Examining the Relationship between Epistemic Beliefs (Justification of Knowing) and the Belief in Conspiracy Theories

Beck, S.J., Boldt, D., Dasch, H., Frescher, E., Hicketier, S., Hoffmann, K., Husemann, R., Kaul, S., Kustermann, J., Molitor, J., Ohland, C., Posmyk, J., Richter, J., Sawatzki, D., Schürle, A., Stoffers, L., Uhe, L., & Weber, J.

Introduction

In times of fake news and alternative facts, a differentiated approach to (scientific) knowledge becomes increasingly important. In light of current events, namely the covid19-pandemic, understanding epistemic beliefs and their effect on dealing with misinformation and conspiracy theories is especially relevant. This study therefore explored relationships between epistemic beliefs (how individuals perceive knowledge and science, as well as scientific knowledge within specific research areas) and beliefs in covid19-related conspiracy theories.

Conspiracy theories are defined as "a subset of false beliefs in which the ultimate cause of an event is believed to be due to a plot by multiple actors working together with a clear goal in mind, often unlawfully and in secret" (Swami & Furnham, 2014, p. 220). Swami and Furnham (2014) further confirmed that the capacity for analytic thinking tends to reduce the belief in conspiracy theories. Moreover, Garret and Weeks (2017) showed that epistemic beliefs do play a major role in developing conspiracist ideation. The authors thereby conceptualized epistemic beliefs as *Faith in Intuition for facts*, *Need for evidence* and *Truth is political*. Following the authors' findings, conspiracy theorists share the conviction that facts are *politically constructed* (compare *Truth is political*).

However, the dimensions put forward by Garret and Weeks, while intuitively plausible, are hard to relate to current epistemic beliefs frameworks. In the present study, we therefore proposed the epistemic beliefs dimension *justification of knowing* (Braten, Stromso, & Ferguson, 2016) as an alternative framing to investigate the relationship between epistemic beliefs and beliefs in conspiracy theories – a research endeavor that has, to our knowledge, not yet been conducted.

The theoretical framework behind justification of knowing is the dimensional model postulated by Hofer and Pintrich (1997). The model consists of four dimensions: Certainty of knowledge, simplicity of knowledge, source of knowledge and justification of knowing. This study focuses on the *justification of knowing* dimension according to Ferguson, Braten and Stromso (2012) and Ferguson, Braten, Stromso and Anmarkrud (2013). According to these authors, justification of knowing consists of three sub-dimensions: justification of knowledge claims through observation and authority (justification by authority), or on the basis of what feels right (personal justification), or on the basis of using rules of inquiry and the evaluation and integration of different sources (justification by multiple sources). Relating justification of knowing to yet another theoretical framework, Braten, Stromso, and Ferguson (2016) assume that the developmental stages of absolutism, multiplism and evaluativism of the model of Kuhn and Weinstock (2002) essentially describe the development of justification for knowing. The current state of research indicates that the three dimensions of justification of knowing can be linked to the stages of development of Kuhn and Weinstock's model (Rosman, Mayer, Merk & Kerwer, 2019; Ferguson, Braten, Stromso, 2012).

Strong beliefs in *justification by authority* may be seen as an absolutist epistemic belief. This dimension underlines the importance of expertise and statements of experts/scientists, which are seen as true. Especially scientists try to expand the current state of research, replicate studies, question old concepts, use standardized methods, and know how to handle conflicting sources and controversial topics. Also, experts/scientists are more likely to convey information that does not fit in with conspiracies. Thus, we expect that people who value authority and expertise are less likely to believe in conspiracy theories.

In contrast, *personal justification* may be seen as a multiplistic epistemic belief, as it describes justification only by personal opinions, which are in this instance more important than actual evidence (Braten et al., 2016). If individuals have never learned to critically reflect on information, but believe what seems to make sense to them personally, choose to ignore sources

which state contradictory information to their personal beliefs, and only believe in sources they judge to be in accordance to their own beliefs, they are not open to contradict their belief in conspiracy theories. Therefore, we expect that personal justification to positively relate to beliefs in conspiracy theories.

Justification by multiple sources is considered to be an evaluative epistemic belief, since it focuses on comparing different knowledge sources (Braten et al., 2016) and on evaluating different forms of justification depending on the context (Ferguson et al., 2012), therefore representing a critical approach to knowledge. By comparing and evaluating multiple sources, people are more likely to judge conspiracies as not trustworthy or unreliable, and are therefore less likely to believe in conspiracies.

