

Article

Explaining Resistance to the COVID-19 Preventive Measures: A Psychological Reactance Perspective

Rabia Bokhari ^{1,*} and Khurram Shahzad ²

¹ Hekma School of Business and Law, Dar Al-Hekma University, Jeddah 22246, Saudi Arabia

² Faculty of Economics and Administration, King Abdulaziz University, Jeddah 21589, Saudi Arabia; kmsahzad@kau.edu.sa

* Correspondence: rbokhari@dah.edu.sa

Abstract: This paper examines the impact that psychological reactance has on the COVID-19 adherence-related behavior and vaccine motivations of the residents of Saudi Arabia. A cross-sectional, online survey was administered, and 604 usable responses were analyzed to discover the level of psychological reactance, and its impact on adherence to COVID-19 preventive measures and vaccine intentions. Results of the Kruskal–Wallis H test demonstrated statistically significant evidence ($p < 0.05$) of differences between the mean ranks for four out of seven key COVID-19 preventive measures studied, and four out of five items related to vaccine motivations, as a result of psychological reactance. These results suggest that while the majority of the population is adhering to COVID-19 preventive measures, for the subset of the population that are not fully compliant, psychological reactance is a significant factor in influencing behavior. Governments are, therefore, recommended to ensure that their public health messages are autonomy supporting, and take into consideration psychological and personality-based differences in individuals.

Keywords: psychological reactance; COVID-19; vaccine hesitancy; COVID-19 preventive measures



Citation: Bokhari, R.; Shahzad, K. Explaining Resistance to the COVID-19 Preventive Measures: A Psychological Reactance Perspective. *Sustainability* **2022**, *14*, 4476. <https://doi.org/10.3390/su14084476>

Academic Editor: John Rennie Short

Received: 15 March 2022

Accepted: 6 April 2022

Published: 9 April 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Over a century ago, an article containing lessons from the Spanish Flu pandemic was published [1]. The three main insights on the spread of pandemics highlighted in the article were explained as follows: “(i) people do not appreciate the risks they run, (ii) it goes against human nature for people to shut themselves up in rigid isolation as a means of protecting others, and (iii) people often unconsciously act as a continuing danger to themselves and others” [2] (p. 467).

The COVID-19 virus outbreak, that started at the end of 2019 and swiftly became a worldwide pandemic, has had a global impact, infecting millions and leaving hundreds of thousands dead. To reduce the spread of COVID-19, governments and health authorities worldwide have advocated the use of preventive measures that restrict human contact, such as stay-at-home orders, school and university closures, a shift to virtual work for non-essential workers and so on [3,4]. Additionally, behavioral guidelines have also been implemented globally to reduce person-to-person transmission, such as through wearing masks, washing hands, social distancing, covering one's mouth and nose when sneezing or coughing, and so on [5]. However, research suggests, as with the insights on the Spanish Flu above, many of these measures are not being effectively adhered to by all members of the public [6], and governments and health authorities all over the world are engaging in a variety of measures, such as public messaging, as well as providing the threat of sanctions, to encourage citizens to comply and demonstrate responsible behavior to control the pandemic [7–11].

Global news articles pertaining to adherence to COVID-19 preventive measures have highlighted both ends of the spectrum. While some have highlighted how diligently

citizens of some countries have been adhering to all preventive measures to halt the spread of the coronavirus pandemic [12], others have raised concerns that individuals in certain countries believe them to be “an infringement of civil liberties” [13] or a loss of personal “freedoms” [14,15].

The development of COVID-19 vaccines, and their subsequent approval by health authorities worldwide have provided hope that an end to the pandemic may be possible; however, again, efforts to have global citizens vaccinated are not going as planned due to vaccine hesitancy, defined as the reluctance or unwillingness to have oneself or one’s children vaccinated against a disease, regardless of the safety and effectiveness of the vaccine being proven [16]. According to studies, while the majority of respondents would take the vaccine, a substantial proportion state that they either feel hesitant in taking the vaccine or would not get vaccinated at all [10,17–21]. A survey conducted on participants across 19 countries found that 71.5% of participants would be somewhat or very likely to become vaccinated against COVID-19 [19], which suggests that a significant percentage would not voluntarily want to receive the vaccination.

With the occurrence of various coronavirus variants [22], as well as ‘waves’ of infection, it is vital that the public continue to comply with the COVID-19 preventive measures and become vaccinated. It is also essential to comprehend the reasons behind non-compliance and non-vaccination. While research on human behavior during the pandemic has been researched using a variety of theoretical frameworks, such as the impact of health beliefs [23,24], fear [18,25], religion [9], conspiracy theories [10], as well as personality traits [3,26–29], this research will use the theoretical lens of the Psychological Reactance Theory.

The purpose of this paper is to contribute to the existing literature by examining the impact that psychological reactance has on the adherence-related behavior and vaccine motivations of the residents of Saudi Arabia. To the best of the authors’ knowledge, the behavior of citizens and residents of Saudi Arabia has not been analyzed with respect to the Psychological Reactance Theory. This article will commence with a discussion of the theoretical framework grounding the study, and then provide contextual information about Saudi Arabia. It will then present the research design, along with a discussion on the results obtained. The article will conclude with a recommendation to governments and health authorities to take psychological and personality-based differences into consideration when designing public health messages.

2. Theoretical Background

The extent to which almost all aspects of daily life have become ‘regulated’, with guidelines now governing how people across the world live, work, study, recreate and function, has almost completely overhauled pre-pandemic lifestyles. “The behavioral changes demanded are huge; the adoption of high standards of nasal and coughing etiquette alongside frequent and thorough handwashing; social distancing, which interferes with ‘normal’ family and friendship behaviors; and the use of the home as a workplace as well as a ‘school’ for those with children” [4] (p. 258), are just some of the ways that change has occurred.

2.1. Psychological Reactance Theory

The Psychological Reactance Theory [30,31] explains the reason behind individuals being attracted towards “forbidden fruits” and describes how any rule or prohibition that tries to prevent individuals from behaving in a particular way activates psychological reactance—a “motivational state hypothesized to occur when a freedom is eliminated or threatened with elimination” [31] (p. 37). In short, when an individual perceives a rule, regulation or attempt at persuasion to be threatening towards their sense of autonomy or freedom of choice, they are overcome by a motivational state, which influences them to assert their control by rejecting the rule, regulation or attempt at persuasion in question. Psychological reactance is usually characterized by feelings of anger and counter-

arguments [32], which could involve denial of the severity of the threat or questioning the effectiveness of the rule [30,31]. Psychological reactance, especially in the context of this study, becomes a cause for concern, as past research states that one of its most visible effect is that individuals engage in behavior that is directly opposed to what was requested or mandated—commonly termed the “boomerang effect” [32–34].

Brehm [31] also posited that individuals differ in terms of their *reactance proneness*, which is the tendency of an individual to experience reactance across different situations. Generally, individuals who are higher in reactance proneness are more sensitive to any dangers to their freedom [35] and are likely to react more strongly to influence attempts than individuals lower in reactance proneness [36].

Previous research states that reactance can be prompted by any rule, or even request, if it is phrased in a way that individuals perceive as being a threat to their freedom. As an example, while offering a choice as part of a request did not trigger reactance, if framed in a way that was assertive and inflexible, reactance was elicited [36]. This has also been further illustrated in another study, where forceful and assertive language used as part of health messages evoked reactance [34]. An additional study eliciting responses of US participants to COVID-19 messages concluded that a greater perceived threat to freedom was linked to a higher level of reactance, which, in turn, was related to lower levels of adherence to COVID-19 preventive measures [37]. Further research, on 1074 respondents from the United States, reported that individuals who had higher trait reactance reported lower compliance with protective behavior and had lower levels of COVID-19 knowledge. The findings indicated that a segment of the population rejected adherence to COVID-19 preventive guidelines, as they perceive them to be an infringement on their personal freedoms, and rejecting the recommendations gives them a sense of having restored their freedom [38].

A study by Taylor and Asmundson [39] found that the majority (84%) of the 2078 participants of their study from the US and Canada wore masks because of COVID-19. In an analysis of the 16% of respondents who did not wear masks, the researchers identified higher levels of psychological reactance, stemming from being forced to wear masks, as well as beliefs that masks are ineffective.

Psychological reactance may also be linked to vaccine hesitancy. A study established that individuals with higher levels of trait reactance were more likely to reject being vaccinated [40]. In addition, a study in Finland concluded that parents who had higher trait reactance also had lower levels of trust in medical authorities and doctors, had a more negative approach towards vaccines for themselves and their children, and were more likely to advocate the use of complementary and alternative medicine treatments, instead of evidence-based medicine [41].

A public report published as part of a wider study being conducted in Belgium [42] reported that as of August 2020, the population under study demonstrated diminishing motivation levels with the commencement of the second wave of infections in Belgium, resulting in ‘corona fatigue’ among the respondents. The report mentioned that voluntary motivation to comply with COVID-19 preventive measures declined sharply, being replaced with ‘*must*’ivation, particularly among young adults aged 18–35 years old. One of the reasons the authors suggested for this trend was due to the long duration of the COVID-19 crisis.

2.2. Context

The first confirmed case of COVID-19 in Saudi Arabia emerged on 2 March 2020. The government responded with strong measures to control the spread of the virus, such as through a nationwide curfew in the early months of the pandemic; suspension of all international air travel; a shift to virtual education instead of face-to-face teaching at all schools and universities; a shift to virtual work for all non-essential workers; the closure of all malls and shops, except pharmacies and groceries; the suspension of Umrah and Hajj pilgrimage visas, as well as the shifting of daily prayers to homes instead of mosques, and

so on [43,44]. In addition, Saudi Arabia started its vaccination drive for all residents over the age of 18 to receive the COVID-19 vaccination free of charge from 17 December 2020, being among the first few countries in the world to do so [45].

The measures seemed to be working, with country-wide COVID-19 cases down to double digits; however, after a relaxation of measures, a second wave commenced in January 2021 [46]. The spokesperson for the Ministry of Health credited the rise in cases, the highest in seven months, to an increase in social gatherings and non-adherence of individuals to the COVID-19 preventive measures. The spokesperson also reiterated the monetary fines that non-complying individuals and establishments would face, in addition to possible prison sentences and the shutting-down of premises, and informed that the security services had identified and dealt with over 27,000 violations across the country in the last week of March 2021 [46].

