Research Article – Extended

A Quantitative Examination of Half-Belief in Superstition

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Abstract: We examined the phenomenon of half-belief in superstitions by asking two samples of participants (total *N* = 1,014) to report how much they practiced positive and negative superstitions and how much they believed in these superstitions. We further assessed whether demographic and psychological variables accounted for practice and belief. The results suggest that very few people show a complete lack of belief in superstitions and practice none. Some participants are calibrated believers, that is, people who practice and believe to the same extent. All others are either half-believers, who practice more than they believe or passive-believers who practice less than they believe. Age, gender, and religiosity correlated with practicing, believing, and with the discrepancy between them (i.e., with half-belief or with passive-belief). Anxiety and uncertainty are associated with practicing, believing, and the discrepancy between them, with some effects being weaker for positive than for negative superstitions. Some correlations were stronger in stressful situations (i.e., COVID-19) than prior to the pandemic.

Keywords: superstition, half-belief, individual differences, stress

Believing in superstition and magical thinking is quite common, dating back to ancient Greece (Vyse, 2019). Although there is no consensus as to the exact definition of superstitious, magical, paranormal, or supernatural beliefs (for a review see Lindeman & Svedholm, 2012), superstitions are cultural or personal practices and beliefs that rely on faith in supernatural forces. Superstitions often generate associations between unrelated items or events, as well as the belief that these associations can influence our immediate or distant future (promote good luck or prevent bad luck). Frequently, these beliefs contradict natural logic and scientific knowledge, and yet they are quite widespread. One in seven Americans feels uncomfortable staying in a hotel room on the 13th floor, and a quarter of Americans admit that they are superstitious (Daprati et al., 2019). While many people reject superstitions intellectually, their behaviors and beliefs present a different story. Thus, they "half-believe" in superstitions (Campbell, 1996; McKellar, 1952).

The impact of superstitious beliefs is far greater than it seems at first glance. For example, on Friday, the 13th of the month, American businesses lose 800–900 million dollars every year (Ng et al., 2010, but see Coutts, 1999, and Dyl & Maberly, 1988 for different results). In Taiwan, people are willing to pay 15% more for products that present the digit 8, since they consider this number lucky (Kramer & Block, 2008). In Israel, pregnant women prefer to avoid buying furniture for babies before birth, even when such avoidance incurs a significant cost (Bayer et al., 2018), for the fear that preparation for a baby fosters bad luck. In Italy, people believe that Tuesdays and Fridays are unlucky days for weddings as well as the 17th day of each month (Ruiu & Breschi, 2017). In other cultures, hunting rare animals is believed to destroy their healing power (de Farias, 2020). Furthermore, Lu and colleagues (2019) showed that superstitious beliefs predicted a lower intention to take an influenza vaccine in the next year and/or a lower probability of ever taking an influenza vaccine. According to Chijoke and colleagues (2021), superstitions had very similar effects on attitudes toward the COVID-19 vaccine.

In modern societies, most people may declare that they do not believe in superstition full-heartedly, and thus it is important to investigate the relationship between the extent of practicing superstitions and the extent of believing in them. McKellar (1952) was the first to suggest that there is a contrast between practice and belief, thus highlighting the concept of half-belief to superstitious thinking. Following McKellar, Campbell (1996) explained that half-beliefs (i.e., practicing more than believing) led to the preservation of superstitious practices in modern societies, pointing out that engagement in practices in which individuals do not believe is quite puzzling. Originally, "half-belief" refers to a lack of faith, and it often describes *non*-believers, but in the 19th-century scholars related it to superstition (e.g., Elworthy, 1895; Silberrad, 1900). According to Campbell (1996), the interesting feature of half-belief "is not merely that superstitious rituals are performed by people who claim not to be superstitious, but that an apparently genuine disbelief in the validity of a superstitious practice co-exists

with actions which would suggest belief in the self-same practice" (p. 158).

Many researchers have attempted to map the circumstances that promote and govern superstitious behaviour. Some studies have suggested that fear (Keinan, 1994, 2002) and uncertainty (Felson & Gmelch, 1979; Kramer & Block, 2008; Malinowski, 1954) motivate superstitious behavior in an attempt to reduce tension by increasing the feeling of control. Hence, superstitions offer individuals a sense of understanding of their environment and afford the development of a causal explanation for arbitrary events (for reviews see Risen, 2016; Vyse, 2019). Indeed, studies repeatedly found positive correlations between superstitions and anxiety (Wolfradt, 1997), intolerance of uncertainty (Sica et al., 2002), and pessimism (Fluke et al., 2014), as well as between superstitions and external locus of control (Dag, 1999; Tobacyk et al., 1988).

Other studies showed that superstitions (mostly those that aim to avoid bad luck) are often correlated *positively* with individual differences such as religiosity (for a review see, Faiza, 2018), as well as with some psychopathologies such as psychotic and obsessive-compulsive disorders (García-Montes et al., 2008). At the same time, self-efficacy (Tobacyk & Shrader, 1991), educational level, and age *negatively* correlate with superstition and magical thinking (Aarnio & Lindeman, 2005; Orenstein, 2002; Otis & Alcock, 1982; Za'Rour, 1972). Gender differences have also emerged, with women holding more superstitious beliefs than men do (e.g., Dag, 1999; Vyse, 1997; Wolfradt, 1997).

Thus, individual differences may explain some of the variances in practicing superstitions while not believing in them. In the current study, we aim to examine the phenomenon of half-belief by documenting the imbalance between actual practices of superstitions and the degree of faith in them. In principle, when people act upon a superstition, this practice may attest to their belief. However, individuals can practice without believing. At the same time, some people may not practice while also not believing in superstitions at all. Yet, half-belief may not be an all-or-none measure that differentiates between believers and non-believers, but rather a *continuum* combined of two separate measures: practicing superstitions to a greater or lesser extent and believing in superstitions to a greater or lesser extent.

If the extent of the practice, as well as the extent of belief, vary across individuals, there may also be individual differences in the discrepancy between the two. To test this possibility, we calculate a discrepancy score for each participant and then examine the association between this score and individual characteristics that are relevant to superstitious behavior. Separating our measurement of practice and belief allows us to map the discrepancies more accurately. First, people may practice to the same extent as they believe. These are the calibrated believers. Second, as already explained, people may be half-believers and may practice more than they believe. Third, people may practice less than they believe. Although the latter group has not gained any research attention, such a difference may resonate with the literature on the difference between attitudes and action (e.g., Ajzen, 1991; Ajzen & Fishbein, 1980; Triandis, 1980), which has demonstrated that people often do not act upon their attitudes in any consistent manner. We name this group "passive-believers."