Due to recent worldwide events, we assumed that studying the coronavirus pandemic may well be suited to gain a better understanding of epistemic beliefs and their role in conspiracist ideation. With our study, we strived to expand the existing research on epistemic beliefs and their impact on the ideation of conspiracy theories. Our aim was to more closely relate conspiracy beliefs to contemporary epistemic beliefs frameworks by using the justification of knowing as an alternative measure for epistemic beliefs. By doing so, we strived to deepen the understanding of epistemic beliefs, particularly in the processing and evaluation of current diverging and contradictory information.

Hypotheses

In this study, we explored whether epistemic beliefs are significantly correlated with individuals' beliefs in conspiracy theories. Accordingly, we postulated the following three hypotheses:

Hypothesis 1: People's tendency to use justification by authority to justify their knowledge is negatively correlated with people's belief in conspiracy theories.

Hypothesis 2: People's tendency to use personal justification to justify their knowledge is positively correlated with people's belief in conspiracy theories.

Hypothesis 3: People's tendency to use justification by multiple sources to justify their knowledge is negatively correlated with people's belief in conspiracy theories.

All hypotheses as well as the planned study design and procedures were included, prior to conducting the study, in a preregistration draft that was written for the purpose of the seminar.

Method

Study type and design

The study type was an observational correlational study making use of a questionnaire-based survey, which means that the data has been collected from the study subjects who were not randomly assigned to a treatment. There was no randomization for the participants of the study, every participant completed the entire questionnaire online. Though, all items that belong to one thematic block in the questionnaire were presented randomly within this thematic block. Therefore, this was not a dismantling or comparative study. There was no differentiation between a control and an experimental group.

Sample size determination

Sample size determination was conducted with G*Power (Faul et al., 2009). According to these analyses, for an expected effect of 0.25, a sample of 168 subjects is sufficient (one-sided hypothesis testing, correlative design, alpha .05 and power .95). The lowest sample size to be accepted is 97 subjects (power is still large enough at .80). The expected magnitude of the effect was based on previous studies on belief in conspiracy theories: Besold et al. (n.d.) found significant effects that classify as small effects (r = .21 to .30). Swami et al. (2014) found small effect sizes as well, for the constructs of rational thinking (r = -.25) and intuitive thinking (r = .21).

Data collection procedures

All data were collected via an online survey using the online platform "Unipark". The questionnaire was distributed through social media websites (Facebook), the mailing list of Trier University and word-of-mouth. The purpose of recruiting participants through multiple channels was to collect data from a wide range of individuals. This also prevents overrepresentation of psychology students in the study sample, as is often the case in psychological studies. The participants did not receive any compensation for their contribution to our study. There had not been any determination of the psychological and physiological state of the participants prior to their participation. The age for participation is restricted to adults being 18 or older.

The data collection started on 15.06.2020. Due to time constraints we planned to stop data collection on the 03.07.2020. Data collection was stopped on 26.06.2020 as we had already reached our target sample size. As we did not work with incentives in this study, no disadvantage was caused for other potential participants.

A total of 422 subjects opened the link to the questionnaire. We stopped recruiting after having reached a sample size $N = 215$ participants having fully completed the survey. This equals a completion rate of 51.18 %. Most of the early terminations (31.52 %) at the first page, which is common in online surveys. The data of participants who did not complete the questionnaire were not included in the analysis.

Measured variables

We measured two main theoretical constructs: epistemic beliefs and belief in conspiracy theories. Epistemic beliefs were operationalized as three dimensions of justification of knowing (Bråten et al., 2016): justification by authority, personal justification, and justification by multiple sources. These subscales of epistemic beliefs are condensed in the modified *Justification Scale* by Klopp and Stark (2016), which is adapted from the original publication by Bråten et al. (2013), originally formulated in Norwegian language. Klopp and Stark (2016) translated the scale to German. Thus, we used this questionnaire to assess the participants' epistemic beliefs on a 6-point-likert scale ranging from 'do not agree at all' to 'fully agree'.