Several surveys were conducted to gauge the vaccine intentions of citizens and residents of Saudi Arabia. Before the availability of the vaccine, a study conducted at the national level reported that only 45% of 3100 participants surveyed were willing to receive a hypothetical COVID-19 vaccine [47], while a second study, with around 1000 respondents, showed a higher percentage at 65% [48]. A survey targeted at 2000 health-care workers in the country reported that three-quarters of the participants were willing to receive a COVID-19 vaccine [49], but when specifically probing about the BNT162b2 vaccine, only one-fifth of them were willing to receive it [50]. After the vaccine became available, another study was conducted to assess vaccine hesitancy in Saudi Arabia [44]. Out of 862 Saudi adults surveyed, only 2.1% had received the vaccination, while 20.3% had registered for it. Almost half the respondents, 46.7%, reported that they would only take the vaccine if it became mandatory. The results of the study demonstrated a high incidence of vaccine hesitancy in Saudi Arabia, and even though the majority of the participants (63.6%) were well aware of the risks of the virus, they stated vaccine effectiveness and safety concerns as obstacles to getting vaccinated.

Saudi Arabia has opened its air, land and sea borders, effective as of 17 May 2021 [51], and with the exception of certain countries, international travel has resumed. More than ever, it is vital that residents continue complying with COVID-19 preventive measures and getting vaccinated, as an influx of tourists, visitors, as well as residents who have travelled internationally, may open up the possibility of the various COVID-19 variants entering the country. This paper, therefore, will assess the role that psychological reactance plays in influencing adherence to COVID-19 preventive measures and vaccine motivations of the residents of Saudi Arabia.

3. Materials and Methods

3.1. Sampling

This cross-sectional study analyzes survey data collected from the general population of the Kingdom of Saudi Arabia, above the age of 18 years old, between 31 May and 14 June 2021, exactly two weeks after international travel resumed. The online survey method was adopted, and participants were recruited through the snow-balling sampling method. The online questionnaire was distributed to participants via social media platforms such as LinkedIn and WhatsApp, who were asked to optionally complete it and forward it to their network of acquaintances.

Based on the latest census data the population of Saudi Arabia stands at 34,218,169 [52]. Based on this population, and using a margin of error of $\pm 4\%$, a confidence level of 95%, and a 50% response distribution, the representative target sample was 601 [53].

A total of 694 responses were received, out of which 73 were excluded due to non-completion. In addition, two complete responses were excluded as the respondents were below the age of 18. The completed responses were also checked to identify any respondents who had answered all items within a section with an identical response, for example selecting strongly agree or strongly disagree for all items. A further 15 responses were excluded. The remaining 604 responses were used for the present analyses.

3.2. Measurement Tool

The questionnaire was conducted in both Arabic and English as the survey was targeted at citizens and expatriate residents of Saudi Arabia. The Arabic translation and its consistency with the English version were confirmed by the chief editor and official translator at one of the authors' parent university. A pilot test was conducted with 20 respondents having academic and research backgrounds in both the Arabic and English languages, and the questionnaire was shared through social media platforms after incorporating the minor changes suggested during the pilot testing phase.

All participants were informed about the background and purpose of the research on the first page of the questionnaire, in addition to apprising them that their participation in the research was completely voluntary, their answers would be kept completely anonymous, no identifying information would be collected and that they would be free to withdraw at any time. Once online informed consent was received from the respondents and they confirmed that they were over 18 years of age, they proceeded with the questionnaire. The research was approved by the Ethics Committee of Dar Al-Hekma University (RC/2021/002, 21 March 2021).

The research instrument comprised a questionnaire consisting of four main areas: psychological reactance, adherence to COVID-19 preventive measures, vaccine motivations and demographic questions.

3.3. Psychological Reactance (Independent Variable)

To measure psychological reactance, the widely used 14-item Hong Psychological Reactance Scale was used [54–59]. The scale measures trait reactance in non-specific everyday circumstances, rather than assessing reactance to the COVID-19 preventive measures. Each item was assessed on a five-point Likert Scale, with strongly disagree coded as 1 and strongly agree coded as 5. The internal consistency of the overall scale, as assessed through Cronbach alpha was 0.875. The scale consists of four sections: emotional response toward restricted choice (internal consistency: 0.789); reactance to compliance (internal consistency: 0.688); resisting influence from others (internal consistency: 0.730); reactance to advice and recommendations (internal consistency: 0.693).

Following on from the public report that highlighted a reduction in compliance with COVID-19 preventive measures in Belgium as a possible result of the long duration of the coronavirus pandemic [42], the authors added two novel items in this section to assess whether psychological reactance is triggered if the same advice is repeated continuously and if they are expected to follow the same instructions for a long period of time. The internal consistency of this section, termed repeated advice and instructions was 0.712, and the two items were:

1. When I keep on receiving the same advice and recommendations continuously over a period of time, I become frustrated. (RAI01)
2. When I am expected to follow the same instructions for a long period of time, I feel like doing the opposite. (RAI02)

3.4. Outcomes (Dependent Variables)

3.4.1. COVID-19 Preventive Measures

This sub-section was constituted of seven items which were adapted from the recommended measures for mitigating the transmission of COVID-19 [5,6,24]. All items were assessed on a five-point continuum, with 1 representing strong disagreement and 5 representing strong agreement with the statement being assessed. The alpha value for the seven items was 0.868. The seven items were:

1. I wash my hands for at least 20 s. (PM01)
2. I wear a mask or a face cover whenever I leave the house. (PM02)
3. I refrain from going out unless it is absolutely necessary. (PM03)
4. I practice social distancing and keep a distance of at least one meter from others. (PM04)
5. I cover my nose and mouth when sneezing or coughing. (PM05)

6. I avoid touching my eyes, nose, and mouth unless I wash my hands before. (PM06)
7. I disinfect items that I use outside the house, such as my cell phone. (PM07)

3.4.2. Vaccine Motivations

This sub-section was constituted of five novel items assessed on a five-point Likert scale, ranging from strongly disagree (coded as 1) to strongly agree (coded as 5). After asking participants about their vaccine status and intention to get vaccinated, the remaining four items aimed to identify how far the motivations behind vaccination intention were based on psychological reactance. Item 1, as listed below, aimed to assess the proportion of the sample that either has already been vaccinated or is planning to get vaccinated soon. The items used to assess autonomous choice were 2 and 5 from those listed below. Two items were included to assess the role of external factors, the role of family and friends (item 3) and the government (item 4), in shaping the vaccine motivations of the sample. The Cronbach's alpha value of the five items listed below was 0.750.

1. I have already been vaccinated against COVID-19, or I am planning to get the vaccination soon. (VACC01)
2. I decided to get vaccinated so I can resume my usual pre-COVID-19 life as soon as possible. (VACC02)
3. I decided to get vaccinated because most of my family and friends are getting vaccinated. (VACC03)
4. I decided to get vaccinated because of the government's directives. (VACC04)
5. I decided to get vaccinated because of my own personal choice. (VACC05)

3.4.3. Demographic Variables (Covariates)

This section included items assessing the gender, age, education level, work status, income and region of the sample.

Gender was assessed through two categories: male and female. Age was assessed with five strata: 18–29; 30–39; 40–49; 50–59; 60 and above. Education was assessed with five categories: high school or below; Bachelor's degree; Advanced degree (including master's doctoral and professional degrees); vocational/technical degree. Employment was assessed with eight strata that were collapsed into seven categories for ease of presentation: employed for wages; self-employed; out of work and looking for work; out of work but not currently looking for work; retired; homemaker; student. Income was assessed with seven strata (in USD): under 25,000; 25,000–49,999; 50,000–74,999; 75,000–99,999; 100,000–124,999; 125,000–149,999; 150,000 or more, as well as an option for those who prefer not to say. The geographic region of the respondents was assessed through the 13 administrative regions in Saudi Arabia: Asir, Mecca, Medina, Riyadh, Eastern Province, Albaha, Aljouf/Quriat, Hail, Jazan, Najran, Northern Borders, Qaseem, Tabouk, and the Western Region.

3.5. Analyses

The skewness and kurtosis results were within acceptable bounds [60]; however, the results of the Kolmogorov–Smirnov test of normality suggested data were not normally distributed, advocating the use of non-parametric analytical tests. The relationships between the variables in the study were measured using Spearman's rank-order correlation. The scores for psychological reactance were split into four equal quartiles, and its impact on adherence to COVID-19 preventive measures and vaccine motivations was assessed with the Kruskal–Wallis H test. Significant results were followed up with the Dunn–Bonferroni post-hoc method.

4. Results

4.1. Descriptive Statistics

There were 604 participants in total, comprising 44.2% ($N = 267$) men and 55.8% ($N = 337$) women (Table 1). In addition, the largest proportion represented within the sample was of participants between the ages of 30–39, constituting 33.6% ($N = 203$); holding

a bachelor's degree (47.2%, $N = 285$); being employed for wages (55.5%, $N = 335$). Most of the participants' income ranged less than USD 99,999 annually, and the majority of the participants in the study were located in the Makkah region (56.5%, $N = 341$), where both the authors of the study are based. In addition, 78.1% ($N = 472$) of the respondents completed the survey in English, while 21.9% ($N = 132$) in Arabic. Table 1 provides the detailed socio-demographic profile of the sample.

Table 1. Descriptive Statistics ($N = 604$).

		Participants	Percent
Gender	Female	337	55.8
	Male	267	44.2
Age	18–29	149	24.7
	30–39	203	33.6
	40–49	169	28.0
	50–59	55	9.1
	60 and above	28	4.6
Education	High School or below	90	14.9
	Bachelor's degree	285	47.2
	Advanced degree (master's/doctoral/professional degree)	186	30.8
	Vocational/technical degree	43	7.1
Employment	Employed for wages	335	55.5
	Self-employed	80	13.2
	Out of work and looking for work	55	9.1
	Out of work but not currently looking for work	33	5.5
	Retired	14	2.3
	Homemaker	42	7.0
	Student	45	7.5
Income (US \$)	Under \$25,000	143	23.7
	\$25,000–49,999	125	20.7
	\$50,000–74,999	125	20.7
	\$75,000–99,999	126	20.9
	\$100,000–124,999	25	4.1
	\$125,000–149,999	13	2.2
	\$150,000 or more	17	2.8
	Prefer not to say	30	5.0
Region	Asir Region	5	0.8
	Eastern Province	50	8.3
	Mecca Region	341	56.5
	Medina Region	51	8.4
	Riyadh Region	157	26.0
Language	English	472	78.1
	Arabic	132	21.9

Table 2 provides the means of preventive behaviors, according to the demographics of the sample. While previous research has demonstrated that females tend to be more careful in adhering to preventive measures [23], the results of this study show that differences between males and females are minor, with males being more compliant for certain preventive measures, such as washing hands for at least 20 s, refraining from going out unless absolutely necessary and practicing social distancing. While there were not significant differences based on the income level of the participants, generally, the participants in the group where annual income was less than USD 25,000 had lower levels of compliance compared to the rest of the sample, and participants in the group where annual income was USD 150,000 or higher had marginally higher levels of compliance, across most of the preventive measures. The Asir region had the highest levels of compliance compared to

the other regions of Saudi Arabia; however, as the percentage of participants from the Asir region constitutes only 0.8% of the sample, this cannot be considered a conclusive result. Age and educational level did not show any significant differences between the categories; however, among the employment status, homemakers were marginally more compliant with the preventive measures than those in other categories.