The current study aims to examine the distribution of practice and belief and its correlation with other individual differences. We hypothesize that people position themselves differently on each scale since each scale measures a separate aspect of superstitious behavior. These two scales will help us identify the full distribution of half-believers who practice more than they believe, as well as passive-believers who practice less than they believe. We also expect to find calibrated individuals who believe and practice to the same degree. This group includes people who are full-disbelievers (who do not practice and do not believe at all), others who are devout believers (who persistently practice and fully believe), and individuals who are partial believers, practicing, and believing only partially but the same degree. We suggest that fully-believing and half-believing do not encompass the full range of the phenomenon. To expose all patterns of the links between practicing and believing, we asked participants to report the degree of belief in common superstitions and then to report the extent or frequency of acting in accordance with the same superstitions. In addition, we measured participants' age, education, religiosity level, anxiety, optimism, and intolerance to uncertainty, and then tested the correlations between individual differences and superstitious behaviours.

Finally, Wiseman and Watt (2004) noted that most research in the field of superstitions has focused on negative superstitions, those that help to avoid bad luck (e.g., black cats bring bad luck; breaking a mirror attracts bad luck; the number "13" is unlucky). However, not all superstitious beliefs fall into this category, and some help to promote good luck (e.g., crossing fingers, or making a wish while a star is falling). Wiseman and Watt also suggested that there might be different psychological functions for positive and negative superstitions. If positive superstitions stem from hope rather than from fear, and if their practice is not supposed to reduce the stress associated with uncertainty, individuals who hold such superstitions may be less anxious, less affected by uncertainty, and more optimistic. Therefore, in the current study we presented participants with both negative and positive superstitions. Furthermore, as we conducted our research shortly before the beginning of the COVID-19 pandemic and then shortly after its beginning, we also had the opportunity to investigate and

Table 1. Demographic characteristics of the two samples

	S1 (2019)	S2 (2020, new)	S2 (2020, returned)
N	612	402	202
Gender (% women)	49.5	51.2	49.5
Age (Mean, *SD*)	41.4 (15.3)	42.6 (15.3)	44.7 (15.4)
Education (% BA degree and above)	41.7	40.5	49.0
Family status (% married)	58.6	53.7	58.7
Religiosity (% secular)	58.1	56.0	59.7

compare superstitious behaviours at two time periods that differed significantly in the level of threat and uncertainty (e.g., Pierce et al., 2020).

Methods

The data for this study is open and available in the Open Science Framework (OSF) at https://osf.io/8auqk/ (Caspi et al., 2022).

Participants

We recruited 1,014 Israeli participants in two different online samples. The first sample (S1) was recruited in March 2019 and included 612 members of an Israeli online panel. The second sample (S2) was recruited in March 2020 and included 402 new participants, as well as 206 returned participants who served to examine test-retest reliabilities. The study received Institutional Review Board ethics approval. Table 1 presents the demographic characteristics of the two samples.

Measures

Demographics

Participants reported their gender, age, education (elementary school, high school, non-academic continuing education, BA degree or above), family status (single, married, divorced, widow), and level of religiosity (secular, traditional, orthodox, ultra-orthodox).

Superstitions

We assembled a large array of 24 very common positive and negative superstitions (as in Darke & Freedman, 1997; Fluke et al., 2014; Wiseman & Watt, 2004). This array included active, proactive, and passive superstitions (Hernandez et al., 2008). Table A1 in Appendix presents the full array of superstitions that we used.

We asked participants to rate each superstition on three scales: (1) How familiar are you with the superstition (*yes – no*); (2) To what extent do you practice this superstition (1 = *never* to 5 = always); (3) To what extent do you believe in this superstition (1 = *not at all* to 5 = *absolutely*). On average, participants were familiar with about 17 of the 24 presented superstitions. We excluded two participants who were unfamiliar with all superstitions from all further analyses.

We calculated four indices: *Practicing positive superstitions* (*PPOS*), *Believing in positive superstitions* (*BELPOS*), *Practicing negative superstitions* (*PNEG*), and *Believing in negative superstitions* (*BELNEG*). Each of these indices is an average of the practice or belief scores for the relevant superstition (i.e., positive or negative), only for superstitions that were marked as familiar by the given participant. Correlations between the four indices were high (see Table 2).

Measuring Half-Belief

According to Campbell (1996), half-belief describes a phenomenon in which people who claim not to be superstitious perform superstitious rituals. We operationalized half-belief in two ways, either with discrepancy scores or according to a continuum. First, we classified participants as *calibrated believers*, *half-believers*, or *passive believers* according to discrepancy scores. Calibrated believers included participants who practiced all familiar superstitions to the same extent as they believed in them (i.e., practice minus believe = 0). This group includes (a) people who fully believe in superstitions and act upon them consistently, (b) people who fully disbelieve in superstitions and do not practice any superstition, and (c) people who believe and practice partially but to the same degree. Discrepancy scores led to the conceptual distinction between *half-believers* (i.e., participants who practiced more than they believed; practice minus believe > 0), and *passive-believers* (i.e., participants who practiced less than they believed; practice minus believe < 0).

Another operationalization of half-belief involved a continuum, in which one pole indicated half-believers and the other pole indicated passive-believers. For each participant, we calculated a discrepancy score – the difference between practicing and believing (averaged across the superstitions that the participant was familiar with). This score could range between −4 (someone who never

Table 2. Correlations between practicing and believing

	S1 (2019)			S2 (2020)		
	PPOS	BELPOS	PNEG	PPOS	BELPOS	PNEG
BELPOS	.799**			.774**		
PNEG	.783**	.702**		.802**	.654**	
BELNEG	.751**	.893**	.829**	.738**	.891**	.784**

Note. PPOS = practicing positive superstitions; BELPOS = believing in positive superstitions; PNEG = practicing negative superstitions; BELNEG = believing in negative superstitions. $^{**}p < .001$.

practices and always believes, an "extreme" passive-believer) and 4 (someone who always practices and never believes, an "extreme" half-believer). All three types of calibrated believers scored zero on the continuum measure. Both measures were calculated separately for positive and negative superstitions.

Psychological Individual Differences

Of the psychological individual differences factors that influence superstitious behavior, five have been repeatedly measured in previous studies: anxiety, intolerance of uncertainty, optimism, locus of control, and magical thinking. We chose not to use questionnaires of locus of control and magical thinking since they include a large number of items that directly relate to superstitions, and therefore cannot be considered independent from the superstition questionnaire that we used.

Anxiety Short Scale (Marteau & Bekker, 1992)

This scale contains six items with a 5-point rating. Cronbach's α for S1 was .88, and for S2 it was .86. The test-retest correlation between S1 and S2 returned participants was .71.

Intolerance of Uncertainty (IUS-12; Carleton et al., 2007)

This questionnaire contains two correlated dimensions: Prospective anxiety (seven items) and Inhibitory anxiety (five items), both measured on a 5-point Likert scale. Cronbach's α was .83 for both samples for prospective anxiety, and .89 (S1), and .88 (S2) for inhibitory anxiety. Given the high correlation between the two dimensions (r = .61 in S1 and S2), we computed a single index that averaged all items, Cronbach's α = .88 in both samples. The test-retest correlation between S1 and S2 returned participants was .69.