Beliefs in conspiracy theories were firstly measured as a general construct and secondly as specific conspiracy beliefs relating to the coronavirus. We chose to measure specific conspiracy theories as well as conspiracy beliefs in general since the specific beliefs can act as a validity factor for general beliefs. We presumed that if people have a general tendency to engage in conspiracy theories, they also believe in different conspiracy theories involving explanations for the coronavirus. Therefore, we investigated whether the general tendency to believe in conspiracy theories predicts the belief in specific theories about the current pandemic.

We chose the general belief in conspiracy theories scale (original title in German: *Allgemeiner Glaube an Verschwörungstheorien)* from a study by Besold et al. (n.d.), which is the one dimension that refers to general conspiracy beliefs from their questionnaire to assess conspiracy theories. We reduced this scale by one item referring to the Guttenberg plagiarism scandal in Germany in 2011 ("Guttenberg musste abtreten, weil er gewissen Kreisen gefährlich

wurde.") since this item seemed to be outdated. Thus, this scale consists of 9 items, measured on a 6-point-likert-scale from 'strong disagreement' to 'strong agreement'.

To assess specific conspiracy beliefs, we chose seven items from a study about conspiracy beliefs regarding the coronavirus, mistrust and compliance with government guidelines in England by Freeman et al. (2020). We analyzed the items from this study regarding their applicability for Germany and excluded some items since they were specific for the United States of America and not useful in a German context. We decided to include different and partly contradictory conspiracy theories about the coronavirus since a study from Goertzel (1994) indicated that people who believe in one conspiracy theory most likely believe in others as well. For the simple reason that we plan a short online questionnaire, we had to reduce the number of items used in the mentioned study, and ended up with the 7 items stated below, measured on a 6-point-likert-scale from 'strong disagreement' to 'strong agreement'.

To keep the questionnaire short, we only included demographic variables such as age, gender, educational degree, living environment and native language as possible control variables.

Data curation
Cases were excluded if they had answered less than two items of each subscale in the justification questionnaire or if they answered less than 60 % of the general conspiracy beliefs questionnaire (answered less than six items) and the specific conspiracy theories questionnaire (answered less than five items). Outliers were included in the analysis.

Descriptive analyses
All analyses were conducted with the statistics program IBM SPSS Statistics 26, apart from the confirmatory factor analysis, which was calculated with the software R Studio Version 1.3.959.

In a first step, we inspected the descriptive statistics of the collected data such as means, standard deviations, minimum and maximum. Secondly, we analyzed the reliability of the scales and calculated corrected item-total correlations for each scale. No items had to be eliminated based on these analyses (e.g., no item-total correlations < .30) Subsequently, the items of each scale were analyzed in a confirmatory factor analysis to verify the emerged scales. Lastly, the remaining items from each scale were condensed to a scale mean. The indices for epistemic beliefs therefore consisted of one mean per subject for each subscale: one for justification by authority, one for personal justification and one for justification by multiple

sources. The indices for belief in conspiracy theories resulted in one mean for the general beliefs scale and one for the specific coronavirus belief scale. We chose to determine a mean from this scale as Goertzel (1994) could show that people tend to believe in more than one conspiracy theory even if they are contradicting each other.

Confirmatory analyses

As inference criteria, we chose a *p-value* of 0.05 for one-tailed testing of the postulated directional hypotheses, and decided to not account for multiple testing (e.g., using the Bonferroni procedure). To test the proposed hypotheses, we conducted a multiple bivariate correlation analyses with the previously mentioned indices of each variable. We thereby separately correlated the created indices for each dimension of justification of knowing with both created indices for conspiracy theories belief: the general belief in conspiracy theories and the specific scale regarding conspiracy theories about the coronavirus. Since the concerning variables are interval type variables, we conducted Pearson correlation analyses for each hypothesis and interpreted those in regard to the stated hypothesis.

Exploratory analyses

In the sense of an exploratory procedure, we analyzed some additional variables in regards to their connection to epistemic beliefs and beliefs in conspiracy theories – age and level of education. A study by Besold et al. (n.d.) shows first exploratory evidence that age is significantly associated with beliefs in conspiracy theories. Additionally, Uscinski and Parent (2014) indicated that the level of graduation is correlated with people's tendency to believe in conspiracy theories. The participants who did not graduate from high school were more likely to engage in conspiracy theories than people with an academic degree. We chose to further explore these variables in the current study as an attempt to replicate these findings.

