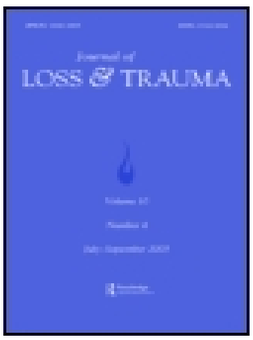

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Willingness to Vaccinate against COVID-19: The Role of Assumptions on the World's Orderliness and Positivity

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ABSTRACT

This research investigates why people refuse the COVID-19 vaccine despite medical argumentation and dangerousCOVID-19 consequences. As the global pandemic development is beyond each person's control, we predicted that two basic assumptions about the world, namely its order and positivity, would play an important role. Two studies on the Polish population took place in December 2020 and January 2021. The most interesting finding was that in both studies, belief in world orderliness negatively moderated, i.e., hampered, the positive relationship between belief in the world's positivity and willingness to vaccinate. It seems that the COVID-19 vaccination might evoke ia feeling of disruption in biological and social natural functioning. If we generalize, any idea undermining our habits and shared beliefs is the more challenged and opposed we have strong faith in the world as an ordered and predictable reality. Believing in the world's positivity may even aggregate this attitude. In discussing these results, we propose how to introduce new ideas or innovative products to consumers.

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KEY WORDS
COVID-19 pandemic; willingness to vaccinate; assumption on the world's orderliness and positivity; meaning in life; life satisfaction; consumer behavior; product innovations

Introduction

Perhaps counter-intuitively, peoples' willingness to have the COVID-19 vaccine has remained somewhat low in most countries. The present study aims to investigate personality factors that may influence peoples' general attitudes toward the COVID-19 vaccination and their decision to vaccinate.

The COVID-19 pandemic has invoked fear and uncertainty. People are growing increasingly concerned about the health and possible death of themselves and their loved ones, as well as their economic future. Governments and medical authorities have promoted the vaccination through various mediums, including the mass media, and the vaccine is

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free of charge. As such, the vaccine should be an obvious and desired solution for most people. However, among many, the vaccine arouses distrust and suspicion of conspiracy, as evidenced in online forums and the mass media. As a consequence, the willingness to vaccinate against COVID-19 was and is lower than initially expected by health experts and governments.

A global survey conducted in partnership with the World Economic Forum at the end of December 2020 and then repeated a month later showed a general worldwide increase in COVID-19 vaccination intent (Lacey, 2021). Nevertheless, the percentage of populations not willing to vaccinate remains disturbingly high. The first survey found that 62% of respondents in the U.S were strongly or somewhat ready to get the vaccine, whereas 38% were strongly or somewhat against it. Six weeks later, there was a 9% increase in readiness. In the French population, the willingness to be vaccinated was shown by only 38% of participants in December and 57% in January. Respondents in Germany showed only a 3% increase, from 65% to 68%. Italy and Brazil showed large increases in willingness to be vaccinated, from 52% to 80% and 68% to 88%, respectively. Russia continued to be one of the most hesitant countries, with the majority of the population (58%) still not willing to vaccinate, according to the second survey (a 3% increase in positive response).

These surveys raise the question of why so many people worldwide resist the COVID-19 vaccination. Furthermore, what is the psychological background for such an attitude? The present research focuses on a more specific question: how do personality factors, like general assumptions about the world, affect attitudes toward vaccination? We predicted that two basic assumptions about the world, namely its order and positivity (Janoff-Bulman, 1992; Trzebiński & Zięba, 2004), influence attitudes toward the pandemic and the willingness to vaccinate. These assumptions are usually expressed metaphorically at the individual and social levels, e.g., religious beliefs and ideologies. They are based on early social experiences, for instance, the predictability of early relationships with parents and the parents' empathy in nurturing the child's needs (Ainsworth & Bowlby, 1991; Bowlby, 1999; Bretherton, 1992). Like broken meaningful relationships, social experiences such as social exclusion, war, and environmental catastrophe may change their strength, either temporarily or permanently (Janoff-Bulman, 2006; Griskevicius et al., 2011).

Data show that strong assumptions of world order and positivity have various positive consequences. They facilitate positive expectations for the future, increase problem-solving behaviors, and enforce trust during social interactions. Furthermore, they positively correlate with openness to experience, readiness for altruistic behavior, and forgiveness for harm (Trzebiński & Zięba, 2013). Interestingly, they also influence the outcomes of major life

events. For example, they reduce the severity of posttraumatic consequences and are associated with posttraumatic growth and adaptive reactions in cases of irreversible loss and crucial life changes (Trzebiński & Zięba, 2004; Zięba et al., 2010, 2018).