Life Orientation Test (LOT-R; Scheier et al., 1994)

We measured optimism with the LOT-R questionnaire, which consisted of six items (and four additional filler items that are not included in the index) that participants rated on a 5-point Likert scale. Cronbach's α for S1 was .72, and for S2 it was .70. The test-retest correlation between S1 and S2 returned participants was .71.

Measures Used in Sample 2

We collected data from the second sample at the early phase of the COVID-19 pandemic outbreak. In addition to all other questionnaires, we also asked five questions about attitudes toward the pandemic. Participants answered using a 5-point Likert scale (1) To what extent do they follow updates regarding the Coronavirus; (2) How worried they are that they will get the Coronavirus; (3) To what extent do they take active steps to protect themselves from the Coronavirus; (4) To what extent they feel that the country is protecting them from the Coronavirus; and (5) To what extent they trust other citizens to obey state regulations regarding the Coronavirus. These questions intended to test the situational effect and addressed personal worries as well as social and institutional trust.

Additional Measures Not Included in the Current Analyses

In the current article, we report only part of the data that we collected in this project. The two samples also completed the Personal Attributes Questionnaire (PAQ; Spence & Helmreich, 1978), and reported to which party they voted as a proxy for political orientation. We intended to use these measures for testing hypotheses that are not part of the current study, and thus we do not include them in the analyses.

Results

Distribution of Practicing, Believing, and the Difference Between Them

Figure 1 presents the correlation between practicing and believing in positive superstitions, and Figure 2 presents the same measure for negative superstitions. As shown in Table 2, greater practice is associated with greater belief. A small number of participants practice no superstitions and believe in none (for positive superstitions – 30 participants in S1 and 14 in S2, 4.3% in total; for negative superstitions – 31 participants in S1 and 19 in S2, 4.9% in total). When looking at positive and negative superstitions

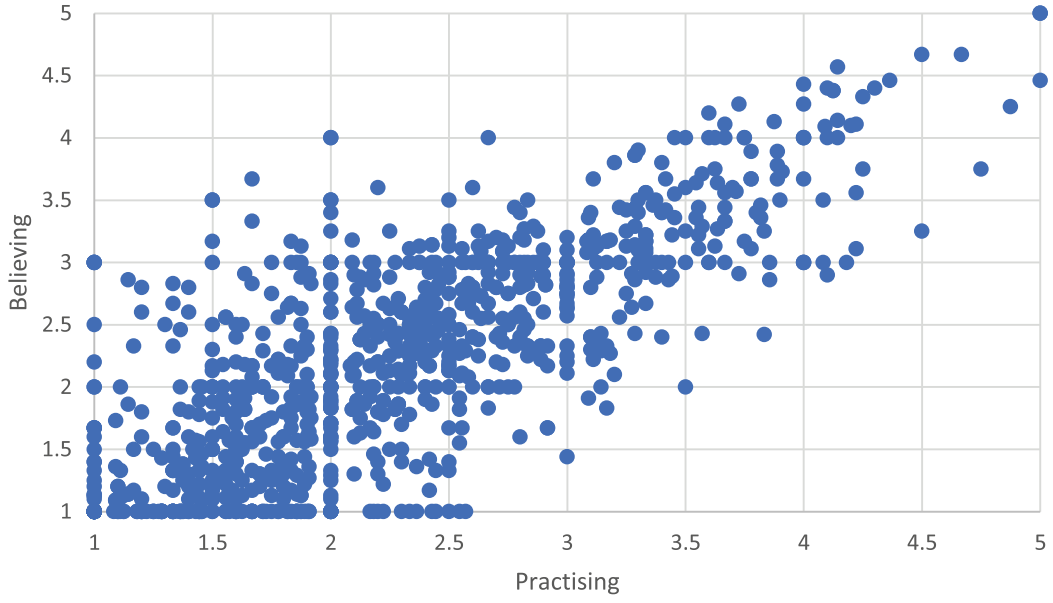

Figure 1. Correlation between practicing and believing in positive superstitions (two samples combined).

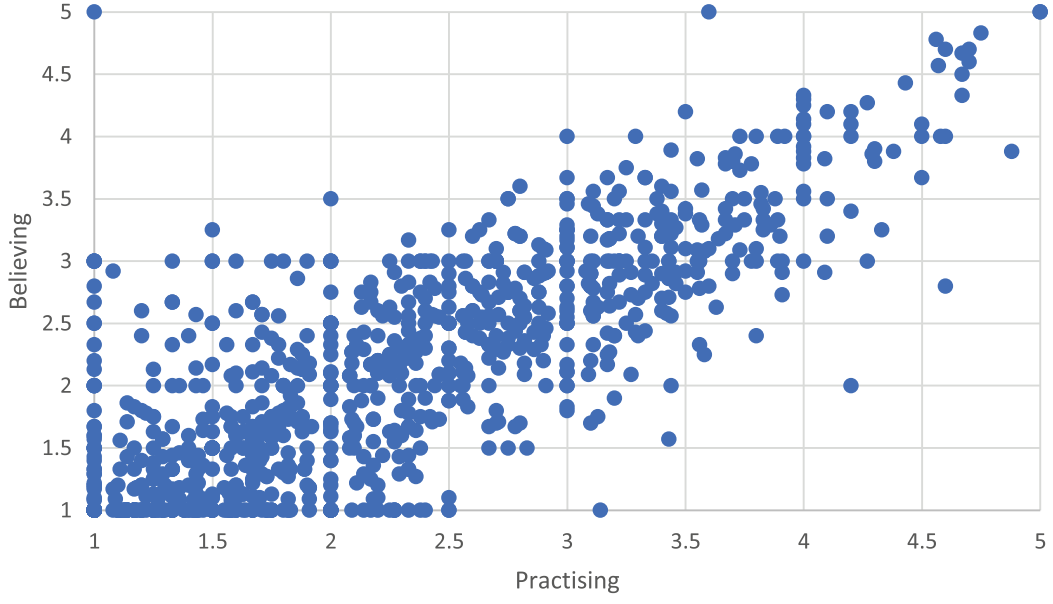

Figure 2. Correlation between practicing and believing in negative superstitions (two samples combined).

in both samples together, only 25 participants neither practiced nor believed in any superstition (2.5%).