Table 2. Means of Preventive Measures According to Demographics.

Demographics	PM01 ¹	PM02 ²	PM03 ³	PM04 ⁴	PM05 ⁵	PM06 ⁶	PM07 ⁷
Gender							
Female	3.52	4.56	3.24	3.88	4.58	3.92	3.46
Male	3.62	4.2	3.65	3.9	4.25	3.82	3.4
Income							
Under \$25,000	3.53	4.38	3.29	3.88	4.47	3.75	3.23
\$25,000–49,999	3.68	4.5	3.55	3.9	4.37	3.86	3.31
\$50,000–74,999	3.56	4.3	3.34	3.76	4.39	3.86	3.47
\$75,000–99,999	3.57	4.4	3.51	3.87	4.41	3.9	3.63
\$100,000–124,999	3.48	4.44	3.64	4.04	4.52	4.04	3.52
\$125,000–149,999	3.31	4.15	2.77	4	4.85	4.08	3.77
\$150,000 or more	3.94	4.47	3.76	3.88	4.65	4.18	3.35
Prefer not to say	3.23	4.6	3.37	4.37	4.5	4.13	3.77
Region							
Asir	3.6	4.8	3.6	4.4	4.4	4.2	2.4
Eastern	3.64	4.34	3.18	3.62	4.5	3.7	3.08
Mecca	3.57	4.42	3.52	3.91	4.38	3.9	3.52
Medina	3.35	4.43	3.51	3.9	4.59	3.78	3.57
Riyadh	3.61	4.38	3.25	3.91	4.49	3.9	3.36
Age							
18–29	3.5	4.27	3.38	3.9	4.5	3.87	3.34
30–39	3.62	4.51	3.51	3.9	4.44	3.97	3.48
40–49	3.56	4.38	3.38	3.8	4.35	3.78	3.43
50–59	3.75	4.44	3.47	4.09	4.49	4.05	3.6
60 and above	3.25	4.39	3.14	3.86	4.46	3.46	3.39
Highest Educational Level							
High School or below	3.61	4.39	3.39	3.84	4.5	3.66	3.22
Bachelor's degree	3.6	4.4	3.34	3.92	4.47	4	3.51
Advanced degree (master's/doctoral/professional degree)	3.54	4.42	3.6	3.9	4.38	3.8	3.47
Vocational/technical degree	3.37	4.4	3.3	3.77	4.3	3.81	3.21
Employment Status							
Employed for wages	3.51	4.42	3.45	3.93	4.39	3.91	3.51
Self-employed	3.43	4.42	3.25	3.78	4.48	3.7	3.14
Out of work and looking for work	3.78	4.42	3.47	3.91	4.6	4.05	3.31
Out of work but not currently looking for work	3.36	4.24	3.39	3.76	4.15	3.64	3.33
Homemaker	3.93	4.36	3.48	3.86	4.55	4.07	3.64
Retired	3.64	4.36	3	3.64	4.29	3.64	3.29
Student	3.73	4.47	3.56	4	4.67	3.8	3.51

¹ I wash my hands for at least 20 s. ² I wear a mask or a face cover whenever I leave the house. ³ I refrain from going out unless it is absolutely necessary. ⁴ I practice social distancing and keep a distance of at least one meter from others. ⁵ I cover my nose and mouth when sneezing or coughing. ⁶ I avoid touching my eyes, nose, and mouth unless I wash my hands before. ⁷ I disinfect items that I use outside the house, such as my cell phone.

Table 3 presents the means of vaccination status and motivations, according to the demographic distribution of the sample. Females were more likely to have either been vaccinated already or demonstrate a positive intent to get vaccinated soon (mean = 4.39), compared to males (mean = 4.09). However, both genders were similar in the fact that the overarching reason for getting vaccinated was to resume their usual pre-COVID lives

at the earliest possible time (males = 4.14, females = 4.28). The means of the different categories within annual income did not show significant differences. Among the regions, the participants from the Asir region were more likely to have either been vaccinated already or planning to get vaccinated soon (mean = 4.6); however, as stated earlier, as the percentage of participants in the sample is very small, this result cannot be considered conclusive. Age did show some differences, with respondents between the ages of 18–29 less likely to have been vaccinated already or having vaccination plans in the near future (mean = 4.11), compared to respondents over the age of 60 (mean = 4.71). In addition, participants holding a bachelor's degree were also more likely to have either been vaccinated already or show a positive intent to get vaccinated (mean = 4.33). Finally, in the employment status demographic, retired individuals were more likely to have either been vaccinated already or planning to get vaccinated soon (mean = 4.57), while self-employed individuals were less likely to do so (mean = 4.09). Across all demographics, however, the main motivating factor for getting vaccinated was to resume their usual pre-COVID lives at the earliest possible time.

Figure 1 provides a basic frequency analysis of the seven COVID-19 preventive measures. Each item was originally measured on a five-point scale, but for the purpose of this analysis, was divided into three groups: Group 1 ('Disagree') includes all respondents who selected 'Strongly Disagree' or 'Disagree'; Group 2 ('Neutral') includes all respondents who selected 'Neither Agree nor Disagree'; Group 3 ('Agree') includes all respondents who responded with either 'Agree' or 'Strongly Agree'. The results show that 83.94% of the people surveyed wear a mask or face covering whenever they leave the house. In this study, 86.59% of respondents reportedly cover their mouth and nose when sneezing or coughing. Items with low levels of compliance include refraining from going out unless necessary, with 32.62% of the respondents reporting non-compliance, disinfecting items used outside the house, with 27.81% stating non-adherence, and 24.01% of respondents reporting that they do not wash their hands for at least 20 s. These results suggest that while the majority of respondents (over 51%) are complying with all preventive measures, there is still a significant percentage of respondents that need to increase their compliance.

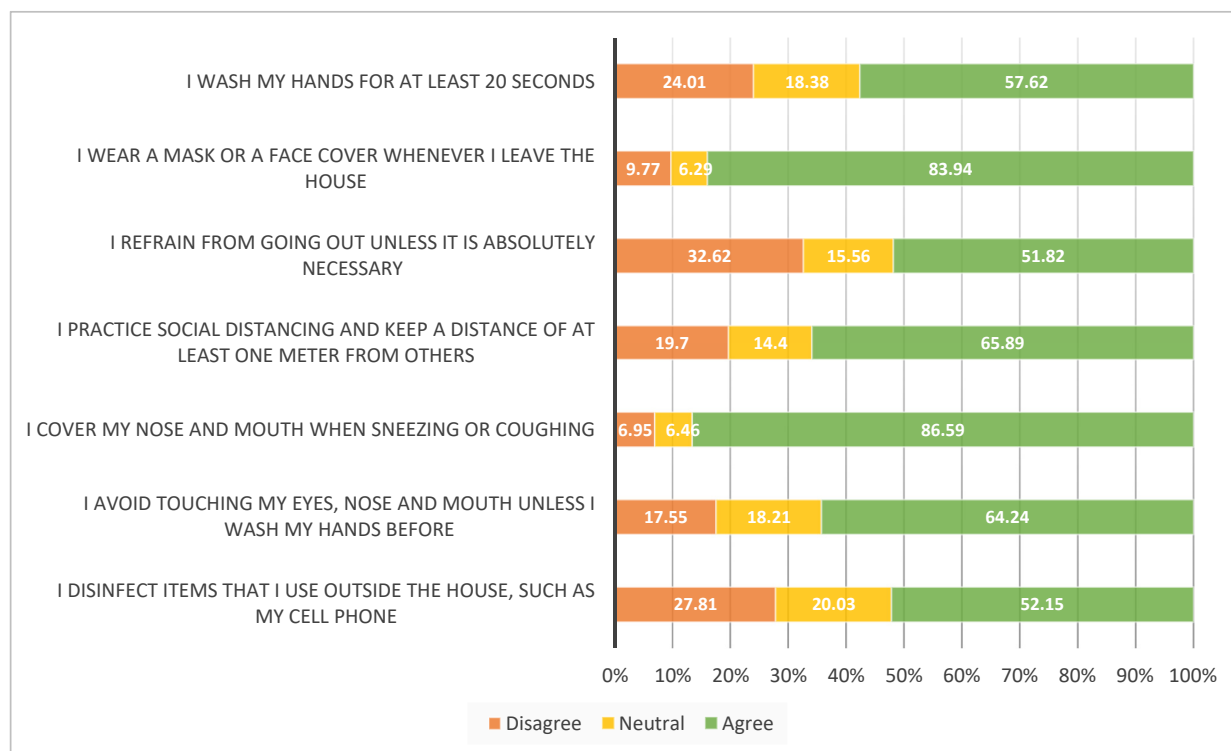


Figure 1. Frequency Analysis of COVID-19 preventive measures.

Table 3. Means of Vaccine Status and Motivations According to Demographics.

Demographics	VACC01 ¹	VACC02 ²	VACC03 ³	VACC04 ⁴	VACC05 ⁵
Gender					
Female	4.39	4.28	3.46	3.71	3.87
Male	4.09	4.14	3.59	3.79	3.9
Income					
Under \$25,000	4.27	4.19	3.64	3.8	3.87
\$25,000–\$49,999	4.29	4.26	3.62	3.96	3.84
\$50,000–\$74,999	4.22	4.08	3.54	3.77	3.98
\$75,000–\$99,999	4.25	4.28	3.41	3.59	3.81
\$100,000–\$124,999	4.24	4.32	3.84	3.72	4.4
\$125,000–\$149,999	4.08	4.08	3.67	3.23	4.23
\$150,000 or more	4.29	4.47	2.94	3.24	3.88
Prefer not to say	4.4	4.27	2.87	3.6	3.43
Region					
Asir	4.6	4.2	3	4	4
Eastern	4.16	4.06	3.58	3.54	3.88
Mecca	4.29	4.24	3.49	3.77	3.89
Medina	4.33	4.32	3.66	4.06	3.98
Riyadh	4.18	4.18	3.53	3.65	3.83
Age					
18–29	4.11	4.11	3.2	3.54	3.71
30–39	4.35	4.21	3.68	3.88	3.96
40–49	4.22	4.19	3.58	3.8	3.82
50–59	4.22	4.47	3.62	3.67	4.07
60 and above	4.71	4.5	3.43	3.64	4.25
Highest Educational Level					
High School or below	4.13	4.17	3.87	3.74	3.98
Bachelor's degree	4.33	4.2	3.38	3.7	3.86
Advanced degree	4.22	4.23	3.57	3.85	3.91
(master's/doctoral/professional degree)	4.21	4.35	3.44	3.58	3.7
Vocational/technical degree	4.21	4.35	3.44	3.58	3.7
Employment Status					
Employed for wages	4.26	4.27	3.58	3.75	3.96
Self-employed	4.09	4.13	3.6	3.81	3.68
Out of work and looking for work	4.42	4.16	3.42	3.85	3.93
Out of work but not currently looking for work	4	4.12	3.42	3.53	3.52
Homemaker	4.52	4.19	3.4	3.74	4.02
Retired	4.57	4.07	3.29	3.79	4
Student	4.27	4.22	3.2	3.62	3.76

¹ I have already been vaccinated against COVID-19, or I am planning to get the vaccination soon. ² I decided to get vaccinated so I can resume my usual pre-COVID-19 life as soon as possible. ³ I decided to get vaccinated because most of my family and friends are getting vaccinated. ⁴ I decided to get vaccinated because of the government's directives. ⁵ I decided to get vaccinated because of my own personal choice.

