCB-s= Coronavirus Conspiracy beliefs-specific explanations, SWB = Spiritual Wellbeing, EWB= Existential Wellbeing, RWB= Religious Wellbeing, EA = Existential Anxiety, M = Mean, S.D = Standard Deviation,  $\alpha$  = Cronbach alpha reliability, k = no. of items.

**Table 2**

*Correlation among Coronavirus Conspiracy Beliefs, Spiritual Wellbeing, Existential Anxiety, and the COVID-19 Vaccine Hesitancy and age of adults (N = 850)*

Variables	1	2	3	4	5	6	7	8	9
1 Age	-	.30	.23	.32	.10**	.01	.08*	-.05	-1.4**
2 Coronavirus Conspiracy Beliefs Covid-19		-	.89**	.96**	.47**	.00**	-.06	.01	.09**
3 Coronavirus Conspiracy Beliefs – Broad explanations			-	.76**	.39**	.05	.02	.06*	.09**
4 Coronavirus Conspiracy Beliefs – Specific explanations				-	.47**	-.02	-.02	-.01	.08**
5 Covid-19 Vaccine Hesitancy					-	-.07*	-.09**	-.05	.05*
6 Spiritual Wellbeing						-	.90**	.92**	-.23**
7 Existential Wellbeing							-	.67**	-.29**
8 Religious Wellbeing								-	-1.4**
9 Existential Anxiety									-

*Note.* CVH = Covid-19 Vaccine Hesitancy, CCB = Coronavirus Conspiracy Beliefs, CCB-b= Coronavirus Conspiracy beliefs-broad explanations, CCB-s= Coronavirus Conspiracy beliefs-specific explanations, SWB = Spiritual Wellbeing, EWB= Existential Wellbeing, RWB= Religious Wellbeing, EA = Existential Anxiety. \*\* $p < .05$ , \* $p < .01$ , \*\* $p < .000$ .

**Table 3**

*Existential anxiety as a moderator in the relationship between Coronavirus Conspiracy Beliefs and COVID-19 Vaccine Hesitancy among adults (N = 850)*

	<i>B</i>	<i>S.E</i>	<i>t</i>	<i>p</i>
Constant	15.92 (15.50, 16.34)	.21	74.77	.00
Coronavirus Conspiracy Beliefs	0.14 (.12, .16)	.01	15.34	.00
Existential anxiety	.06 (-.09, .23)	.08	0.83	.40
Conspiracy Beliefs * Existential anxiety	.01 (-.00, .01)	.00	1.60	.10
R	.47			
R <sup>2</sup>	.22			
F	83.87**			
R <sup>2</sup> - change	.01			

Note. \* $p < .05$ . \*\* $p < .01$

**Table 4**

*Spiritual well-being as a moderator in the relationship between Coronavirus Conspiracy Beliefs and COVID-19 Vaccine Hesitancy among Adults (N = 850)*

	<i>B</i>	<i>S.E</i>	<i>t</i>	<i>p</i>
Constant	15.96 (15.54, 16.37)	.21	75.44	.00
Coronavirus Conspiracy Beliefs	.14 (0.13, 0.17)	.01	15.86	.00
Spiritual Wellbeing	-.04 (-.06, -.01)	.01	-2.76	.00
Conspiracy Beliefs * Spiritual Wellbeing	.01 (-.00, .00)	.00	1.22	.22
R	.48			
R <sup>2</sup>	.23			
F	86.15**			
R <sup>2</sup> - change	.01			

Note. \* $p < .05$ . \*\* $p < .01$

**Table 5**

*Gender differences in Coronavirus Conspiracy Beliefs, Spiritual Wellbeing, Existential Anxiety, and Covid-19 Vaccine Hesitancy among adults (N=850)*