Table 3, Figure 3 (positive), and Figure 4 (negative) present the distributions of the discrepancies between practicing and believing scores. Across the two samples, 149 participants (15%) were calibrated in the sense that their average practice and belief scores for positive superstitions were identical. For negative superstitions, 159 (16%) participants were calibrated. Calibrated participants could be either full-disbelievers (do not practice and do not believe in superstitions), devout-believers (fully practice and fully believe in superstitions) or partial-believers, that is scoring identically at the middle of the practice and the belief scales. Across the two samples, 475 (47%) participants practiced more than they believed in positive superstitions, and 553 (54%) participants practiced more than they believed in negative superstitions. For positive superstitions, 386 (38%) participants practiced less than they believed, and for negative superstitions, 296 (29%) practiced less than they believed. The difference between the distribution of half-believers, calibrated believers, and passive-believers in positive superstitions and the equivalent distribution for negative superstitions was significant, $\chi^2(2) = 17.94$, $p < .001$. About 65% of the participants showed consistency

Table 3. Means (standard deviations, *SD*) of practicing and believing in positive and negative superstitions by half-believers, calibrated believers, and passive believers

		Calibrated believers			
	Half believers (practice > Belief)	Full-disbelievers	Partial-believers	Devout believers	Passive believers (Practice < Belief)
Positive					
N	475	44	106	2	386
Practice	2.37 (0.82)	1 (0.00)	2.34 (0.87)	5 (0.00)	2.20 (0.75)
Believe	1.90 (0.82)	1 (0.00)	2.34 (0.87)	5 (0.00)	2.69 (0.70)
Negative					
N	553	50	107	2	296
Practice	2.45 (0.90)	1 (0.00)	2.53 (0.99)	5 (0.00)	2.10 (0.85)
Believe	1.95 (0.87)	1 (0.00)	2.53 (0.99)	5 (0.00)	2.60 (0.81)

Note. Calibrated believers are participants that have identical scores for practice and belief, therefore their means and *SD*s are identical.

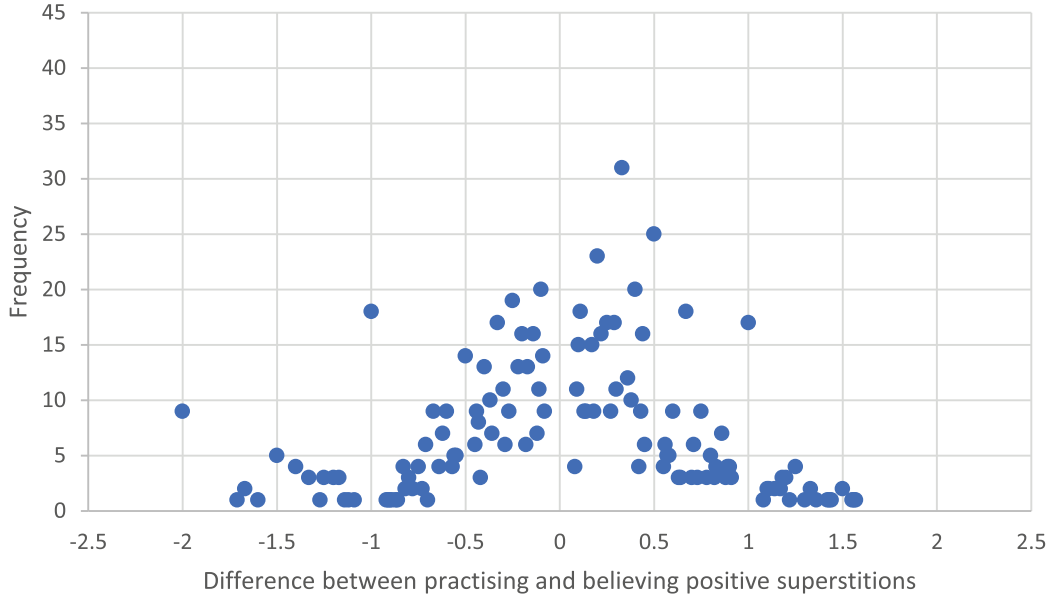

Figure 3. Distribution of discrepancy scores (practicing minus believing) for positive superstitions. Participants with a score of 0 ("calibrated" participants, *n* = 152) are not presented. Positive scores represent half-believers who practice more than they believe.

in the sense that they were classified into the same group for both positive and negative superstitions (for more details see the Electronic Supplementary Material, ESM 1).

These three groups (calibrated believers, half-believers who practiced more than they believed, and passive-believers who practiced less than they believed) differed in their level of familiarity with positive superstitions, $F(2, 1{,}010) = 3.683$, $p = .025$, $\eta_p^2 = .007$, as well as negative superstitions, $F(2, 1{,}005) = 14.745$, $p < .001$, $\eta_p^2 = .029$. The calibrated group was familiar with 68% of the positive superstitions and with 70% of the negative superstitions. Half-believers were familiar with 72% of the positive and 73% of the negative superstitions. Passive believers were familiar with 69% of the positive and 65% of the negative superstitions. Bonferroni post hoc tests showed significant differences between passive-believers and half-believers for both positive and negative superstitions, and significant differences between passive-believers and calibrated believers for negative superstitions (*p*s < .05). Though significant, these differences were quite small. Controlling for familiarity in the following analyses did not change the pattern of results. Thus, the level of familiarity with superstitions cannot explain all other results.

Individual Differences and Practicing Superstitions or Believing in Them

Table 4 presents correlations between measures of individual differences on the one hand, and practicing, believing, and the discrepancies between them on the other hand.

Table 4 shows that practicing positive and negative superstitions and believing in these superstitions relate to *gender* (women > men), *age* (as age increases practice and belief decrease), *religiosity* (religious > secular), *anxiety*

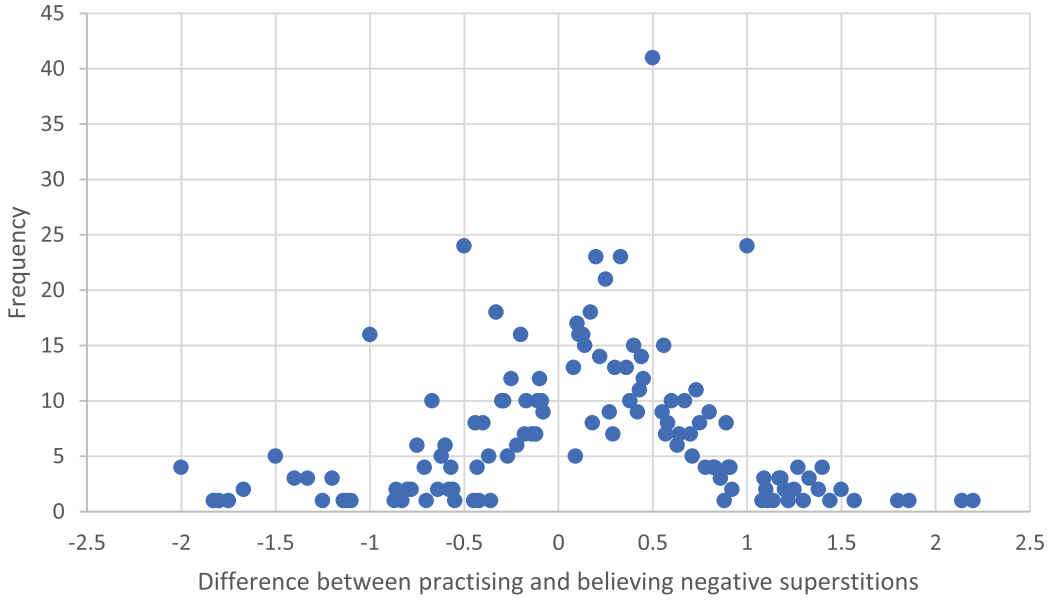

Figure 4. Distribution of discrepancy scores (practicing minus believing) for negative superstitions. Participants with a score of 0 ("calibrated" participants, n = 159) are not presented. Positive scores represent half-believers who practice more than they believe.