Results

Demographics

There was a wide age range among the 215 participants. 16.2 % of the participants were between 18-24 years, 24.1 % between 25-34 years, 22.7 % between 35-44 years, 22.2 % between 45-54 years, 13.4 % between 55-64 years and 0.9 % 65 years or above. Further, 56.5 % of participants stated to be located in an urban environment, whereas 39.4% live in rather

rural areas. The reported mother tongue for 204 out of the 215 participants was German. Four participants did not provide the information and the native languages of the remaining seven participants included, for instance, Albanian and Luxembourgish. The highest level of education was rather diverse, with 0.9 % of the participants still in school, 0.5 % without any educational qualifications, 4.6 % German "Hauptschulabschluss", 13.0 % German "Realschulabschluss", 34.7 % German "(Fach-) Hochschulreife" and 45.8 % holding a university degree.

Descriptives

We examined the means of all items and results revealed a range between $M = 1.20$ to 4.33 ($SD = 0.70$ to $SD = 0.97$), showing a tendency towards approval for the majority of the items on the 6-point Likert-scale, with the highest means within the Justification by Authority scale (Justification by Authority 1: $M = 4.24$ [$SD = 1.10$]; Justification by Authority 2: $M = 4.33$, [$SD = 0.97$]; Justification by Authority 3: $M = 4.32$ [$SD = 1.09$]) We further examined the means of all scales. The scales Just_A_Gesamt (justification by authority), Just_P_Gesamt (personal justification) and Just_Q_Gesamt (justification by multiple sources) aimed to measure the construct "Justification of knowledge", the Verschwörung_Gesamt scale aimed to measure the belief in conspiracy theories in general and lastly, the Corona_Gesamt scale aimed to measure the belief in conspiracy theories with regard to covid-19. For the scale Just_A_Gesamt, the mean was $M = 4.23$ ($SD = 9.16$), for Just_P_Gesamt $M = 2.26$, ($SD = 1.06$), for Just_Q_Gesamt $M = 5.02$ ($SD = 0.86$), for Verschwörung_Gesamt $M = 2.76$ ($SD = 1.12$), for Corona_Gesamt $M = 1.56$, ($SD = 0.93$).

Reliability

The corrected item-total correlations were all above the aforementioned cut-off of .30. Cronbach's α ranged from .76 to .93, indicating high internal consistency.

Confirmatory factor analysis (CFA)

The CFA was conducted in R using the package lavaan and yielded a moderate to good fit with a comparative fit index of CFI = 0.925, RMSEA = 0.071 and SRMR = 0.059.

Hypothesis testing

Hypothesis 1 predicts that people's tendency to use justification by authority (measured by the scale Just_A_Gesamt) to justify their knowledge is negatively correlated with people's belief in conspiracy theories. In line with our expectations, we found a highly significant negative

correlation between the scales *Just_A_Gesamt* and *Verschwörung_Gesamt* ($r = -.43$, $p < .01$) and between *Just_A_Gesamt* and *Corona_Gesamt* ($r = -.50$, $p < .01$), indicating that individuals who justify knowledge through authorities are less likely to believe in conspiracy theories. Hypothesis 1 is confirmed.

Hypothesis 2 predicts that people's tendency to use personal justification (measured by the scale Just_P_Gesamt) to justify their knowledge is positively correlated with people's belief in conspiracy theories. A highly significant positive correlation was found between the scales *Just_P_Gesamt* and *Verschwörung_Gesamt* ($r = .55$, $p < .01$) and *Just_P_Gesamt* and *Corona_Gesamt* ($r = .55$, $p < .01$). Hypothesis 2 is confirmed, too.

Hypothesis 3 predicts that people's tendency to use justification by multiple sources (measured by the scale Just_Q_Gesamt) to justify their knowledge is negatively correlated with people's belief in conspiracy theories. Contrary to our expectations, we found highly significant small to moderate positive correlations between the scales *Just_Q_Gesamt* and *Verschwörungsglaube_Gesamt* ($r = .32$, $p < .01$), as well as the between *Just_Q_Gesamt* and *Corona_Gesamt* ($r = .23$, $p < .01$), which indicates that the Hypothesis 3 is not confirmed.

