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Reducing Conspiracy Theory Beliefs

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This study aimed to look at possible ways to reduce beliefs in conspiracy theories and increase the intention to have a fictitious child vaccinated. One hundred and sixty participants answered an online questionnaire. Three groups were used. The control group did not read any text prior to answering whereas the two experimental groups read either only debunking information or information about the motives of the conspiracists and the fallacy in their reasoning in addition to the debunking paragraph. The second experimental manipulation was effective in reducing medical conspiracy theories beliefs, but not belief in conspiracy theories in general. Neither intervention was effective in increasing the likelihood to have a fictitious child vaccinated. Those not intending to vaccinate a fictitious child endorsed conspiracy theories to a greater degree. A positive correlation between beliefs in conspiracy theories and the experiential/intuitive information processing system was found.

Keywords: beliefs in conspiracy theories, experiential/intuitive information processing system, interventions, debunking

"Conspiracy theories" can be defined as tendency to explain the cause of significant events as a secret malevolent plot (Bojanović, 1998) by covert coalition of powerful individuals or group of individuals (Douglas & Sutton, 2011). The explanation usually contradicts more plausible and official accounts (Brotherton, 2013). Examples of conspiracy theories include the more classic ones, such as the belief that *contact with aliens has been made, but the government keeps this a secret* or the belief that the *HIV virus is man-made and deliberately spread*, as well as more modern ones, such as the belief that the *government was involved in the 9/11 terrorist attacks or the 7/7 London bombings* or that *pharmaceutical companies and governments conspire to produce harmful vaccines*. Based on the contents of the plot, some authors have distinguished between political, personal (Bojanović, 1998), or commercial conspiracy theories (Furnham, 2013).

Consequences of believing in conspiracy theories

Although research has found that exposure to conspiracy theories influences people's beliefs in conspiracy theories without them being aware of

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it (Douglas & Sutton, 2008), they are generally regarded as harmless (Clarke, 2002), and it is possible this is the reason they have been neglected by the academic community for a long time. However, in the last two decades, they are becoming a topic of increasing scientific interest. This might be a result of the growing awareness that conspiracy theories are prone to narratives that create mistrust in the public and that these narratives have negative effect (Swami, 2012). For example, the intention to engage in political activities, such as voting, is influenced by the exposure to conspiracy theories, and the intention to reduce the carbon footprint is decreased after exposure to climate change conspiracy theories (Jolley & Douglas, 2014b). Also, beliefs in the conspiracy theory that HIV is deliberately spread amongst the Afro-American population leads to non-adherence to treatment in this population (Bogart, Wagner, Galvan, & Banks, 2010). On the other hand, some have argued for beneficial effects of conspiracy theories by proposing that the conspiracy mentality is challenging the current power structures (Imhoff & Bruder, 2014).

Predictors of beliefs in conspiracy theories

Beliefs in conspiracy theories are often discussed in the context of paranoia (Pipes, 1997; Hofstadter, 1967). Others (Sunstein & Vermeule, 2009) have argued that knowing that beliefs are so widespread it is implausible for a great number of individuals to be mentally ill. Recent research has found correlation between paranoid ideation and beliefs in conspiracy theories (Darwin, Neave, & Holmes, 2011); however, other research has suggested that beliefs in political conspiracy theories and paranoia are not related (Bojanović, 1998). Known correlates of beliefs in conspiracy theories include dogmatism, locus of control (Nikoloska, 2009), right-wing authoritarianism, anomie, powerlessness (Abalakina-Paap, Stephan, Craig, & Gregory, 1999), and less-plausible explanations for an event (Swami & Furnham, 2012). Research has found no correlation to gender, education level, or occupational category (Goertzel, 1994). Newheiser, Farias and Tausch (2011) found correlation between the belief in the Da Vinci conspiracy (based on *The Da Vinci Code*) and death-related anxiety, which might suggest that people cope with existential anxiety by endorsing conspiracy theories.