(the higher the anxiety the higher the score), and *intolerance of uncertainty* (people who cannot tolerate uncertainty report greater practice, but not greater belief). *Education* (except negative correlation with believing in positive superstitions), *family status*, and *optimism* are associated neither with practicing superstitions nor with believing in them.

To test whether the correlations between individual differences and superstitious behavior differ between types of superstitions (positive versus negative), we employed Steiger's (1980) Z^*-test. For practicing superstitions, the correlations observed for positive superstitions were weaker than those for negative superstitions for the following pairs of variables: *gender*, $Z^* = -2.86$, $p = .004$; *age*, $Z^* = -3.25$, $p = .001$; and *anxiety*, $Z^* = -4.46$, $p < .001$. No differences emerged for *religiosity* or *Intolerance of uncertainty*. For believing in superstitions, a significant difference emerged for *anxiety*, $Z^* = -3.98$, $p < .001$, but for no other variables. Thus, the type of superstition affected the strength of three of the five correlations between individual differences and practicing but only one of the five correlations between individual differences and believing.

Using the continuous measure of the discrepancy score (between practicing and believing) revealed that for negative superstitions, age, gender, education, religiosity, anxiety, and intolerance of uncertainty correlated positively with the tendency to practice more than to believe. For positive superstitions, education, and religiosity correlated with the tendency to practice more than to believe but none of the other variables did. The type of superstition affected the strength of the correlation between the tendency to practice more than to believe and anxiety, $Z^* = -2.38$, $p = .017$, suggesting that the tendency to be a half-believer is stronger among anxious people, especially when it comes to negative (compared to positive) superstitions.

Last, we ran regression models to test the contribution of each of the variables to practicing, believing, and half-believing, controlling for all the other variables. Table 5 summarizes the results of the six models that we ran.

The regressions revealed two interesting findings. First, gender (women > men) and religiosity (religious > secular) predicted both practicing and believing. Anxious people were more superstitious but only for negative superstitions. Younger participants were marginally more superstitious but only for positive superstitions. People who are intolerant of uncertainty marginally practiced more negative superstitions. Second, secular people tended to be half-believers more often than religious people. People who are intolerant of uncertainty tended to be marginally more half-believers when it comes to negative superstitions.

Next, to test the effect of stressful circumstances, we examined the differences between the two samples. We ran 48 regressions (eight individual differences predictors by six dependent variables) and their full results appear in ESM 1. We found no significant main effect of time of sampling. This finding contradicts the notion that stressful circumstances increase superstitious behavior. However, after adjusting p-values for multiple comparisons, two interactions reached significance. Religious people reported a greater difference between practice and belief (more practice than belief) than non-religious people in both positive and negative superstitions. This effect was stronger in

Table 4. Correlations between measures of individual differences and measures of practice and belief

	M (*SD*)	Gender	Age	Education	Family status	Religiosity	Anxiety	IUS	Optimism
Gender	1 = women								
Age	41.87 (15.30)	.020							
Education	1 = Academic	−.003	.157**						
Family status	1 = Married	−.071	.226**	.152**					
Religiosity	1 = Secular	−.027	.247**	.146**	−.133**				
Anxiety	2.59 (0.78)	.120**	−.033	−.038	−.041	.077*			
IUS	2.77 (0.79)	.075*	−.029	−.102**	−.072*	.056	.195**		
Optimism	3.45 (0.64)	.030	.046	.065*	.167**	−.140**	−.177**	−.410**	
PPOS	2.25 (0.83)	.171**	−.116**	−.054	−.053	−.072*	.083**	.074*	−.018
BELPOS	2.21 (0.89)	.146**	−.125**	−.091**	−.016	−.165**	.069*	.033	−.008
PNEG	2.27 (0.93)	.208**	−.049	−.018	−.051	−.047	.173**	.098**	−.038
BELNEG	2.14 (0.92)	.166**	−.097**	−.066	−.026	−.152**	.127**	.055	−.034
P-BEL.POS	0.03 (0.56)	.022	.028	.065*	−.052	.156**	.013	.057	−.014
P-BEL.NEG	0.13 (0.57)	.070*	.078*	.078*	−.040	.170**	.076*	.071*	−.008

Note. Outcomes measures are gray shaded. IUS = Intolerance of Uncertainty; PPOS = practicing positive superstitions; BELPOS = believing in positive superstitions; PNEG = practicing negative superstitions; BELNEG = believing in negative superstitions; P-BEL.POS = practicing minus believing, positive superstitions; P-BEL.NEG = practicing minus believing, negative superstitions. *$p < .05$; **$p < .001$.

Table 5. Regressions predicting superstitions

	Positive superstitions											
	Practice				Belief				Practice − Belief			
	B	*SE*	β	*t*	*B*	*SE*	β	*t*	*B*	*SE*	β	*t*
Intercept	1.723	.248		6.954***	2.000	.264		7.565***	−.277	.171		−1.625
Gender (1 = women)	**.260**	**.052**	**.158**	**5.004*** **	**.241**	**.055**	**.136**	**4.346*** **	.019	.036	.017	0.532
Age	**−.005**	**.002**	**−.096**	**−2.872****	**−.005**	**.002**	**−.083**	**−2.513***	.000	.001	−.009	−0.275
Education (1 = academic)	−.041	.054	−.024	−0.755	−.107	.057	−.059	−1.857	.066	.037	.058	1.780
Family status (1 = married)	−.044	.055	−.026	−0.795	−.002	.059	−.001	−0.035	−.042	.038	−.037	−1.100
Religiosity (1 = secular)	−.071	.056	−.042	−1.276	**−.237**	**.059**	**−.133**	**−4.001*** **	**.166**	**.038**	**.146**	**4.347*** **
Anxiety	.060	.034	.057	1.769	.066	.036	.059	1.842	−.007	.023	−.009	−0.285
Intolerance of Uncertainty	.063	.036	.060	1.735	.016	.039	.015	0.426	.046	.025	.065	1.859
Optimism	.028	.045	.022	0.625	.003	.048	.002	0.056	.026	.031	.029	0.821
R^2			.053				.062				.032	
	Negative superstitions											
Intercept	1.148	.277		4.142***	1.708	.276		6.180***	−.560	.174		−3.223***
Gender (1 = women)	**.335**	**.058**	**.181**	**5.820*** **	**.268**	**.057**	**.146**	**4.678*** **	.066	.036	.058	1.842
Age	−.002	.002	−.028	−0.834	−.003	.002	−.053	−1.596	.002	.001	.041	1.208
Education (1 = academic)	.014	.060	.008	0.242	−.058	.059	−.031	−0.968	.072	.037	.062	1.926
Family status (1 = married)	−.074	.061	−.040	−1.208	−.033	.061	−.018	−0.543	−.041	.038	−.035	−1.062
Religiosity (1 = secular)	−.086	.062	−.046	−1.392	**−.256**	**.061**	**−.138**	**−4.163*** **	**.170**	**.039**	**.147**	**4.401*** **
Anxiety	**.167**	**.037**	**.142**	**4.465*** **	**.128**	**.037**	**.109**	**3.421*** **	.039	.023	.054	1.679
Intolerance of Uncertainty	**.080**	**.040**	**.069**	**2.008***	.026	.040	.022	0.651	**.054**	**.025**	**.075**	**2.167***
Optimism	.032	.050	.022	0.628	−.017	.050	−.011	−0.329	.048	.032	.054	1.524
R^2			.074				.067				.048	