Our previous research linked assumptions about the world's orderliness and positivity to participants' reactions to the sudden and unpredictable danger associated with the developing COVID-19 pandemic (Trzebiński et al., 2020). The strength of these assumptions and higher meaning in life and life satisfaction were negatively correlated with stress due to COVID-19 and state anxiety. Mediation analysis revealed that assumptions about world orderliness and positivity enforce the meaning in life and life satisfaction, which in turn reduce COVID-19 stress and general anxiety. Knowledge of how personality factors, like assumptions about the world, influence attitudes and decisions related to COVID-19 vaccination may help promote pro-healthy choices more efficiently. It may also help better understand people's reactions to ideas and products beyond their habits and shared opinions. Two studies were conducted to answer these questions.

Study 1 (December 2020)

The goals of Study 1 were to observe: (1) changes in assumptions about the world, meaning in life, and life satisfaction after the pandemic peak in late November 2020, (2) how these assumptions correlate with the meaning in life and life satisfaction, and (3) how these three factors affect attitudes toward the COVID-19 vaccination. In Poland, the study was conducted during the first half of December, just after the unexpected and high peak in new COVID-19 cases (GCDL, 2021, Reuters, 2021). At the time, the level of infection was still very high.

In December, the COVID-19 vaccine was discussed in the mass media for the first time as an incoming aid to Poles. These discussions included publicity of the first research results on the vaccines' efficacy and the first official positive recommendations. At that time, the breaking news elicited in many a long-awaited feeling of relief and hope for a brighter future. The possibility of global mass vaccination could finally mean returning to the pre-COVID normalcy, children going back to schools, business reopening, and regaining the freedom to meet with friends and travel. Nevertheless, the enthusiasm was not spread evenly throughout society, and the vaccine skeptics' voices could not be louder at that moment. It was speculated that the vaccine distribution was yet another way of the government imposing control over the masses, for example, by inserting microchips in peoples' bodies. Some also claimed that the vaccine could seriously endanger one's

health, possibly even leading to death. People worried about the vaccine's long-term side effects stemming from the fact that it had been developed within a relatively brief time (Dziermański, 2020).

We expected that a high and sudden worldwide increase in the COVID-19 infection rate would lower participants' assumptions in the world's orderliness and positivity and, subsequently, meaning in life and life satisfaction. Additionally, we expected a positive impact of these factors on vaccination attitudes. This expectation was based on the previously observed positive effects of those factors on lowering stress induced by the pandemic.

Method

Invitation to participate in the study was published on open-access forums on the Internet. By the middle of December 2020, 266 participants (76.7% females; $M_{age} = 30.25$, $SD = 7.63$) had been recruited.

The procedure was the same as in the study conducted in April 2020 and the October replication (Trzebiński et al., 2020) First participants were asked their gender, age, present place of residence, and education level. Next, we explained the study:

> We invite you to participate in a short, easy, and interesting study. The study addresses the emotions and thoughts evoked by the ongoing coronavirus pandemic and some more general beliefs. We are researchers from the SWPS University in Warsaw. The test takes about 10–15 minutes and consists of completing five short questionnaires. It is on the border of social psychology and sociology. Everyone who participates, if they want, will receive from us a report with the results and conclusions of the study. The survey is online and is fully anonymous. You can take part at any time. The test does not test knowledge and skills, and it only concerns your views and feelings. It's easy to do: you choose one answer from several options, the one that best suits your thoughts and feelings. Please choose deliberately and honestly.

Next, six scales were presented in random order: the Basic Hope Scale (BH), the Meaning in Life Scale (MIL), the Satisfaction with Life Scale (SWLS), the Perceived Vaccination Safety Scale, and a single item to measure willingness to vaccinate.

Two general world assumptions, its positivity and orderliness, were measured using the BH. It contained twelve statements (Trzebiński & Zięba, 2003; $\alpha = .882$) coded from 1 (strongly disagree) to 5 (strongly agree). Seven of these statements referred to the world's orderliness ($\alpha = .812$; e.g., "*The world is fair and sooner or later everyone will get what they deserve"),* and five referred to the world's positivity ($\alpha = .807$; e.g. "*There will always be some people who will help us in a misfortune*").

The MIL ($\alpha = .887$) included eight items from the Meaning in Life Questionnaire (MLQ; Steger et al., 2006), and the Orientation to Life Questionnaire (OLQ; Antonovsky, 1987), and contains statements such as "*My Life makes sense*" and "*I have my goals in life, and I am attached to them*," which are coded from 1 (definitely not fitting) to 5 (definitely matches).

The SWLS (Diener et al., 1985, $\alpha = .888$) included five 5-point items related to life satisfaction, for example, "*So far, I have managed to achieve what is important in my life,*" coded from 1 (strongly disagree) to 5 (strongly agree).