Exploratory analyses

We followed up with an analysis of our exploratory research questions. Interestingly, we found a highly significant correlation of $r = .80$ ($p < .01$) between *Verschwörung_Gesamt* and *Corona_Gesamt*. Moreover, we found highly significant negative correlations between *Bildungsabschluss* and *Verschwörung_Gesamt* ($r = -.22$, $p < .01$), as well as between *Bildungsabschluss* and *Corona_Gesamt* ($r = -.18$, $p < .01$). This suggests that higher levels of education are associated with lower likelihood to believe in conspiracy theories. Age does not seem to have a (significant) effect on belief in conspiracy theories in the present study, which can be seen in the small correlations between *Alter* and *Verschwörung_Gesamt* ($r = -.01$, $p =$ ns) and *Alter* and *Corona_Gesamt* ($r = .04$, $p =$ ns).

When descriptively looking at differences between participants who were recruited from Facebook groups versus the mailing list group of Trier University, we found a mean of $M = 3.03$ ($SD = 1.38$) for Facebook and the scale Verschwörung_Gesamt and $M = 1.87$ ($SD = 1.23$) for Facebook and the scale Corona_Gesamt. For the University mailing list we found a mean of $M = 2.77$ ($SD = .86$) for Verschwörung_Gesamt and $M = 1.42$ ($SD = .54$) for Corona_Gesamt. Overall, we did not find any major differences between the Facebook group

and the mailing list group. Despite recruiting mainly in Facebook groups which, at least according to their group titles, are rather in favor of conspiracy-theories, participants of this group showed only slightly higher values in the scale Verschwörung_Gesamt.

Moreover, we performed a MANOVA to further analyze any differences between Facebook and mailing list participants (Facebook n = 84, mailing list n = 70). The results of the MANOVA suggested a significant difference between the Facebook and mailing list groups with F (5, 148) = 3.96, p < .002; Wilk's Λ = .88, partial $\eta2$ = .118. The Between-Subject-Factors test revealed a significant difference between the Facebook group and mailing list group regarding the Corona_Gesamt scale (p < .001). However, it is important to note that the results of the MANOVA assumptions were violated. The Box's Test for Equivalence of Covariance Matrices yielded a significant result of Box's M = 62.08 (p < .001) and the Levene's Test of Equality of Error Variances indicated unequal variances for the scales Just_A_Gesamt (F (1, 152) = 6.10, p < .005), Verschwörung_Gesamt (F (1,152) = 16,70, p < .001) and Corona_Gesamt (F (1,152) = 39.90, p < .001). Nonetheless, due to the violation of assumptions it is advisable to interpret the results of the MANOVA with great caution. We therefore performed a t-test which showed a significant result of t(118.21) = 3.01 (p < 0.003) for Corona_Gesamt (while equal variances not assumed), again indicating a significant difference between the Facebook and mailing list participants with regard to the scale Corona_Gesamt.

Discussion

This study aimed to explore the relationship between epistemic beliefs and beliefs in conspiracy theories. Especially in times of a pandemic, it is crucial to keep the public informed about current research results in order to increase trust and ultimately compliance with regard to the hygiene and safety measures implemented by the government, as this prevents further spreading of the virus. Gaining insight into the public's understanding of how knowledge (more specifically scientific knowledge) is built and how research is perceived in general is therefore essential.

We would like to begin the discussion of our findings with an unexpected result: We initially hypothesized that individuals who rely on multiple sources of information to build their knowledge would be less likely to believe in conspiracy theories. This assumption was based on the work of Braten et al. (2016) and their understanding of the justification of knowledge.

Different (scientific) sources could provide thorough insight into the matter of interest and a therefore more critical approach to conspiracy theories and knowledge in general. Gathering information from different sources would hence act as a protective factor against believing in conspiracy theories. However, the results of our study suggest the opposite: Consulting various sources does not seem to help people in discarding conspiracy theories. This may be due to the wording of the items of the justification by multiple sources scale, as the term "source" is used without being specified as a scientific source. This may have been confusing to some of the participants and, thus, have led to bias. In fact, as the term 'source' was not further explained, it might even have been interpreted differently than we expected: While students might tend to think of sources in a more scientific context, many of our participants did not have a University background. It is thus possible that some of the participants considered their friends' opinions or unscientific websites as 'sources'. To summarize, participants might think of sources that are not necessarily scientific and respond accordingly, whereas our intention was to measure the effects of using multiple scientific sources on conspiracist ideation. Related to this, another possible explanation could be that conspiracists may think that they have access to more or better sources than everyone else. Hence, they might consider themselves better informed and more apt to assess 'the truth' than other people. In future studies, it would therefore be interesting to examine the potential impact of using the term "source" while specifying them as scientific, to explore whether the outcome would change.