The strongest predictor for a belief in a particular conspiracy theory is the belief in other conspiracy theories (Swami, Chamorro-Premuzic, & Furnham, 2010; Swami et al., 2011; Swami et al., 2013). This is true not only for actually existing conspiracy theories, but also for fictitious ones, created for research purposes (Swami et al., 2011), and even for mutually contradictory theories, such as that bin Laden is both dead and alive (Wood, Douglas, & Sutton, 2012). These findings confirm the idea of Goertzel (1994) that conspiracy theories form a monological belief system, in which the belief in one conspiracy theory serves as evidence for other conspiracy theories. Other authors have referred to this monological belief system as "conspiracy ideation" (Swami, 2012) or "conspiracy mentality" (Bruder, Haffke, Neave, Nouripanah, & Imhoff, 2013; Imhoff & Bruder, 2014).

Other predictors of beliefs in conspiracy theories include paranormal beliefs (Swami et al., 2011). Also, it was found that people who endorse conspiracy theories to a greater extent commit more conjunction fallacy errors (Brotherton & French, 2014).

Mechanisms for endorsement of conspiracy theories beliefs

One socio-psychological mechanism that may be the driving force for the endorsement of conspiracy theories is projection, that is, people tend to project their own moral tendencies onto the conspirators. For example, participants who received higher scores for Machiavellianism were more likely to believe in conspiracy theories, probably because they themselves thought that if they were in the conspirator's position, they would do the same—conspire (Douglas & Sutton, 2011).

Besides projection, another social-psychological mechanisms that may drive people towards the endorsement of conspiracy theories is the fact that socially and emotionally significant events tend to be explained by major causes (Leman & Cinnirella, 2007); thus, people are less likely to believe that a major event happened by chance and, in the mix of relevant and irrelevant information, will tend to ascribe the event to an important cause, such as conspiracy.

Is counter-argumentation effective?

Do people, once introduced with counterarguments, stop endorsing conspiracy theories? Warner and Neville-Shepard (2014) have focused on the effects confirming and debunking information might have. In their research, three groups of participants were exposed to information that confirmed particular conspiracy theories, to both confirming and debunking information regarding the same conspiracy theories, or to unrelated material. The results were mixed: For one of the conspiracy theories used (i.e., President Obama was not born in the USA, and his birth records are faked), the belief in the conspiracy theory increased for the confirmation group and decreased for the other groups. But for the other conspiracy theory (i.e., President Bush was involved in the 9/11 attacks), the belief in conspiracy theory increased in the post-test condition in reference with the pre-test condition for all three groups. The authors believe that if the audience perhaps considered the debunking evidence more carefully, they would have found the evidence persuasive. Although this might be true, the fact is that people do not always engage in such endeavours, and if effective interventions are to be made, there needs to be a way to appeal to people more effectively. Unfortunately, studies so far have focused only on the effects of debunking or presenting counterarguments.

For example, Jolley and Douglas (2014a) researched the effects of presenting counterarguments to conspiracy theorising. The participants were to rate the likelihood that they would have a fictitious child vaccinated after reading either a pro-conspiracy or an anti-conspiracy article. However, in that study, although the beliefs were reduced in the group that read the anti-conspiracy article, the desirable outcome — that is, the intention to have a fictitious child

vaccinated — was not increased as the participants did not report a greater tendency to vaccinate the child.

Since providing debunking information is not 100% effective and is sometimes counterproductive as conspiracists engage in counter-argumentation while reading the debunking information, it is perhaps worthwhile to consider an alternative approach, such as providing information about the fallacy in conspiracists thinking or exposing the motives of the conspiracists ("consumers" who believe and spread conspiracy theories).