Perceived vaccination safety was measured with four 5-point items ($\alpha = .763$) designed for this study. The scale comprised the following items: "*To what extent is official information about the vaccine truthful*?" (1 – absolutely false, 5 – absolutely truthful); "*To what extent is information provided by the authorities about the vaccine manipulated?*" (1 – absolutely manipulated, 5 – absolutely honest); "*To what extent are the more severe negative effects of the vaccine foreseeable at this time?*" (1 – absolutely unforeseeable, 5 – absolutely foreseeable); "*To what extent do you agree that the vaccine producers are driven by their profits and not by people's health?*" (reversed) (1 – strongly disagree, 5 – strongly agree).

A single 5-point item measured willingness to vaccinate against COVID-19 ("*Do you want to get vaccinated against COVID-19?*" 1 – definitely not, 5 – definitely yes).

Results

The presented study used the same method (including sample design and measurements) as two previous studies: Trzebiński et al. (2020), conducted in April 2020, and its replication in October 2020, after 6 months of the

TABLE 1. Assumptions about the world, meaning in life, and life satisfaction levels across studies (April 2020–January 2021).

	April 2020[1] ($N = 317$) Mean	October 2020[2] ($N = 375$) Mean	Change vs. April 2020	December 2020 (Study 1, $N = 266$) Mean	Change vs. October 2020
BH –Orderliness	3.360	3.348	−.012	3.006	−.342***
BH – Positivity	3.415	3.408	−.007	2.983	−.425***
BH – Total	3.383	3.373	−.010	2.997	−.377***
MIL	3.485	3.629	.143*	3.394	−.235***
SWLS	4.155	4.345	.190*	4.190	−.155

Note. The BH Scale measures the assumptions regarding the world's orderliness and positivity.
Notes: BH: Basic Hope Scale; MIL: Meaning in Life; SWLS: Satisfaction with Life Scale.
*$p < .05$; ** $p < .01$; *** $p < .001$.
[1]The study was conducted in April 2020, using the same method as Study 1 and Study 2 (Trzebiński et al., 2020).
[2]The study was conducted in October 2020, using the same method as Study 1 and Study 2.

TABLE 2. Correlations (Pearson's *r*) of the measured variables (Study 1, December 2020, $N = 266$).

		1.	2.	3.	4.	5.	6.
1.	BH –Orderliness	…					
1.	BH – Positivity	.71***	…				
1.	BH – total	.95***	.90***	…			
1.	MIL	.47***	.51***	.52***	…		
1.	SWLS	.39***	.47***	.45***	.80***	…	
1.	VACCINT	−.11	−.01	−.07	.06	.12	…
1.	VACCSAF	−.05	.09	.01	.06	.15*	.75***

Note. The BH Scale measures the assumptions regarding the world's orderliness and positivity.
Notes: BH: Basic Hope Scale; MIL: Meaning in Life; SWLS: Satisfaction with Life Scale; VACCINT: Willingness to Vaccinate against COVID-19; VACCSAF: Perceived Vaccination Safety vs. Anxiety.
*$p < .05$; ** $p < .01$; *** $p < .001$.

pandemic. As shown in Table 1, the results are in line with expectations. After a significant peak of COVID-19 infections (December 2020), there was a substantial decrease in the strength of beliefs in the world's orderliness, positivity, and meaning in life compared to the first two measurements (April and October 2020).

Table 2 presents correlations between the measurements. As in April and October 2020, assumptions about the world, Meaning in Life, and Life satisfaction correlated positively. There were no significant correlations between assumptions on the world (total index and components, i.e., world's orderliness and positivity) and vaccination attitudes (willingness to vaccinate, $p > .2$ and perceived vaccination safety, $p > .7$). Similarly, meaning in life did not correlate with vaccination attitudes (all p values $> .08$). Only life satisfaction correlated slightly with willingness to vaccinate ($r = .16$, $p = .010$).

People may view the COVID-19 vaccine as an intrusion to bodily functions, considering it too new to be verified and introduced into a body already potentially in distress. It results in ambivalence, distrust, and often objections against the vaccine. We hypothesized that the impact of the assumed world's positivity might differ across the world's orderliness levels in such a case. If somebody believes firmly in the ordered world and believes also that the vaccine is the intrusion against that order, it may make them less willing to vaccinate. The more positive the world seems to be, the stronger this attitude since "if the world is good, there is no need to such vaccinate".

On the other hand, if the belief in the world's orderliness is not firm, the level of the world's positivity plays a more dominant role. The belief in world positivity should prompt us to vaccinate, even if it is new and even somehow risky. We expected, therefore, that an increase in assumed world positivity would enforce participants' willingness to vaccinate but only when the assumed world orderliness was not high.