Variable	Males (n=368)		Females (n=482)		<i>t</i>	<i>p</i>	95% CI		Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>	
CVH	17.08	7.90	15.09	6.15	4.00	.00	1.01	2.97	0.28
CCB	38.59	24.24	34.86	21.03	2.35	.02	.62	6.84	0.16
CCB-b	14.82	9.30	13.30	8.04	2.50	.01	.33	2.71	0.17
CCB-s	23.76	16.27	21.56	14.33	2.07	.04	.11	4.31	0.14
SWB	92.98	16.75	94.03	15.08	-.95	.34	-3.23	1.12	0.06
RWB	48.36	9.44	50.10	8.82	-2.76	.01	-2.97	-.51	0.19
EWB	44.61	8.43	43.93	7.94	1.21	.22	-.42	1.79	0.08
EA	5.69	2.78	6.36	2.38	-3.67	.00	-1.02	-.31	0.25

*Note.* CVH= Covid-19 Vaccine hesitancy, CCB= Coronavirus Conspiracy beliefs, CCB-b= Coronavirus Conspiracy beliefs-broad explanations, CCB-s= Coronavirus Conspiracy beliefs-specific explanations, SWB = Spiritual Wellbeing, EWB= Existential Wellbeing, RWB= Religious Wellbeing, EA = Existential Anxiety, \**p* <.05, \*\**p*= <.01.

## Discussion

The present study was carried out to investigate the relationship between Coronavirus conspiracy beliefs, COVID-19 vaccine hesitancy, spiritual wellbeing, and existential anxiety among adults. Furthermore, whether Coronavirus conspiracy beliefs predict COVID-19 vaccine hesitancy was investigated. Furthermore, it investigated the moderating role of spiritual wellbeing and existential anxiety in the relationship between conspiracy beliefs and attitudes toward the Corona virus vaccine in adults. Additionally, this study determined gender differences in conspiracy beliefs, COVID-19 vaccine hesitancy, spiritual wellbeing, and existential anxiety. Furthermore, it examined differences based on education status, marital status, and vaccination status in conspiracy beliefs, COVID-19 vaccine hesitancy, spiritual wellbeing, and existential anxiety.

The study's first hypothesis stated that coronavirus conspiracy beliefs and existential anxiety will have a positive relationship with adult COVID-19 vaccine hesitancy. The results indicated that COVID-19 vaccine hesitancy had a significant positive relationship with coronavirus conspiracy beliefs and existential anxiety.

Scrima et al. (2021) investigated the relationship between fear of COVID-19 and intention to get vaccinated, with the serial mediation roles of existential anxiety and conspiracy beliefs. Their results indicated that existential anxiety was positively related to conspiracy beliefs and that conspiracy beliefs were negatively related to the intention to get vaccinated. Another study conducted recently in Jordan and Kuwait (Sallam et al., 2021) aimed to explore the association of high rates of COVID-19 vaccine hesitancy with conspiracy beliefs and found that belief in conspiracies regarding the origin of the virus and the vaccine was associated with less willingness to get the vaccine. In the study, higher vaccine conspiracy belief scores were associated with significantly higher rates of vaccine hesitancy. Al Sanafi and Sallam's (2021) study also supported the finding that COVID-19 vaccine conspiracy beliefs were associated with a significantly lower intent to receive the vaccine among health care workers in Kuwait.

The second hypothesis proposed a negative relationship between spiritual well-being and adult attitudes toward the COVID-19 virus vaccine. The results indicated that COVID-19 vaccine hesitancy had a significant negative relationship with spiritual wellbeing. A recent study was conducted (Kosarkova, 2021) in the Czech Republic to find out the association of vaccine refusal with being spiritual but not religiously affiliated. Contrary to our findings, it was found that spirituality, both by itself and in combination with non-affiliation, was associated with increased levels of vaccine refusal. But previous literature supports the fact that spiritual

wellbeing is associated with health-seeking behaviours (Miller & Thoresen, 1999).

The third hypothesis stated that coronavirus conspiracy beliefs and existential anxiety are likely to positively predict covid-19 hesitancy in adults. Coronavirus Conspiracy Beliefs were found to be significant positive predictors of COVID-19 Vaccine Hesitancy, whereas Existential Anxiety was not. Previous research substantiates the findings, as a study in Kuwait explored the psychological determinants of COVID-19 vaccine acceptance among healthcare workers in Kuwait (Al Sanafi & Sallam 2021), and the relation between the beliefs in the vaccine conspiracy and COVID-19 vaccine hesitancy was evident in their study.