Figure 2 shows a basic frequency analysis of vaccine status and motivators for the COVID-19 vaccine. Similar to the frequency analysis reported above, each item was originally measured on a five-point scale, but for the purpose of this analysis, was divided into three groups: Group 1 ('Disagree'), constituting of all respondents who selected 'Strongly Disagree' or 'Disagree'; Group 2 ('Neutral'), including all respondents who selected 'Neither Agree nor Disagree'; Group 3 ('Agree'), constituting all respondents who responded with either 'Agree' or 'Strongly Agree'. The results show that 80.79% of the respondents have either already been vaccinated or are planning to get the vaccination soon. The main motivating factor to getting vaccinated for 77.48% of the respondents was so that they could resume their usual pre-COVID-19 life at the earliest possible time. The lowest motivator was the influence of family and friends getting vaccinated at 57.28%, which suggests that vaccine decisions are, to a large extent, determined by the personal

choices of individuals (68.54%). After personal choice, the role of government directives is also an important determinant at 63.25%.

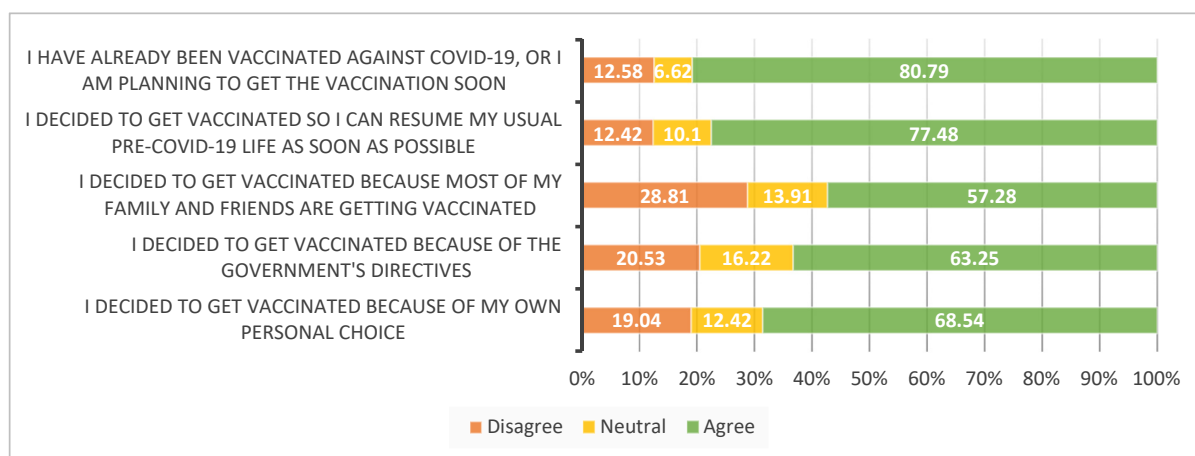


Figure 2. Frequency of Vaccine Status and Intentions.

4.2. Correlations

A Spearman rank correlation was performed between the variables in the study. As shown by Table 4, both novel items related to repetitive advice and instructions (RAI01) and expectations to adhere to the same instructions over continued periods of time (RAI02) have a statistically significant correlation (at the 0.001 level), with both Psychological Reactance as an overall scale ($r = 0.572$, $p \leq 0.001$ for RAI01; and $r = 0.587$, $p \leq 0.001$ for RAI02) and with the components of Psychological Reactance separately. The strongest correlation of both items was with the section on *resisting influence from others* (for RAI01: $r = 0.540$, $p \leq 0.001$; and for RAI02: $r = 0.548$, $p \leq 0.001$), while RAI01 has the strongest correlation with *emotional response toward restricted choice* ($r = 0.575$, $p \leq 0.001$).

Table 4. Spearman Rank Correlation between Psychological Reactance and Novel Items RAI01 and RAI02.

Constructs	Emotional Response toward Restricted Choice	Reactance to Compliance	Reactance to Advice and Recommendations	Resisting Influence from Others	Psychological Reactance
[RAI01] When I keep on receiving the same advice and recommendations continuously over a period of time, I become frustrated	0.575 **	0.414 **	0.218 **	0.540 **	0.572 **
[RAI02] When I am expected to follow the same instructions for a long period of time, I feel like doing the opposite	0.467 **	0.481 **	0.381 **	0.548 **	0.587 **

** Correlation is significant at the 0.01 level (2-tailed).

Table 5 presents the correlation between adherence to COVID-19 preventive measures and the overall Psychological Reactance scale, its four components separately, and the two novel items, RAI01 and RAI02. When measuring the correlation of the overall Psychological Reactance scale, a statistically significant correlation was shown with the item related to washing hands for at least 20 s ($r = 0.151$, $p \leq 0.001$). Emotional response toward restricted choice, however, shows a statistically significant correlation with washing hands for at least 20 s ($r = 0.127$, $p = 0.002$), wearing a mask or face covering outside the house ($r = 0.146$, $p \leq 0.001$), and covering mouth and nose when sneezing or coughing ($r = 0.141$, $p \leq 0.001$). There is also a correlation between washing hands for at least 20 s and

reactance to compliance ($r = 0.130, p \leq 0.001$), and resisting influence from others ($r = 0.188, p \leq 0.001$). Reactance to advice and recommendations, however, is correlated with five of the seven preventive measures: wearing a mask or face covering outside the house ($r = -0.152, p \leq 0.001$); refraining from going out unless necessary ($r = 0.104, p = 0.010$); covering mouth and nose when sneezing ($r = -0.88, p = 0.030$); avoiding touching the face until hands have been washed ($r = 0.89, p = 0.029$); disinfecting the items that are used outside the house ($r = 0.101, p \leq 0.013$). RAI01 was correlated with covering nose and mouth when sneezing ($r = 0.127, p = 0.002$), and RAI02 demonstrated a correlation with social distancing ($r = -0.131, p = 0.001$) and avoiding touching the face until hands have been washed ($r = -0.123, p = 0.003$).

Table 5. Spearman Rank Correlation between COVID-19 Preventive Measures, Psychological Reactance, RAI01 (repeated advice and instructions) and RAI02 (expectations to follow the same instructions for a long period of time).

Constructs	Emotional Response toward Restricted Choice	Reactance to Compliance	Reactance to Advice and Recommendations	Resisting Influence from Others	Psychological Reactance	RAI01	RAI02
I wash my hands for at least 20 s	0.127 **	0.130 **	0.037	0.188 **	0.151 **	0.022	0.038
I wear a mask or a face cover whenever I leave the house	0.146 **	−0.058	−0.152 **	0.061	0.022	0.128 **	0.041
I refrain from going out unless it is absolutely necessary	−0.041	0.060	0.104 *	0.055	0.038	−0.057	−0.029
I practice social distancing and keep a distance of at least one meter from others	−0.018	−0.019	0.044	−0.028	−0.026	−0.076	−0.131 **
I cover my nose and mouth when sneezing or coughing	0.141 **	−0.070	−0.088 *	0.075	0.035	0.127 **	−0.046
I avoid touching my eyes, nose, and mouth unless I wash my hands before	0.035	0.033	0.089 *	0.050	0.050	−0.057	−0.123 **
I disinfect items that I use outside the house, such as my cell phone	−0.018	0.065	0.101 *	0.023	0.028	−0.074	−0.057

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

Correlations between overall Psychological Reactance, its four components and RAI01 and RAI02 were also assessed with the COVID-19 vaccine intentions and motivations of the residents of Saudi Arabia (Table 6). The item measuring vaccination status and intent (“I have already been vaccinated against COVID-19, or I am planning to get the vaccination soon”) was correlated with emotional response toward restricted choice ($r = 0.192, p \leq 0.001$) and RAI01 ($r = 0.138, p \leq 0.001$). The item assessing the motivation to get vaccinated to resume pre-COVID-19 life demonstrated correlations with overall psychological reactance ($r = 0.118, p = 0.004$), as well as two of its components: emotional response toward restricted choice ($r = 0.228, p \leq 0.001$) and resisting influence from others ($r = 0.144, p \leq 0.001$) and RAI01 ($r = 0.201, p \leq 0.001$). The item assessing the role of personal choice in getting vaccinated was correlated with resisting influence from others ($r = 0.097, p = 0.017$). When looking at the impact of external factors, such as the role of government directives, this was correlated with emotional response toward restricted choice ($r = 0.134, p = 0.001$) and RAI02 ($r = 0.086, p = 0.036$). The influence of family and friends getting vaccinated demonstrated correlations with overall psychological reactance ($r = 0.177, p \leq 0.001$), as well as all four of its components: emotional response toward restricted choice ($r = 0.165, p \leq 0.001$); reactance to compliance ($r = 0.137, p \leq 0.001$); resisting influence from others ($r = 0.188, p \leq 0.001$) and reactance to advice and recommendations ($r = 0.104, p = 0.011$), and both items RAI01 ($r = 0.120, p = 0.003$) and RAI02 ($r = 0.144, p \leq 0.001$).

Table 6. Spearman Rank Correlation between COVID-19 Vaccine Intentions, Psychological Reactance, RAI01 (repeated advice and instructions) and RAI02 (expectations to follow the same instructions for a long period of time).

Constructs	Emotional Response toward Restricted Choice	Reactance to Compliance	Reactance to Advice and Recommendations	Resisting Influence from Others	Psychological Reactance	RAI01	RAI02
I have already been vaccinated against COVID-19, or I am planning to get the vaccination soon	0.192 **	−0.010	0.003	0.068	0.070	0.138 *	−0.034
I decided to get vaccinated so I can resume my usual pre-COVID-19 life as soon as possible	0.228 **	0.016	−0.012	0.144 **	0.118 **	0.201 **	0.077
I decided to get vaccinated because most of my family and friends are getting vaccinated	0.165 **	0.137 **	0.104 *	0.188 **	0.177 **	0.120 **	0.144 **
I decided to get vaccinated because of the government's directives	0.134 **	0.032	0.033	0.064	0.070	0.065	0.086 *
I decided to get vaccinated because of my own personal choice	0.064	0.069	−0.013	0.097 *	0.073	0.060	−0.024

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

4.3. Kruskal–Wallis H Test

In order to conduct the Kruskal–Wallis H test, the mean psychological reactance scores of all participants were divided into four percentile groups. The percentile groups were created at the 25%, 50%, 75% and 100% levels. These were constituted of 151 participants with the lowest psychological reactance scores in quartile 1 (Q1), 149 participants in quartile 2 (Q2), 150 participants in quartile 3 (Q3) and 154 participants with the highest scores in quartile 4 (Q4).