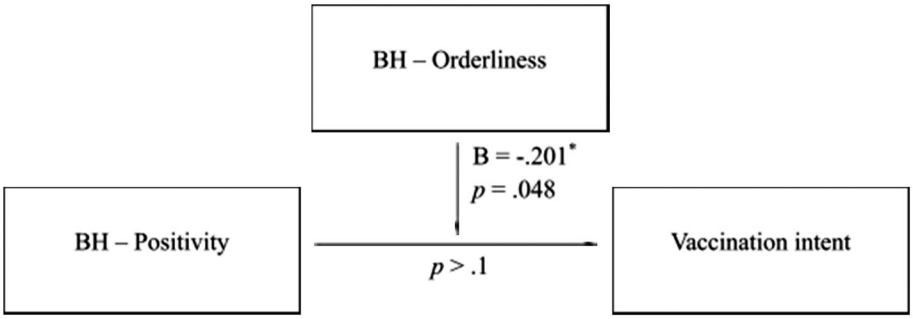

FIGURE 1. A moderation analysis of the relationship between positivity and vaccination intent with orderliness as a moderator (Study 1, December 2020, $N = 266$). *Note*. The BH Scale measures the assumptions regarding the world's orderliness and positivity.

To test this expectation we used a moderation analysis. In a moderation model with willingness to vaccinate as a dependent variable, positivity (mean centered) as an independent variable, and orderliness (mean centered) as a moderator (PROCESS, Hayes model 1, $R^2 = .034$, $F = 3.047$, $p = .029$, $\Delta R^2 = .015$, $F_{\text{change}} = 3.952$, $p = .048$, VIFs ≤ 2.0), an interaction effect was significantly negative (Figure 1, $B = -.201$, $t = 1.988$, $p = .048$), while the effect of positivity was non-significant ($p > .1$), and the effect of orderliness was negative ($B = -.314$, $t = 2.198$, $p = .029$). The conditional effect of positivity for 1 SD below the mean of orderliness was significantly positive ($B = .384$, $t = 2.300$, $p = .022$), and there was no significant effect for 1 SD below the mean ($p > .8$).

In a moderation model with perceived vaccination safety as a dependent variable, positivity (mean centered) as an independent variable, and orderliness (mean centered) as a moderator (PROCESS, Hayes model 1, $R^2 = .056$, $F = 5.131$, $p = .002$, $\Delta R^2 = .022$, $F_{\text{change}} = 6.065$, $p = .014$, VIFs ≤ 2.0), an interaction effect was significantly negative ($B = -.154$, $t = 2.463$, $p = .014$), while the effect of positivity was positive ($B = .261$, $t = 2.960$, $p = .003$), and the effect of orderliness was negative ($B = -.225$, $t = 2.542$, $p = .012$). The conditional effect of positivity for 1 SD below the mean of orderliness was significantly positive ($B = .395$, $t = 3.815$, $p = .0002$), and there was no significant effect for 1 SD above the mean ($p > .2$).

Overall, the above moderation analyses suggest that the assumption about the world's positivity increase willingness to vaccinate more when the assumption about the world's orderliness is low (vs. high). In other words, the orderliness assumption may diminish the positive influence of positivity assumption on willingness to vaccinate.

TABLE 3. Assumptions on the world, meaning in life, and life satisfaction levels in January 2021 (Study 2, $N = 266$).

	Mean	*Change vs. December 2020 (Study 1, N = 266)*
BH –Orderliness	3.279	.272***
BH – Positivity	3.393	.410***
BH – total	3.337	.340***
SWLS	4.617	.428***

Note. The BH Scale measures the assumptions regarding the world's orderliness and positivity.
Notes: BH: Basic Hope Scale; SWLS: Satisfaction with Life Scale.
*$p < .05$; ** $p < .01$; *** $p < .001$.

Study 2 (January 2021)

The goal of Study 2 was to check whether the relationships observed in December 2020, including the interaction effect of the two world assumptions, continued in January 2021 when the pandemic situation was meaningfully different. Firstly, the number of new cases dropped after the peak in December 2020 (GCDL, 2021; Reuters, 2021). Secondly, the vaccination program started in Poland. The government publicized the outline of the vaccination schedule. The vaccination against COVID-19 was the main topic across the mass media and was broadly discussed. The message was very favorable for the vaccination, and most arguments came from reputable medical authorities. The European Medicines Agency announced that in an extensive clinical trial, the Moderna COVID-19 Vaccine effectively prevented COVID-19 in people over 18 years of age. The test showed a 94.1% reduction in the number of symptomatic COVID-19 cases in those who received the vaccine compared to a placebo. The trial also showed 90.9% efficacy in participants at risk of severe COVID-19, including those with chronic lung disease, heart disease, obesity, liver disease, diabetes, or HIV infection [European Medicines Agency, January 6, 2021]. Those new circumstances might positively affect people's world assumptions and views on vaccination, as well as the relationship between those assumptions and the willingness to the vaccine.