This study builds on the findings of Jolley and Douglas (2014a) by including another experimental group, in which the experimental manipulation is strengthened. Since debunking information does not necessarily lead to decreased beliefs in conspiracy theories or increased intention to vaccinate a child, in this study, in addition to presenting debunking information, we elaborated on the motives of those who propagate beliefs in conspiracy theories and exposed the fallacy in their thinking. Another experimental manipulation was thus created to answer the question whether strengthened argumentation, as compared to mere debunking information is more effective in decreasing the conspiracy beliefs and increasing the intention to have a child vaccinated. Also, since the cognitive factors in research regarding beliefs in conspiracy theories have been relatively neglected so far, in this study, the potential relation between the rational/analytical information processing and experiential/intuitive information processing system and beliefs in conspiracy theories was examined. Other studies have found that the need for cognition is not related to beliefs in conspiracy theories (Abalakina-Paap et al., 1999); however, no research so far has investigated another aspect of cognition—that is, the experiential/intuitive information processing system (Pacini & Epstein, 1999). Cognitive-Experiential Self Theory posits two independent information processing systems: the rational/analytical and the experiential/intuitive. The rational system is responsible for conscious thinking and follows the rules of logic. The intuitive system is responsible for preconscious learning (Epstein, 2010). It was hypothesised that perhaps the experiential/intuitive information processing system is responsible for conspiracy theories endorsement and, a positive correlation between the beliefs in conspiracy theories and the experiential information processing system was expected to be found. The rationale for this hypothesis was that previously experienced events attributed to conspiracy might be evoked through the experiential system when faced with new conspiracy theory and this might lead to its endorsement. Additionally, we wanted to examine whether those who prefer the rational/analytical mode of processing more likely to respond to the interventions and reduce beliefs in conspiracy theories? In line with results from other studies (Jolley & Douglas, 2014a), it was speculated that a difference in beliefs in conspiracy theories between those that intend and do not intend to vaccinate a fictitious child would be found.

The usual approach to measuring the beliefs in conspiracy theories has been through a specifically constructed self-report questionnaire for individual research purposes. This practice has resulted in several self-report questionnaires that have not been used by other researchers save the ones who developed them.

The limitation of these questionnaires is that they are content specific, that is to say, the statements refer to specific real-world events that might be more relevant for some societal contexts than others, and thus any generalization is limited. Also, this practice had made difficult to directly compare the results on items referring to the same conspiracy due to idiosyncrasies in wording. In addition, the psychometric properties of these questionnaires have not been determined (Brotherton, French & Pickering, 2013).

In order to overcome this practice, Brotherton et al. (2013) have developed and validated a scale for measuring generic conspiracist beliefs. Their scale was used for the purposes of the present research.

Method

Participants and Groups

A total of 160 participants (46 males and 113 females; one did not indicate gender), in the age range of 18–72 years (mean age: 33.39 years; five did not indicate age), completed an online questionnaire: 148 participants indicated that they live in urban areas and 12 live in rural areas; 26 had graduated from high school, 89 had a university degree, 36 had a master's degree, six had a doctorate degree, whereas three subjects did not indicate their education.

There were three groups of participants, one control and two experimental. The only difference between them was the text they read at the beginning of the questionnaire.

Procedure

Initially participants were contacted and asked to fill in the questionnaire. Subsequent participants were collected via the snowballing method. When the participants clicked on the questionnaire link, they were randomly redirected to one of three versions of the questionnaire. A schematic representation of the procedure is given in Figure 1.

Group	Step 1	Step 2	Step 3	Step 4
Control	Read nothing	Intention to have a child vaccinated	Rational-Experiential Inventory	Generic Conspiracist Beliefs Scale
Debunking	Read short article containing debunking information regarding anti-vaccination	Intention to have a child vaccinated	Rational-Experiential Inventory	Generic Conspiracist Beliefs Scale
Debunking +motives +fallacy	Read short article containing debunking information regarding anti-vaccination AND a short paragraph about the motives of the conspiracists and a paragraph about the fallacy in thinking of the conspiracists	Intention to have a child vaccinated	Rational-Experiential Inventory	Generic Conspiracist Beliefs Scale

Figure 1. Schematic representation of the experimental design

As can be seen from the schematic representation, the only difference between the groups was in step 2, that is, the control group did not read any material, whereas the first experimental group read a short article containing debunking information regarding anti-vaccination, and the second experimental group read the same article plus a short paragraph about the motives of the conspiracists and a paragraph about the fallacy in the reasoning of the conspiracists.