Note. Bold values indicate the significant predictors. Adjusting *p*-values for multiple comparisons leaves only *p*-values of .001 or smaller as significant results. *$p < .05$; **$p < .01$; ***$p < .001$.

the sample collected in the early days of COVID-19 than in the sample collected one year earlier. Thus, in stressful times the effect of individual differences on superstitious behavior is slightly increased.

To further explore the effect of stressful times, we tested the correlations between attitudes toward the pandemic as measured by five items, anxiety, intolerance of uncertainty, and optimism, as well as practicing, believing, and

half-believing. Table 6 presents the results. Anxious people, people who are more intolerant of uncertainty, and pessimistic people worried more about being infected. People who were more concerned about being infected practiced more superstitions, but they believed more only in negative superstitions. Anxious people and pessimistic people were less certain that the state would protect them from the pandemic and reported less trust that other citizens will comply with regulations. People who trusted neither the state nor other citizens demonstrated lower practice as well as lower belief in superstitions.

Further, we tested whether attitudes toward the pandemic, which may serve as a proxy for the influence of the situation, mediated the correlations between anxiety and optimism on the one hand and practicing and believing on the other hand. First, anxious people were *more* concerned about being infected, which in turn increased practicing both positive and negative superstitions. Optimistic people were *less* concerned about being infected, consequently practicing fewer positive and negative superstitions. Optimistic people who were less concerned about being infected also reported lower belief in negative superstitions. Second, anxious people tended to trust the country *less* and thus showed higher levels of practice and belief in both positive and negative superstitions. Pessimistic people trusted the country *less* and thus showed higher levels of practice and belief. The full results appear in ESM 1.

Discussion

Since the canonical manuscripts by McKellar (1952) and Campbell (1996), researchers of superstitions have warmly embraced the phenomenon of half-belief. However, this phenomenon has not been examined quantitatively. In the current study, we map the relations between practicing superstitions and believing in the effectiveness of this ritual. Moreover, we document the correlation between practicing and believing on the one hand and relevant individual differences on the other hand. Additionally, because we collected data just before the COVID-19 pandemic as well as during its first weeks, we investigate the effect of this stressful period on superstitious behaviors.

The differentiation between practicing superstitions and believing in them reveals several important findings. First, very few people practice no superstitions and report complete disbelief in them. Second, people who demonstrate calibration between practice and belief are just about 15% of the sample. All other participants are half-believers who practice more than they believe or passive-believers who practice less than they believe. Importantly, our method reveals a new phenomenon that so far has not been exposed and has not been researched. That is, we found a group of passive believers who practices less than they believe. Third, the evidence regarding the motivating role of anxiety and uncertainty in the discrepancy between practicing and believing is mixed. Fourth, individual differences correlate with practicing, believing, and with the discrepancy between practice and belief. These correlations are stronger for negative superstitions than for positive superstitions. Fifth, stressful circumstances, such as a global pandemic, slightly moderate the correlations between superstitious behavior and individual differences, showing that the effects are stronger when tested in times of stress and uncertainty. Lastly, attitudes toward the pandemic that reflected personal concern or trust in institutional and public activities mediated the effects of anxiety and optimism on superstitious behaviors.

Our discussion begins with revisiting the phenomenon of half-belief, continues with the correlations between practice and belief on the one hand and individual differences on the other hand, then addresses the situational influence, and closes with the potential differences between positive and negative superstitions.

The Links Between Practicing and Believing

Our study presented a large array of superstitions, thus offering a better estimate of the prevalence of practicing superstitions and believing in them. In such a diverse array, the likelihood that participants would be familiar with at least some superstitions increases. The fact that we allowed participants to report practicing separately from believing encouraged them to be more specific when disclosing their behavior. We found that the vast majority of the sample believed to some extent in at least some superstitions. Previous research that aimed at estimating the prevalence of superstitions in the global population is rather scarce. Gallup polls have found that a quarter of Americans admit to being superstitious (Daprati et al., 2019). Two out of five Europeans are superstitious (Philips, 2010). Our data suggest that the percentages of those who engage in superstitious behaviors are much higher (97%). Only about 3% of the sample practiced no superstition at all and believed in none. We argue that these findings reflect the fact that we selected diverse superstitions and distinguished between practice and belief rather than any cultural bias.

According to the original definition of half-belief (Campbell, 1996; McKellar, 1952), this phenomenon refers to individuals who perform superstitious rituals while genuinely disbelieving them. As our questionnaire included a large and diverse array of superstitions and we measured practice and belief separately, our study affords a more

Table 6. Correlations between measures of attitude toward the pandemic, anxiety, intolerance of uncertainty, optimism, and practicing, believing, and half-believing (N = 402)

	M	*SD*	1	2	3	4	5	Anxiety	IUS	Optimism	PPOS	BELPOS	PNEG	BELNEG	P-BEL.POS
(1) To what extent do you follow updates regarding the Coronavirus?	5.18	1.05													
(2) How worried are you that you will get the Coronavirus?	2.91	1.08	.200**												
(3) To what extent do you take active steps to protect yourself from the Coronavirus?	3.78	0.87	.240**	.209**											
(4) To what extent do you feel that your country is protecting you from the Coronavirus?	3.69	1.01	.179**	.048	.247**										
(5) To what extent do you trust other citizens to obey state regulations regarding the Coronavirus?	3.43	0.96	.076	−.032	.196**	.398**									
Anxiety	2.61	0.75	−.001	.240**	−.091	−.163**	−.166**								
Intolerance of Uncertainty	2.79	0.79	.108*	.274**	.091	−.033	−.053								
Optimism	3.45	0.63	−.010	−.122*	.053	.129**	.139**	−.529**	−.434**						
POPS	2.23	0.81	.029	.124*	.106*	.140**	.108*	.093	.132**	.009					
BELPOS	2.23	0.89	−.016	.066	.036	.171**	.173**	.091	.071	.038	.774**				
PNEG	2.26	0.91	.072	.178**	.071	.113*	.095	.183**	.187**	−.033	.802**	.654**			
BELNEG	2.16	0.91	.003	.139**	.038	.158**	.150**	.170**	.117*	−.028	.738**	.891**	.784**		
P-BEL.POS	0.00	0.58	.065	.073	.093	−.066	−.113*	−.009	.078	−.046	.217**	−.450**	.123*	−.333**	
P-BEL.NEG	0.10	0.60	.105*	.060	.050	−.068	−.083	.020	.107*	−.007	.102*	−.356**	.333**	−.324**	.693**

Note. Outcome measures are gray shaded. PPOS = practicing positive superstitions; BELPOS = believing in positive superstitions; PNEG = practicing negative superstitions; BELNEG = believing in negative superstitions; P-BEL.POS = practicing minus believing, positive superstitions; P-BEL.NEG = practicing minus believing, negative superstitions. *$p < .05$; **$p < .001$.

exhaustive and accurate description of the phenomenon of half-believing. We show that about half the participants indeed practice more than they believe, especially when it comes to negative superstitions. Although it is reasonable to expect that the other half will be either full-believers or full-disbelievers, in fact fully calibrated individuals consisted of only 15% of the sample. Yet, most of these calibrated individuals actually partially believe in superstitions.