Method

Invitation to participate in the study was published on open-access forums on the Internet. The 266 participants (78.1%; $M_{age} = 35.11$, $SD = 14.06$) were recruited in the middle of January 2021.

The procedure was the same as in study 1 except that we eliminated the MIL because it showed no significant correlation with vaccination attitudes in Study 1. The measurements had satisfactory levels of reliability ($\alpha_{\text{basic hope}} = .875$, $\alpha_{\text{positivity}} = .775$, $\alpha_{\text{orderliness}} = .809$, $\alpha_{\text{life satisfaction}} = .884$, $\alpha_{\text{perceived vaccination safety}} = .775$).

TABLE 4. Correlations (Pearson's *r*) of the measured variables (Study 2, December 2021, $N = 266$).

		1.	2.	3.	4.	5.
1.	B.H. –Orderliness	…				
1.	BH – Positivity	.76***	…			
1.	BH – total	.96***	.90***	…		
1.	SWLS	.41***	.46***	.46***	…	
1.	VACCINT	−.13*	−.06	−.10	.00	…
1.	VACCSAF	−.08	−.03	.05	−.05	.70***

Note. The BH Scale measures the assumptions regarding the world's orderliness and positivity.
Notes. BH: Basic Hope Scale; MIL: Meaning in Life Scale; SWLS: Satisfaction with Life Scale; VACCINT: Vaccination Intent; VACCSAF: Perceived Vaccination Safety vs. Anxiety.
$^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

Results

Along with our expectations, the level of basic hope and its components, as well as life satisfaction, significantly increased compared to December 2020 (see Table 3), and achieved similar level as in the April and October 2020. Likewise, the vaccination attitude rose (willingness to vaccinate: $M_{\text{Dec 2020}} = 3.03$, $M_{\text{Jan 2021}} = 3.84$, $t = 6.834$, $p < .001$; perceived vaccination safety: $M_{\text{Dec 2020}} = 2.76$, $M_{\text{Jan 2021}} = 3.12$, $t = 4.722$, $p < .001$).

As in Study 1 (December 2020) and in April 2020 (Trzebiński et al., 2020), the strength of the two world assumptions showed high positive correlations with life satisfaction ($r = .46$, $p < .001$; see Table 4). However, life satisfaction did not correlate with vaccination attitudes (all p values $> .3$).

More importantly, as in December 2020, the strength of the two world assumptions (separated and in total) did not correlate with perceived vaccination safety(all p values $> .1$). However, there was a low but significant negative correlation between orderliness and willingness to vaccinate ($r = -.13$, $p = .039$).

We conducted the same moderation analyses as in Study 1, obtaining similar results. Namely, in a moderation model with willingness to vaccinate as a dependent variable, positivity (mean centered) as an independent variable, and orderliness (mean centered) as a moderator (PROCESS, Hayes model 1, $R^2 = .056$, $F = 5.149$, $p = .002$, $\Delta R^2 = .036$, $F_{\text{change}} = 10.007$, $p = .002$, VIFs < 2.4), an interaction effect was significantly negative (Figure 2, $B = -.350$, $t = 3.163$, $p = .002$), while the effect of positivity was non-significant ($p > .4$), and the effect of orderliness was negative ($B = -.342$, $t = 2.186$, $p = .030$). The conditional effect of positivity for 1 SD below the mean of orderliness was significantly positive ($B = .397$, $t = 2.251$, $p = .025$), and there was no significant effect for 1 SD above the mean ($p > .4$).

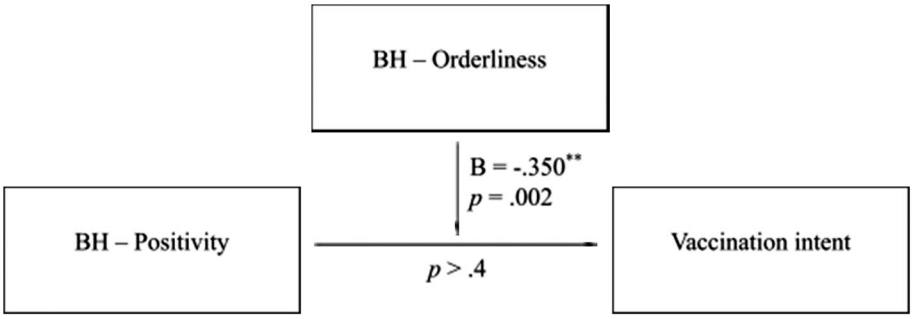

FIGURE 2. A moderation analysis of the relationship between positivity and vaccination intent with orderliness as a moderator (Study 2, January 2021, $N = 266$). *Note*. The BH Scale measures the assumptions regarding the world's orderliness and positivity.