Materials

The debunking text that the first experimental group was exposed to was taken from the Popular Science website (Diep, 2013) and read as follows:

> People that are against vaccination believe that certain vaccines might be harmful for the children. For example, they say that in the past the polio vaccine contained live virus, that in some cases reverted to its natural state and caused paralysis. But those people do not mention that the medical science has advanced and no child has been paralyzed from the new vaccine against polio. On the other hand the vaccines do not make the diseases disappear, but only stop them from occurring. If people stop vaccinating their children, it is very possible that diseases we haven't seen for years will become widespread again.
>
> Another argument they state is that the vaccines contain dangerous ingredients, such as timerosal, for which they claim it causes autism. Still, although there is much evidence that says timerosal does not cause autism, most of the vaccines do not contain it anymore.
>
> The overwhelming of the child's organism with vaccines is a third argument. Research shows that there is no correlation between vaccination and other diseases later in life. There is no evidence that the vaccines "overwhelm" the organism of a child. Although their immune system is not fully developed, children can cope with the vaccines, the same way they copes with the viruses and bacteria around them.

The second experimental group read the same text as the first and, in addition, the following two paragraphs that refer to the motives of the conspiracists and the fallacy in thinking:

> It is considered that these and similar beliefs allow people to:
>
> – feel superior regarding other people that do not have such beliefs;
>
> – blame others for their misfortune (e.g. if someone close to them has autism), or
>
> – express the hostility they feel (e.g. towards higher power groups than the groups the individual belongs to).
>
> If the arguments for this and similar claims that are not officially confirmed are analyzed, one will conclude that they are quasi-argumentation, meaning that the arguments might be true but not relevant. For example, a child may indeed show symptoms of autism immediately after vaccination, but that does not mean that the vaccine caused the autism, in the same way it does not mean that vaccines cause broken bones, if a child falls and breaks his arm exiting the doctor's office.
>
> An event that follows another event is not necessarily caused by the previous event, because there may be many other factors that caused the second event.

> Once people have formed beliefs, they are more prone to "accept" only those beliefs that support their opinion, and automatically to "reject" those that do not confirm their beliefs. For example, they will consistently base their claims on one case of autism manifested immediately after the vaccine and, will not take into consideration all other examples when the children received vaccine but did not get autism.

Instruments

Intention to have a child vaccinated. The participants were asked to imagine that they are the parent of a fictitious child who needs to be vaccinated the next day. They were asked to indicate the likelihood that they will have the child vaccinated on a 5-point Likert scale, ranging from 1 (definitely not) to 5 (definitely yes). The question was phrased as follows: *Imagine that you are a parent of one year old Mark that tomorrow needs to receive regular vaccine. Would you take Mark to receive the vaccine?* It was decided not to mention a specific made up disease as in the Jolley and Douglas (2014a) study, but instead to measure the intention to vaccinate with a vaccine on the regular vaccination schedule. This was done in order to make the choice more imminent. The variable *intention to vaccinate* was tested for normality with both the stem-and-leaf test and the Kolmogorov-Smirnov test. It failed both tests (i.e. was not normally distributed) and therefore was treated as a categorical variable.

Generic Conspiracist Beliefs scale. Beliefs in conspiracy theories were measured with the Generic Conspiracist Beliefs scale developed and validated by Brotherton et al. (2013). It consisted of 15 Likert-type statements, such as *The spread of certain viruses and/ or diseases is the result of the deliberate, concealed efforts of some organization*; *Technology with mind-control capacities is used on people without their knowledge*; or *The power held by heads of state is second to that of small unknown groups who really control world politics*. The rationale behind the statements of this scale is that the agreement with the generic, non-event-based statement reflects the beliefs in specific conspiracy theories and at the same time overcomes the theoretical and practical problems associated with conspiracy theories based on a specific event. The participants were asked to indicate their agreement with each statement on a scale ranging from 1 (definitely not true) to 5 (definitely true). The internal reliability of the scale was $\alpha = 0.914$. The items of the scale were translated to the Macedonian language by two separate individuals. Any differences in the translation were discussed and agreed upon. The scale passed both the steam-and-leaf and Kolmogorov-Smirnov tests of normality (Kolmogorov-Smirnov: $Z = 0.949$, $p = 0.329$). For measuring *medical conspiracy theory beliefs* only those items from the Generic Conspiracy Beliefs scale that refer to science/ medicine were taken, that is the fourth, fifth and fourteenth item.