It was hypothesized that the moderating role of existential anxiety is more likely to strengthen the relationship between coronavirus conspiracy beliefs and attitudes towards the coronavirus vaccine in adults. Our results did not support this hypothesis, as existential anxiety did not emerge as a significant predictor of coronavirus conspiracy beliefs.

Previous studies have not particularly studied the moderating role of existential anxiety in the relationship between COVID-19 vaccine hesitancy and coronavirus conspiracy, but a study conducted in France (Miceli et al., 2021) shows a serial mediation role of existential anxiety and conspiracy beliefs. The hypothesis may be rejected because the data was collected through convenient sampling.

It was hypothesized that the moderating role of spiritual well-being is more likely to weaken the relationship between coronavirus conspiracy beliefs and COVID-19 vaccine hesitancy in adults. Spiritual well-being was found to be a non-significant moderator in the relationship between Coronavirus conspiracy beliefs and COVID-19 vaccine hesitancy.

It was hypothesized that there are likely to be gender differences in coronavirus conspiracy beliefs, COVID-19 vaccine hesitancy, spiritual wellbeing, and existential anxiety. Results indicated that significant gender differences were present in COVID-19 vaccine hesitancy, coronavirus conspiracy beliefs, spiritual wellbeing, and existential anxiety. Results clearly show that male individuals have higher COVID-19 vaccine hesitancy and coronavirus conspiracy beliefs, whereas female individuals scored higher on religious wellbeing and existential anxiety than males.

A previous study conducted in Jordan and Kuwait, among other Arab countries (Sallam et al., 2021), indicated somewhat different results, as higher vaccine conspiracy belief scores were found among females. This may be due to cultural and regional differences. In another study by Ran and Gabriel (2019), it was observed that there are higher



levels of vaccine hesitancy among women than men. Our results were contradictory to previous research, maybe due to the fact that this was indigenous research and may have biased data.

### Limitations and Implications

There are a lot of concerns that have been raised related to the present study's generalization that the COVID-19 vaccine hesitancy processes are the same for all age groups. There is a need and recommendation for the future researcher to study the COVID-19 vaccine hesitancy in every age group, and data will be collected from different university employees so the results can be generalized. Furthermore, only female participants were included in the current study, so the results regarding COVID-19 vaccine hesitancy could not be generalized to both genders.

### Conclusion

The study's main aim was to examine the effect of conspiracy beliefs on COVID-19 vaccine hesitancy and the moderating role of existential anxiety and spiritual wellbeing among adults in Pakistan. The study was successful in achieving its aim as it examined the effect of conspiracy beliefs on COVID-19 vaccine hesitancy along with the moderating roles of existential anxiety and spiritual wellbeing among adults. It is concluded from the above discussion that coronavirus conspiracy beliefs are a significant positive predictor of COVID-19 vaccine hesitancy among adults. Whereas spiritual well-being is a significant negative predictor of COVID-19 vaccine hesitancy. Differences based on gender, marital status, vaccination status, and education have also been identified in this study.

### Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

### Ethical Consideration

The study was approved by Department of Psychology, Foundation University School of Science and Technology, Pakistan. Consent Form was taken before taking data and participants were asked to take voluntary participation

### Acknowledgement

The author thanks to Department of Psychology, Foundation University School of Science and Technology, Pakistan.

### Availability of data and materials

The data sets used and analyzed during the current study are available from the corresponding author on reasonable request.

### Authors' contributions/Author details

Atqa Noor, Ushba Rafaqat, & Dua Butt performed this study under-supervision of Miss Soulat Khan.

### Corresponding author

Correspondence to Noor, A.  
nooratqa@gmail.com.