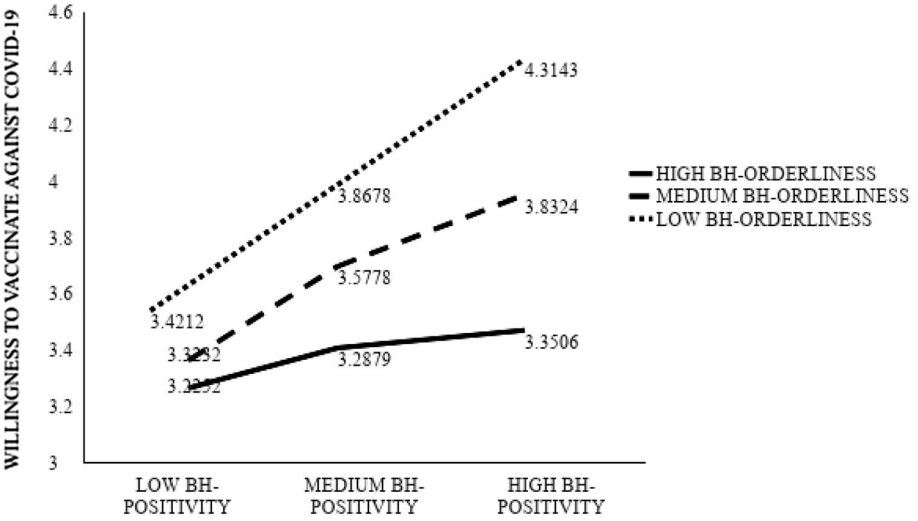

FIGURE 3. A visualization of the relationship between positivity and willingness to vaccinate with orderliness as a moderator (joint data from Study 1 and Study 2, $N = 532$). *Note*. The BH Scale measures the assumptions regarding the world's orderliness and positivity.

In the same moderation model run on the joint dataset (December 2020 together with January 2021; $R^2 = .045$, $F = 8.263$, $p < .001$, $\Delta R^2 = .025$, $F_{\text{change}} = 13.661$, $p < .001$, VIFs ≤ 2.2), an interaction effect was significantly negative ($B = -.276$, $t = 3.696$, $p < .001$), while the effect of positivity was positive ($B = .303$, $t = 2.817$, $p = .005$), and the effect of orderliness was negative ($B = -.349$, $t = 3.211$, $p = .001$). The conditional effect of positivity for 1 SD below the mean of orderliness was significantly positive ($B = .532$, $t = 4.378$, $p < .0001$), and there was no significant effect for 1 SD above the mean ($p > .5$), see a visualization in Figure 3.

In a moderation model with perceived vaccination safety as a dependent variable, positivity (mean centered) as an independent variable, and

orderliness (mean centered) as a moderator (PROCESS, Hayes model 1, $R^2 = .031$, $F = 2.765$, $p = .042$, $\Delta R^2 = .025$, $F_{change} = 6.831$, $p = .010$, VIFs < 2.4), an interaction effect was significantly negative ($B = -.189$, $t = 2.614$, $p = .010$), while the effect of positivity was non-significant ($p > .7$), as well as the effect of orderliness ($p > .2$).

In the same moderation model run on the joint dataset (December 2020 together with January 2021; $R^2 = .049$, $F = 9.014$, $p < .0001$, $\Delta R^2 = .026$, $F_{change} = 14.470$, $p < .001$, VIFs ≤ 2.2), an interaction effect was significantly negative ($B = -.176$, $t = 3.804$, $p = .0002$), while the effect of positivity was positive ($B = .222$, $t = 3.321$, $p = .001$), and the effect of orderliness was negative ($B = -.198$, $t = 2.927$, $p = .004$). The conditional effect of positivity for 1 SD below the mean of orderliness was significantly positive ($B = .368$, $t = 4.881$, $p < .0001$), and there was no significant effect for 1 SD above the mean ($p > .3$).

Overall, Study 2 replicates the results of Study 1. The orderliness assumption again appears to diminish the positive influence of positivity assumption on willingness to vaccinate.