Rational-Experiential Inventory. The information processing system was measured with the Rational-Experiential Inventory (Pacini & Epstein, 1999) based on the Cognitive-Experiential Self Theory that posits independent, parallel dual-process model of information processing (Pacini & Epstein, 1999). The experiential/intuitive system is emotional, holistic, motivated by hedonic principles, resistant to change, self-evidently valid (an "experiencing is believing" stance), and is characterised by categorical thinking and rapid processing. This system is automatic, learns by experience and is responsible for making associative connections and encoding information in images and metaphors. When the experiential system is in operation, the behaviour is mediated by automatic appraisal of events and vibes from past experiences. Its operation is experienced passively, and one is seized preconsciously by ones emotions and has uncontrolled spontaneous thoughts (Epstein, 2010). The rational/analytical system is conscious, relatively slow, analytical, reason oriented, verbal and affect-free. It encodes the reality in abstract symbols, and mediates the behaviour by conscious appraisals

of events. The inventory consisted of two Likert-type subscales measuring rational/analytical ability and engagement (α = 0.786) and experiential/intuitive ability and engagement (α = 0.888). Each subscale consisted of 20 statements, and participants were asked to indicate their agreement/disagreement with the statements on a scale from 1 to 5. Examples from the rationality subscale included *I enjoy solving problems that require hard thinking; I don't reason well under pressure*. Examples from the experientiality subscale included *I believe in trusting my hunches; I don't think it is a good idea to rely on one's intuition for important decisions.* The items of the scale were translated to the Macedonian language by two separate individuals. Any differences in the translation were discussed and agreed upon. Both subscales passed the Kolmogorov-Smirnov test of normality ($Z = 0.526$ and $p = 0.944$ for the rational subscale, and $Z = 0.755$ and $p = 0.619$ for the experiential subscale). The participants who scored above the mean for each subscale were classified as high in intuition or rationality accordingly, and those who scored below the mean were classified as low in intuition or rationality, accordingly.

Results

Descriptive analysis

In order to answer the question whether the experimental interventions were effective in increasing the intention to vaccinate a child, we tested the differences between groups with a Chi-square test. The results are presented in Table 1.

Table 1
Cross tabulation of group and intention to vaccinate a child

Are you going to vaccinate the child?	Debunking	Debunking, motives, fallacy	Control	Total
Definitely not	3	3	3	9
	5.4%	6.4%	5.3%	5.6%
Probably not	5	6	3	14
	8.9%	12.8%	5.3%	8.8%
I don't know	7	3	7	17
	12.5%	6.4%	12.3%	10.6%
Probably yes	16	14	17	47
	28.6%	29.8%	29.8%	29.4%
Definitely yes	25	21	27	73
	44.6%	44.7%	47.4%	45.6%
Total	56	47	57	160
	100.0%	100.0%	100.0%	100.0%

Note: $\chi^2(8, N=160) = 2.935$.
*$p>.05$.

The chi-square was not significant, meaning there was no difference in the intention to vaccinate a child between any of the groups, thus rendering the interventions ineffective.

In Table 2, the means and standard deviations for *beliefs in conspiracy theories* for the three groups are presented, for the whole scale and for the medical conspiracy theories in particular.

Table 2
Descriptives for beliefs in conspiracy theory and medical conspiracy theory across D, DMF and C group

	Beliefs in conspiracy theory			Beliefs in medical conspiracy theory	
	N	Mean	*SD*	Mean	*SD*
Debunking	56	50.66	11.32	3.52	1.02
Debunking, motives, fallacy	47	49.83	11.36	3.42	0.98
Control	57	53.72	9.71	3.84	0.87
Total	160	51.89	10.79	3.61	0.97

Note: M = mean, *SD* = standard deviation, *N*= number of observations, D = debunking, DMF = debunking, motives, fallacy, C= Control.