### Ethics declarations

#### Ethics approval and consent to participate

This study was approved by the Institutional Review Board of Department of Psychology, Foundation University School of Science and Technology, Pakistan.

#### Consent for publication

Not applicable.

#### Competing interests

The authors declare to have no competing interests.

#### Additional Information

Not applicable.

**Received: 06 December 2022 Accepted: 6 February 2023: 6 February 2023 published online**

### References

- Abdool Karim, S. S., de Oliveira, T., & Loots, G. (2021). Appropriate names for COVID-19 variants. *Science*, 371(6535), 1215-1215.
- Ali, M. A. (2019). Polio vaccination controversy in Pakistan. *The Lancet*, 915-916.
- Allington, D., McAndrew, S., Moxham-Hall, V., & Duffy, B. (2021). Coronavirus conspiracy suspicions, general vaccine attitudes, trust and coronavirus information source as predictors of vaccine hesitancy among UK residents during the COVID-19 pandemic. *Psychological medicine*, 1-12.
- Bertin, P., Nera, K., & Delouvée, S. (2020). Conspiracy beliefs, rejection of vaccination, and support for hydroxychloroquine: A conceptual replication-extension in the COVID-19 pandemic context. *Frontiers in psychology*, 11, 2471.
- Chadwick A, K. J. (2021). Online social endorsement and Covid-19 vaccine hesitancy in the United Kingdom. *Soc Media + Soc*, 7(2).
- Chadwick, A. K. (2021). Online social endorsement and Covid-19 vaccine hesitancy in the United Kingdom. *Social Media+ Society*, 7(2).
- Chen, H., Li, X., Gao, J., Liu, X., Mao, Y., Wang, R., ... & Dai, J. (2021). Health Belief Model Perspective on the Control of COVID-19 Vaccine Hesitancy and the Promotion of Vaccination in China: Web-Based Cross-sectional Study. *Journal of Medical Internet Research*, 23(9), e29329.
- Chen, Y. L., Lin, Y. J., Chang, Y. P., Chou, W. J., & Yen, C. F. (2021). Differences in the protection motivation theory constructs between people with various latent classes of motivation for vaccination and preventive behaviors against COVID-19 in Taiwan. *International Journal of Environmental Research and Public Health*, 18(13), 7042.
- Dubé, E. G. (2016). Understanding vaccine