Discussion

Our two studies consistently suggest that the basic assumptions about the world have no or little impact on COVID-19 vaccination attitudes. This conclusion's external validity is further supported by the two studies conducted during previous stages of the COVID-19 pandemic in Poland. Additionally, in December 2020 (Study 1), the strength of these assumptions dropped, presumably due to the peak in new COVID-19 cases. In January 2021, their strength increased and reached a level not seen since the beginning of the pandemic. During that time (early December vs. second half of January), the willingness to vaccinate also moderately increased, possibly due to the effortful official media campaign.

However, the most interesting observation is the interplay between two kinds of assumptions about the world on attitudes toward the COVID-19 vaccination. Specifically, our findings indicate that belief in the world's orderliness negatively moderates the positive relationship between belief in the world's positivity and willingness to vaccinate and perceived vaccination safety. When trying to explain this fact, we should consider that the vaccination against a new kind of virus was not perceived as a regular and tested medication for most people, a conviction that remained steady. To some extent, many saw it as a medicine that endangers health. The numerous comments on Polish blogs are a good illustration of the perception that the vaccine is against the natural order. Some of them may reflect religious inspirations. For example:

> Personally, I prefer relying on an infallible God than on a fallible human. God will not hurt us, while a human may do so, even having no wrong intentions.
>
> The new vaccines offered by Pfizer, Moderna, and other corporations are (…) not traditional, and they (…) may be dangerous.
>
> I have always been avoiding vaccination as it is testing your body against something very unfamiliar.
>
> In the past, people suffer from even worse illnesses, and there were no medications for them; people were using homemade treatments.

The same attitudes are alive in many western countries. The recent New York Times online describes an example (*NYT*, 2021):

> Millions of white evangelical adults in the U.S. do not intend to get vaccinated against COVID-19, presenting a significant obstacle as the country races to reach herd immunity. Their opposition is rooted in a mix of religious faith and a wariness of mainstream science, fueled by broader cultural distrust of institutions and gravitation to online conspiracy theories. Some have been energized by what they see as a battle between faith and fear, and freedom versus persecution. While many high-profile conservative pastors have endorsed the vaccines, other influential evangelical voices have sown fears. In churches, on talk shows, and on TikTok, they warn the devout that "globalist entities" will "use bayonets and prisons to force a needle into your arm," or that the vaccines are "an experimental biological agent."

Such observations may suggest that the vaccination against COVID-19 might be questioned as part of the world's order or even perceived as not belonging. Consequently, even if one believes in world positivity, a stronger assumption on world orderliness may block the willingness to vaccinate. The thinking might be: "if the world is good and orderly, so the vaccination, as something apart from, or even against that order, is not required." In line with this interpretation, in the January 2021 sample, the orderliness assumption showed a negative, rather than positive, relationship with willingness to vaccinate, and the increase in the assumed world's orderliness hampers the positive relationship between the assumptions of the world's positivity and willingness to vaccinate.

However, it is worth noting that the moderation analyses we reported above have relatively low R squared, which indicates that many other factors may determine attitudes toward vaccination (e.g., accessible information on vaccines, perceived risk of contracting COVID-19, individual medical conditions, fear of needles, and prosocial orientation). The two assumptions had a more substantial effect on vaccination attitudes than meaning in life, and life satisfaction did. This is surprising, considering in our earlier studies, where both these factors correlated significantly with lower pandemic stress. However, in the current two studies, meaning in life did not correlate with the attitudes toward vaccination. For life satisfaction, the correlation was weak and only in the case of willingness to vaccinate.

If we generalize the above observations, we may assume that any idea that undermines one's habits and commonly shared beliefs is more likely to be challenged when one has a strong faith in the world as an ordered and predictable reality. If we look at some historical examples of introducing great innovation to societal ways of living, we might spot similarities with the current situation. Even though today, using a seat belt seems to be as natural as breathing, in the 1960s it aroused heated debate. Despite increasing scientific research in the 1940s and 1950s affirming their value in saving lives, there were arguments put forth against seatbelts, claiming they could cause internal injuries, that they prevented easy escapes from cars submerged in water, and that the devices frequently failed. Researchers disputed these arguments but opposition remained fierce. Some opponents argued the decision to use a seat belt should be personal rather than legal. A popular opinion stated that as long as the risk to life is one's own, the individual should decide whether or not to use a seat belt. In 2002, Volvo estimated that the seat belt had saved more than one million lives in the four decades since it was introduced (Janik, 2017).

Another example of a controversial discovery is the in vitro fertilization (IVF) procedure. Before the successful birth of children whose mothers had been implanted with eggs that were fertilized outside the body, many people said that science was meddling where it should not. As IVF moved from the hypothetical to the actual, some people considered it to be nothing more than scientists showing off, while others thought it a perilous insult to nature. The British magazine Nova ran a cover story in the spring of 1972 suggesting that so-called test-tube babies were "the biggest threat since the atom bomb" and demanding that the public rein in the "unpredictable scientists". Nowadays IVF still causes fierce opposition, especially among conservative and religious circles, but it has been scientifically proven as the only effective and safe method of treating infertility (Britannica, 2020).