Testing the main hypothesis

Next, it was examined whether the experimental manipulation was more effective in reducing the beliefs in medical conspiracy theories in those with high/low intuition or high/low rationality. For this purpose, a three way ANOVA (group (control – debunking – debunking, motives, fallacy) × intuition (high-low) × rationality (low-high)) was conducted. There was a significant effect of group for the beliefs in medical conspiracy theories ($F(2,147)=3.15$, $p<0.05$, $\eta^2=0.041$). Post hoc LSD test revealed that there was a significant difference between the control group and the DMF (debunking, motives, fallacy) group ($p<0.05$), whereas the difference between the control and the debunking conditions was not significant ($p= 0.07$) as well as between the debunking and DMF ($p>0.1$). This means that the DMF manipulation was effective in reducing beliefs in medical conspiracy theories. There was also a main effect of the experiential system ($F(1,147)=7.728$, $p<0.01$, $\eta^2=0,05$). These results suggest that those high in experiential processing tended to endorse the conspiracy theory beliefs to a greater extent across all groups. There was no group × rationality × experientiality interaction ($p=0.09$).

Table 3
Means and standard deviations of medical conspiracy beliefs by group and by information processing system

Experiential/intuitive score	Group	Rationality score	M	SD	N
Low	D	Low	3.63	1.00	21
		High	3.12	1.27	16
		Total	3.41	1.14	37
	DMF	Low	3.36	.94	12
		High	2.69	.91	11
		Total	3.04	.97	23
	C	Low	3.76	1.09	13
		High	3.83	.73	12
		Total	3.80	.91	25
	Total	Low	3.60	1.00	46
		High	3.22	1.10	39
		Total	3.42	1.06	85
High	D	Low	3.48	.85	9
		High	4.07	.43	9
		Total	3.77	.72	18
	DMF	Low	3.89	.73	13
		High	3.66	1.04	11
		Total	3.79	.87	24
	C	Low	4.15	.76	13
		High	3.70	.88	19
		Total	3.88	.85	32
	Total	low	3.88	.80	35
		High	3.77	.84	39
		Total	3.82	.82	74
Total	D	Low	3.58	.94	30
		High	3.46	1.13	25
		Total	3.53	1.03	55
	DMF	Low	3.64	.87	25
		High	3.18	1.07	22
		Total	3.42	.98	47
	C	Low	3.96	.94	26
		High	3.75	.81	31
		Total	3.84	.87	57
	Total	Low	3.72	.92	81
		High	3.50	1.01	78
		Total	3.61	.976	159

Note: M = mean, *SD* = standard deviation, *N*= number of observations, D = debunking, DMF = debunking, motives, fallacy, C= Control.

In order to inspect whether this effect of reducing conspiracy beliefs transferred to other conspiracy theories, *t*-test was done between the DMF (*M*=49.83, *SD*=11.357) and the control group (*M*=53.72, *SD*=9.708) for the whole scale. The difference was not significant (t=–1.88(102), p>0.05).

Investigating the relations with Rational/Experiential system

Since there was no difference between the control group and the debunking group in regard to beliefs in conspiracy theories or the intention to vaccinate a child, for the following analyses the data for these two groups only (the control group and the debunking group) were taken into consideration (and the DMF group data was excluded from the analysis).

Since there was a main effect of the experiential system, we wanted to explore a possible correlation between the experiential system and the beliefs in conspiracy theories. The correlation coefficient between the beliefs in conspiracy theories and the experiential system was small but significant (r (111)=0.209, p<0.05).

In order to examine whether the participants in the five categories of intention to vaccinate a child differed in their beliefs in conspiracy theories, one way ANOVA was conducted, once for the whole scale and once only for the medical conspiracy theories. There was a significant difference both for the whole scale (F(4,112)=2.505, p<0.05) as well as for the medical (F(4,112)=2.93, p<0.05) conspiracy theories items. Upon closer inspection with LSD post hoc test it was revealed that the difference existed between those intending and probably intending on one side and not intending or probably not intending to vaccinate the child on the other side.