- hesitancy in Canada: results of a consultation study by the Canadian Immunization Research Network. *PloS one*, 11(6).
- Ellison CW. (1983). Spiritual well-being: conceptualization and measurement. *J Psychol Theol*. 11, 330-40.
- Figueiredo, A. d. (2020). Mapping global trends in vaccine confidence and investigating barriers to vaccine uptake: a large-scale retrospective temporal modelling study.
- Freeman D, B. L. (2020). COVID-19 vaccine hesitancy in the UK: the Oxford coronavirus explanations, attitudes, and narratives survey (Oceans) II. *Psychological Medicine*, 1-15.
- Freeman, D., Loe, B., Chadwick, A., Vaccari, C., Waite, F., Rosebrock, L., . . . Lambe, S. (2020). COVID-19 vaccine hesitancy in the UK: The Oxford coronavirus explanations, attitudes, and narratives survey (Oceans) II. *Psychological Medicine*, 1-15.  
doi:10.1017/S0033291720005188
- Freeman, D., Waite, F., Rosebrock, L., Petit, A., Casier, C., East, A., . . . Lambe, S. (2020). Coronavirus conspiracy beliefs, mistrust, and compliance with government guidelines in England. *Psychological Medicine* <https://doi.org/10.1017/S0033291720001890>
- Glanz, K.; Bishop, D.B. The Role of Behavioral Science Theory in Development and Implementation of Public Health Interventions. *Annu. Rev. Public Health* **2010**, *31*, 399–418.
- Goertzel, T. (1994). Belief in conspiracy theories. *Political psychology*, 731-742.
- Graham, B. S. (2020). Rapid COVID-19 vaccine development. *Science*, 368(6494), 945-946.
- Hughes, S., & Machan, L. (2021). It's a conspiracy: Covid-19 conspiracies link to psychopathy, Machiavellianism, and collective narcissism. *Personality and individual differences*, 171, 110559.
- Jennings, W., Stoker, G., Bunting, H., Valgarðsson, V. O., Gaskell, J., Devine, D., ... & Mills, M. C. (2021). Lack of trust, conspiracy beliefs, and social media use predict COVID-19 vaccine hesitancy. *Vaccines*, 9(6), 593.
- Khan, Y. H., Mallhi, T. H., Alotaibi, N. H., Alzarea, A. I., Alanazi, A. S., Tanveer, N., & Hashmi, F. K. (2020, June 22). Threat of COVID-19 vaccine hesitancy in Pakistan: the need for measures to neutralize misleading narratives. *The American journal of tropical medicine and hygiene*, 103(2), 603. Retrieved January 16, 2022, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7410483/>
- Lazarević, L. B., Purić, D., Teovanović, P., Lukić, P., Zupan, Z., & Knežević, G. (2021). What drives us to be (ir) responsible for our health during the COVID-19 pandemic? The role of personality, thinking styles, and conspiracy mentality. *Personality and individual differences*, 176, 110771.
- Lin, C. (2021). Confidence and Receptivity for COVID-19 Vaccines: A Rapid Systematic Review.
- Marzo, R. R., Sami, W., Alam, M. Z., Acharya, S., Jermstiparsert, K., Songwathana, K., Pham, N. T., Respati, T., Faller, E. M., Baldonado, A. M., Aung, Y., Borkar, S. M., Essar, M. Y., Shrestha, S., & Yi, S. (2022). Hesitancy in COVID-19 vaccine uptake and its associated factors among the general adult population: a cross-sectional study in six Southeast Asian countries. *Tropical medicine and health*, 50(1), 4.  
<https://doi.org/10.1186/s41182-021-00393-1>
- Mathieu, E., Ritchie, H., Ortiz-Ospina, E. et al. A global database of COVID-19 vaccinations. *Nat Hum Behav* (2021).
- Matranga, D., Restivo, V., Maniscalco, L., Bono, F., Pizzo, G., Lanza, G., ... & Miceli, S. (2020). Lifestyle Medicine and Psychological Well-Being Toward Health Promotion: A Cross-Sectional Study on Palermo (Southern Italy) Undergraduates. *International Journal of Environmental Research and Public Health*, 17(15), 5444.
- Murphy, J. (2021). Psychological characteristics associated with COVID-19 vaccine hesitancy and resistance in Ireland and the United Kingdom.
- NE, M. (2015). Vaccine hesitancy: definition, scope and determinants. *Vaccine*, 33(34):4161–4.
- NE, M. (2015). Vaccine hesitancy: Definition, scope and determinants. *SAGE Working Group on Vaccine Hesitancy*.
- Nossier, S. A. (2021). Vaccine hesitancy: the greatest threat to COVID-19 vaccination programs.
- Nossier, S. A. h.-1. (2021). Vaccination Programs.
- Olson O, B. C. (2020). Addressing parental vaccine hesitancy towards childhood vaccines in the United States: A systematic literature review of communication interventions and strategies. *Vaccines*.
- Organization, W. H. (2020). Behavioral considerations for acceptance and uptake