Perhaps the factors that increase and exacerbate such anti-vaccine and similar spreading movements are feelings of the progressive disintegration of the old, understandable habits and, at the same time, the accumulation of chaos in the developing new social relation. It causes strong resistance and aggression toward new ideas and those promoting them.

Our study suggests how to build on people's general assumptions about the world in persuading them to consider the new idea or innovative product. The starting point would be accepting the knowledge-based, rather than the emotional, premises of rejection of the novelty. We should not treat opponents of new ideas only as ignorants, nor as people overwhelmingly guided by negative emotions toward novelty. It is their particular vision of the world that influences their thoughts and decisions. They may interpret information on the novelty in their way, which is rational on the

ground of their worldview. From their perspective, those who wanted to be vaccinated behave irrationally because emotions and conformity to suspicious medical and political authorities govern their decisions. However, we may introduce a new idea more thoughtfully, as a new episode in a changing but ordered world. Education that accentuates steady progress in science and comprehensive contacts with new cultures or different world visions may be the best medium, or even the necessary condition, to initiate this path. Belief in the world's order and positivity will jointly facilitate accepting the novelty in that case.

However, suppose that some novelty does undermine, in fact, the order in a particular sphere of a person's life. In that case, a person who does not believe strongly in the world's unchangeable order but has a firm belief in the world's positivity may favor leaping into the unknown and embracing the new. Conversely, when there is a weak faith in both the world's universal order and its positivity, the novelty will not be readily accepted. It is unknown and risky in an unfriendly environment—why take any risks in a chaotic, unfavorable world?

Although our findings require further research, they already allow for some reflections on consumer behavior, considering vaccines against COVID-19 as a product category and willingness to vaccinate as a form of consumer response. Present data suggest that firm beliefs in the world's positivity and orderliness may cause a *negative* interaction. Specifically, the consumer's faith in orderliness may diminish the positive effect on their faith in positivity on willingness to use a new product. Perhaps the above mechanism pertains to other innovative products, which are related to technological breakthroughs. They may be perceived by consumers as disconnected from the world's order. The presented data and its discussion may shed new light on the existing literature, highlighting the relatively *positive* effects of consumer optimism on consumer responses. For example, consumer hope (i.e., a belief that some positive [or negative] outcome will be achieved [or avoided]) is considered to increase satisfaction with products (MacInnis & Chun, 2006). Fazal-e-Hasan et al. (2018) demonstrated the positive relationship between consumer hope (defined as an emotional mechanism involving consumer motivation and plans related to a product purchase) and brand-relationship variables, such as satisfaction, trust, and commitment. Likewise, consumer belief in a just world (i.e., believing that "good things happen to good people and bad things happen only to bad people") increases trust in salespeople after a purchase (Wilson & Darke, 2012). It may also enhance the positive effect of perceived restoration potential on willingness to buy fair trade products (White et al., 2012). However, Consiglio and Van Osselaer (2019) suggest a different pattern: consumers perceiving a lower risk of interpersonal harm may be less loyal

to their current service provider, as their optimistic assumptions may encourage them to try a new provider. Consequently, communicating the possible risks may paradoxically act in favor of consumer loyalty to a brand.

From that perspective, the present research indicates another possible mechanism of a negative role of optimistic consumer assumptions: an assumption of world orderliness may discourage consumers from using innovative products perceived as violating the world's order (like novel medicines, food, autonomous vehicles, or products based on artificial intelligence). In this case, presenting a novelty appearing in different life domains as a natural and stable characteristic of the world order and subsequently advertising the product as belonging to that order may help marketers avoid these negative attitudes.

Our studies were run in a short period of the COVID-19 pandemic (December 2020 – January 2021) on a population of Polish adults. Thus, specific conditions related to the pandemic and specificity of the studied population (e.g., religiosity) may account for the primary relationship identified in our study, i.e., the negative interaction between two kinds of assumptions influencing the attitudes toward vaccination. Despite the still high resistance toward COVID-19 vaccination in most countries, and the very similar arguments used by vaccination opponents worldwide, we cannot exclude the possibility that the role of the world's assumptions might be different in different cultures. Apart from replicating our results in various pandemic cultural contexts and stages of the pandemic, future research may attempt to verify more directly the underlying mechanisms of the identified interaction effect, e.g., by measuring or manipulating people's views on vaccines (as for or against the "natural" order of the world).

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