Discussion

Manipulation effectiveness

Warner and Neville-Shepard (2014) found that in some cases presenting participants with information that debunked conspiracy theories could be effective in reducing belief in conspiracy theories; however, in some cases it could backfire. We wanted to examine whether strengthening of the debunking, using information about the conspiracists' motives and the fallacy in their reasoning, might be more effective in reducing conspiracy theory beliefs, focusing specifically on whether it increased the likelihood of a participant choosing to vaccinate a fictitious child.

The "strengthened" experimental manipulation, in which information was presented that both debunked the conspiracy theory and highlighted the conspiracists' motives and fallacy in their thinking, proved to be effective in reducing medical conspiracy theory beliefs. However, it was not effective in reducing general conspiracy theory beliefs and did not increase the likelihood that a participant would choose to have a fictitious child vaccinated. The "usual" manipulation, in which only information that debunked the conspiracy theory was presented, was not effective in reducing belief in either medical conspiracy theories or general conspiracy theories, and it did not increase the likelihood of hypothetical vaccination. Hence, information that debunked conspiracy theories

was, on its own, not effective in reducing medical conspiracy theory beliefs, but exposing participants to additional information about the conspiracists' motives and the fallacy in their reasoning was effective. This suggests that if unwarranted beliefs are to be successfully dismissed, one needs not only to offer debunking information but also to supplement this information with details that highlight the logical flaws in the argument and possible reasons for believing such statements.

The DMF manipulation incorporated multiple factors, such as personal motives, fallacy in causal reasoning and confirmation bias. One might therefore wonder which of these was effective or consider that perhaps the effectiveness of the manipulation was due to the combination of factors. It seems that the debunking information might have in itself reduced the strength of conspiracy beliefs, although the effect was not sufficient to have a significant effect. Indeed, if less strict criterion is adopted, such as a significance level of $p = 0.1$, then the debunking information was effective. When the effect of conspiracists' motives and fallacy in reasoning was added to this, the participants' beliefs in medical conspiracy theories were shaken. Thus, although each factor by itself (i.e. information about motives, confirmation bias or fallacy in causal reasoning) might have had an effect, it was the combined effect that ultimately unsettled the participants' beliefs.

Why was the DMF intervention effective in weakening only medical conspiracy theory beliefs, but not unrelated conspiracy theory beliefs? The debunking information pertaining to vaccination and the conspiracists' fallacy in reasoning explicitly mentioned the wrongly assumed *causal* relation between vaccination and autism. With regard to motives, the conspiracists considered that others were to blame for the affected individuals' development of autism. In addition, autism is often talked about in the context of vaccination conspiracy theories. Thus, the intervention was effective for those conspiracies that could fit this frame of reference (e.g. the spread of certain viruses and/or diseases is the result of deliberate, concealed efforts of some organization), but a transfer was not made to conspiracy theories that did not fit that frame of reference (e.g. the government uses people as patsies to hide its involvement in criminal activity).

Regarding the intention to vaccinate a child, other studies have reported similar results: the debunking information alone did not increase the likelihood of a participant deciding to have a fictitious child vaccinated (Jolley & Douglas, 2014a). The fact that the DMF manipulation was not effective either probably means that intention for vaccination depends on factors other than beliefs in conspiracy theories.

Bogart et al. (2010) found that believers in the HIV conspiracy theory were less likely to adhere to the treatment schedule, and believers in the global warming conspiracy theory were less willing to reduce the carbon footprint. Similarly, this study showed that endorsing conspiracy theories was related to refusal to vaccinate a child. This further indicates that the endorsement of conspiracy theories is associated with undesirable behaviours related to these specific beliefs.