In contrast, our results regarding Hypotheses 1 and 2 were as expected: Regarding Hypothesis 2, we found *personal justification* to be a predictive factor for beliefs in conspiracy theories, as Braten et al. (2016) have stated before. People who do not take multiple sources into account, but rather rely on their own judgement, seem to be more vulnerable to misinformation. Moreover, our findings regarding Hypothesis 1 suggest that individuals who confide in authorities, referring to researchers and research institutions, tend to believe less in conspiracy theories. Relying on *justification by authority* (in this study: researchers) as a means to explain knowledge seems to be a strong predictor of not believing in conspiracy theories. This could be due to the fact that individuals who rely on *justification by authority* may be more likely to have a higher level of education, such as a university degree. This may help them to better comprehend scientific work. Understanding how research is being done might enable the public to develop greater trust towards science and to differentiate between legitimate and less reliable sources. These results also corroborate the findings by Swami and Furnham (2014), who claimed that greater distrust in authority and other psychological constructs can be linked to

beliefs in conspiracy theories. Consequently, our study validates existing research findings on epistemic beliefs and their impact on the ideation of conspiracy theories. The theoretical framework (justification of knowing) is supported through this study and allowed us to investigate epistemic beliefs and belief in conspiracy theories in this specific context.

Limitations

When considering the results of this study, it is important to note that there were floor effects the *Corona_Gesamt* and *Verschwörung_Gesamt* scales visible in scatterplots (see Appendix A). Moreover, the two conspiracy scales (*Corona_Gesamt* and *Verschwörung_Gesamt*) intercorrelated very highly, implying that both scales seem to measure a very similar (or even exactly the same) construct. The results should therefore be interpreted with caution. Nevertheless, since the *Verschwörung_Gesamt* scale has proven to work well in terms of psychometrics, the correlation between the two scales underpins the validity of the scale *Corona_Gesamt*. We thus conclude that using both scales does not diminish the explanatory power of our findings, but rather supports it. Yet, it also clearly demonstrates that a distinction between general the belief in conspiracy theories and the belief in specific conspiracy theories is difficult. It could be advisable to test the two scales that correlated highly separately and for different subpopulations in future studies.

Furthermore, it is also important to consider that a substantial part of our study sample were students of Trier University, which might have caused bias, as we were able to show that the higher the education level of individuals, the less likely they are to believe in conspiracy theories. This may also explain why we did not find strong approval of conspiracy theories overall in this study. That being said, it is interesting to note that the results of participants who were recruited from through Facebook did not differ significantly from the mailing list participants except for the Corona_Gesamt scale. This suggests that the two subpopulations are indeed quite similar regarding the belief in conspiracy beliefs. Finally, it should be noted that our sample consisted of a relatively small number of individuals ($n = 215$), which means that our findings may not be generalizable to the general population. In order to be able to draw conclusions on a bigger scale, further research (with larger sample sizes and a more heterogeneous set of participants) would be necessary. In addition, the items, more specifically the exact wording, need to be revised. A follow-up study using qualitative interviews to explore the interpretation of the items could provide helpful information to improve existing scales.

Conclusion

By measuring epistemic beliefs and beliefs in conspiracy theories in relation to justification of knowledge we found that relying on personal justification is associated with higher levels of belief in conspiracy theories, justification by authority (in this study the term authorities referred to researchers) is linked to lower levels of belief in conspiracy theories and, lastly, justification by multiple sources relates to higher levels of conspiracy theories. The latter is not in line with the current state of research and may be an indicator for the need of item wording revision in that scale. Our findings further show that higher education levels are associated with a lower likelihood to believe in conspiracy theories. We therefore conclude that providing access to better education or training for the public to distinguish reliable from unverified information and to identify trustworthy sources is crucial. Furthermore, the findings suggest that research results should be accessible and understandable for anyone, regardless of their educational background, as it is also being promoted by the Open Science movement. Summarizing study results in lay language as an attempt to make findings more transparent for the public might also increase the public's trust in research and at the same time enable the layman to get adequately informed. More transparency and better access in research could help the public to better understand research results and may also be a way to make the public feel more included. They might then also be less inclined to seek information in sources of questionable quality. This might be facilitated by making research findings publicly accessible on online platforms, such as PsychArchives (https://www.psycharchives.org) or the Open Science Framework (https://osf.io), in order to overcome paywalls. This could possibly lead people from relying on themselves for justification of knowledge to relying more authorities (i.e. research) and therefore reduce the belief in conspiracy theories. To summarize, if knowledge created through research would be perceived as intelligible and trustworthy, unscientific sources and conspiracy theories might become less popular than they currently are.