The Kruskal–Wallis H test provided statistically significant evidence ($p < 0.05$) of differences between the mean ranks for four of the preventive measures (Table 7). For the item stating ‘I wash my hands for at least 20 seconds’, there was very strong evidence of a difference ($p < 0.001$) between the mean ranks of at least one pair of groups. Dunn’s pairwise tests were carried out for the four pairs of groups. There was very strong evidence adjusted using the Bonferroni correction of differences between Q2 and Q4 ($p = 0.001$) and between Q1 and Q4 ($p = 0.046$). There was no evidence of a difference between the other pairs. For the preventive item stating ‘I refrain from going out unless it is absolutely necessary’, the Kruskal–Wallis H test provided strong evidence ($p = 0.002$) of a difference between the mean ranks of at least one pair of groups. Results of Dunn’s pairwise tests adjusted using the Bonferroni correction provided very strong evidence of a difference between Q3 and Q4 ($p = 0.002$). For the item ‘I practice social distancing and keep a distance of at least one meter from others’, there was evidence of a difference ($p = 0.017$), and post-hoc Dunn–Bonferroni results provided evidence of a difference between Q3 and Q4 ($p = 0.030$). For the item ‘I disinfect items that I use outside the house, such as my cell phone’, there was very strong evidence of a difference ($p < 0.001$) between the mean ranks of at least one pair of groups. The Dunn–Bonferroni results provided very strong evidence of differences between three pairs: Q3 and Q2 ($p = 0.011$); Q3 and Q1 ($p = 0.006$) and between Q3 and Q4 ($p = 0.000$). There was no evidence of a difference between the other pairs.

Table 7. Kruskal–Wallis H Test with Post-hoc: Psychological Reactance and Adherence to Preventive Measures.

Preventive Measures	Kruskal–Wallis H	Pairwise Quartiles	Test Statistic	p Value
I wash my hands for at least 20 s	H (3) = 16.558, $p \leq 0001$	Q2–Q1	23.948	1.000
		Q2–Q3	−46.605	0.102
		Q2–Q4	−75.543	0.001
		Q1–Q3	−22.658	1.000
		Q1–Q4	−51.595	0.046
		Q3–Q4	−28.937	0.812
I wear a mask or a face cover whenever I leave the house	H (3) = 5.051, $p = 0.168$			
I refrain from going out unless it is absolutely necessary	H (3) = 14.379, $p = 0.002$	Q3–Q2	20.538	1.000
		Q3–Q1	41.837	0.190
		Q3–Q4	−70.105	0.002
		Q2–Q1	21.300	1.000
		Q2–Q4	−49.567	0.064
		Q1–Q4	−28.267	0.864
I practice social distancing and keep a distance of at least one meter from others	H (3) = 10.220, $p = 0.017$	Q3–Q2	46.515	0.084
		Q3–Q1	47.605	1.070
		Q3–Q4	−52.729	0.030
		Q2–Q1	1.090	1.000
		Q2–Q4	−6.214	1.000
		Q1–Q4	−5.124	1.000
I cover my nose and mouth when sneezing or coughing	H (3) = 6.423, $p = 0.093$			
I avoid touching my eyes, nose, and mouth unless I wash my hands before	H (3) = 7.688, $p = 0.053$			
I disinfect items that I use outside the house, such as my cell phone	H (3) = 28.799, $p \leq 0.001$	Q3–Q2	60.897	0.011
		Q3–Q1	64.092	0.006
		Q3–Q4	−103.181	0.000
		Q2–Q1	3.195	1.000
		Q2–Q4	−42.284	0.179
		Q1–Q4	−39.090	0.263

The Kruskal–Wallis H test was also conducted on the vaccine status and motivations of the four quartiles of scores for psychological reactance. The test provided statistically significant evidence ($p \leq 0.05$) of differences between the mean ranks for four of the vaccine-related items (Table 8). The item stating ‘I have already been vaccinated against COVID-19, or I am planning to get the vaccination soon’ provided strong evidence of a difference between the mean ranks of at least one pair of groups ($p = 0.009$). Results of Dunn’s pairwise tests adjusted using the Bonferroni correction provided very strong evidence of a difference between Q3 and Q4 ($p = 0.006$). For the item ‘I decided to get vaccinated because most of my family and friends are getting vaccinated’, there was very strong evidence of a difference ($p \leq 0.001$) between the mean ranks of at least one pair of groups. The Dunn–Bonferroni results provided very strong evidence of differences between three pairs: Q1 and Q4 ($p = 0.003$); Q1 and Q3 ($p = 0.001$) and between Q2 and Q3 ($p = 0.024$). The Kruskal–Wallis test conducted on the item ‘I decided to get vaccinated because most of my family and friends are getting vaccinated’, provided evidence ($p = 0.042$) of a difference between the mean ranks of at least one pair of groups. Results of Dunn’s pairwise tests adjusted using the Bonferroni correction provided evidence of a difference between Q2 and Q4 ($p = 0.033$). For the last item, which stated ‘I decided to get vaccinated because of my own personal choice’, the Kruskal–Wallis test provided evidence of a difference between the mean ranks ($p = 0.048$); however, the Dunn–Bonferroni results did not show a difference between any of the pairs.

Table 8. Kruskal–Wallis H Test with Post-hoc: Psychological Reactance and Vaccine Status and Intentions.

Vaccine Status & Intentions	Kruskal–Wallis H	Pairwise Quartiles	Test Statistic	p Value
I have already been vaccinated against COVID-19, or I am planning to get the vaccination soon	H (3) = 11.631, $p = 0.009$	Q3–Q2	13.720	1.000
		Q3–Q1	21.296	1.000
		Q3–Q4	−54.810	0.006
		Q2–Q1	7.576	1.000
		Q2–Q4	−41.090	0.086
		Q1–Q4	−33.514	0.271
I decided to get vaccinated so I can resume my usual pre-COVID-19 life as soon as possible	H (3) = 7.324, $p = 0.062$			
I decided to get vaccinated because most of my family and friends are getting vaccinated	H (3) = 21.353, $p \leq 0.001$	Q1–Q2	−17.751	1.000
		Q1–Q4	−66.443	0.003
		Q1–Q3	−73.204	0.001
		Q2–Q4	−48.691	0.065
		Q2–Q3	−55.453	0.024
		Q4–Q3	6.762	1.000
I decided to get vaccinated because of the government’s directives	H (3) = 8.225, $p = 0.042$	Q2–Q3	−15.691	1.000
		Q2–Q1	21.056	1.000
		Q2–Q4	−52.985	0.033
		Q3–Q1	5.366	1.000
		Q3–Q4	−37.294	0.295
		Q1–Q4	−31.929	0.556
I decided to get vaccinated because of my own personal choice	H (3) = 7.918, $p = 0.048$	Q3–Q2	3.869	1.000
		Q3–Q1	9.040	1.000
		Q3–Q4	−46.224	0.077
		Q2–Q1	5.171	1.000
		Q2–Q4	−42.355	0.137
		Q1–Q4	−37.184	0.270

In addition, the authors wanted to assess the impact of the two novel items related to repetitive advice and instructions (RAI01) and expectations to adhere to the same instructions over continued periods of time (RAI02) on psychological reactance. The Kruskal–Wallis H test provided strong evidence of a difference between the mean ranks of at least one pair of groups for both the items: $p = 0.000$ for RAI01 and $p = 0.000$ for RAI02. Results of Dunn’s pairwise tests adjusted using the Bonferroni correction provided very strong evidence of a difference between all pairs for both items (Table 9).

Table 9. Kruskal–Wallis H Test with Post-hoc: Psychological Reactance and RAI01 (repeated advice and instructions) and RAI02 (expectations to follow the same instructions for a long period of time).

Repeated Advice and Instructions	Kruskal–Wallis H	Pairwise Quartiles	Test Statistic	p Value
When I keep on receiving the same advice and recommendations continuously over a period of time, I become frustrated	H (3) = 176.302, $p = 0.000$	Q1–Q2	−79.141	0.000
		Q1–Q3	−173.580	0.000
		Q1–Q4	−240.760	0.000
		Q2–Q3	−94.439	0.000
		Q2–Q4	−161.619	0.000
		Q3–Q4	−67.180	0.003
When I am expected to follow the same instructions for a long period of time, I feel like doing the opposite	H (3) = 178.603, $p = 0.000$	Q1–Q2	−73.806	0.001
		Q1–Q3	−151.332	0.000
		Q1–Q4	−248.774	0.000
		Q2–Q3	−77.526	0.001
		Q2–Q4	−174.968	0.000
		Q3–Q4	−97.442	0.000

In order to conduct the Kruskal–Wallis H test, the means of all participants for the two items were divided into four percentile groups. The percentile groups were created at the 25%, 50%, 75% and 100% levels. For RAI01, these were constituted of 160 participants with the lowest means in quartile 1 (Q1), 144 participants in quartile 2 (Q2), 123 participants in quartile 3 (Q3) and 177 participants with the highest means in quartile 4 (Q4). For RAI02, these were constituted of 125 participants with the lowest means in quartile 1 (Q1), 110 participants in quartile 2 (Q2), 250 participants in quartile 3 (Q3) and 119 participants with the highest means in quartile 4 (Q4).

While conducting the Kruskal–Wallis H test for RAI01 and preventive measures, strong evidence of differences were provided for the following items: ‘I wear a mask or a face covering whenever I leave the house’ ($p = 0.007$); ‘I refrain from going out unless it is absolutely necessary’ ($p = 0.024$), and ‘I cover my nose and mouth when sneezing and coughing’ ($p = 0.008$). The post-hoc Dunn pairwise tests adjusted with the Bonferroni correction are presented in Table 10.

Table 10. Kruskal–Wallis H Test with Post-hoc: RAI01 (repetitive advice and instructions) and Adherence to Preventive Measures.