- of COVID-19 vaccines: WHO technical advisory group on behavioral insights and sciences for health, meeting report.
- Paloutzian RF, Ellison CW. (1982). Loneliness, spiritual well-being and the quality of life. In Peplau LA, Perlman D (eds), (pp. 224-37). Loneliness: a sourcebook of current theory, research and therapy. Wilen-Interscience, New York.
- Pfizer and BioNTech Provide Update on Omicron Variant / Pfizer. (2021, December 8). Retrieved January 16, 2022, from <https://www.pfizer.com/news/press-release/press-release-detail/pfizer-and-biontech-provide-update-omicron-variant>.
- Piedmont RL. (2001). Spiritual transcendence and the scientific study of spirituality. *J Rehabil*, 67, 4-14.
- Piedmont RL. (2005). The role of personality in understanding religious and spiritual constructs. In Paloutzian RF, Park CL (eds), *Handbook of the psychology of religion and spirituality* (pp. 253-273). Guilford, New York, NY.
- Razai, M. S. (2021). Covid-19 vaccine hesitancy among ethnic minority groups.
- Reed, D. E., Williamson, R. E., & Wickham, R. E. (2021). Memento Mori: understanding existential anxiety through the existential pathway model. *Journal of Theoretical Social Psychology*, 5(1), 14-25.
- Rogers, R. W., & Prentice-Dunn, S. (1997). Protection motivation theory.
- Romer, D., & Jamieson, K. H. (2020). Conspiracy theories as barriers to controlling the spread of COVID-19 in the US. *Social science & medicine*, 263, 113356.
- Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. *Health education quarterly*, 15(2), 175-183.
- Rutten, L. J. (2021). Evidence-based strategies for clinical organizations to address COVID-19 vaccine hesitancy. *Elsevier*, 699-707.
- Salali, G. D., & Uysal, M. S. (2020). COVID-19 vaccine hesitancy is associated with beliefs on the origin of the novel coronavirus in the UK and Turkey. *Psychological medicine*, 1-3.
- Sallam, M., Dababseh, D., Eid, H., Al-Mahzoum, K., Al-Haidar, A., Taim, D., ... & Mahafzah, A. (2021). High rates of COVID-19 vaccine hesitancy and its association with conspiracy beliefs: A study in Jordan and Kuwait among other Arab countries. *Vaccines*, 9(1), 42.
- Salmon DA, D. M. (2015). Vaccine hesitancy: Definition, scope and determinants. *Am J Prev Med*.
- Scrima, F., Miceli, S., Caci, B., & Cardaci, M. (2022). The relationship between fear of COVID-19 and intention to get vaccinated. The serial mediation roles of existential anxiety and conspiracy beliefs. *Personality and Individual Differences*, 184, 111188.
- Sharma, M. Multi-theory model (MTM) for health behavior change. *WebmedCentral Behav*. 2015, 6, WMC004982.
- Sharma, M. *Theoretical Foundations of Health Education and Health Promotion*, 4th ed.; Jones & Bartlett Learning: Sudbury, ON, Canada, 2021.
- Soares, P. (2021). Factors Associated with COVID-19 Vaccine Hesitancy.
- Staff, O. (2020). Bill Gates' coronavirus vaccine will have nano trackers, will be controlled via 5G satellites to take Islam out of Muslims: Pakistani 'expert' Zaid Hamid. *OpIndia*.
- Staff, O. (2020). Coronavirus is not natural but invented in a laboratory by Israel, US and UK: Former Pakistan Foreign Minister comes up with a bizarre conspiracy theory. *OpIndia*.
- Tomaszek, K., & Muchacka-Cymerman, A. (2020). Thinking about my existence during COVID-19, I feel anxiety and awe—The mediating role of existential anxiety and life satisfaction on the relationship between PTSD symptoms and post-traumatic growth. *International journal of environmental research and public health*, 17(19), 7062.
- Wong, M. C., Wong, E. L., Huang, J., Cheung, A. W., Law, K., Chong, M. K., ... & Chan, P. K. (2021). Acceptance of the COVID-19 vaccine based on the health belief model: A population-based survey in Hong Kong. *Vaccine*, 39(7), 1148-1156.
- World Health Organization, 2. (2020). WHO Director-General's remarks at the media briefing on 2019-nCoV on 11 February 2020.
- Zhao, H., Lu, L., Peng, Z., Chen, L. L., Meng, X., Zhang, C., ... & To, K. K. W. (2021). SARS-CoV-2 Omicron variant shows less efficient replication and fusion activity when compared with delta variant in TMPRSS2-expressed cells: Omicron variant replication kinetics. *Emerging microbes & infections*, 1-18.

## Publisher's Note

The Nature-Nurture publishing group remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.