References

Bråten, I., Ferguson, L. E., Strømsø, H. I., & Anmarkrud, Ø. (2013). Justification beliefs and multiple-documents comprehension. *European Journal of Psychology of Education*, 28(3), 879–902.

Bråten, I., Strømsø, H. I., & Ferguson, L. E. (2016). *The role of epistemic beliefs in the comprehension of single and multiple texts.* In P. Afflerbach (Ed.), Handbook of individual differences in reading: Reader, text, and context (pp. 67-79). Routledge.

Besold, M., Böhringer, J., Kammerl, B., Offereins, B., Schulz, M., Thiem, A., & Raab, M. Die Big Six des Verschwörungsglaubens.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149–1160.

Ferguson, L. E., Bråten, I., & Strømsø, H. I. (2012). Epistemic cognition when students read multiple documents containing conflicting scientific evidence: A think-aloud study. *Learning and Instruction, 22,* 103-120.

Ferguson, L. E., Bråten, I., Strømsø, H. I.., & Anmarkrud, Ø. (2013). Epistemic beliefs and comprehension in the context of reading multiple documents: Examining the role of conflict. *International Journal of Educational Research, 62,* 100-114.

Freeman, D., Waite, F., Rosebrock, L., Petit, A., Causier, C., East, A., Jenner, L., Teale, A.-L., Carr, L., Mulhall, S., Bold, E., & Lambe, S. (2020). Coronavirus conspiracy beliefs, mistrust, and compliance with government guidelines in England. *Psychological Medicine*, 1-30.

Garrett, R. K., & Weeks, B. E. (2017). Epistemic beliefs' role in promoting misperceptions and conspiracist ideation. *PloS one*, *12*(9), e0184733.

Goertzel, T. (1994). Belief in conspiracy theories. *Political psychology*, 731-742.

Hofer, B. K., & Pintrich, P. R. (1997). The Development of Epistemological Theories: Beliefs About Knowledge and Knowing and Their Relation to Learning. *Review of Educational Research*, *67*(1), 88–140.

Jolley, D., & Douglas, K. M. (2014). The effects of anti-vaccine conspiracy theories on vaccination intentions. *PloS one*, *9*(2), e89177.

Klopp, E. & Stark, R. (2016). Persönliche Epistemologien - Elemente wissenschaftlicher Kompetenz. In A.-K. Mayer & T. Rosman (Hrsg.). *Denken über Wissen und Wissenschaft. Epistemologische Überzeugungen als Gegenstand psychologischer Forschung* (S. 39-69). Lengerich: Pabst Science Publishers.

Kuhn, D., & Weinstock, M. (2002). What is epistemological thinking and why does it matter? In B. K. Hofer & P. R. Pintrich (Eds.), *Personal epistemology: The psychology of beliefs about knowledge and knowing* (p. 121–144). Lawrence Erlbaum Associates Publishers.

Swami, V., & Furnham, A. (2014). Political paranoia and conspiracy theories. In J.-P. Prooijen & P. A. M. van Lange (Eds.), *Power politics*, *and paranoia: Why people are suspicious of their leaders* (pp. 218-236). Cambridge University Press.)

van Prooijen, J.-W. 2016. Sometimes inclusion breeds suspicion: Self-uncertainty and belongingness predict belief in conspiracy theories. *European Journal of Social Psychology, 46,* 267-279.

Rosman, T., Mayer, A. K., Merk, S., & Kerwer, M. (2019). On the benefits of 'doing science': Does integrative writing about scientific controversies foster epistemic beliefs? *Contemporary Educational Psychology, 58,* 85-101.

Uscinski, J. E., & Parent, J. M. (2014). *American conspiracy theories.* Oxford University Press.

Appendix A. Scatterplots