Preventive Measures	Kruskal–Wallis H	Pairwise Quartiles	Test Statistic	<i>p</i> Value
I wash my hands for at least 20 s	H (3) = 1.165, $p = 0.761$			
		Q1–Q3	−13.644	1.000
		Q1–Q2	−21.945	1.000
I wear a mask or a face cover whenever I leave the house	H (3) = 12.010, $p = 0.007$	Q1–Q4	−51.545	0.005
		Q3–Q2	8.301	1.000
		Q3–Q4	−37.901	0.134
		Q2–Q4	−29.600	0.372
I refrain from going out unless it is absolutely necessary	H (3) = 9.484, $p = 0.024$	Q4–Q1	22.114	1.000
		Q4–Q3	31.219	0.692
		Q4–Q2	57.747	0.014
		Q1–Q3	−9.105	1.000
		Q1–Q2	−35.633	0.398
		Q3–Q2	26.528	1.000
I practice social distancing and keep a distance of at least one meter from others	H (3) = 4.228, $p = 0.238$			
		Q2–Q1	7.123	1.000
		Q2–Q3	−22.479	1.000
I cover my nose and mouth when sneezing or coughing	H (3) = 11.804, $p = 0.008$	Q2–Q4	−50.181	0.012
		Q1–Q3	−15.356	1.000
		Q1–Q4	−43.058	0.037
		Q3–Q4	−27.702	0.610
I avoid touching my eyes, nose, and mouth unless I wash my hands before	H (3) = 2.970, $p = 0.396$			
I disinfect items that I use outside the house, such as my cell phone	H (3) = 4.343, $p = 0.227$			

The Kruskal–Wallis H test for RAI01 and vaccine status and motivations also provided very strong evidence of differences in means for three of the items: ‘I have already been vaccinated against COVID-19, or I am planning to get the vaccination soon’ ($p = 0.009$); ‘I decided to get vaccinated so I can resume my usual pre-COVID-19 life as soon as possible’ ($p \leq 0.001$), and ‘I decided to get vaccinated because most of my family and friends are getting vaccinated’ ($p \leq 0.001$). The post-hoc Dunn–Bonferroni results are provided in Table 11.

Table 11. Kruskal–Wallis H Test with Post-hoc: RAI01 (repeated advice and instructions) and Vaccination Status and Intentions.

Vaccine Status & Intentions	Kruskal–Wallis H	Pairwise Quartiles	Test Statistic	p Value
I have already been vaccinated against COVID-19, or I am planning to get the vaccination soon	H (3) = 11.462, $p = 0.009$	Q1–Q2	−32.499	0.317
		Q1–Q3	−47.344	0.041
		Q1–Q4	−49.132	0.012
		Q2–Q3	−14.845	1.000
		Q2–Q4	−16.633	1.000
		Q3–Q4	−1.788	1.000
I decided to get vaccinated so I can resume my usual pre-COVID-19 life as soon as possible	H (3) = 23.780, $p \leq 0.001$	Q1–Q2	−19.092	1.000
		Q1–Q3	−48.239	0.039
		Q1–Q4	−73.760	0.000
		Q2–Q3	−29.148	0.643
		Q2–Q4	−54.669	0.006
		Q3–Q4	−25.521	0.844
I decided to get vaccinated because most of my family and friends are getting vaccinated	H (3) = 20.071, $p \leq 0.001$	Q3–Q2	13.272	1.000
		Q3–Q1	20.698	1.000
		Q3–Q4	−77.185	0.000
		Q2–Q1	7.427	1.000
		Q2–Q4	−63.913	0.004
		Q1–Q4	−56.486	0.011
I decided to get vaccinated because of the government's directives	H (3) = 2.775, $p = 0.428$			
I decided to get vaccinated because of my own personal choice	H (3) = 5.454, $p = 0.141$			

Table 12 presents the Kruskal–Wallis H test and the post-hoc Dunn–Bonferroni results for RAI02 and adherence to preventive measures. The Kruskal–Wallis H test demonstrated very strong evidence of differences in means for two of the preventive measures ‘I practice social distancing and keep a distance of at least one meter from others’ ($p \leq 0.001$), and ‘I avoid touching my eyes, nose, and mouth unless I wash my hands before’ ($p = 0.007$). Table 13 provides the Kruskal–Wallis H test along with the post-hoc Dunn–Bonferroni results for RAI02 and vaccine status and motivations. While the Kruskal–Wallis H test showed evidence of a difference in means for the item ‘I decided to get vaccinated so I can resume my usual pre-COVID-19 life as soon as possible’, the post-hoc tests did not show a difference between the pairs. For the item ‘I decided to get vaccinated because most of my family and friends are getting vaccinated’, the Kruskal–Wallis test demonstrated very strong evidence of differences in means for at least one group ($p \leq 0.001$). Dunn’s pairwise tests adjusted using the Bonferroni correction demonstrated very strong evidence of a difference in means between the following pairs: Q2 and Q4 ($p = 0.000$); Q3 and Q1 ($p = 0.000$) and between Q1 and Q3 ($p = 0.001$).

Table 12. Kruskal–Wallis H Test with Post-hoc: RAI02 (expectations to follow the same instructions for a long period of time) and Adherence to Preventive Measures.

Preventive Measures	Kruskal–Wallis H	Pairwise Quartiles	Test Statistic	p Value
I wash my hands for at least 20 s	H (3) = 0.864, $p = 0.834$			
I wear a mask or a face cover whenever I leave the house	H (3) = 1.270, $p = 0.736$			
I refrain from going out unless it is absolutely necessary	H (3) = 6.071, $p = 0.108$			
I practice social distancing and keep a distance of at least one meter from others	H (3) = 19.843, $p \leq 0.001$	Q4–Q2	45.111	0.223
		Q4–Q3	63.998	0.003
		Q4–Q1	88.828	0.000
		Q2–Q3	−18.887	1.000
		Q2–Q1	43.717	0.247
		Q3–Q1	24.830	0.997
I cover my nose and mouth when sneezing or coughing	H (3) = 2.938, $p = 0.401$			
I avoid touching my eyes, nose, and mouth unless I wash my hands before	H (3) = 11.975, $p = 0.007$	Q4–Q3	36.566	0.275
		Q4–Q2	38.451	0.462
		Q4–Q1	72.830	0.003
		Q3–Q2	1.885	1.000
		Q3–Q1	36.264	0.264
		Q2–Q1	34.379	0.658
I disinfect items that I use outside the house, such as my cell phone	H (3) = 7.634, $p = 0.054$			

Table 13. Kruskal–Wallis H Test with Post-hoc: RAI02 and Vaccination Status and Intentions.

Vaccine Status & Intentions	Kruskal–Wallis H	Pairwise Quartiles	Test Statistic	p Value
I have already been vaccinated against COVID-19, or I am planning to get the vaccination soon	H (3) = 3.982, $p = 0.263$			
I decided to get vaccinated so I can resume my usual pre-COVID-19 life as soon as possible	H (3) = 8.432, $p = 0.038$	Q2–Q1	6.835	1.000
		Q2–Q3	−8.690	1.000
		Q2–Q4	−49.334	0.068
		Q1–Q3	−1.855	1.000
		Q1–Q4	−42.499	0.148
		Q3–Q4	−40.644	0.080
I decided to get vaccinated because most of my family and friends are getting vaccinated	H (3) = 27.777, $p \leq 0.001$	Q2–Q3	−13.376	1.000
		Q2–Q1	21.975	1.000
		Q2–Q4	−100.386	0.000
		Q3–Q1	8.599	1.000
		Q3–Q4	−87.010	0.000
		Q1–Q4	−78.411	0.001
I decided to get vaccinated because of the government's directives	H (3) = 3.591, $p = 0.309$			
I decided to get vaccinated because of my own personal choice	H (3) = 1.611, $p = 0.657$			

5. Discussion

This paper set out to examine the impact that psychological reactance has on the adherence-related behavior and vaccine motivations of the residents of Saudi Arabia.

The Kruskal–Wallis H test demonstrates that psychological reactance does have an impact on the compliance of respondents to the COVID-19 preventive measures, especially with washing hands for at least 20 s, refraining from going out unless absolutely necessary,

practicing social distancing and disinfecting items used outside the house. The frequency analysis results report that 83.94% of the people surveyed wear a mask or face covering whenever they leave the house. This rate is lower than the rate identified by [23] in their study in Korea, where 98.6% of the respondents wore face masks; however, it is higher than previous studies conducted, where 59.9% of individuals wore masks during the influenza pandemic in Australia in 2008, and 75.8% wore masks during the SARS outbreak in 2003 in Hong Kong [61]. The result is more closely aligned with the results from a study in the United States and Canada, which found that 84% of their sample wore masks because of COVID-19 [39]. The results show that while the majority of respondents are complying with all preventive measures, there is still a significant percentage of respondents that need to increase their compliance with some measures. It may be argued that disinfecting items used outside the house is not a governmental suggestion, therefore, such measures have lower levels of compliance, as highlighted in another study [23]; however, the remaining items, such as washing hands for at least 20 s, refraining from going out unless necessary and social distancing are all governmental recommendations. Another explanation could be that the time duration that people have had to follow these preventive measures (over one year) has negatively affected their motivations to comply. The availability of the COVID-19 vaccine may also have had an influence on adherence to preventive behaviors, possibly resulting in vaccinated individuals relaxing their levels of compliance.

Psychological reactance was also a contributing factor when assessing the vaccine status and motivations of the respondents. The Kruskal–Wallis H test highlighted that the impact of psychological reactance was high on whether participants have already been vaccinated or are planning to get vaccinated soon, and on the intention to get vaccinated because of the influence of friends and family. Other intentions also showing an impact were getting vaccinated due to the government's directives, and due to one's own personal choice. In addition, the frequency analysis results show that 80.79% of the respondents have either already been vaccinated or are planning to get the vaccination soon. This contrasts with the research reported earlier, where only 2.1% of respondents had received the vaccine, 20.3% had registered for it, and 46.7% stated that they would only take the vaccine if it became mandatory [44]. A possible explanation for this could be that the research was conducted soon after the COVID-19 vaccine became available and people were not sure of its efficacy and safety, with its side effects unknown. However, this research, conducted over 6 months after the availability of the vaccine, has allowed citizens to put to rest their concerns regarding the safety of the vaccine. In addition, seeing the efforts of governments worldwide in getting their citizens vaccinated may also have been a contributing factor. Another plausible motivating factor could also be the response to the second item in the figure, where 77.48% of the respondents decided to get vaccinated so that they could resume their usual pre-COVID-19 life at the earliest possible time. The lowest motivator was the influence of family and friends getting vaccinated, at 57.28%, which suggests that vaccine decisions are, to a large extent, determined by the choices of individuals (68.54%).

A possible reason for the residents of Saudi Arabia to report compliance with COVID-19 preventive measures and positive vaccine intentions could be due to cultural tightness, which results in norms being strictly followed and there is little tolerance for deviance. A study found that higher levels of cultural tightness and government efficiency had lower mortality rates, when contrasted with countries where both factors were either not present or only one was present [62]. It is also stated that people in countries with cultural tightness may be more willing to comply with norms that would be seen as cooperative, such as physical distancing [63]. Researchers argue that this is not the case in countries with *cultural looseness*, where citizens have weaker social norms and there is high tolerance for deviant behavior, as citizens expect governments to justify any action that could take away their individual and social freedoms [7]. In Saudi Arabia, the government has been very meticulous in ensuring that it puts in place rules and guidelines for COVID-19 prevention, and equally diligent in following up on their compliance. As mentioned in the contextual information, Saudi Arabia has imposed monetary fines that non-complying

individuals and establishments face, in addition to possible prison sentences and the shutting-down of premises; security services have been tasked with identifying and dealing with any violations.