A new and intriguing finding is that between 30% and 40% of the sample reported less practice than belief. McKellar (1952) and Campbell (1996) described the phenomenon of practicing more than believing, but they did not consider this group of passive believers. If people believe in superstitions, why do they choose not to practice them? The superstitions that we presented involved no special burden. Thus, the practice-related effort cannot explain this discrepancy. We argue that the discrepancy resembles the well-established attitude-behavior gap (Ajzen, 1991; Ajzen & Fishbein, 1980; Bagozzi & Burnkrant, 1979; Fishbein & Ajzen, 1974), in which people do not fully act according to their own beliefs. Ajzen's (1991) theory of planned behavior suggests that the intention to act involves three factors: a positive (or negative) attitude toward the behavior, social norms that foster performing (or not performing) the behavior, and the perceived efficacy to act. Given the relevant opportunity, the formed intention will be executed. Believing in superstitions manifests itself in a positive attitude toward them. Low efficacy to act most likely does not limit the practice, and instead, social norms drive the practice of superstitions. Thus, we suggest that people who practice *more* than they believe do so because they fail to overrule their emotional approach through rational thinking (as suggested by Risen, 2016). However, one cannot explain why people practice less than they believe by contending that they are rational. Rather, this discrepancy might be due to normative constraints. Further studies are required to delve into this surprising discrepancy.

Individual Differences

We found several individual differences that are relevant to superstitious behavior, and most of them are consistent with previously reported findings. As for demographic variables, we found that women are more superstitious than men, corroborating earlier results (Blum & Blum, 1974; Buhrmann & Zaugg, 1981; Conklin, 1919; Dag, 1999; Fluke et al., 2014; Randall & Desrosiers, 1980; Tosyali & Aktas, 2021; Voracek, 2009; Wiseman & Watt, 2004). This finding may reflect differences in anxiety levels, although in the current study, the correlation between gender and anxiety was relatively weak. Another explanation is that women tend to rely more than men on intuition, and such a thinking style promotes superstitions (Ward & King, 2020). We found that superstition levels decreased with age, similar to previous reports (Chen & Young, 2018; Gallup & Newport, 1990; Trolger, 2007). As younger adults are more likely to embrace unconventional ideas, they may be more inclined to believe in superstition than older people who have already gained life experience (Trolger, 2007). In addition, younger adults experience stronger uncertainty about the future and generally worry more than older adults do (Basevitz et al., 2008; Hunt et al., 2003), which in turn may elicit superstitious behavior. As in previous research (Beck & Miller, 2001; MacDonald, 1995; Orenstein, 2002; Tobacyk & Milford, 1983; Trolger, 2007), we also found that religious people were more superstitious. Trolger (2007) suggested that adherence to a religious faith may serve as a predisposition for being superstitious because religious people accept the existence of supernatural forces. Lastly, we found a weak chilling effect of education on superstitious behavior (e.g., Aarnio & Lindeman, 2005; Blum & Blum, 1974; Orenstein, 2002; Otis & Alcock, 1982), suggesting that having an academic degree does not prevent superstitious thinking through a presumed increase in critical thinking.

We also tested the contribution of three psychological variables that might relate to superstitious behavior: anxiety, intolerance of uncertainty, and optimism. Anxious participants showed a greater tendency to practice superstitions and to believe in them than non-anxious participants. For negative superstitions, this effect remained after controlling for all other variables. Given that the relation between trait anxiety and superstitious behavior is well documented (e.g., Sica et al., 2002; Wolfradt, 1997), we will not elaborate further on this issue here. Intolerance of uncertainty is associated with the practice of superstitions, especially negative superstitions. Sica and colleagues (2002) found that people who are more intolerant of uncertainty practice more superstitions, and this effect may reflect the attempt to gain an illusion of control over uncertain reality. Last, unlike Fluke and colleagues' (2014) findings according to which pessimistic participants endorsed more superstitions, and unlike Rudski's (2004) results that showed the reverse effect, our findings indicated no correlation of any type between pessimism and superstitious behavior. However, in our second sample, recruited during the first wave of the COVID-19 pandemic, we found that pessimistic participants expressed greater concerns about the pandemic, which in turn increased superstitious behavior. Thus, we established an indirect effect of pessimism on superstitious behavior.

The investigation of individual differences may point to the factors that differentiate between half-believers who practice more than they believe and passive-believers who practice less than they believe. Controlling for all other

measures, *religiosity* relates to half-belief in both *positive* and *negative* superstitions. The likelihood of practicing more than believing is higher for secular participants than for religious participants, while the latter tend to practice less than they believe. As documented in our study, secular participants are more anxious (e.g., Abdel-Khalek et al., 2019; Sturgeon & Hamley, 1979) and more pessimistic (e.g., Ciarrocchi et al., 2008; Rudski, 2004; Schuurmans-Stekhoven, 2018) than are religious participants. Therefore, anxiety and pessimism may increase the likelihood of high practice levels alongside low belief levels (as the zero-order correlations reveal), because they allow individuals to gain control over life circumstances despite the self-acknowledgment of the illusory nature of superstitions. Further research is required to define the role of psychological traits that impel religious people to be more superstitious. *Intolerance of uncertainty* is also a predictor of half-believing in *negative* superstitions. People who are intolerant of uncertainty tend to practice more than they believe, while tolerant people tend to practice less than they believe.

Situational Influences

Situations of uncertainty increase superstitious behavior (Case et al., 2004; Felson & Gmelch, 1979; Hamerman & Morewedge, 2015; Malinowski, 1954; Vogt & Hyman, 1959). Vyse (1997) wrote that "if there is a universal truth about superstition, it is that superstitious behavior emerges as a response to uncertainty – to circumstances that are inherently random and uncontrollable" (p. 201). Superstitions also decrease state anxiety (Brooks et al., 2016). Thus, we expected to find an increase in superstitious behavior in the first days of the COVID-19 pandemic. However, this was not the case. It is possible that we found no such increase because we selected well-known superstitions. Perhaps the new circumstances generated new superstitious practices that we did not address. Another possibility is that people coped with pandemic-elicited stress with non-superstitious practices, and therefore we could not detect an increase in superstitious behavior. A recent study that examined Belgian and American samples (Hoffmann et al., 2022) has reported a positive correlation between holding superstitions and fear of the pandemic. According to this study, superstitious beliefs do not help to deal with an uncertain situation, but instead, they increase the feeling of being at risk. The current data may support this conclusion, because we also found correlations between superstitious behaviors and fear of the pandemic, despite not finding an increase in such behaviors relative to an earlier measurement.