The fact that those intending and not intending to vaccinate a child differed in their conspiracy beliefs supports the idea of a "conspiracy mentality" (the Generic Conspiracist Beliefs Scale measures not only medical conspiracy theory beliefs but also those referring to other topics; e.g., extra-terrestrial cover-ups and political conspiracies). Thus, if beliefs in conspiracy theories stem from a conspiracy mentality, wherein a person is prone to look for evidence of a conspiracy, and if (as evidence suggests) those believing in conspiracy theories are less likely to engage in desired behaviour, it follows that these individuals are involved in a vicious cycle. For example, a prospective pro-vaccination campaign or statement is regarded as evidence for the conspiracy, thus widening the conspiracy to include the scientists and government officials involved, or whoever finances the campaign or issues the statement. With the Internet and other mass media, it is easier than ever to spread conspiracy theories. Thus, it is imperative that more studies investigate the question of how to reduce conspiracy theory beliefs so that information about effective and ineffective interventions is available.

Relationships to Rational/Experiential system

The ANOVA revealed a main effect of the experiential system: across all three groups, those high in experiential processing had a higher score for medical conspiracy theory beliefs. This relationship was confirmed by a correlational analysis of the control and debunking group data. As the experiential-intuitive system has not been a variable in previous conspiracy theory research, further studies are needed to explore this relationship in more detail.

The lack of a correlation between conspiracy theory beliefs and the rational-analytical system is interesting. This indicates that both rational and less rational people are likely to endorse conspiracy theory beliefs. One reason for this might be that those high in rationality who believe in conspiracy theories actively search for arguments in favour of their opinion, and disregard the arguments against their beliefs. Those high in rationality who do not believe in conspiracy theories may engage in counter-argumentation and search for arguments against conspiracy theories.

How are conspiracy theories endorsed in the first place? One possible reason might be the experiential-intuitive information processing system. As was previously mentioned, the experiential-intuitive system and rational-analytical system are CEST constructs. These systems are independent; hence, an individual can be both high in rationality and high in intuition, low in rationality and low in intuition, or low in rationality and high in intuition or vice versa. In the experiential system, learning is achieved via associative connections; information in this system is encoded in metaphors. The experiential system is based on emotional experiences and is resistant to change. When the experiential system is active, behaviour is mediated by an automatic appraisal of events and information from past experiences (Epstein, 2010).

Considering the characteristics of the experiential/intuitive information processing system, one can easily imagine a scenario where a previously

experienced event attributed to "conspiracy", no matter how benevolent the conspiracy, might unconsciously teach individuals that events in the world are based on conspiracy. Examples of such conspiracies might include early childhood ones, such as the Santa Claus conspiracy in which parents (high-power individuals from a child's point of view) conspire to make the child believe that Santa is real, or when children conspire to carry out a prank on their friend or foe. Conspiracies in adulthood might include those where adults conspire to exclude someone from their group. People might even learn from indirect experience; for example, generalising confirmed conspiracies such as the Watergate conspiracy to other events.

Conspiracies are experienced in terms of emotions and semiconscious thoughts, and those with a more pronounced experiential system might more strongly learn from or relate to these few experiences and conclude that the world is an unsafe, conspiratorial place. This would also explain why conspiracy theories form a monological belief system. An example of the logic underlying this system would be "we were lied to about Watergate then, we are being lied to about global warming now". Douglas and Sutton (2011) found that projection mechanisms are also at work in conspiracy theory endorsement; hence, further research should explore the relations between Machiavellianism, the experiential/intuitive system and conspiracy theory beliefs.

Concluding comments

This research demonstrated that conspiracy theory beliefs might be weakened by an intervention that includes both debunking of the conspiracy theory and information about the motives of the conspiracist and the fallacy in their thinking. However, this intervention did not increase the likelihood that a participant would decide to vaccinate a fictitious child. The findings suggest that conspiracy theories are relatively resistant to change. Nevertheless, the findings also suggest that the chances of reducing beliefs in conspiracy theories are greatly increased by attacking the conspiracy on multiple grounds. Although there was no interaction between the intervention, rationality and experientiality, the fact that the DMF intervention – which addressed the rationality of participants – was successful, indicates that the rational system does play some role in reducing conspiracy theory beliefs.

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