The findings indicate that psychological reactance is associated with key COVID-19 preventive measures and vaccine status and motivations. The results are similar to studies conducted earlier in the United States and Canada [38,39], which demonstrate that a significant proportion of the population are adhering to the COVID-19 preventive measures. However, in the subset of the population that are not fully compliant, psychological reactance does have a role in influencing behavior. This necessitates taking into account prior research that demonstrates that the level of psychological reactance may be decreased through the use of messages that are implicit and autonomy-supporting, rather than those that are explicit and commanding [33].

One study, however, found individuals with higher trait reactance to also have lower COVID-19 knowledge [38]. While knowledge was not assessed in this study, the authors referred to a study in Saudi Arabia, which was constituted of 3,388 participants and found that most respondents were knowledgeable about COVID-19, achieving a mean score of 81.64% in the knowledge questionnaire [43]. They also referred to previous studies, which also demonstrated satisfactory levels of knowledge across Saudi Arabia for previous epidemics, such as the MERS-coronavirus [64,65].

Another finding of this study is that receiving the same advice and recommendations over a long period of time, as well as being expected to follow the same instructions for a long period of time, plays a role in triggering psychological reactance. In addition, this is also linked to the level of compliance with COVID-19 preventive measures, as well as, to some extent, with vaccine intentions. Currently, the Hong Psychological Reactance Scale [57] does not look at the role of repeated instructions or a longer period of expected compliance as triggers of psychological reactance. This is an area that may be of interest to future researchers, and may potentially result in a revision of the scale.

The findings in this study are subject to several limitations. First, the use of an online data collection method limited the participants to individuals who are digitally literate, and did not allow the use of the random sampling method when selecting respondents. As a result, not all regions of Saudi Arabia were represented in this study, and individuals between the ages of 18–39 constituted 58.3% of the sample. Additionally, using the snow-balling method of sampling may have limited the variety of opinions in the study sample.

6. Conclusions

Similar to the Spanish Flu pandemic, the current COVID-19 pandemic is panning out to be a long-term situation. Dealing with this pandemic successfully requires long-term and sustained effort on the part of citizens, by complying with COVID-19 preventive measures and getting vaccinated. Therefore, how individuals respond to COVID-19 advice, guidelines and regulations is an important determinant in facing the pandemic.

Governments need to revisit their public health messages to ensure that they are implicit and autonomy-supporting, so that the triggering of psychological reactance may be minimized as far as possible. In addition, it is to be noted that messages that could convince one person may not be persuasive for another; therefore, governments need to take their citizens' varying personality and psychological characteristics into account when designing public health messages.

Author Contributions: Conceptualization, R.B. and K.S.; Formal analysis, R.B. and K.S.; Investigation, R.B. and K.S.; Methodology, R.B. and K.S.; Project administration, K.S.; Validation, K.S.; Writing—original draft, R.B.; Writing—review & editing, R.B. and K.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of Dar Al-Hekma University (RC/2021/002 on 21 March 2021).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The authors confirm that the data supporting the findings of this study are available within the article. Other data that support the findings of this study are available from the corresponding author (Rabia Bokhari) upon request.

Conflicts of Interest: The authors declare no conflict of interest.

Permissions: Hong and Faedda, Refinement of the Hong Psychological Reactance Scale, Educational and Psychological Measurement (56, 1) pp. 173–182. Copyright © 2022 by Hong and Faedda. Scale used in study with the permission of SAGE Publications, Inc.

References

1. Soper, G.A. The Lessons of the Pandemic. *Science* **1919**, *49*, 501–506. [CrossRef] [PubMed]
2. Van Bavel, J.J.; Baicker, K.; Boggio, P.S.; Capraro, V.; Cichocka, A.; Cikara, M.; Crockett, M.J.; Crum, A.J.; Douglas, K.M.; Druckman, J.N.; et al. Using Social and Behavioural Science to Support COVID-19 Pandemic Response. *Nat. Hum. Behav.* **2020**, *4*, 460–471. [CrossRef] [PubMed]
3. Nofal, A.M.; Cacciotti, G.; Lee, N. Who Complies with COVID-19 Transmission Mitigation Behavioral Guidelines? *PLoS ONE* **2020**, *15*, e0240396. [CrossRef]
4. While, A. Will Life Ever Be the Same Again? *Br. J. Community Nurs.* **2020**, *25*, 362. [CrossRef] [PubMed]
5. CDC. How to Protect Yourself & Others. Available online: <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html> (accessed on 5 May 2021).
6. Wiest, B. The Psychological Reason Why Some People Aren't Following COVID-19 Quarantine Orders. Available online: <https://www.forbes.com/sites/briannawiest/2020/04/08/the-psychological-reason-why-some-people-arent-following-covid-19-quarantine-orders/?sh=4abdef4b6905> (accessed on 31 March 2021).
7. Al-Hasan, A.; Yim, D.; Khuntia, J. Citizens' Adherence to COVID-19 Mitigation Recommendations by the Government: A 3-Country Comparative Evaluation Using Web-Based Cross-Sectional Survey Data. *J. Med. Internet Res.* **2020**, *22*, e20634. [CrossRef] [PubMed]
8. Clark, C.; Davila, A.; Regis, M.; Kraus, S. Predictors of COVID-19 Voluntary Compliance Behaviors: An International Investigation. *Glob. Transit.* **2020**, *2*, 76–82. [CrossRef] [PubMed]
9. DeFranza, D.; Lindow, M.; Harrison, K.; Mishra, A.; Mishra, H. Religion and Reactance to COVID-19 Mitigation Guidelines. *Am. Psychol.* **2021**, *76*, 744–754. [CrossRef]
10. Soveri, A.; Karlsson, L.C.; Antfolk, J.; Lindfelt, M.; Lewandowsky, S. Unwillingness to Engage in Behaviors That Protect against COVID-19: The Role of Conspiracy Beliefs, Trust, and Endorsement of Complementary and Alternative Medicine. *BMC Public Health* **2021**, *21*, 684. [CrossRef]
11. Weible, C.M.; Nohrstedt, D.; Cairney, P.; Carter, D.P.; Crow, D.A.; Durnová, A.P.; Heikkilä, T.; Ingold, K.; McConnell, A.; Stone, D. COVID-19 and the Policy Sciences: Initial Reactions and Perspectives. *Policy Sci.* **2020**, *53*, 1–17. [CrossRef]
12. Easton, M. Coronavirus: Do British People Still Accept the Lockdown? Available online: <https://www.bbc.com/news/uk-52495201> (accessed on 15 February 2021).
13. Marcus, J. The Dudes Who Won't Wear Masks. Available online: <https://www.theatlantic.com/ideas/archive/2020/06/dudes-who-wont-wear-masks/613375/> (accessed on 15 February 2021).
14. Andrew, S. The Psychology Behind Why Some People Won't Wear Masks. Available online: <https://edition.cnn.com/2020/05/06/health/why-people-dont-wear-masks-wellness-trnd/index.html> (accessed on 15 February 2021).
15. Buchwald, E. Why do so Many Americans Refuse to Wear Face Masks? Politics is Part of It—But only Part. Available online: <https://www.marketwatch.com/story/why-do-so-many-americans-refuse-to-wear-face-masks-it-may-have-nothing-to-do-with-politics-2020-06-16> (accessed on 15 February 2021).
16. Coustasse, A.; Kimble, C.; Maxik, K. COVID-19 and Vaccine Hesitancy: A Challenge the United States Must Overcome. *J. Ambul. Care Manag.* **2021**, *44*, 71–75. [CrossRef]
17. Detoc, M.; Bruel, S.; Frappe, P.; Tardy, B.; Botelho-Nevers, E.; Gagneux-Brunon, A. Intention to Participate in a COVID-19 Vaccine Clinical Trial and to Get Vaccinated against COVID-19 in France during the Pandemic. *Vaccine* **2020**, *38*, 7002–7006. [CrossRef] [PubMed]
18. Karlsson, L.C.; Soveri, A.; Lewandowsky, S.; Karlsson, L.; Karlsson, H.; Nölvi, S.; Karukivi, M.; Lindfelt, M.; Antfolk, J. Fearing the Disease or the Vaccine: The Case of COVID-19. *Pers. Individ. Differ.* **2021**, *172*, 110590. [CrossRef] [PubMed]
19. Lazarus, J.V.; Ratzan, S.C.; Palayew, A.; Gostin, L.O.; Larson, H.J.; Rabin, K.; Kimball, S.; El-Mohandes, A. A Global Survey of Potential Acceptance of a COVID-19 Vaccine. *Nat. Med.* **2021**, *27*, 225–228. [CrossRef] [PubMed]
20. Roozenbeek, J.; Schneider, C.R.; Dryhurst, S.; Kerr, J.; Freeman, A.L.J.; Recchia, G.; van der Bles, A.M.; van der Linden, S. Susceptibility to Misinformation about COVID-19 around the World. *R. Soc. Open Sci.* **2020**, *7*, 201199. [CrossRef]