Importantly, we found a few significant interactions between demographic variables and the time of data collection (before and during the pandemic), showing stronger correlations in the early days of the pandemic relative to the year before. We found that the positive effect of religiosity on belief in superstitions was higher in 2020 relative to 2019. We also found indirect effects of anxiety and pessimism on superstitious behavior, with attitudes toward the pandemic that reflect insecurity (i.e., fear of being infected, low trust in institutions and fellow citizens) serving as mediating variables. Taken together, the effect of circumstances on superstitious behavior is more complex than predicted, and superstitious behavior is not a simple way to cope with a temporary stressful situation. Instead, stress leads to an increase in the influence of other factors on superstitious behavior, such as anxiety or attitudes that reveal uncertainty.

Positive and Negative Superstitions

Positive and negative superstitions may have different motivations. Positive superstitions may stem from hope for a better future rather than from fear of bad mishaps, and people do not practice these superstitions to relieve themselves from the threat of uncertainty but to summon good outcomes. Wiseman and Watt (2004) found interactions between the type of superstitions (positive vs. negative), neuroticism, and life satisfaction, and suggested that positive and negative superstitions have a different impact. Similarly, Matute and Blanco (2014; Blanco & Matute, 2015) distinguished between positive and negative illusions of control. Positive illusions lead individuals to think that their actions will generate a desired outcome, whereas negative illusion leads people to think that the action will generate undesired outcomes. Blanco and Matute (2015) found that positive illusions emerge when a behavior intended to generate frequently desired outcomes occurs very often. Negative illusions appear when the behavior intended to prevent *in*frequent *un*desired outcomes occurs very often. The magnitudes of the two illusions are very similar.

The current results show stronger correlations between negative superstitions and individual differences relative to the equivalent correlations with positive superstitions. However, it is important to note that this difference emerged for practicing superstitions but not for believing in them. This difference may be attributed to the negativity bias (Baumeister et al., 2001) – the powerful impact of negative relative to positive events. Assuming that future bad outcomes are more threatening than the attractiveness of future good outcomes, one may be more motivated to prevent negative consequences than to invest effort in promoting positive results. In contrast, the belief in either type of superstition seems to incur no cost.

A comparison of practicing minus believing in positive and in negative superstitions showed that the tendency to

practice more than to believe is stronger among anxious people, especially for negative superstitions. In addition, after controlling for all other predictors, intolerance of uncertainty increases negative but not positive half-believing. Together, these results provide evidence that negative events affect the urge to practice superstitions despite acknowledging the irrationality of this practice.

Limitations

Superstitious behaviors vary between cultures and are sometimes completely idiosyncratic. As such, one possible shortcoming of the current study is that we collected data in one culture only. However, several predictors of superstitious behavior seem to be universal and indeed emerged in the current study as in previous research. We argue that any disparity between the current study and previous reports reflects our novel methodology rather than cultural differences. In addition, many Israelis are immigrants from other countries or descendants of such immigrants, thus guaranteeing a diverse culture.

An inherent limitation of the current study is that practicing superstitions was measured by self-report rather than by actual performance. First, reporting behavior may differ from actual behavior, and this difference could inflate or deflate the measured phenomenon. Second, a common method bias (Podsakoff et al., 2003) may emerge, which may make the association between practicing and believing larger than the true relation. However, our data show differential relations between these two scales and some outcome variables, which we interpret as representing a valid psychological reality.

In addition, most of the correlations and the regression coefficients that we found were small. The relatively large samples that we used allowed us to detect them, but it is fair to ask whether these effect sizes are meaningful. We believe they are. Superstitious behaviors are by nature extremely diverse, and as such they are governed by many variables, of which we tested only a few.

Conclusion

The variety of findings that we presented points to the importance of mapping superstitious behaviour more extensively. By separating the practice of superstitions from believing in them we exposed a phenomenon that has been neither described nor measured before. We identified demographic and psychological factors that contribute to superstitious behaviors, including the tendency to be a half-believer or a passive-believer. Finally, we documented some differences between positive and negative superstitions that fit the negativity bias.

Electronic Supplementary Material

The electronic supplementary material is available with the online version of the article at https://doi.org/10.1027/1614-0001/a000401

ESM 1. Table E1: Positive superstitions. Table E2: Negative superstitions.

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History
Received August 15, 2022
Revision received February 19, 2023
Accepted March 22, 2023
Published online June 1, 2023

Publication Ethics
All procedures in studies involving human participants were performed in accordance with the ethical standards of the institution's Human Research Ethics Committee (#3165).

Authorship
Avner Caspi and Eran Chajut – conceptualization, methodology, formal analysis, writing. Eti Shmuel – conceptualization, investigation, data curation. All authors approved the final version of the article.

Open Data
The information needed to reproduce all of the reported results is available at https://osf.io/8auqk/ (Caspi et al., 2022).

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Appendix

Table A1. Superstitions used in current study

1. If you make a wish when you see a falling star, it will come true	Positive
2. If you cross your fingers before an important test or event, it will help you succeed	Positive
3. If you make a wish when an eyelash falls, it will come true	Positive
4. If you lose something in the house, you should turn over a glass and you will find it	Positive
5. If you pass under a ladder, it will bring you bad luck	Negative
6. If you see a black cat passing, you should spit to prevent bad luck	Negative
7. If you knocking on wood, it will keep bad luck away	Negative
8. If you hold events on Friday the 13th, they will bring you bad lack	Negative
9. If you enter a room with the right foot first, it will promote good luck	Positive
10. If you put a horseshoe on the wall of your house, it will bring you good luck	Positive
11. If you have a special charm, it can bring you good luck	Positive
12. If you scatter salt upon entrance to a new home, it will bring you good luck	Positive
13. If you put a *Hamsa* on the wall of your house, it will prevent the evil eye	Negative
14. If you make a wish out loud, it will not come true	Negative
15. If you celebrate a birthday before its date, it will bring you bad luck	Negative
16. If you pass a knife (or scissors) between people, they will fight	Negative
17. If you encounter the number 7, it will bring you good luck	Positive
18. If you see a gecko in your house, it will bring you good luck	Positive
19. If a bird poops on your head, it will bring you good luck	Positive
20. If your right hand itches, you will get money	Positive
21. If you encounter the number 13, you will have bad luck	Negative
22. If a mirror breaks in your house, it will bring bad luck	Negative
23. If you spill salt, it will bring you bad luck	Negative
24. If you open an umbrella indoors, it will bring you bad luck	Negative