21. Teovanović, P.; Lukić, P.; Zupan, Z.; Lazić, A.; Ninković, M.; Žeželj, I. Irrational Beliefs Differentially Predict Adherence to Guidelines and Pseudoscientific Practices during the COVID-19 Pandemic. *Appl. Cogn. Psychol.* **2020**, *35*, 486–496. [CrossRef]
22. Tracking SARS-CoV-2 Variants. Available online: <https://www.who.int/en/activities/tracking-SARS-CoV-2-variants/> (accessed on 31 May 2021).
23. Kim, S.; Kim, S. Analysis of the Impact of Health Beliefs and Resource Factors on Preventive Behaviors against the COVID-19 Pandemic. *Int. J. Environ. Res. Public Health* **2020**, *17*, 8666. [CrossRef]
24. Shahnazi, H.; Ahmadi-Livani, M.; Pahlavanzadeh, B.; Rajabi, A.; Hamrah, M.S.; Charkazi, A. Assessing Preventive Health Behaviors from COVID-19: A Cross Sectional Study with Health Belief Model in Golestan Province, Northern of Iran. *Infect. Dis. Poverty* **2020**, *9*, 157. [CrossRef]
25. Ahorsu, D.K.; Lin, C.-Y.; Imani, V.; Saffari, M.; Griffiths, M.D.; Pakpour, A.H. The Fear of COVID-19 Scale: Development and Initial Validation. *Int. J. Ment. Health Addict.* **2020**, 1–9. [CrossRef]
26. Blagov, P.S. Adaptive and Dark Personality in the COVID-19 Pandemic: Predicting Health-Behavior Endorsement and the Appeal of Public-Health Messages. *Soc. Psychol. Personal. Sci.* **2021**, *12*, 697–707. [CrossRef]
27. Miguel, F.K.; Machado, G.M.; Pianowski, G.; de Francisco Carvalho, L. Compliance with Containment Measures to the COVID-19 Pandemic over Time: Do Antisocial Traits Matter? *Pers. Individ. Differ.* **2021**, *168*, 110346. [CrossRef]
28. Nowak, B.; Brzóska, P.; Piotrowski, J.; Sedikides, C.; Żemojtel-Piotrowska, M.; Jonason, P.K. Adaptive and Maladaptive Behavior during the COVID-19 Pandemic: The Roles of Dark Triad Traits, Collective Narcissism, and Health Beliefs. *Pers. Individ. Differ.* **2020**, *167*, 110232. [CrossRef] [PubMed]
29. Zajenkowski, M.; Jonason, P.K.; Leniarska, M.; Kozakiewicz, Z. Who Complies with the Restrictions to Reduce the Spread of COVID-19? Personality and Perceptions of the COVID-19 Situation. *Pers. Individ. Differ.* **2020**, *166*, 110199. [CrossRef] [PubMed]
30. Brehm, J.W. *Theory of Psychological Reactance*; Academic Press: San Diego, CA, USA, 1966.
31. Brehm, S.S.; Brehm, J.W. *Psychological Reactance: A Theory of Freedom and Control*; Academic Press: San Diego, CA, USA, 1981.
32. Rains, S.A. The Nature of Psychological Reactance Revisited: A Meta-Analytic Review. *Hum. Commun. Res.* **2013**, *39*, 47–73. [CrossRef]
33. Miller, R.L. Mere Exposure, Psychological Reactance and Attitude Change. *Public Opin. Q.* **1976**, *40*, 229. [CrossRef]
34. Quick, B.L.; Stephenson, M.T. Examining the Role of Trait Reactance and Sensation Seeking on Perceived Threat, State Reactance, and Reactance Restoration. *Hum. Commun. Res.* **2008**, *34*, 448–476. [CrossRef]
35. Chartrand, T.L.; Dalton, A.N.; Fitzsimons, G.J. Nonconscious Relationship Reactance: When Significant Others Prime Opposing Goals. *J. Exp. Soc. Psychol.* **2007**, *43*, 719–726. [CrossRef]
36. Dillard, J.P.; Shen, L. On the Nature of Reactance and Its Role in Persuasive Health Communication. *Commun. Monogr.* **2005**, *72*, 144–168. [CrossRef]
37. Ball, H.; Wozniak, T.R. Why Do Some Americans Resist COVID-19 Prevention Behavior? An Analysis of Issue Importance, Message Fatigue, and Reactance Regarding COVID-19 Messaging. *Health Commun.* **2021**, 1–8. [CrossRef]
38. Resnicow, K.; Bacon, E.; Yang, P.; Hawley, S.; Van Horn, M.L.; An, L. Novel Predictors of COVID-19 Protective Behaviors among US Adults: Cross-Sectional Survey. *J. Med. Internet Res.* **2021**, *23*, e23488. [CrossRef]
39. Taylor, S.; Asmundson, G.J.G. Negative Attitudes about Facemasks during the COVID-19 Pandemic: The Dual Importance of Perceived Ineffectiveness and Psychological Reactance. *PLoS ONE* **2021**, *16*, e0246317. [CrossRef]
40. Hornsey, M.J.; Harris, E.A.; Fielding, K.S. The Psychological Roots of Anti-Vaccination Attitudes: A 24-Nation Investigation. *Health Psychol.* **2018**, *37*, 307–315. [CrossRef] [PubMed]
41. Soveri, A.; Karlsson, L.C.; Mäki, O.; Antfolk, J.; Waris, O.; Karlsson, H.; Karlsson, L.; Lindfelt, M.; Lewandowsky, S. Trait Reactance and Trust in Doctors as Predictors of Vaccination Behavior, Vaccine Attitudes, and Use of Complementary and Alternative Medicine in Parents of Young Children. *PLoS ONE* **2020**, *15*, e0236527. [CrossRef] [PubMed]
42. Report 12: People Are No Longer Motivated. Available online: <https://motivationbarometer.com/en/portfolio-item/12-bevolking-is-niet-meer-gemotiveerd/> (accessed on 17 May 2021).
43. Al-Hanawi, M.K.; Angawi, K.; Alshareef, N.; Qattan, A.M.N.; Helmy, H.Z.; Abudawood, Y.; Alqurashi, M.; Kattan, W.M.; Kadasah, N.A.; Chirwa, G.C.; et al. Knowledge, Attitude and Practice toward COVID-19 among the Public in the Kingdom of Saudi Arabia: A Cross-Sectional Study. *Front. Public Health* **2020**, *8*, 217. [CrossRef]
44. Almaghaslah, D.; Alsayari, A.; Kandasamy, G.; Vasudevan, R. COVID-19 Vaccine Hesitancy among Young Adults in Saudi Arabia: A Cross-Sectional Web-Based Study. *Vaccines* **2021**, *9*, 330. [CrossRef] [PubMed]
45. Saudi Health Minister: COVID-19 Vaccines Will Be Available at Pharmacies for Free. Available online: <https://www.arabnews.com/node/1819076/saudi-arabia> (accessed on 4 April 2021).
46. Ministry of Health. Gatherings, Wrong Behaviors Contributed to Current COVID-19 Spike. Ministry of Health Saudi Arabia. Available online: <https://www.moh.gov.sa/en/Ministry/MediaCenter/News/Pages/News-2021-04-04-007.aspx> (accessed on 4 April 2021).
47. Magadmi, R.M.; Kamel, F.O. Beliefs and Barriers Associated with COVID-19 Vaccination among the General Population in Saudi Arabia. *BMC Public Health* **2021**, *21*, 1438. [CrossRef]
48. Al-Mohaithef, M.; Padhi, B.K. Determinants of COVID-19 Vaccine Acceptance in Saudi Arabia: A Web-Based National Survey. *J. Multidiscip. Healthc.* **2020**, *13*, 1657–1663. [CrossRef]

49. Barry, M.; Temsah, M.-H.; Alhuzaimi, A.; Alamro, N.; Al-Eyadhy, A.; Aljamaan, F.; Saddik, B.; Alhaboob, A.; Alsohime, F.; Alhasan, K.; et al. COVID-19 Vaccine Confidence and Hesitancy among Health Care Workers: A Cross-Sectional Survey from a MERS-CoV Experienced Nation. *PLoS ONE* **2021**, *16*, e0244415. [CrossRef]
50. Temsah, M.-H.; Barry, M.; Aljamaan, F.; Alhuzaimi, A.; Al-Eyadhy, A.; Saddik, B.; Alrabiaah, A.; Alsohime, F.; Alhaboob, A.; Alhasan, K.; et al. Adenovirus and RNA-Based COVID-19 Vaccines' Perceptions and Acceptance among Healthcare Workers in Saudi Arabia: A National Survey. *BMJ Open* **2021**, *11*, e048586. [CrossRef]
51. Saudi Arabia to Lift Travel Ban on May 17. Available online: <https://saudigazette.com.sa/article/606249> (accessed on 2 May 2021).
52. STATS General Authority for Statistics: The Kingdom of Saudi Arabia 2020. Available online: <https://www.stats.gov.sa/en/node> (accessed on 4 April 2021).
53. Sample Size Calculator by Raosoft, Inc. Available online: <http://www.raosoft.com/samplesize.html> (accessed on 28 March 2021).
54. Donnell, A.J.; Thomas, A.; Buboltz, W.C., Jr. Psychological Reactance: Factor Structure and Internal Consistency of the Questionnaire for the Measurement of Psychological Reactance. *J. Soc. Psychol.* **2001**, *141*, 679–687. [CrossRef]
55. Jonason, P.K.; Knowles, H.M. A Unidimensional Measure of Hong's Psychological Reactance Scale. *Psychol. Rep.* **2006**, *98*, 569–579. [CrossRef]
56. Hong, S.M.; Giannakopoulos, E.; Laing, D.; Williams, N.A. Psychological Reactance: Effects of Age and Gender. *J. Soc. Psychol.* **1994**, *134*, 223–228. [CrossRef] [PubMed]
57. Hong, S.-M.; Faedda, S. Refinement of the Hong Psychological Reactance Scale. *Educ. Psychol. Meas.* **1996**, *56*, 173–182. [CrossRef]
58. Hong, S.-M.; Page, S. A Psychological Reactance Scale: Development, Factor Structure and Reliability. *Psychol. Rep.* **1989**, *64* (Suppl. 3), 1323–1326. [CrossRef]
59. Shen, L.; Dillard, J.P. Psychometric Properties of the Hong Psychological Reactance Scale. *J. Pers. Assess.* **2005**, *85*, 74–81. [CrossRef]
60. George, D.; Mallery, P. *SPSS for Windows Step by Step: A Simple Guide and Reference 18.0 Update*, 11th ed.; Pearson: Upper Saddle River, NJ, USA, 2010.
61. Barr, M.; Raphael, B.; Taylor, M.; Stevens, G.; Jorm, L.; Giffin, M.; Lujic, S. Pandemic Influenza in Australia: Using Telephone Surveys to Measure Perceptions of Threat and Willingness to Comply. *BMC Infect. Dis.* **2008**, *8*, 1–14. [CrossRef]
62. Gelfand, M.J.; Jackson, J.C.; Pan, X.; Nau, D.; Pieper, D.; Denison, E.; Dagher, M.; Van Lange, P.A.M.; Chiu, C.-Y.; Wang, M. The Relationship between Cultural Tightness–Looseness and COVID-19 Cases and Deaths: A Global Analysis. *Lancet Planet. Health* **2021**, *5*, e135–e144. [CrossRef]
63. Porat, T.; Nyrup, R.; Calvo, R.A.; Paudyal, P.; Ford, E. Public Health and Risk Communication during COVID-19—Enhancing Psychological Needs to Promote Sustainable Behavior Change. *Front. Public Health* **2020**, *8*, 637. [CrossRef]
64. Al-Mohrej, O.A.; Al-Shirian, S.D.; Al-Otaibi, S.K.; Tamim, H.M.; Masuadi, E.M.; Fakhoury, H.M. Is the Saudi Public Aware of Middle East Respiratory Syndrome? *J. Infect. Public Health* **2016**, *9*, 259–266. [CrossRef]
65. ALdowyan, N.; Abdallah, A.S.; El-Gharabawy, R. Knowledge, Attitude and Practice (KAP) Study about Middle East Respiratory Syndrome Coronavirus (MERS-CoV) among Population in Saudi Arabia. *Int. Arch. Med.* **2017**, *10*. [CrossRef]